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Self-Reported Data, Oral Hygiene and Periodontal Indices
as
Key Performance Indicators
In a Long-Term Residential Care Facility for Older Adults

Carmen Caruana

2024



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Self-Reported Data, Oral Hygiene and Periodontal Indices
as Key Performance Indicators in a Long Term Residential
Care Facility for Older Adults

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**FACULTY/INSTITUTE/CENTRE/SCHOOL Faculty of Dental
Surgery DECLARATION OF AUTHENTICITY FOR DOCTORAL
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Course **PhD Research Project**

Title of Dissertation/Thesis

**Self-reported Data, Oral Hygiene and Periodontal Indices as Key Performance
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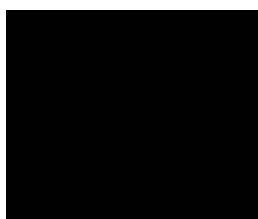
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Abstract

Background: In long-term care facilities, optimal oral hygiene is vital for maintaining the overall health and quality of life of older adults. Despite its importance, adherence to oral health guidelines is often inadequate, leading to poor oral hygiene and periodontal health. This research stresses the need to reassess and implement effective oral hygiene practices by using self-reported data and clinical parameters as Key performance indicators to help implement periodontal care strategies, including guidelines and oral health policies. Integrating feedback from healthcare professionals and older adults is essential to enhance care standards and address the complex oral health needs and quality of life of this growing population effectively.

Objectives: The objective of this research study is to assess the effectiveness of oral health indicators as key performance indicators (KPIs) in a long-term care facility for older adults. The aims of the study include exploring the utility of self-reported data, Oral Hygiene Indices, and Periodontal Indices as KPIs within this setting. Additionally, the study seeks to determine if Oral Hygiene and Periodontal Indices effectively reflect the oral self-care management by older adults and/or their carers and if these indices can also serve as tools for monitoring manpower performance in these facilities. Another aim is to examine the impact of oral health education on the outcomes of clinical assessments using these indices. Finally, the study will evaluate whether Oral Hygiene Indices are effective in measuring the impact of poor oral hygiene on the general health and quality of life of older adults.

Methods and Materials: In this study conducted at St. Vincent de Paul Long-Term Residential Care Facility for Older Adults, the effectiveness of oral health indicators as key performance indicators (KPIs) was assessed through a cross-sectional and longitudinal clinical design. The study involved both healthcare professionals and older adults residents. The sample included 200 staff members and 384 older adults, determined through Yamane's Sampling formula to ensure statistical reliability at a 95% confidence level.

Calibration and training were provided prior to commencement of the study. The calibration was based on the diagnosis and charting of periodontal disease to standardize data collection, which included various oral health indices. Ethical considerations were meticulously handled, with approvals from various entities, including FREC and UREC, ensuring compliance with GDPR for handling participant data and securing informed consent.

Recruitment involved a cross-sectional analysis to gather baseline data on attitudes towards oral health care among different professional groups and residents. Simple random sampling was used to select wards for inclusion, balancing gender representation and cognitive ability among participants. The data collection phased into a longitudinal study, monitoring oral hygiene and periodontal changes over time, and included educational and oral health promotion interventions.

Methodologically, the study was designed to be pseudonymous, safeguarding participant identities while facilitating long-term data analysis. The clinical interventions included regular dental assessments using standardized instruments and indices to test

whether these can be utilised as Key Performance Indicators, to track oral hygiene and periodontal status and the effectiveness of educational provided to the study group compared to a control group.

This thorough methodological framework aims to provide comprehensive insights into how well self-reported data, along with Oral Hygiene and Periodontal Indices, function as KPIs for enhancing oral health management in a geriatric care setting.

Results

Data-Reported Results of Staff Members: Demographic analysis of 193 SVPR staff revealed significant diversity, with administrators, health carers, and nurses forming the majority, reflecting the actual distribution at SVPR (33.1%, N=58; 24.6%, N=43; 14.3%, N=25 respectively). The majority (47.6%, N=89) were aged between 46 and 64 years, with a mean age of 41.5 years (SD = 12.8). Gender disparities were evident in oral health behaviours and education. A higher percentage of male staff reported poor dental health compared to females ($p<0.05$). Females were more likely to brush twice daily ($p<0.05$) and prefer brushing before breakfast ($p<0.05$). Additionally, females more frequently used interdental aids (34.1%, χ^2 (df 1; N=193)=4.60; $p=0.032$) and were more likely to have received oral health education ($p<0.05$).

Data-reported Results of Older Adults: In older adults at St. Vincent de Paul, a cross-sectional analysis involving 103 participants revealed significant differences in oral health behaviours by gender and ward type. Most were female (mean age 82.3), with

limited education but retaining their own teeth. Gender-specific patterns showed that males had poorer dental health and higher instances of dental visits and brushing after meals compared to females ($p < 0.05$). Older adults in dementia wards exhibited lower adherence to routine oral hygiene and lacked basic oral care necessities compared to those in non-dementia wards, affecting their perceived quality of life ($p < 0.05$).

Results of Clinical Assessments of Older Adults: Comprehensive Spearman's correlation analyses highlighted significant correlations between clinical parameters and older adults' self-assessments of their oral health. Lower awareness or educational attainment was linked to higher periodontal pocket depths and increased clinical attachment loss ($p < 0.05$), while increased awareness correlated with reduced total bleeding scores and calculus index scores ($p < 0.05$). This suggests that better knowledge positively affects hygiene practices. Additionally, higher OHIP-14 functional and Psychosocial scores correlated with poorer periodontal conditions ($p < 0.05$), underscoring the fact that oral health issues do not have an impact on functional and Psychosocial well-being.

Results of Correlation of staff members' and older adults' attitudes with clinical parameters of older adults, their systemic conditions and quality of life: The research identified positive but mild to moderate associations between the oral health consciousness of staff members and rising bleeding index scores in older adults over three visits ($p < 0.05$). Remarkably, the greatest increases in bleeding scores were seen in wards where the staff had high scores for personal oral health awareness ($p < 0.05$). Positive correlations were also observed with deteriorating periodontal probing depths (PPDs) and recession in the

upper front sextants ($p < 0.05$), showing a regular pattern. However, no significant results were reported for OHIP-14 in this part of the study.

Interestingly, some older adults with a positive self-perception of their oral health had higher bleeding and calculus scores ($p < 0.05$), indicating a mismatch between their perception and actual clinical outcomes. Furthermore, higher scores on the Oral Health Impact Profile-14 (OHIP-14), which measures Psychosocial impact, were connected with poorer periodontal health ($p < 0.05$). Therefore older adults who had poorer periodontal health, felt that their Psychosocial function was not affected.

The study highlighted the complex links between systemic diseases, medication use, and oral health in older adults. It noted high rates of neurological disorders (65.1%), cardiovascular diseases (63.6%), and diabetes (57.9%) among older adults, with many suffering from multiple conditions. There were notable gender differences in disease prevalence, with females more commonly affected ($p < 0.05$). The research also found that respiratory diseases were more frequent in non-dementia wards, while neurological and mental health conditions were more common in dementia wards, suggesting a strong link between living conditions and health outcomes. Furthermore, older adults with neurological disorders had more mobile teeth ($p < 0.05$) and higher calculus indexes ($p < 0.05$), indicating a connection between systemic health and oral health deterioration.

This study also included multivariate analyses to identify key performance indicators (KPIs) influencing oral health outcomes in the long-term care facility. Endocrine ($p = 0.070$), neurological ($p < 0.05$), hepatic ($p = 0.008$), and gastrointestinal ($p = 0.022$) conditions were significant predictors of periodontal health changes. Additionally,

higher medication use correlated with greater improvements in BPE Score 2 ($p < 0.05$), while staff education ($p = 0.037$) influenced calculus indices in specific regions. Ward type and gender ($p = 0.028$) were associated with variations in debris indices, and dementia wards showed increased bleeding in the lower left sextants ($p = 0.015$). High staff awareness correlated with increased periodontal pocket depths ($p = 0.005$) and bleeding levels ($p = 0.043$), suggesting the interplay of systemic and contextual factors. Localized challenges, such as severe deterioration in the lower anterior sextants ($p = 0.003$), underscore the importance of targeted and region-specific oral health strategies.

Conclusion: In conclusion, this thesis validates the hypothesis that self-reported data, oral hygiene and periodontal indices are effective to use as Key Performance Indicators, for the comprehensive assessment and enhancement of oral health in older adults within long-term care settings. The findings emphasise the necessity of integrating these measures with extensive clinical assessments and tailored interventions to effectively meet the diverse needs of this population. By emphasizing a multidimensional approach that includes educational programs, gender-sensitive strategies, and strategic staffing, this research advocates for the re-evaluation of current practices and workforce performances to improve oral health outcomes. Additionally, it highlights the importance of an ethical clinical governance framework to ensure high standards of care, promoting transparency, accountability, and continual improvement in oral health strategies.

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Dedication

Honouring the cherished memory of my parents

Dedicated with deepest gratitude

to

My husband Dennis and to my beloved sons, Deon and Ramon.

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Abbreviations

ABBREVIATIONS	DEFINITIONS
AL	Attachment Loss
ACNC	Administrators, Consultants, Nurses, Carers
AHP	Allied Health Professionals
ANOVA	Analysis of Variance
AV	Average
BL	Bone Loss
BPE	Basic Periodontal Examination
CAL	Clinical Attachment Loss
CEO	Chief Executive Officer
CHX	Chlorhexidine
CL-S	Calculus Index Score
CNS	Central Nervous System
CPITN	Community Periodontal Index of Treatment Needs
DAY C.	Day Clinic
DENT. C.	Dental Clinic
DR. Q.	Doctor's Quarters
DI-S	Debris Index Score
HCI	Hydrochloride
IQR	Inter Quartile Range
JP	John Paul Wards
KPI(S)	Key Performance Indicator/s
KW	Kruskal Wallis
L	Lower Arch (Mandibular Arch)
LA	Lower Anterior Sextant
LL	Lower Left Sextant
LR	Lower Right Sextant
LTCF	Long Term Care Facility
METS	Metabolic Syndrome
MT	Mother Tereza Wards
MW	Mann Whitney Test
N	Number
OHI	Oral Hygiene Index
OHIP – 14	Oral Hygiene Impact Profile
OHL	Oral Hygiene Literacy
OHI – S	Oral Hygiene Index Status

OH STATUS	Oral Hygiene Status
OHQOL	Oral Health-Related Quality of Life
PCT	Percentage
PD	Periodontal Disease/Pocket Depth
PI	Periodontal Index
PMS	Performance Measurement System/s
PPC	Periodontal Pocket Chart
PPD	Periodontal Pocket Depths
Q	Question
RB	Ruzar Briffa Wards
REC	Recession
SEC	Section
SF	St. Frances Wards
SJ	St. Joseph Wards
SOP(S)	Standard Operating Procedure/s
SVPR	St. Vincent de Paul Residence
T	Total
T-1	Time 1
T-2	Time 2
U	Upper Arch (Maxillary Arch)
UA	Upper Anterior Sextant
UL	Upper Left Sextant
UR	Upper Right Sextant
UNC-15	University of North Carolina Periodontal Probe
V1	Visit 1
V2	Visit 2
V3	Visit 3
WHO	World Health Organisation

Chapter 1

Literature Review

1.1 Introduction

In long term care facilities for older adults, oral hygiene is imperative to preserve oral health and quality of life (Weening-Verbree et al 2013), and in spite of this, evidence has shown that the oral health and oral hygiene of older adults is poor. They attribute this situation to the fact that oral care is not in conformity with guidelines or protocols which may or may not exist within a service.

Older adults may face several difficulties to carry out their daily tasks and chores, with one of these tasks being daily oral care maintenance. An interdisciplinary approach is required to plan effectively innovative health care strategies. It is up to the oral health professionals including, dentists, dental hygienists, other oral healthcare specialists such as periodontists and prosthodontists, together with managers and policy-makers in long term care facilities, to find a compelling and appropriate role within the interdisciplinary management of this vulnerable population. Therefore, these professionals need to determine how they can best contribute to the overall care and well-being of older adults. They also need to actively engage in interdisciplinary care, making sure their expertise aligns with the broader goals of patient care in a meaningful and necessary way. This is due to the fact that oral diseases together with tooth loss, impact negatively on the well-being and quality of life of older adults, hindering them from functioning and interacting socially (Grixti C. 1999).

Physical and cognitive changes, together with chronic medical problems, lead to a decrease in self-care ability, inevitably increasing the risk of oral diseases. Studies indicate that negligence and insufficient oral care may worsen medical conditions, potentially leading to nutritional deficiencies and communication problems. It may also

increase the risk for systemic diseases such as cardiovascular disease, pulmonary disease, diabetes, several forms of dementia including Alzheimer's, rheumatoid arthritis, oral cancer, and other neoplasias (Michael I. MacEntee, 2011).

Tenani et al., (2020) noted that the ever increasing ageing trends observed in recent decades in the global population poses increasing challenges for public health policies, necessitating a rise in primary and long-term health services and a greater number of qualified professionals to address the needs of this ageing population. Projections suggest that by the year 2050, the worldwide population aged 60 years or older will nearly double, reaching approximately 2.1 billion compared to the 900 million individuals identified in 2015.

Research has consistently demonstrated that oral health plays a pivotal role in healthy ageing, as poor dental health serves as a risk factor for oral pain, impaired chewing, oral and general infections, and an elevated risk of malnutrition and systemic diseases, along with diminished quality of life among older individuals. Recognizing and addressing these oral health challenges is crucial for promoting a holistic approach to healthy ageing (Tenani et al. 2020)

In its report 'The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme (2003a and 2003b)', WHO stated that even though population studies have shown improvements in the oral health status of individuals, oral health problems still exist. Petersen and Ogawa (2005), comment that according to the WHO report, the universal burden of oral disease is fueled by periodontal disease. However oral health providers and public health administrators in most countries, have not given much attention to

this matter, even though the bi-directional relation have been evidenced between oral and general diseases.

1.2 Defining Health and Periodontal Health

1.2.1 Health

In literature, "health" is often contrasted with "disease," but its definition varies depending on context. Health can refer to physical, social, or economic well-being. However, in dentistry, "periodontal health" is measured by the condition of the periodontal structures (Mariotti & Hefti, 2015). Schuster et al. (2004) note that how health is perceived by both patients and health professionals, helps predict health behaviours, suggesting that health promotion should focus on wellness, not just disease-specific treatment. Cockerham (2001) emphasized that "health is more than the absence of disease." From a sociological perspective, health includes not only biological well-being but also psychosocial factors influenced by socioeconomic and cultural conditions. Over the past century, health has evolved from merely surviving to ensuring quality of life and functional ability (Schuster et al., 2004).

1.2.2 Periodontal Health

Society's perception of health and disease has also changed since scientific knowledge is continuously emerging. However, an individual's belief in health and disease also depends on his or her cultural, social and value judgement. Therefore, a standard definition of health provides another viewpoint to the reoccurring signs and symptoms which are not accepted within normal parameters. Thus viewing periodontal health

within this context, it is better characterised according to what it constitutes and how it can be affected (Mariotti & Hefti, 2015).

If a person can reach his or her vital goals on daily basis and in standard circumstances, that is circumstances related to a cultural norm which has nothing to do with normal circumstances, then that person is said to be healthy. As an example, if a person has controlled gingival recession but can chew in an effective way without any pain and he or she is not affected by his or her facial image, then the person is considered to be periodontally healthy. This is where the major concern of dental health care professionals and dental researchers needs to shift to people who probably are not concerned about their periodontal health in everyday life (Nordenfelt, 2007).

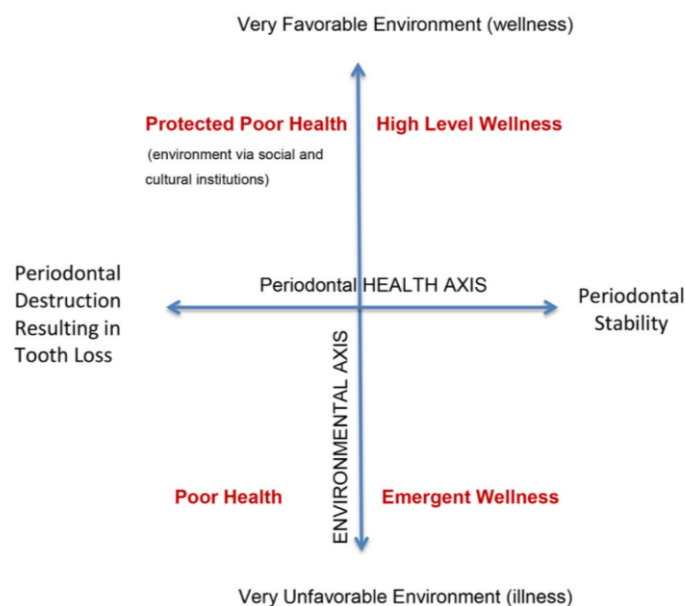


Figure 1 Periodontal Wellness Grid (Mariotti & Hefti, 2015)

Mariotti and Hefti (2015), have proposed a periodontal health model based on wellness. The principal four characteristics are founded on a) a dentition which functions well b) pain free function of the dentition c) periodontal stability of the attached periodontium

and d) the psychosocial and social well-being of the individual. If the individual is satisfied with his or her periodontium structures which are not deteriorating, and thus the periodontium is functioning well, and the appearance and facial image are satisfactory, then the individual has reached a balance between 'mind, mouth and spirit'. In this context, this is referred to as periodontal health.

Definitely gingival inflammation and probing depths are required factors to consider in the proposed periodontal health (or illness) model. Although some researchers consider gingival inflammation as a characteristic which is normally distributed in the population, evidence has demonstrated that gingival inflammation is the 'gateway' to severe periodontal disease and eventual tooth loss (Lang, Schätzle, & Löe, 2009).

Figure 1 focuses on the factors which affect periodontal health, and which ultimately ensures the maintenance of periodontal health, such as function, comfort, stability and well-being. It does not focus on the periodontal disease processes but rather on patient-reported factors. On the other hand, stability of the periodontium needs to be assessed by the dental professional. When the clinical attachment levels, as measured by a periodontal probe, are stable and do not change, then periodontal disease is controlled. Hefti (1997), referred to this oral clinical assessment as 'the gold standard used to determine change in the periodontal attachment apparatus'.

Therefore as stated by Mariotti and Hefti (2015),

'The definition of periodontal health is a hybrid between the natural and the holistic concepts of health that reflects a notion of wellness. From the natural concept of health, the absence of progressive attachment loss around the tooth is a required

objective characteristic. Effortless occlusal function reflects the holistic concept of health in that function and comfort do not have to be ideal but are relative to patient needs and wishes. Social and psychosocial wellbeing revolves around a personal constructive attitude, signalling a positive quality of life for periodontal wellness.'

The primary goal of periodontal care is to achieve and sustain a healthy periodontium. How periodontal health is defined is essential for population monitoring and establishing key therapeutic objectives for clinicians. Traditionally, a healthy periodontium has been viewed as the absence of periodontal disease, similar to the WHO's definition of health as the absence of illness. Specifically, periodontal health is described as a condition free from inflammation, characterized by shallow pockets and no gingival bleeding. However, there are various definitions for periodontal health, which include different clinical signs and symptoms such as probing pocket depth (PPD), clinical attachment loss (CAL), and bleeding on probing (BOP). This variety suggests that definitions of periodontal health may vary. A consistent definition is needed to facilitate the comparison of clinical studies. Recently, the 2018 World Workshop of the European Federation of Periodontology (EFP) and the American Academy of Periodontology (AAP) defined periodontal health as the absence of clinically detected inflammation, primarily based on PPD and BOP scores. To date, there has been no comprehensive review of these definitions (Li, A. et al. (2020).

1.2.3 Periodontitis

Periodontitis is a chronic inflammatory condition affecting oral health, characterized by dysbacteriosis in the oral microbiota. This dysbacteriosis leads to a shift from a commensal to a pathogenic microbial community within the periodontal biofilm, marked by an overabundance of periodontal pathogens. The resulting host immune response triggers sustained inflammation, progressively destroying periodontal tissues and causing tooth-supporting structure loss, potentially leading to tooth mobility (Janakiram & Dye, 2020; Lafaurie et al., 2023; Wu, Zhang, Zhao, Ren, & Hu, 2022).

As one of the leading causes of tooth loss globally, periodontitis carries significant public health implications. Addressing risk factors and promoting preventive measures through public health initiatives is crucial to reduce its prevalence and impact on overall health. The severity and extent of periodontal disease increase with age, and is influenced by systemic and local factors such as tobacco smoking, specific subgingival microorganisms, uncontrolled diabetes, calculus, and dental plaque (Liu et al., 2023; Ramseier et al., 2017; Yaragani et al., 2020). Socio-economic development also plays a role in the prevalence and severity of periodontitis (Wu et al., 2022). CAL serves as a key marker for studying risk indicators, providing valuable insights into the severity of periodontal disease among the adult population. Understanding these complexities underscores the importance of comprehensive approaches to oral health, combining clinical intervention with broader public health strategies (Lafaurie et al., 2023).

According to Lang & Bartold (2018), the conceptualization of periodontal health introduces a delicate framework, categorizing it into four distinct levels based on the condition of the periodontium and corresponding treatment outcomes. Firstly, there is

"pristine periodontal health," characterized by a structurally sound and uninflamed periodontium, reflecting an optimal state. Moving along the spectrum, the second level is defined as "well-maintained clinical periodontal health," wherein both the structure and clinical presentation of the periodontium remain intact and sound, indicating effective maintenance efforts (Ramfjord, S.P. 1993).

Transitioning into a different phase, the third level is identified as "periodontal disease stability," where the periodontium is reduced, signifying a compromised state. Despite this reduction, the condition remains stable, highlighting a managed state of periodontal disease. Lastly, the fourth level is designated as "periodontal disease remission/control," also featuring a reduced periodontium. However, in this stage, there is a marked control or remission of the periodontal disease, indicating successful intervention and ongoing management to mitigate further deterioration (Lang & Bartold, 2018).

This multi-tiered classification provides a comprehensive perspective on periodontal health, accounting for both structural and clinical considerations, as well as the dynamic nature of treatment outcomes. Such a framework facilitates a more plausible understanding of periodontal health states and aids in tailoring appropriate interventions for each specific condition.

1.3 Factors influencing Periodontal Health

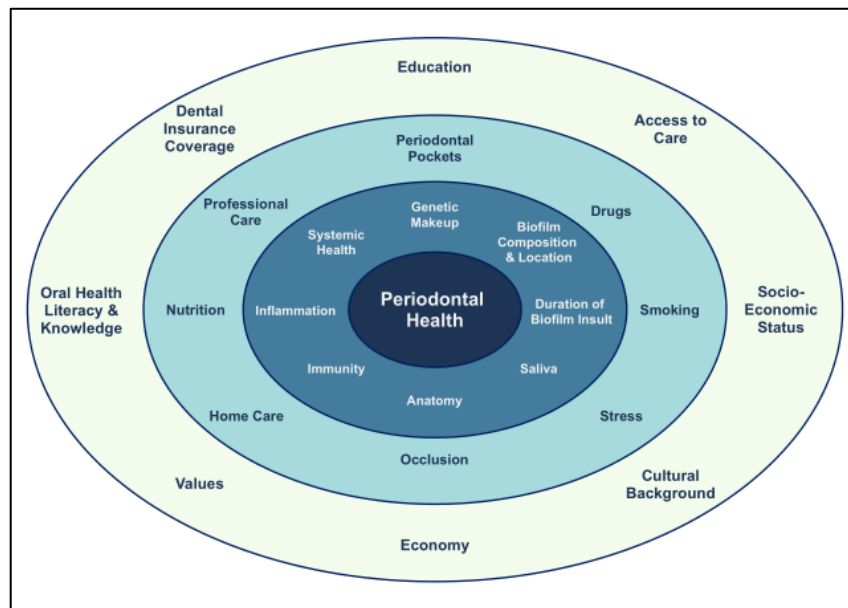


Figure 2 Three-Layer Periodontal Health Model (Mariotti & Hefti, 2015)

In their publication, 'Defining periodontal Health', Mariotti & Hefti (2015) proposed a model for periodontal health which focused not only on disease processes but also on a paradigm for the preservation of periodontal well-being. This model delineates the various factors (Figure 2 and Table 1) influencing the health of the periodontium, encompassing aspects such as function, comfort, stability, and overall welfare. While the patient's perception of comfort, function, and a positive sense of well-being is crucial and subjective, the stability of the periodontium necessitates specific observation of dental and other health professionals (Colombo, A.P. et al., 2023). In essence, a stable periodontium is characterized by an unchanged attachment level, a metric clinically measured using a periodontal probe (Hefti, 1997).

Table 1 Factors Influencing Periodontal Health (Mariotti and Hefti, 2015)

First Layer Biologically discrete entities of biofilm and host that affect the periodontium.	- Composition and character of the oral biofilm - Location of biofilm - Duration of biofilm insult - Saliva - Anatomical characteristics of alveolar bone and teeth - Immunity - Inflammation - Systemic health - Genetics
Second Layer Environmental and systemic factors that can influence biological entities	- Pre-existing periodontal pockets - Smoking - Drugs - Stress - Occlusion - Nutrition - Home care - Professional care
Third Layer General Conditions that influence both the biological and the environment/systemic factors	- Access to care - Cultural background - Education - Socio-economic status - Economy - Values (attitudes and beliefs) - Oral health literacy and knowledge

1.3.1 Exploring Biofilm Components and their Impact on the Periodontium

1.3.1.1 Biofilm Structure and Constituents' Elements

The mouth and naso-pharynx, like skin, harbor microbial biofilms influenced by habitat characteristics, leading to stable and diverse species compositions (Li, Bihan, & Methé, 2013). These dynamic ecosystems can support health through homeostasis or cause disease under distress (Marsh, 2012). Bacterial biofilms on dental surfaces, mainly gram-positive aerobes like Streptococci followed by gram-negative commensals such as Fusobacteria, engage in gene-transferring communications (Kolenbrander et al., 2002; Socransky & Haffajee, 2002). Their resilience against biological and mechanical challenges can lead to periodontal diseases by disrupting host responses (Hajishengallis, 2014). Biofilms, structured microbial communities, adhere to surfaces with organizational complexity, and their antibiotic resistance underscores the need for comprehensive dental care and patient education to manage and prevent biofilm-related periodontal diseases effectively (Das et al., 2023).

1.3.1.2 Distribution and Location of Biofilm

The forces of flowing saliva, mastication and brushing disrupt the biofilm matrix, therefore dental biofilms settle in areas where they are less reachable. Coronal fissures and pits, along with roughened enamel surfaces like cracks and scratches, as well as overhanging restorations and gingival sulci, create optimal environments for the development and maturation of dental biofilms. The col, the interproximal space between the gingival sulcus and the teeth also serves as an attractive area for bacterial colonies to multiply.

When there is an inflammatory response at these areas (Figure 3), the junctional epithelium will ulcerate and multiply causing the gingival sulcus to deepen and form periodontal pockets (Van Dyke & Sima, 2020).

For most people, cleaning the interproximal areas and proximal tooth surfaces is a difficult, if not obscure, task. Therefore individuals and dental professionals should be well equipped to remove plaque and plaque retentive factors from areas difficult to access such as periodontal pockets (Axelsson, 2004).

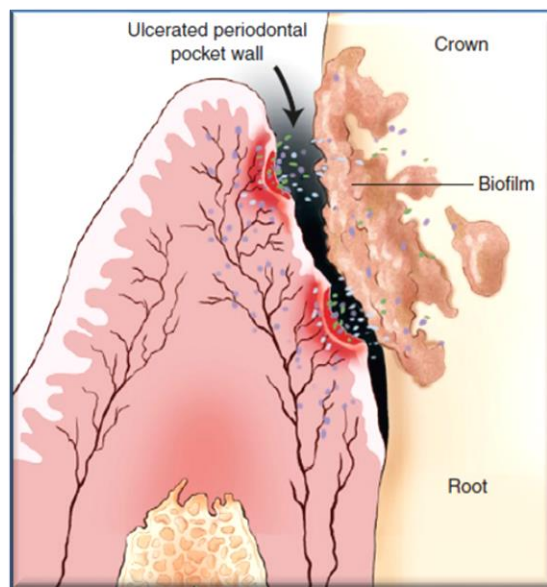


Figure 3 Ulcerated Pocket Wall (Darby & Walsh, 2014)

The microbial dental plaque biofilm, particularly the subgingival dental plaque biofilm, is posited to emulate a human tissue both in its structural composition and functional attributes. This assertion draws on the definition of tissue as an amalgamation of akin cells and their products, creating a defined structure with a specific function within a multicellular organism. Thus, the dental plaque biofilm is conceptualized as an acquired

human tissue primarily composed of bacteria, playing a pivotal role in maintaining the health of gingival tissue (Darveau & Curtis, 2021).

1.3.1.3 Impact of Biofilm Exposure and Duration on Inflammation

Earlier studies suggested a direct link between early gingival disease, plaque accumulation, inflammation, and subsequent periodontal tissue destruction, leading to tooth loss (Lovdal, Arno, & Waerhaug, 1958). However, recent longitudinal research shows that not all individuals with poor oral hygiene and high plaque levels suffer from tooth loss; many maintain periodontal health despite significant biofilm and inflammation. It is now understood that biofilm-induced inflammation does not necessarily result in periodontal breakdown; stable periodontal health can exist without regular oral care, especially in sites not chronically inflamed (Chapple, 2020).

Current understanding emphasizes the role of the host's genetic factors and the balance of body mechanisms in determining oral health. The complexity of factors affecting periodontal health, such as genetic makeup and the dynamic oral environment, challenges the straightforward relationship previously assumed between plaque, inflammation, and tissue destruction (Baima, G. et al., 2022; Mariotti & Hefti, 2015).

1.3.1.4 Prostheses as potential reservoirs for biofilm microorganisms

The association between oral microorganisms and systemic diseases highlights prostheses (dentures) as potential reservoirs for harmful biofilms. Denture plaque, linked to various oral and systemic conditions, necessitates effective management, especially given an aging population (Coulthwaite & Verran, 2009). Denture cleaning involves mechanical, chemical, and thermal methods (Coulthwaite & Verran, 2009).

Mylonas, Milward, and McAndrew (2022) stress the importance of proper denture care, noting that poor maintenance can reduce the lifespan of prostheses whilst increasing disease risk. There is a notable knowledge gap among patients and dental professionals regarding denture care, underscoring the need for targeted education to enhance denture maintenance and overall oral health.

Denture wearers must be educated on proper hygiene practices using suitable cleaning agents to prevent damage to the dentures and adverse effects on oral health. The Denture Cleanliness Index helps monitor denture hygiene in clinical settings. Effective patient education on these practices is crucial for the health and longevity of dentures and improving the well-being of denture wearers (Mylonas, Milward, & McAndrew, 2022).

1.3.1.5 Saliva's Influence on Periodontal Health

Teeth and mucosa are constantly bathed with secretions from the major and minor salivary glands and gingival crevicular fluid. This continuous moisture contributes to the health of oral tissues.

The effects of saliva on periodontal health are varied. Saliva has the potential of providing antimicrobial conditions, through specific mechanisms (e.g., immunoglobulin A, IgA) and non-specific mechanisms (e.g., lysozyme, lactoferrin). These mechanisms contribute to the defence against bacteria and help maintain a healthy oral environment.

Saliva also helps to regulate the pH of plaque, which is important for preventing conditions conducive to bacterial growth and acid production. Saliva can agglutinate

bacteria, causing clumping and aiding in bacterial colonies removal. It has growth-modulating effects on bacteria, modifying growth effects which contribute to the eradication of bacteria and their nutrients from the oral cavity, thus regulating the oral microbial environment (Beighton, 2009).

Saliva's influence on the supragingival biofilm can also affect the composition of the subgingival microflora. While reduced salivary levels, referred to as hyposalivation, may be associated with periodontal disease, studies have shown that periodontal disease can develop in individuals regardless of their salivary flow and composition. Therefore saliva composition alone does not prevent periodontal disease. Mild forms of hyposalivation can lead to mucosal pathology, sometimes described by affected patients as a "burning sensation of the gums". Hence, saliva is considered to be a contributor to periodontal wellness (Beighton, 2009; Najera et al., 1997).

1.3.1.6 Impact of Host Immune Response on the Periodontium

Maintaining periodontal health is intricately tied to a sophisticated immune response against the tooth biofilm. The immune system safeguards individuals by recognizing and responding to antigens. When the immune system becomes overwhelmed, clinical symptoms of disease become apparent. Periodontal health, and conversely susceptibility to periodontal disease, stem from both an inflammatory response and the activation of diverse immune pathways, regulating both innate and acquired immunity (Dentino, Lee, Mailhot, & Hefti, 2013).

Consequently, the immune system's responsiveness, in conjunction with the amount and type of antigens encountered, profoundly influences the health of the

periodontium. Individuals with compromised immune responses, such as localized aggressive periodontitis, and those with hyperreactive immune responses may experience diminished periodontal health. The delicate balance of immune regulation plays a crucial role in determining the state of the periodontium (Cekici, Kantarci, Hasturk, & Van Dyke, 2014).

1.3.1.7 The Correlation between Systemic Health and Periodontal health

Dental plaque is the primary cause of periodontal disease, initiating inflammation and sustaining its progression with associated development of periodontal pockets. If untreated, this condition results in tooth mobility and eventual loss, causing residual ridge resorption, and thus complicating prosthetic treatment longitudinally (Tallgren, 2003; Atwood, 1979; Hotz et al., 1979).

Focal sepsis refers to the spread of bacteria from one part of the body to another. This concept led to studies linking dental sepsis to conditions like endocarditis after tooth extractions. Recent research supports the connection between oral health and systemic conditions, such as atherosclerosis and cardiovascular disease (Tsakos & Quinonez, 2013). Studies also show that mortality is linked to tooth loss and oral health habits like tooth brushing, with periodontal disease often tied to smoking and inflammation-related mechanisms (Farghaly et al., 2019). Indeed, the oral biofilm, particularly in periodontal pockets, allow microorganisms to enter the bloodstream, potentially causing systemic infections in organs like the heart, lungs, and brain. The surface area of the periodontal ligament, about 75 cm², can become a large wound in severe cases of alveolar bone loss, increasing the risk of bacterial translocation. A person with 50% alveolar jawbone loss would have a wound surface of about 30 to 40 cm², which likely

raises the risk of bacterial translocation compared to healthy gums. The most common periodontal disease, established gingivitis, can result in gingival pockets of 4 to 5 mm, creating a wound surface of 10 to 20 cm² (Scannapieco, 2013).

The relationship between systemic health and periodontal health is complex, involving inflammatory and immune responses. Systemic conditions such as diabetes, immunosuppression, and genetic disorders can exacerbate periodontal disease. This bidirectional relationship means that periodontal health can influence systemic health and vice versa. A comprehensive healthcare approach is essential to address both aspects (Chatzopoulos et al., 2003).

1.3.1.7.1 Aspiration of Oropharyngeal Pathogenic Organisms

Researchers, including Sekizawa et al. (1990) and Kikuchi et al. (1994), have noted that older adults with altered swallowing reflexes due to cardiovascular disease are at higher risk for pneumonia, both in hospitals and in the community. Scannapieco and Mylotte (1996) hypothesized that periodontal disease could lead to bacterial pneumonia, suggesting that oral hygiene impacts bacterial colonization in the oropharynx.

Ishikawa et al. (2008) and Van der Maarel-Wierink et al. (2013) found that weekly professional oral care significantly reduced or eliminated oropharyngeal microorganisms in long-term care settings. This care included brushing teeth, dentures, and cleaning the tongue and oral mucosa, emphasizing the need for regular mechanical cleaning to prevent aspiration pneumonia in older adults.

Azarpazhooh & Leake (2006) reported that antimicrobial decontamination of the oropharyngeal tract helps reduce the incidence of respiratory diseases. Similarly, Linuma

et al. (2015) found poor oral hygiene and prolonged overnight denture wear to be a significant risk factor for pneumonia in seniors. Overnight denture use and perceived swallowing difficulties were linked to a 2.3-fold increase in pneumonia risk, along with higher oral inflammation and microbial burden.

1.3.1.7.2 The Link Between Metabolic Syndrome and Periodontal Disease

A meta-analysis by Campos et al., (2022) identified periodontitis as a chronic inflammatory condition leading to deterioration of tissues supporting the teeth, and found a positive correlation between metabolic syndrome (MetS) and periodontitis. It is characterized by changes in the dental biofilm and release of pro-inflammatory mediators, with symptoms including bleeding, altered probing depth, and bone loss (Papapanou et al., 2018). The literature consistently links periodontal health to overall health, highlighting associations with metabolic syndrome and other systemic conditions (Kapila, 2021; Pirih et al., 2021).

Metabolic syndrome (MetS), which includes a group of factors that raise the risk for cardiovascular disease and diabetes, is diagnosed when at least three of five risk factors are present. Campos, Costa, & Cota (2020) found a dose-response relationship, showing that the likelihood of periodontitis increases as more MetS components are present, especially in individuals with three or more components.

1.3.1.7.3 Poor Oral Hygiene and Cardiovascular Disease

The link between periodontal disease and cardiovascular disease stems from the role of inflammation in atherosclerosis. Cesar de Oliveira et al. (2010) observed that markers of low-grade inflammation, often linked to chronic infections like periodontal disease,

increase cardiovascular risk. Other studies (Slade et al. (2003) and Loos et al. (2000)) further supported the role of periodontal disease in raising risk of cardiovascular disease.

Locally O'Brien (2022) found significant disparities in oral care practices among caregivers at St. Vincent de Paul Residence in older stroke survivors, with those having higher education more diligent in oral hygiene. Her study highlighted the need for better oral care models for older stroke survivors in long-term care.

In a large-scale study of 2,623 participants from the Tromsø Study (Tromsø7, 2015–2016), periodontitis was classified using the 2017 American Academy of Periodontology/European Federation of Periodontology system, and cardiovascular risk assessed via the NORRISK 2 model. Results showed that moderate to severe periodontitis (Grade B/C) was associated with higher cardiovascular risk compared to mild or no periodontitis (Grade A), with this link being most significant in never-smokers aged 65-74 (Petrenya, N. et al. (2022)).

1.3.1.7.4 Oral Hygiene habits in people with diabetes

Sanz et al. (2018) found that poor blood sugar management in diabetes is closely linked to worsened periodontal health and less effective treatment outcomes. Periodontitis can lead to dysglycemia and increased insulin resistance, and is associated with a higher risk of developing diabetes, related complications, and mortality. Treating periodontal disease can improve blood sugar control, evidenced by reduced HbA1C levels, though additional therapies beyond standard treatment have limited support.

Dental professionals are crucial in identifying individuals at risk for prediabetes or undiagnosed diabetes, while medical practitioners should recognize the impact of periodontal disease on blood sugar control and associated complications. Guidelines are available to educate physicians, dental professionals, and the public on the relationship between periodontal health and diabetes management.

Petersen & Ogawa (2005) report that 177 million people globally have diabetes, a number expected to double by 2030. They note that advanced periodontal disease affects 10% to 15% of adults, with risk factors including poor oral hygiene, diabetes, tobacco use, alcohol, and stress. They emphasize the need for monitoring periodontal disease and promoting oral health.

The strong link between periodontal disease and diabetes is supported by studies (Grossi et al., 1998; Soskolne et al., 2001; Rønningen et al. (2012); Nascimento et al., 2018). Comisso et al. (2011) associate diabetes with quality-of-life issues and complications such as retinopathy, nephropathy, neuropathy, and cardiovascular disease, including periodontitis.

1.3.1.7.5 Oral Hygiene, Periodontal Health and Haematological Disorders

Sudhakar, U. et al., (2020) highlight that haematological disorders, while less common than other systemic diseases, present unique non-specific oral symptoms and significantly impact periodontal conditions. These disorders can affect the efficacy of periodontal treatment due to changes in wound healing, bleeding, and increased infection susceptibility.

Additionally, disorders affecting white blood cells can intensify reactions to periodontal pathogens, potentially increasing atherothrombotic risks in coronary diseases. Research indicates that periodontitis patients often show elevated levels of white blood cells, C-reactive protein, and plasma fibrinogen, alongside increased platelet activity in those with cardiovascular diseases. However, the precise mechanisms linking these systemic responses to periodontal disease outcomes remain unclear.

1.3.1.7.6 Oral Hygiene, Periodontal Disease and Gastrointestinal Disorders

Periodontal disease is increasingly seen as a key dental subject due to the fact that it's common and due to its impact on oral health, which involves chronic inflammation of structures supporting the teeth, potentially leading to systemic issues if untreated. It is linked with various gastrointestinal disorders like inflammatory bowel disease and colorectal cancer, possibly through shared oral pathogens and inflammatory mediators that disrupt the oral microbiome balance, influencing gut health. Advanced research methods and animal models are vital for exploring these interactions to enhance diagnosis and treatment strategies (Gheorghe et al., 2022; Lam et al., 2023).

1.3.1.7.7 Oral Hygiene, Periodontal Health, Dermatological and Rheumatologic Conditions

Individuals with inflammatory dermatologic and rheumatologic conditions experience increased oral discomfort, dry mouth, and periodontal disease compared to healthy controls. Patients with diseases like psoriasis, rheumatoid arthritis, and systemic lupus erythematosus report higher occurrences of oral conditions and complications, which severely impact their quality of life. The use of immunomodulatory therapies may also lead to adverse oral side effects like ulcers and mucositis, highlighting the importance

of regular oral health assessments for these patients. It is crucial for clinicians to recognize the risk of poor OH in these patients and to consider involving dental professionals early in the management of severe inflammatory disease (Kiernan, O'Connor, Ryan, & Murphy, (2023).

1.3.1.7.8 Hepatic Disease and Poor Oral Hygiene

Liver diseases and periodontitis are significant global health issues among adults, with emerging evidence suggesting a link between the two. Understanding their relationship is crucial for developing effective prevention strategies for liver diseases. Research highlights the negative impact of chronic periodontitis on the progression of liver diseases, including cirrhosis. Periodontitis, caused by gram-negative bacteria such as *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis*, facilitates the translocation of oral pathogens to the gut, disrupting microbiota and contributing to liver disease. Both conditions trigger inflammatory responses, potentially influencing each other through inflammatory mediators (Rinčić et. al., 2021).

Epidemiological studies show poorer periodontal health in individuals with cirrhosis compared to those without. Periodontal therapy in such patients improves oral and gut microbiomes, reduces systemic inflammation, and positively affects cirrhosis prognostic factors and cognitive function. Future research should focus on elucidating the biological mechanisms, strength, and direction of the association between these conditions (Rinčić et. al., 2021).

1.3.1.7.9 Older adults' mental health conditions, neurological and cognitive impairment and lack of oral hygiene.

Steve Kisely (2016) and Ward et al. (2019) explore the bidirectional link between oral and mental health, noting that dental anxiety and psychiatric disorders can both hinder dental care and exacerbate periodontitis. Kisely (2016) recommends oral health assessments by non-dental staff and early referrals. Nascimento et al. (2019) connect periodontitis with systemic inflammation, which may impact neuroinflammation and cognitive functions, highlighting the need for further research.

Zenthofer et al. (2016) show that tailored dental education improves oral hygiene in older adults with dementia. Kisely et al. (2016) suggest using standard checklists for assessing oral health in older adults with severe mental illnesses. Baiju et al. (2019) emphasize the importance of Clinical Attachment Level (CAL) and periodontal pocket depths in diagnosing periodontitis severity in patients with these conditions.

Lauritano et al. (2019) find no significant differences in oral health between older adults with and without dementia, though gingival bleeding and periodontal disease were more common in those with dementia. Stajkovic (2020) highlights the challenges caregivers face in managing oral health for dementia patients, including limited time and resources. Caregivers at SVPR had higher Debris and Bleeding Scores compared to other older adult facilities.

Mohammadi, Franks, & Hines (2015) stress the role of dental hygienists in creating personalized care plans for older adults in care facilities. Delwel et al. (2018) recommend comprehensive oral examinations upon admission to care facilities.

Van Der Putten et al. (2015) and Persson et al. (2022) report that education and training for caregivers can significantly improve oral health care in care homes, potentially influencing cognitive health and dementia management.

1.3.1.7.10 Genetic Content of Oral Microorganisms

The connection between periodontal disease and genetics is intricate, with genetics playing a significant role in periodontal health (Michalowicz et al., 2000). Recent findings indicate that genetic variations may influence the subgingival niche, creating a conducive environment for specific bacteria, thereby promoting the growth of periodontopathogenic bacteria (Shaddox, Morford, & Nibali, 2021).

Shaddox, Morford, and Nibali (2021) highlight that genetic studies have identified certain gene polymorphisms, such as those in IL-1, IL-6, and Fc-gamma receptor genes, that predispose individuals to colonization by periodontopathogenic bacteria. A genome-wide association study revealed possible links between these gene variants and the presence of specific oral bacteria.

Contrastingly, Papapostolou et al., (2011) reported no clear evidence of host genotype influencing the composition of healthy oral microbial communities. Meanwhile, Mariotti and Hefti (2015) suggested that epigenetic changes within the oral cavity might affect periodontal health, with certain genetic characteristics, like the type of alveolar bone, predisposing individuals to periodontal diseases or health.

1.3.1.8 Effects of Medication on the Periodontium

Xerostomia, or dry mouth, often does not directly correspond to reduced saliva production but is associated with a higher risk of dental caries, particularly in older adults with existing periodontal disease and exposed roots (Grusovin, 2019; Mariotti & Hefti, 2015). Xerostomia is commonly linked to conditions like Sjogren's syndrome, diabetes, and radiation therapy, and is a frequent side effect of medications such as antidepressants, anticholinergics, antipsychotics, diuretics, and antihistamines.

Systemic medications can also impact periodontal health, with gingival overgrowth seen with drugs like phenytoin, cyclosporine, and calcium channel blockers. Oral lichenoid reactions may be triggered by beta-blockers, antidiabetic drugs, gold salts, and NSAIDs (Grusovin, 2019; Mariotti & Hefti, 2015).

1.3.1.9 The Influence of Smoking as a Modifiable Risk Factor on Periodontal Health Decline

Tobacco use is a major modifiable risk factor affecting overall and periodontal health. Smoking not only links to general health deterioration and higher mortality but also directly influences periodontitis development and the success of periodontal treatments. It affects periodontal therapy by obscuring inflammation signs through reduced gingival bleeding and lowering attendance at maintenance therapy sessions. Thus, effective smoking cessation interventions and behavior change counseling are crucial for mitigating smoking's adverse effects on periodontal health, highlighting the need for comprehensive prevention and management strategies (Arweiler, Auschill, & Sculean, 2018; Salvi et al., 2023).

Further, Salvi et al., (2023) emphasize the need for detailed assessment of smoking status, including the duration and amount of exposure. A thorough understanding of an individual's smoking history is vital for precise interventions and effective management of the risks associated with smoking on both general and periodontal health. This detailed approach is key in developing targeted smoking cessation strategies and managing periodontal outcomes.

1.3.1.10 Stress and Poor Quality of Life

Psychosocial stress significantly impacts various diseases, including depression, cardiovascular issues, and asthma, extending its influence on physiological systems such as the immune response and wound healing. Chronic stress may exacerbate infections leading to severe dental problems like periodontitis in susceptible individuals. Understanding the biological interactions of stress with factors like hygiene and smoking is complex, but stress management is increasingly recognized as vital for dental health (Mariotti & Hefti, 2015).

Conversely, research on how periodontal health affects Oral Health-Related Quality of Life (OHQoL) shows inconsistent results. A systematic review by Van de Rijt, Liza et. al. (2020) reports mixed findings, with periodontal disease's impact on life quality varying with its severity. Although periodontal disease may not directly impair OHQoL, its advanced stages, leading to tooth loss, can diminish life quality, especially in seniors.

Quality of life encompasses a subjective evaluation of one's life within their cultural and value systems, heavily influenced by physical and mental health, beliefs, and social connections (Niesten & McKenna, 2020). This multidisciplinary view supports the

disparities in life quality among individuals with similar health statuses, shaped by personal experiences and expectations.

Niesten & McKenna (2020) further state that the concept of Oral Health-Related Quality of Life (OHRQoL) has guided dental professionals towards a patient-centred approach over the last two decades, emphasizing the broad effects of oral health on daily functioning and overall well-being, beyond mere clinical health indicators. This perspective underscores the importance of holistic dental health management for enhancing individual life quality.

1.3.2 Impacts of Environmental and Systemic Factors on Biological Entities

1.3.2.1 *Factors Predicting Initial Periodontal Status Before Treatment*

In a year-long study by Machtei et al. (1997), 79 patients with established periodontitis were monitored for clinical, microbiological, and immunological markers, including attachment loss (AL), bone loss (BL), plaque, calculus, pocket depth (PD), and attachment levels, measured every three months. The average AL and BL were 0.159 mm and 0.164 mm, respectively, with wide individual variation (-0.733 to +1.004 mm), and active sites occurred at 6.89%. Mean PD showed minimal change (-0.033 mm), indicating that AL often coincided with gingival recession. Smokers experienced greater AL than non-smokers, and baseline PD, AL, and crestal bone height were strongly linked to future changes, particularly bone loss. Patients with baseline PD ≥ 3.2 mm were at higher risk for future bone loss, with smokers also more prone to further AL. Key risk factors included past periodontal damage, smoking, and specific microorganisms, while baseline plaque, calculus, and gingival indices were not correlated with changes in periodontal health over the year.

A recent review by Di Stefano et al. (2022) highlighted the growing recognition of the oral microbiome's role in maintaining oral and systemic health. Modern lifestyles, marked by poor diets, smoking, and inadequate oral hygiene, disrupt the oral microbiome, leading to conditions like periodontitis, especially in those with genetic predispositions. The review advocates for patient education on oral health, healthy lifestyle choices, and effective plaque management to maintain microbiome balance and prevent periodontal disease.

1.3.2.2 The Role of Existing Periodontal Pockets in Subsequent CAL

Residual probing depths greater than 4 mm can indicate a risk for future attachment loss in periodontal health. While deep pockets and their deepening are linked to further attachment loss (Badersten, Nilvéus, & Egelberg, 1990; Claffey et al., 1990), longitudinal studies suggest that stability of these depths depends on individual maintenance care (Lindhe & Nyman, 1984; Matulienė et al., 2008). Probing depths should be considered alongside other clinical parameters, such as bleeding on probing and anatomical conditions, to assess periodontal health comprehensively (Matulienė et al., 2008).

Baudet et al. (2020) found that gingival bleeding is a common indicator of inflammation and periodontal disease. Absence of bleeding may suggest stability (Lang et al., 1986; Lang et al., 1990). A survey of 794 French adults indicated that 502 (63.2%) reported gingival bleeding with 414 (82.5%) considered it harmless and 309 (61.6%) taking actions like using mouthwash or changing brushing techniques. Nearly half (49.0%) consulted healthcare professionals, including dentists (43.0%), physicians (14.1%), and pharmacists (8.0%). The survey revealed a general lack of understanding of periodontal health among those who saw gingival bleeding as harmless and did not seek appropriate care.

1.3.2.3 Self-Care and Control of Periodontal Infections

Maintaining personal oral hygiene to eliminate supra-gingival plaque is fundamental in periodontal care, as dental bacterial biofilm (Arweiler et al. 2018) is the primary modifiable risk factor for periodontal diseases. Evidence supports that regular mechanical removal, such as brushing and flossing, is crucial for stabilizing periodontal

tissues (Haas et al., 2012). Effective oral hygiene requires consistent motivation (Abegg et al., 2000; Cuculescu et al., 2019), skill, proper tools, and chemotherapeutic agents (Mariotti & Hefti, 2015); Newton & Asimakopoulou (2017) and Raison et al. (2020)

Carra et al. (2020) note that therapeutic education incorporating behavioural interventions can potentially enhance oral hygiene in patients with periodontal diseases. However, the clinical effectiveness of these approaches remains uncertain.

Managing bacterial biofilms involves both self-care and professional maintenance. Antimicrobial agents can support mechanical biofilm management but face challenges in subgingival areas, where biofilms are more resistant and difficult to treat (Arweiler et al., 2018; Rams et al., 1996).

Toothbrushing remains crucial for periodontal treatment, aiding in plaque removal and supporting overall gingival health (Arweiler et al., 2018). While traditional methods focused on mechanical cleaning, modern approaches include adjuvant antibacterial agents to prevent infections (Arweiler et al., 2018). These agents are beneficial not only for those unable to perform mechanical hygiene but also for those who struggle with it (Arweiler et al., 2018).

1.3.2.4 Professional Care and Maintenance of Periodontal Health

Mariotti & Hefti (2015) highlight that regular dental care, including nonsurgical and/or surgical periodontal therapy, is essential for periodontal health and tooth retention. Regular maintenance care reduces attachment loss and tooth loss, whereas neglecting it increases tooth loss risk. Arweiler et al. (2018) emphasize that effective maintenance care and scaling/root surface debridement are crucial for long-term periodontal success.

Consistent professional care coupled with effective self-care significantly impacts treatment outcomes, while poor oral hygiene can undermine long-term tooth preservation.

Self-cleaning of pockets is challenging, and managing gingivitis is vital for controlling periodontal infections. Dental professionals should monitor and support patients experiencing difficulties with oral hygiene (Arweiler et al., 2018). For those with periodontal issues, consistent maintenance care, including periodic scaling and root debridement every 3-6 months, is crucial. Addressing modifiable risk factors and understanding cognitive psychology principles can aid in behaviour change (Lindhe et al., 1984). Grusovin (2019) discusses the role of non-surgical therapy in biofilm elimination, with air polishing technology offering advantages for older adults. Primary prevention focuses on patient-performed biofilm control, while secondary prevention aims to prevent disease recurrence. Oral hygiene instructions should be adapted for geriatric individuals, including using specialized aids and educating caregivers.

Professional subgingival irrigation aims to remove plaque and reduce pocket microflora, though its effectiveness is limited. Research shows mixed results on the benefits of various irrigants, with chlorhexidine, tetracyclines, and povidone-iodine all demonstrating effectiveness (Jalaluddin et al., 2020). Alrashdan et al. (2023) highlight unresolved questions regarding mouthwash's impact on overall health, particularly concerning cardiovascular risks and dementia. Further research is needed to balance the benefits and potential harms of mouthwash use.

A health policy recommends an initial oral examination upon admission to long-term care facilities, with regular check-ups every six months. Dental care should include

proper brushing and flossing, fluoride toothpaste for high caries risk, and customized chlorhexidine mouth rinse use if needed (Charadram et al., 2021).

1.3.2.5 Evaluation of Periodontal Disease Data in Epidemiological Research Studies

Leroy et al. (2010) discuss the difficulties in periodontal research due to inconsistent definitions and methodologies in data collection, which hinder data comparison and risk factor assessment. Their review identified few studies that provided clear definitions and measurements of periodontitis. They advocate for uniform criteria in defining periodontitis, focusing on clinical signs like pocket depth, clinical attachment loss (CAL), and bleeding on probing. Comprehensive examiner training and consistent measurement tools are crucial for improving data reliability and comparability.

Page and Eke (2007) suggest that CAL and probing pocket depth are key markers for studying periodontal disease epidemiology. CAL reflects historical disease presence, while probing depth provides a snapshot of current disease status. Bleeding on probing is also a valuable clinical indicator. Atassi et al. (1992), Keagle et al. (1989), and Larsen et al. (2009) highlight limitations in measuring probing pocket depth and attachment loss. Variables such as probe design, inflammation, examiner technique, and dental restorations can affect measurement accuracy, leading to inconsistent research outcomes.

The Community Periodontal Index of Treatment Needs (CPITN) faces criticism for assessing only a limited number of teeth, raising concerns about its ability to represent overall periodontal health (Leroy et al., 2010).

Savage et al. (2009) emphasize that an ideal periodontal index should be straightforward, objective, and statistically valid. It should minimize subjective judgment, be reliable and reproducible, measure even minor changes, be patient-friendly, and consider assessment time.

1.3.3 Systemic factors together with biological and environmental factors effected by general conditions

1.3.3.1 Availability of healthcare and fundamental dental services.

Andersson et al. (2021) highlight that older adults, especially those from low-income backgrounds, face significant barriers to dental care. Contributing factors include a lack of awareness about the importance of dental visits, fear, anxiety, negative past experiences, and insufficient knowledge of dental issues.

Metcalf, Northridge, and Lamster (2011) found that 61% of 125 homebound older adults had not seen a dentist in over three years. Common issues included oral pain (33.6%), toothaches (15.1%), gum soreness (27.3%), and gum bleeding (16.3%). Additionally, 50.4% reported chewing difficulties, and 59.4% were dissatisfied with their dentures, indicating poor oral health and the need for better dental care. Similarly, Grixti (1999) found that 78% of participants at St. Vincent de Paul Residence in Malta visited the dentist only when in pain, 83% lacked assistance with daily oral care, and 66% had dental problems.

Santucci and Attard (2015) reported poor oral health in older adults in state institutions, with low dental attendance (29.3%), high needs for extractions (44.4%), and restorations (42.1%). Edentulism prevalence was 41%. These findings underscore the oral health

challenges in long-term care and the need for improved access and treatment. Recommendations include integrating caregivers into formal care networks and enhancing dental education for healthcare students to better address the needs of older adults (Janto et al., 2022; Nitschke & Hahnel, 2021; Ornstein et al., 2015; Gomez-Rossi et al., 2022).

1.3.3.1.1 Access to Dental care during the Covid-19 Pandemic

During the COVID-19 pandemic, nursing homes intensified infection control measures, classifying dental care as nonessential and frequently postponing it. This led to significant constraints on emergency dental care in these settings, with public health authorities advising that such care be limited to private dental offices (Brian & Weintraub, 2020).

Johnson et al. (2022) noted that vulnerable populations, already facing barriers to oral health care, experienced even greater difficulties during the pandemic. They emphasized the need for targeted strategies to support these groups and mitigate growing disparities in oral health, as pandemic-related changes led to reduced service access and new disruptions, including delays and denials of care.

The pandemic increased anxiety among individuals, particularly those with pre-existing health issues, leading to avoidance of dental and medical services. Fear of virus transmission during procedures exacerbated these concerns, potentially resulting in delayed diagnoses and worsened health. Denial of care due to office policies or not being a registered patient led to increased oral infections, periodontal issues, and other dental problems. Participants highlighted the need for better resources,

communication, safety protocols, and empathy from dental and care providers. Limited evidence exists on improving access for underserved populations during the pandemic, but recommendations include enhancing communication and safety measures (Botros et al., 2020; Jeronimo et al., 2022).

Kedthongma & Phakdeekul (2022) identified several oral health issues among older adults during and after the COVID-19 outbreak, including loss of attachment (88.30%), denture use (78.45%), and pocket depth issues (78.20%). The study also highlighted that oral health, socio-economic status, and environmental factors significantly influenced subjective well-being during and post-pandemic.

1.3.3.2 Periodontal Health and the Relationship with Age, Gender, Education, Cultural Background, Socio-economic Status, Values and Oral Health Literacy and Knowledge.

Aging increases susceptibility to chronic diseases, including periodontitis, which is linked to prolonged pathogen exposure. Dental biofilms, mainly bacterial accumulations on teeth and gingivae, are the primary cause of periodontitis, though other risk factors also play a role, highlighting the need for targeted prevention and management (Wulandari et al., 2022).

Studies show a significant relationship between periodontitis severity and demographic factors such as age and gender, though education level does not show a strong correlation (Wulandari et al., 2022). Higher educational attainment is associated with better oral health and more frequent gingival treatments among older adults (Siukosaari et al., 2012).

Men generally experience poorer oral health with more cavities and remaining roots, while women often face tooth loss despite similar oral hygiene practices, likely due to inconsistent dental care attendance (Santucci & Attard 2015 a, b; Janssens & Kossioni, 2020; Lipsky et al., 2021). Research suggests that periodontal health does not necessarily decline with age, emphasizing the role of individual health practices (Ship & Beck, 1996).

A meta-analysis highlights significant associations between factors such as education, marital status, and general health with oral health-related quality of life among older adults, underscoring the need for public health interventions (Baniyadi et al., 2021). Gender also affects health-related behaviors, which are important for tailored health interventions (Santucci et. al 2015). Immigrants face unique oral health challenges, stressing the need for adequate support and access to healthcare in host countries (Dahlan et al., 2019). Cultural perspectives are crucial for effective health promotion and interventions (Marino, 2015). Improving oral health literacy among seniors is essential for better oral health outcomes (Tenani et al., 2020).

In Helsinki, research showed a continuous rise in the use of Professional Oral Health Services (POHS) among older adults over an 11-year period. Restorative treatments were most common, but attendance was lower for those aged 85 and older. Notable declines in restorative, periodontal, and endodontic treatments were observed for individuals aged 60 and above. Addressing future POHS challenges requires focusing on evidence-based treatments with an emphasis on oral health maintenance and disease prevention (Hiltunen et al., 2021).

1.4 Implications for Dental Practice within a long-term care facility for older adults

Table 2 Implications for Dental Practice

Administrative and Managerial Approach	- Policy Makers/Directors/Managers should provide an oral health service to older adults and should be involved in a strategic plan to provide high standards of oral care in a long-term facility. Focus should not only be on the administrative and financial aspect of the oral health plan/programme but also on daily oral self-care and clinical services. - Policy Makers/Directors/Managers should consider the importance of oral health care and the implications if there is lack of it within the facility. - Policy Makers/Directors/Managers are to prioritise resource allocation. - Policy Makers/Directors/Managers are to promote oral health education amongst the staff members and older adults. - Policy Makers/Directors/Managers are to encourage an inter-professional approach towards oral health care. - Policy Makers/Directors/Managers should consider the ethical implications when providing an oral health service to older adults.
Members of Staff (interdisciplinary team members) approach	- The interdisciplinary team should be aware of the importance of daily oral care and the implications if this is lacking. - There must be a change in attitudes and perceptions towards daily oral care and assistance in daily oral hygiene for older adults. - Staff members should attend to oral health education programmes as part of a continued professional development strategy.
Older Adults' Approach	- There is still lack of awareness regarding oral health/hygiene status. Most older adults still consider their oral health as satisfactory even though clinical findings show otherwise. - Older adults are not aware of the health services provided in long term residential facilities. - Older adults are to be encouraged to use dental health services more frequently. - Older adults need to be assisted in daily oral care due to restricted ability to perform self-care due to physical or

	cognitive impairments. - Access to dental services should be more facilitated. - Older adults should be well informed re costs of oral health services, if any.
Introduction of Clinical Governance and Ethical Considerations	- Standards of care and quality of care should be based on patients' needs. - Clinical effectiveness should reflect health benefits and health care interventions according to a structured oral health programme. - Affordability should not be considered over and above effectiveness and should be based on ethical values, namely procedural values and substantive values.
Promoting Oral Health Awareness, Interventions and Events	- Health professionals and older adults should be made more aware about systemic health and oral health and how these are correlated. - Health professionals and older adults should be aware how health care strategies can mitigate the causes of periodontal disease. - Health professionals and older adults should be made aware of oral hygiene instructions.
Improving Oral Health and Quality of Life	- Health authorities especially in long term care facilities in Malta should be aware that previous studies have shown that older adults have poor oral health. - Health professionals and older adults should be made aware of poor oral hygiene and poor oral health leading to poor quality of life. - Health professionals should be knowledgeable about poor oral health and quality of life as perceived by older adults according to their idea of good health and lifestyle.
Introducing and Creating Key Performance Indicators	- Research findings should highlight gaps in service provision and performance. - There should be key performance indicators to monitor the healthcare environments which provide health services to the older adults in the long-term care facilities. - Oral Hygiene and Periodontal Indices should be used as key performance Indicators since they are important components of the information needed to explain the long-term care facility's progress towards its stated oral health goals.

1.4.1 Implications for Dental Practice: Administrative and Managerial Approach

Kettratad-Pruksapong M. (2011), commented that oral healthcare success in a long term facility for the older adults, depends on the ‘organisational culture, philosophy, and connectivity of everyone involved.’ It also depends on the dental services being provided to the residents in the facility. In their study, ‘Nursing home executive directors’ perception of oral care in long-term facilities’, Pyle M A et al., (2005) concluded that most executive directors appreciate the importance of oral health, however oral health is not a priority on their scale since health concerns are given more priority amongst the frail older adults. Since the executive directors’ job is more administrative and they are not in direct contact with the older adults, they focus more on policy making, planning , financial management services and quality assurance.

Booth, T et al., (1990), imply that:

“ Institution officers may be more likely to paint glowing pictures of facility practices or are too far removed from caring practices to know what really happens on a daily basis...therefore they do not know the level of oral care or oral care procedures despite believing in the philosophical value of oral health and oral care.”

The Oral Health Workforce Research Centre report (2016), ‘Evolving delivery models for Dental care services in Long-Term Care Settings’, suggest that efforts by teams should be ‘complex, collaborative and interprofessional’ so that the best practices for the workforce in place when delivering dental care to long-term care residents. This requires

coordination between several care providers and the supporting administrative infrastructures (Atkinson, K.A., et al., 2022).

McNally M.E. et al., (2011) conducted a daily mouth care plan for older adults in a long residential facility, setting up an action plan amongst all those involved. The project focused on effective and ongoing communication with both members involved in the set-up of the project, with the research team and with the end-users, therefore with the older adults themselves. This led to a familiar atmosphere where ideas could be shared and where 'the groundwork for exploratory and planning phases' led to realistic research goals. The authors concluded that, 'the government, policy makers, directors of care, educators, health administrators and a broad spectrum of health professionals' have to be engaged for positive outcomes regarding the provision of oral care to the older adults in a long term facility. There must be the availability and access to dental health services in the facility in order to create awareness regarding oral health as linked to general health (Atchison, Fellows, Inge, & Valachovic, 2022).

1.4.2 Implications for Dental Practice : Staff members' Approach

Nitschke Ina et al., (2010), argued that it is a well-known fact that older adults in long term facilities need to be assisted more in their daily oral care regime and require more professional assistance focused on oral hygiene. Literature has shown that nursing attitudes toward oral health and oral hygiene have been identified as areas of importance in the hindrance of such care (Jonsson, B. et al., 2009).

Wardh I et al., (1997, 2012), commented that results from their study regarding staff attitudes to oral care, show that tooth brushing was the first most annoying nursing task

which came to mind. Other researchers such as Boyle S (1992) and Eadie DR et al (1992) stated that nurses of all grades preferred caring for older adults having incontinent problems rather than brushing teeth and cleaning dentures. Nurses also indicate that some older adults refuse to allow members of staff to assist them in their daily oral care. Other nurses consider lack of time as an important factor in reducing oral hygiene assistance to a lesser priority (Palmer, E. et al., 2022).

Kullberg Erika et al (2010) concluded that attitudes and perceptions towards oral care need to be addressed amongst nursing staff. Dental hygiene education programmes within the facility, should aim at improving the older adults' oral health and reduce the implications of poor oral care on systemic diseases to reduce healthcare costs (Sigurdardottir, A.S. et al., 2022).

1.4.3 Implications for Dental Practice: Attitudes and perceptions of Older Adults towards daily oral care.

Mitov et al. (2014) found that older adults often express satisfaction with their oral health despite poor hygiene and treatment needs. In their study of 170 nursing home residents, over 70% hadn't seen a dentist in the past year, and many were unaware of their dental issues, such as needing restorations, prosthodontics, or periodontal care. A notable gap existed between perceived need and actual treatment requirements, highlighting the need for systematic dental care programs in nursing homes.

Abrams et al. (1992) found that 72% of adults over 55 had not visited a dentist in the past two years due to perceived lack of need, while 15% cited high costs. Grixti (1999) reported that 77% of institutionalized older adults had mobility or dexterity issues affecting oral hygiene, and 78% only visited a dentist when in pain, believing dental

problems were an unavoidable part of aging. Santucci et al. (2015) found that deeper periodontal pockets were linked to poorer Oral Health-Related Quality of Life (OHRQoL). Only 46.9% of the study population brushed daily, 11.7% brushed several times a week, and 70.7% had not visited a dentist in the past year, often due to needing assistance and unawareness of free dental check-ups. Santucci concluded that poor oral health correlates with reduced quality of life, influenced by individual perceptions of health.

1.4.4 Implications for Dental Practice: Clinical Governance and Ethical Considerations.

Older adults face oral healthcare inequalities due to access and financial disparities, worsened by socioeconomic status (Tsakos et al., 2013). Addressing these requires changes in health behaviours and improving social conditions while well-trained health providers must offer patient-centered education (Dounis et al., 2010). Parveen et al. (2023) found that medical practitioners have varied knowledge of the link between oral and systemic health, with webinars significantly improving their understanding.

Healthcare decisions should focus on clinical effectiveness and cost-effectiveness while maintaining quality (McSherry & Pearce, 2011; Rawlins & Culyer, 2004). Grixti (1999) emphasized the need for an interdisciplinary approach to better manage periodontal disease in older adults.

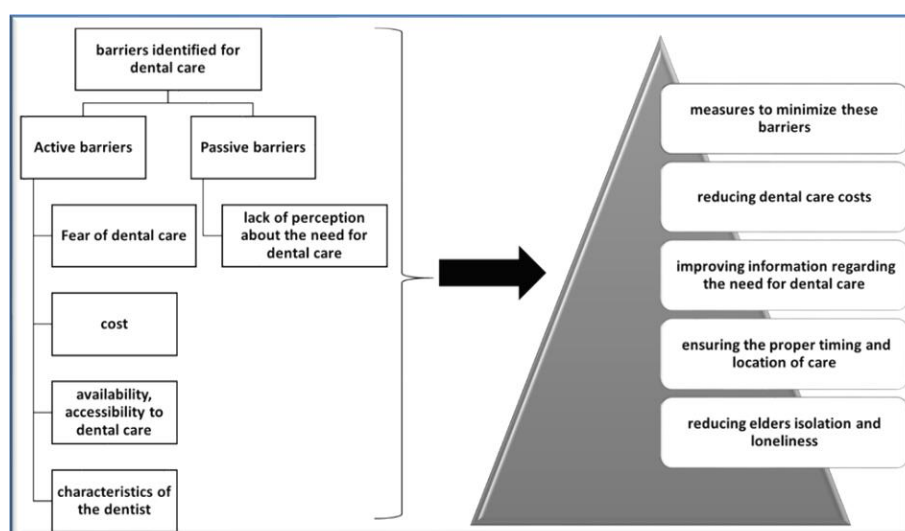


Figure 4 Barriers and Methods in Dental Care Access of Older adults (Janto. M, et al., 2022)

Barriers to providing oral health services in long-term care facilities involve issues related to healthcare providers, facility managers, and various professionals, including limited resources, insufficient training, and lack of integrated care (Kerr et al., 2022; Janto et al., 2022). Mills et al. (2023) highlight the importance of whole-person, patient-centered care, recommending preventative screenings, better communication, and integrated healthcare software to enhance patient well-being. Caruana (2014) emphasizes overcoming clinical governance barriers and improving patient care through continuous evaluation and understanding of current practices.

The FDI World Dental Federation's report on "Oral Health for Healthy Ageing" advocates for comprehensive community healthcare systems and improved training for oral health practitioners to support older adults' oral health needs (FDI World Dental Federation, 2023). Kossioni et al. (2018) note that older adults, particularly those frail or dependent, often experience poor oral health due to personal, professional, and policy-related

challenges. They recommend educational initiatives for healthcare providers, health policy reforms, and empowering citizens in oral care.

The Dutch Association of Nursing Home Physicians' Oral Health Care Guideline (OGOLI) emphasizes systematic oral health care for older adults in long-term care, recommending daily oral hygiene, regular professional exams, and monitoring the effects of medications (De Visschere et al., 2011). On the other hand, Chávez et al. (2022) link poor oral health to chronic diseases and highlight the need for improved access to preventive and restorative care. Integrating preventive oral health care into overall health care can enhance health outcomes and reduce costs, emphasizing the global need for policies that address oral health literacy, integrate care, and ensure effective resource use.

1.4.5 Implications for Dental Practice: Oral Health, General Health and Quality of Life.

Declining birth rates and increasing life expectancy are contributing to a growing older adult population. Improved healthcare is extending life expectancy but also increasing the burden of disease and impacting quality of life, including oral health and overall well-being (Kandelman, Petersen, & Ueda, 2008).

The World Oral Health Report 2003 emphasizes that oral diseases are age-related and share risk factors with chronic diseases, underscoring the importance of oral health in overall well-being and quality of life. In a more recent report, the WHO stated that oral diseases are the most common noncommunicable diseases, affecting nearly half of the global population (45% or 3.5 billion people) throughout life, from early childhood to old age (WHO, 2022).

Santucci and Attard (2015) found that while older adults, residing in long term care facilities, in Malta, reported a good quality of life according to the Oral Health Impact Profile-14, General Oral Health Assessment Index, and Denture Satisfaction Scores, their actual oral health status was poor. The study revealed a direct link between poor oral health and reduced quality of life, affected by individuals' perceptions of health and lifestyle.

Niesten & McKenna (2020) note that oral health-related quality of life (OHRQoL) assesses the impact of oral health on physical, mental, and social well-being. They emphasize the need for healthcare professionals to address the significant effects of poor oral health on quality of life, integrating oral health into comprehensive medical evaluations, and promoting good oral hygiene practices.

1.4.6 Implications for Dental Practice: Creating Key Performance Indicators.

Performance Measurement Systems (PMSs) help organizations achieve goals by tracking progress, identifying improvement areas, and enhancing learning and capabilities. Effective PMSs reveal staff competencies and resource needs, boosting team and individual performance, thus improving organizational efficiency (Star et al., 2016).

Healthcare providers and policymakers must commit to enhancing the oral health and quality of life for older adults, involving them in decision-making to foster trust and address their needs (Reh, 2017; Caruana, 2014). Implementing key performance indicators (KPIs) for oral hygiene in long-term care facilities helps monitor and improve service quality (Barone et al., 2011; Badawy et al., 2016). According to PricewaterhouseCoopers (2007), KPIs, both financial and non-financial, are crucial for

tracking progress towards goals. Paul Batchelor (2012) argues that government should establish policy frameworks and local structures to effectively manage oral health care delivery and resources.

1.5 Questionnaires, Oral Hygiene and Periodontal Indices as Key Performance Indicators

To investigate and test an oral care programme and factors associated with it for effectiveness, oral care maintenance efficiency parameters are to be used (Kothari, Nascimento, Jakobsen, Nielsen, & Kothari, 2021). These parameters include, awareness of oral health within the organisation, OH, comprising also denture hygiene and mucosa hygiene, factors affecting dry mouth and periodontal status.

Key Performance Indicators are used to monitor these parameters and help understand the cohesiveness of health care teams, their nature and their function in an organisation at different levels. The key performance indicators indicated below, highlight and identify multi-component variables and factors which will eventually determine whether teamwork is taking place. They also aim at broadening knowledge and comprehension to acquire team interaction and therefore oral care and oral health effectiveness (Ahmed, Siantonas, & Siantonas, 2017).

1.5.1 Questionnaires used to collect Key Performance Indicators Data

Questionnaires are the most common and useful instruments which are used by researchers to collect data and measure performance. Questionnaires need to be formulated in such a way as to determine four aspects within the framework to measure performance. These include, the content itself, the understanding of the content, the use of the content, testing of the content through pilot studies and if necessary, modifying of the content (Barr Stacey, 2017).

The questions need to be constructed according to the data which is required to be gathered. This includes the format in which the data is to be collected such as in values or numbers. The respondents need to understand the questions, therefore simple language with few words should be used. Since human beings are subject to errors, the researcher has to make sure that the questions are formulated in such a way as to avoid mistakes as much as possible. These mistakes may include ticking the wrong answer or missing important questions. This can be done by providing tick boxes, spaces where to write and leaving spaces in between the replies so that eyes can navigate well between one answer and another. Through pilot studies, the researcher can decide whether the respondents answered the questions as expected. If problems are noted, then the questions or the lay out needs to be modified (Barr Stacey, 2017).

1.5.2 Oral Hygiene and Periodontal Indices

Oral Hygiene of individuals or groups can be monitored either at one point in time or over a period of time, by using dental indices. These are used as a quantitative measure of the OH.

As defined by Darby ML and Walsh M (2015),

‘a dental index is a data collection tool that allows the practitioner or researcher to convert specific clinical observations into numeric values that can be quantified, summarised, analysed and interpreted’

1.6 Challenges in providing oral health services to prevent oral disease and enhance general health in older adults – The Way Forward.

Mary E. McNally (2011) stated that decisions to meet patients' health needs should be taken collectively, even though clinical decisions are more often taken on a patient specific basis. Collective decision making should allow prioritization in resource allocation and health education and should consider 'ethical dimensions because outcomes ultimately affect the human condition — whether as an individual or as part of a larger social group.'

1.7 Conclusion and Statement of the Problem

Although State-supported oral health services have been available for several decades, various authors have indicated that the oral health status of the older adults in long term care facilities is poor. This highlights the need for key performance indicators to be applied so as to understand why oral health has not improved, as well as to establish novel approaches to bring about change.

Jurgensen, Petersen, Ogawa, & Matsumoto (2012), commented that in spite of great improvements in health led by science and research, there are health systems which still malfunction. These gaps within health systems create major development challenges. Therefore research aids 'policy-makers, health professionals, researchers, the public, civil society, patients and health system managers' to access information and apply knowledge in order to be able to make informed decisions. Therefore both the practice and the culture within a health environment should go beyond academic entities.

The primary behavioural causes of oral health and disease are i) unhealthy diets ii) insufficient nutrition iii) tobacco use iv) alcohol v) stress associated with psychosocial factors and vi) poor oral hygiene that are patient- and professional generated. These factors together with social determinants such as education, employment and income, highlight the need for oral health action (Kwan & Petersen, 2010). Since there is evidence that periodontal disease is linked to systemic disease and modifiable risk factors which do exist between periodontal disease and non-communicable conditions, the prevention of periodontal disease requires significant implications to devise strategies and formulate policies in health care systems (Petersen & Ogawa, 2012). Cohen (1995), stated that obtaining data from clinical assessments and from public health opinions within communities and populations, results to be beneficial in preventing periodontal disease.

On the other hand, Batchelor. P. (2014), in the publication 'Is periodontal disease a public health problem?', stated that there exists a problem with the approach when managing periodontal disease and the oral health needs of citizens. Watt & Sheiham, (2012), elaborate that most of the models which are used, focus mainly on the actual clinical disease and its assessment, however the impacts caused by the disease are hardly considered. Batchelor. P. (2014), further states that 'Instruments that measure this and how they change need to be adopted'. The author notes that even for the most common intervention, which is dental health education, there is a question about why it needs to be repeated and reinforced annually, especially when evidence indicates its effectiveness.

Kwan & Petersen (2010); Leroy, Eaton & Savage (2010), stated that periodontal disease

cannot be prevented due to a major gap which is not linked to the knowledge of what oral hygiene is or what oral health procedures should be implemented. The problem lies within the fact that organisations find it difficult to translate scientific findings into 'effective and sustainable programmes for groups and populations'.

In 1999, Grixti, C., concluded that 82% of older adults residing in a state residence had high plaque and calculus scores while the majority, 78% of residents, visited the dentist only when they were in pain. Sixteen years later, Santucci and Attard (2015), reported that the oral health status of older adults residing within the same residence was poor and that the attendance to the dental clinic was low (29.3%). In 1999, edentulism stood at 33% amongst the older adults' participating in the study 'Promoting an interdisciplinary approach towards oral maintenance care in an institution for the older adults in Malta', while in 2015, edentulism was found to be that of 41% in a study conducted within the same residence by Santucci and Attard (2015), 'The oral health of institutionalised older adults in Malta.'

This indicates that within sixteen years, the oral health and the OH of older adults within the state residential care facility for older adults did not improve. This requires attention and reinforces the need of a clear evidence based implementation strategy, using key performance indicators, to improve oral health care within SVPR Residence for Older Adults. As Clark & Weale (2012), stated, the implementation of an effective oral health strategy also requires 'priority setting' within a health system, which focuses on what is most important and on what really matters. The authors state that:

'Priority setting is undertaken at many different levels of decision making, from the highest levels of health politics and management, where overall resources are

allocated, to decisions at the bedside (chairside), where the value of interventions has to be assessed.'

In their comprehensive systematic review, 'Oral Health and its Associated factors among Older Institutionalised Residents', Wong, Ng, & Leung (2019), reported that several studies of evidence-based knowledge pertaining to oral health, Oral Health-Related Quality of Life (OHRQoL), and their associated factors among older adults in long term residential care, has been undertaken. The findings underscore the necessity for additional research to validate these observations. To enhance oral health, elevate OHRQoL, and contribute to the overall well-being of older residents, there is a call for targeted clinical trials.

These trials should specifically focus on modifiable factors, including but not limited to, addressing social inequality, improving oral healthcare accessibility, and enhancing the quality of services within nursing homes. By delving into these many sided factors, the aim is to pave the way for tailored interventions that can significantly improve the oral health outcomes and overall quality of life for older adults who reside in long term care facilities (Wong, Ng, & Leung, 2019).

1.8 Objective of the Study

The objective of this research study is to test whether oral health indicators can be used as key performance indicators in a long term facility for older adults.

1.9 Aims of the Study

It is therefore the aim of this study to:

1. Establish whether Self-reported data, Oral Hygiene and Periodontal Indices can be used as measuring tools to assess and monitor manpower performance.
2. Determine whether Self-reported data, Oral Hygiene and Periodontal Indices indicate that the older adults are managing oral self-care on daily basis.
3. Evaluate whether Self-reported data, Oral Hygiene and Periodontal Indices measure the effects poor oral hygiene has on general health and quality of life.
4. Determine whether oral health education does affect the results obtained from clinical assessments when using Self-reported data, Oral Hygiene and Periodontal Indices as key performance indicators.
5. Explore if Self-reported data, Oral Hygiene and Periodontal Indices can be utilised as key performance indicators in a long-term facility for older adults.

1.10 Null Hypotheses

The Null hypotheses of the study are:

1. Self-reported data, Oral Hygiene Indices and Periodontal Indices cannot be used as measuring tools to assess and monitor management and manpower performance as regards to the provision of oral health care on daily basis.
2. Self-reported data, Oral Hygiene Indices and Periodontal Indices cannot be used as measuring tools to assess and monitor oral self-care of older adults on daily basis.
3. Oral hygiene Indices and Periodontal Indices do not necessary measure the effects poor oral hygiene has on general health and quality of life.
4. Oral health education does not improve oral health as measured by Self-reported data, Oral Hygiene and Periodontal Indices.
5. Self-reported data, Oral Hygiene and Periodontal Indices cannot be used as oral health key performance indicators in a long-term facility for older adults.

Chapter 2

Methods and Materials

2.1 General Design of the Study

2.1.1 Rationale for conduction of the study at SVPR

The decision to conduct this study at St. Vincent de Paul Residence (SVPR) was driven by several key factors, grounded in both the unique nature of the residence for older adults and the researcher's professional background. SVPR, as a standalone government facility, offers specialized long-term care to older adults, which is distinct from other older adults' care homes, including private ones. With its own administrative structures and corporate governance, SVPR operates on a scale and level of care comparable to that of a hospital, providing a highly specialized environment for geriatric healthcare, including oral health services. This made SVPR an ideal setting for a comprehensive study on oral health and periodontal care in older adults.

Additionally, the researcher has a long-standing professional association with SVPR, having served as a dental hygienist at the residence from 1995 until 2016, providing direct dental hygiene services to its residents. Since 2016, the researcher has been involved in mentoring students in dental geriatric care as a clinical supervisor at the Faculty of Dental Surgery, University of Malta, within the teaching dental clinic at SVPR. This extensive experience and familiarity with both the residence and its residents provided a unique perspective and insight into the oral health challenges faced by older adults in long-term care.

Given the specialized nature of the care provided at SVPR, the study sought to highlight the comprehensive resources, diverse resident population, and the residence's hospital-like care standards to explore and evaluate oral hygiene and periodontal health

outcomes. Furthermore, the unique demands and complexities of the services provided at SVPR, underscored the importance of investigating oral health in this setting. The requirement for higher levels of resources compared to standard for older adults further justified the choice of SVPR as the focal point for this research, aiming to address gaps in oral health knowledge and care provision among older adults in this particular long-term care.

In conclusion, the unique characteristics of SVPR, combined with the researcher's professional expertise and longstanding involvement in the long term care facility, provided a compelling rationale for selecting SVPR as the site for this study. The study aimed to contribute to the understanding of oral health needs among older adults at SVPR and to inform future interventions and improvements in oral care delivery.

2.1.2 Subjects and Location

Healthcare professionals and older adult individuals participating in this research were employed and resided respectively, at St. Vincent de Paul Long-Term Residential Care Facility for Older Adults.

2.1.3 Type of Study

This longitudinal study was carried out to primarily determine whether oral hygiene and periodontal indices, together with self-reported data can be used as key performance indicators at SVPR.

2.1.4 Sample

In determining the sample size for the target population, which includes both staff members and older adults, the chosen technique was simple random sampling (Bell, E. et al., 2022).

To determine the sample size for the target population of staff members and older adults to participate in questionnaires and interview questions, Yamane's Sampling formula (1973), (Chaokromthong, K, et al., 2021), was used:

$$n = \frac{N}{1 + N(E)^2}$$

Where:

n is the required sample size from the population under study.

N is the whole population that is under study.

E is the precision or sampling error which is usually 0.05 at a level of confidence level of 95%.

Calculation:

For number of staff members participating in the questionnaire:

$$n = \frac{400}{1 + 400(0.05)^2}$$

$$n = \frac{400}{1 + 400(0.0025)}$$

n = 200 participants.

For number of older adults participating in the interview and clinical study, using the same formula:

$$n = \frac{1200}{1 + 1200(0.05)^2}$$

n = 300 participants

The participant count for the clinical research study involving older adults was raised to 384, compensating for potential attrition in the original group.

2.1.5 Procedure

2.1.5.1 Calibration

Training on periodontal disease diagnosis and charting was conducted by Professor Kenneth Eaton before the project started. Research on equipment and instruments ensured standardization and relevance in the prevalence study data collection. The reliability of computer-aided periodontal measurements around six teeth in two patients was evaluated using the Intra-Class Correlation Coefficient. A total of 36 measurements, including periodontal pocket depths and recession at mesial, distal, and mesiodistal sites, were recorded on two different days. The averages of these 72 measurements were then analyzed to determine the calibration of the lead investigator and assess both intra- and inter-observer variability with another seasoned investigator.

2.1.5.1.1 Intra-observer Agreement for the Periodontal Pocket Depths and Recession Measurements

Table 3 Intra-Observer Measurements

Investigator	Intra-class Correlation Coefficient	
	Periodontal Pocket Depth	Recession
Main Investigator	0.873 (>0.05)	0.996 (>0.05)

2.1.5.1.2 Inter-observer Agreement for the Periodontal Pocket Depths and Recession Measurements

Table 4 Inter-observer Measurements

Intra-Class Correlation Coefficient	
Periodontal Pockets Depth	0.776 (>0.05)
Recession	0.968 (>0.05)

Findings indicated that there were no significant results and therefore both clinical examiners were well calibrated.

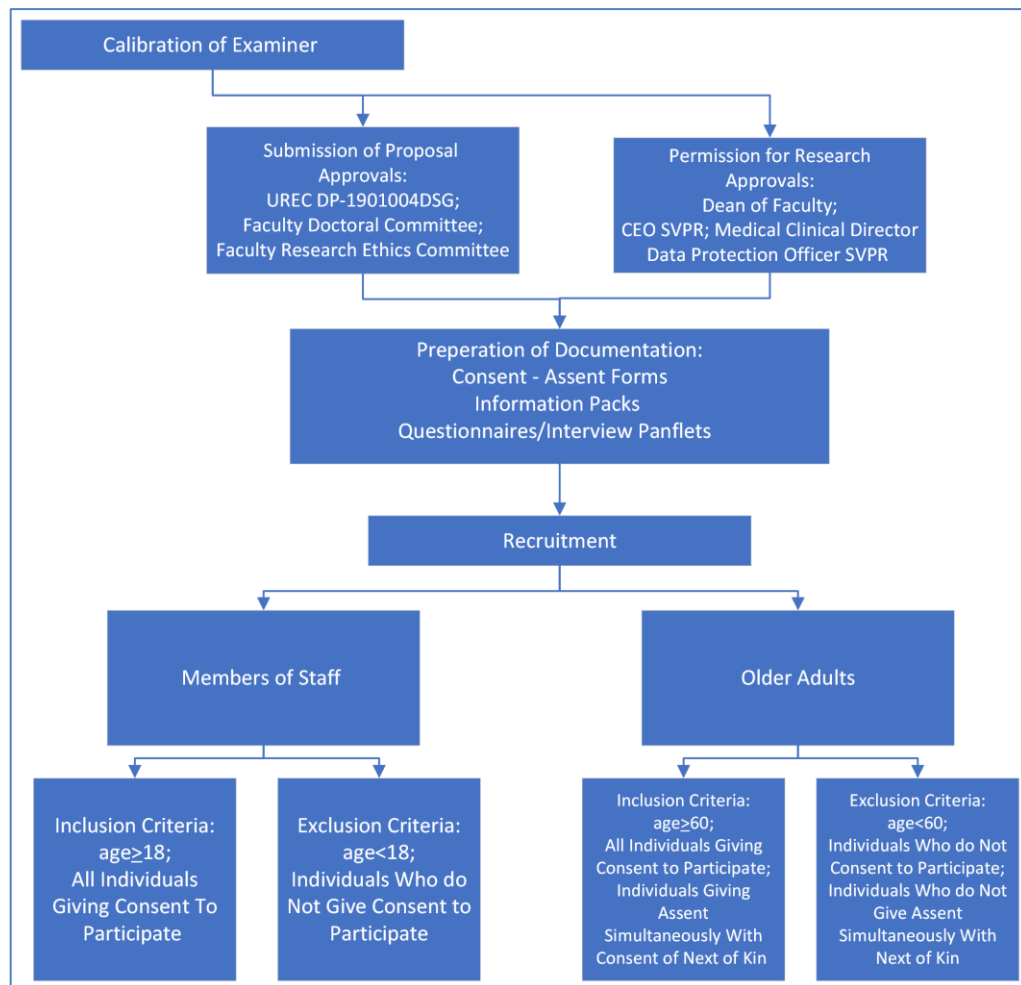


Figure 5 Flow Chart: Research Design Initial Phases and Recruitment

2.1.5.2 Ethical Consideration

The following steps demonstrate a commitment to ethical research practices, participant confidentiality, and compliance with relevant regulations and guidelines. The emphasis on securing approvals at multiple levels and implementing safeguards for participant data reflects a rigorous and ethical approach to the research process (Figure 5).

1. Ethical Approval:

- A comprehensive research proposal was submitted to the Faculty Research Ethics Committee, Faculty Doctoral Committee and the University Research Ethics Committee at the University of Malta.

- Permissions and authorizations to conduct the study were sought and obtained (Appendices 1-12; pgs 476 – 487).

2. Approvals from Various Authorities:

- Approvals were obtained from the University Research Ethics Committee (UREC DP-1901004 DSG; Appendix 3; pg. 478), Dean, Faculty of Dental Surgery (Appendix 4; pg. 479), Chief Executive Officer, SVPR (Appendix 5-6; pg. 480, 481) and Clinical Chairperson (Appendix 7-8; pg. 482, 483) at SVPR.

3. Data Collection Approvals:

- Approvals for data collection permission to access patients' data according to the GDPR declaration, were secured by the data protection officer at SVPR (Appendices 9-12; pgs. 484 - 487).

4. Informed Consent Process:

- Consent forms for Next of Kin/Guardians, were distributed to staff members and older adults (Appendices 15, 16; pgs. 498 - 507).

- Information packs and recruitment letters and covering letters (Appendices 13, 14; pgs. 488 - 497) and questionnaires and interview questions (Appendices 17, 18; pgs. 508 - 569), were provided in both English and Maltese versions.

5. Pseudonymous Study Design:

- The study was conducted in a pseudonymous manner.
- A file linking participant details to identification numbers was created.
- This file was stored in an encrypted hard drive, kept in a locked office, accessible only to the supervisor.
- The encrypted file ensured participant information could not be traced back.
- Once the study concluded, the data linking identification numbers to participants on the encrypted hard drive was kept for ten years.

2.1.5.3 Recruitment

A cross sectional analysis to obtain base-line information of the prevalence of attitudes towards daily oral care of administrative and clinical authorities and health staff members at St. Vincent De Paul Residence was conducted. Therefore leading administrators from the administrative offices, medical doctors, allied health professionals, nurses and carers from selected wards and dental professionals were invited to participate in the study.

Older adults from selected wards were also invited to participate in the study.

2.1.5.3.1 Inclusion and Exclusion Criteria

The following inclusion and exclusion criteria were used to select the participants for this research project.

2.1.5.3.1.1 Inclusion Criteria

- Members of staff who were 18 years and over.
- Older adults who were 60 years of age or over.
- All participants including those with physical, medical and cognitive impairment (few of the participants might have be of an age out of the research parameters, however older adults were not excluded due to ethical reasons).
- Older adults who managed to communicate to participate in the interview according to the ward managers' decision.
- All individuals who gave consent to participate in questionnaires, clinical assessments and interviews.

2.1.5.3.1.2 Exclusion Criteria:

- Individuals who did not give consent to participate (staff members and older adults).
- Cognitively impaired older adults who did not give assent to participant simultaneously with the consent of the next of kin.
- Older adults who couldn't participate due to lack of ability to communicate according to the ward managers' decision.

2.1.5.4 Wards Chosen For Research Study

Table 5 Wards Chosen for Research Study by Random Sampling

Wards	Male	Female	Mixed	Dementia Male	Dementia Female
		St Frances 3			
	SJ4	RB1	SJ2	JP2	JP1
		RB3			JP3
	Lourdes	St Frances 2			JP5
		Mother Tereza 1			

During the first meeting with the administrative and clinical leadership at SVPR, the wards earmarked for the research study (Table 5), were chosen using a simple random sampling approach. The gender distribution within this study is a true representative of the gender distribution of older adults at SVPR, which is 2 females : 1 female.

2.1.5.5 Cross-Sectional Research Design

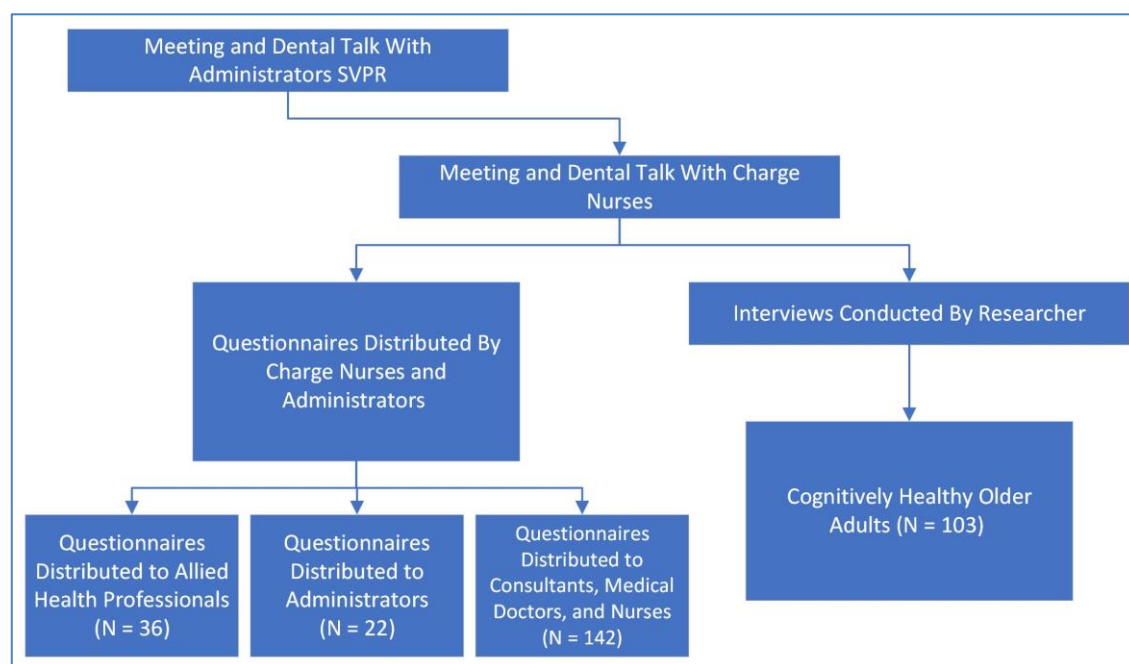


Figure 6 Flow Chart of the Cross-Sectional Research Design

2.1.5.5.1 Initial Meetings with Administrators

The research study was discussed, and oral health talks were delivered during a subsequent meeting held with the administrative authorities, namely, the Chief Executive Officer, the Clinical Chairperson, the Chief Nursing Manager and with the Charge Nurses (Managers) of all the chosen wards prior to commencement of the research project (Figure 6).

2.1.5.5.2 Questionnaires

A questionnaire was devised (Appendix 17, pg. 508 - 536) and circulated to administrative/clinical authorities and clinical staff members at St. Vincent De Paul Residence, including medical doctors, allied health professionals, nurses and carers and dental professionals. This questionnaire highlighted the attitudes towards oral health and the current practices of professionals working at the residence to assist the older adults to maintain oral health. The professionals were asked about the awareness regarding their own oral health.

The questionnaires were distributed by two intermediaries, the Chief Nursing Manager and the Secretary of the Medical Director, at SVPR, to 200 members of staff, representing a total population of 400 professional health workers and care-givers (Figure 6). The two intermediaries were present during the first meeting when the researcher introduced the research study. Both intermediaries successfully carried out the tasks of disseminating and gathering the questionnaires.

2.1.5.5.3 Interviews

Interviews (Appendix 18, pgs. 537 - 569) were undertaken with 103 older adults individuals who agreed to respond to the interview questions at that particular moment in time. This was done in order to determine their oral needs and the services required by the interdisciplinary team. The prospective participants were first approached by an intermediary to obtain consent. The intermediary person chosen was the Charge Nurse, who is the person in charge of the ward. The interviews were conducted with the older adults residing within the wards chosen for the research study. Only those who gave their consent were approached by the researcher (Figure 6).

2.1.5.6 Longitudinal Research Study Design

A longitudinal study over a period of two and a half years followed the collation of data of questionnaires and interviews.

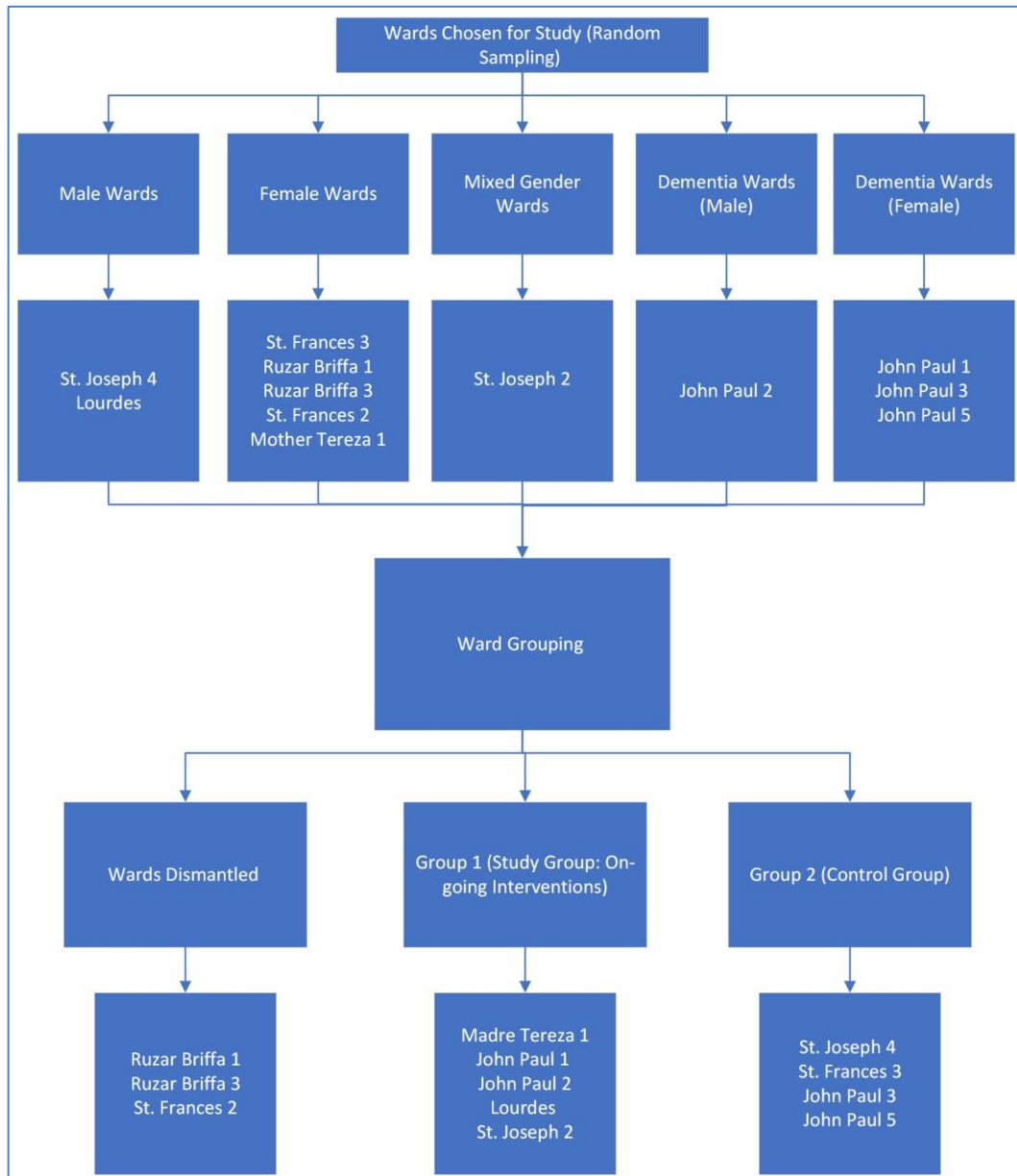


Figure 7 Flow Chart of the Longitudinal Research Study Design

2.1.5.6.1 Ward Grouping for the Longitudinal Clinical Research Study

The same wards which were randomly chosen for the cross-sectional research study were again chosen for the longitudinal clinical research study. However, some adjustments had to be made since some wards were dismantled due to Covid-19 pandemic. Ruzar Briffa 1, Ruzar Briffa 3 and St. Frances wards were transferred into Covid wards and patients were reallocated into other wards which were not included in the study. Due to this, two more wards, St. Frances 3 and Jean Paul 5 wards, were added to compensate for the shifting of patients (Figure 7).

2.1.5.6.1.1 Study Group and Control Group

The participants, at ward level, were divided into two groups, Group 1 (study group) and Group 2 (control group).

Group 1 (study group), received ongoing oral health information which consisted of oral health talks, oral hygiene instructions, oral self-care reminders. They also received non-surgical periodontal treatment if required. This group was clinically monitored and assessed using oral hygiene and periodontal indices, referred to as key performance indicators in this research study. This clinical assessment was conducted every four or six months, to establish the level of self-care (Figure 7).

Group 2 (control group), was also clinically monitored and assessed using key performance indicators, every four to six months, to determine the level of self-care. However they did not receive oral hygiene instructions, oral health talks, reminders and non-surgical periodontal treatment.

Notwithstanding this, older adults, participating and not participating in the study, were not denied any dental/oral intervention which they might have asked for or required and which was being offered at the Dental Teaching Clinic at SVPR Residence (Figure 7).

Therefore the clinical study as intended, was conducted to establish a cause-effect relationship.

2.1.5.6.1.2 Ethical Considerations for the Longitudinal Clinical Research Study

The prospective participants were first approached by an intermediary. The intermediary person chosen was the Charge Nurse, who is the person in charge of the ward and who was present during the first meeting which was conducted when the researcher introduced the research project to the administrative staff at SVPR.

In the case of cognitively-impaired older adults, the intermediary attempted to attain assent (Appendix 16; pgs. 503 - 507), which includes an affirmative agreement to participate in oral hygiene assessments/research study as expressed verbally, therefore saying 'yes' or a non-verbal indication of willingness to cooperate with study procedures, such as acting behaviourally and thus agreeably or emotionally, therefore having a positive facial expression, both at the time of enrolment and over the course of the study). In the case of this research project, the assent was obtained simultaneously with the participation and consent of the next of kin, in order to ensure that interpretation of expressions and gestures were correct.

2.1.5.7 Longitudinal Research Clinical Study with Interventions

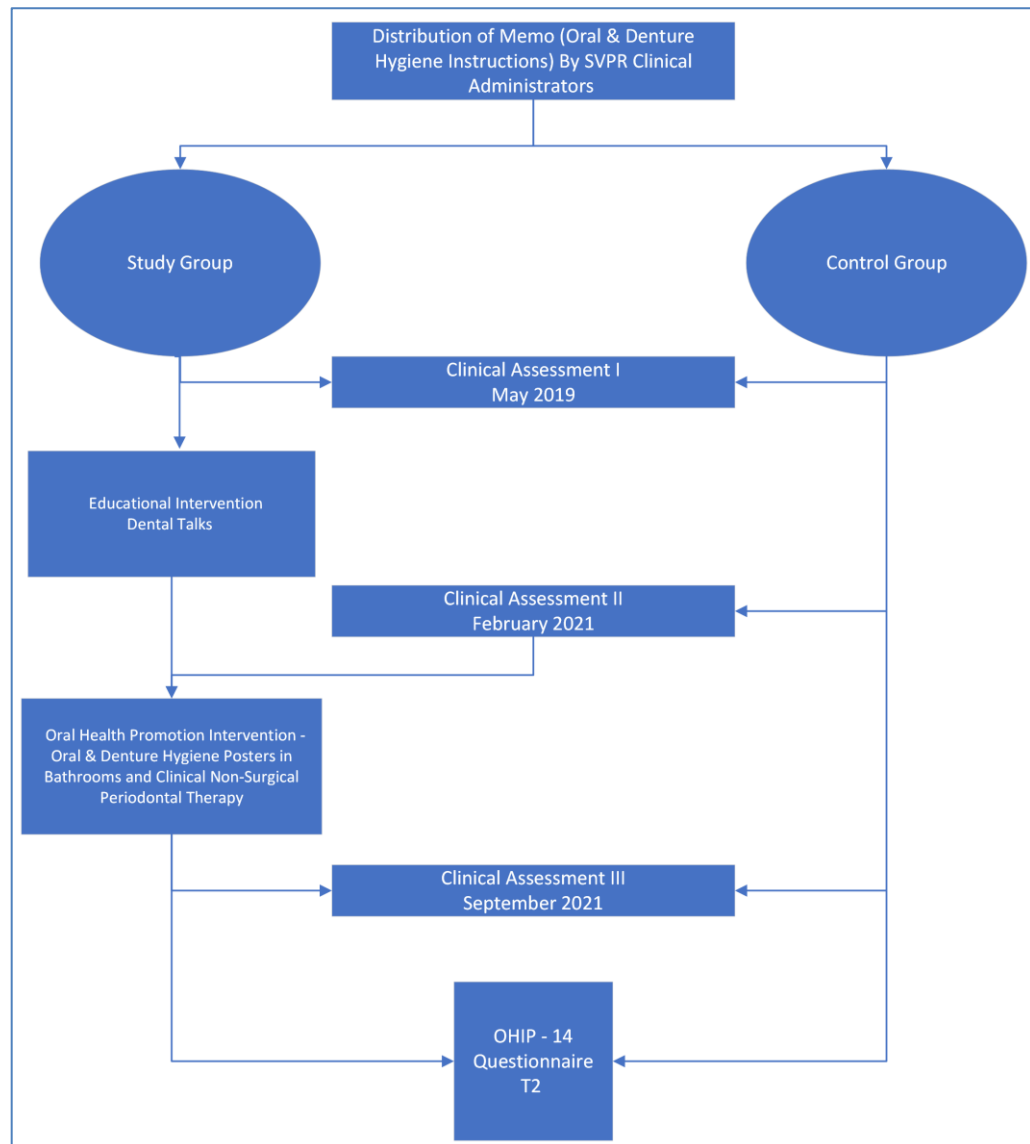


Figure 8 Flow Chart of the Longitudinal Clinical Research Design with Interventions

2.1.5.7.1 First Intervention – Delegation of Daily Oral Care Duties to Charge Nurses and Ward Staff Members (Wards in Study Group and Control Group)

A memo (Appendices 20, 21; pgs. 588 - 591), regarding daily oral care for older adults residing at SVPR, was drafted by the researcher and sent to the Clinical Director to be endorsed and distributed to all Charge Nurses of wards participating in the research study. The aim of this memo was to serve as a direct order to all Charge Nurses participating in the study, to delegate daily oral care duties to their members of staff.

This intervention was considered to be the primary step before daily oral care was included in the Standard Operating Procedures at SVPR. The main goal being of enhancing efficiency in providing daily oral care to residents, ensuring good clinical outcomes, and maintaining consistent performance, all while minimizing non-compliance with SVPR organisational standards (Figure 8).

2.1.5.7.2 Second Intervention – Educational Intervention (Study Group)

Dental talks were held in five wards within the Study Group. Talks were aimed at six working shifts of nurses and carers in each ward. Oral hygiene instructions were also delivered to older adults during the clinical assessments. The aim of this education intervention was to create oral health and oral hygiene awareness amongst staff members and older adults within the study group wards. The researcher communicated updated evidence-based information in oral health research. Since this was a comparative study, the outcome of this educational intervention indicated whether staff members employed in wards where talks had been delivered and older adults residing in these wards, have benefitted from the educational information compared to those

staff members and older adults, who did not receive dental talks and oral hygiene instructions respectively. This was determined after clinical results of patients showed any significant difference or not in the maintenance of daily oral care of the participants (Figure 8).

*2.1.5.7.2.1 **Third Intervention** – Non-Surgical Periodontal Therapy and Oral Health Promotion*

2.1.5.7.2.2 Clinical Intervention – Study Group

Appointments were scheduled, and non-surgical periodontal treatment was offered to those patients residing in wards within the study group. These patients were assessed in the wards during the 1st and 2nd round of data collection and the clinical intervention took place before the last round of clinical assessments (Figure 8).

Staff members from wards who consented to participate in the study, were offered a dental check-up and a periodontal assessment. Due to the Covid 19 pandemic and union directives which hindered staff members from attending the dental clinic due to the unavailability of the Covid 19 swabbing test at SVPR, only six staff members attended for the check up and clinical assessment. Therefore due to the low number of participants, the clinical data collected for staff members, was not analysed since the sample did not represent the whole population of staff members. This would have given a clear picture of the OH of the professionals. (Participants who refused to participate in the research project, were not denied any dental/oral intervention which they required. This is being stated for ethical reasons. This service is available to all staff members at the Dental Teaching Clinic at St. Vincent de Paul Residence).

2.1.5.7.2.3 Oral Health Promotion Intervention – Study Group

A pictorial poster depicting the toothbrushing technique and care for dentures, was designed and printed on waterproof sticky posters (Appendix 22; pg. 592). These posters were distributed and stuck on the walls of bathrooms of the Study Group wards, near the water basins. Posters were additionally affixed to notice boards located in the reception areas within the study group wards. The intention was to remind both staff members and older adults to brush teeth and/or dentures daily (Figure 8).

2.1.5.7.2.4 Fourth Intervention - OHIP – 14 Interview

A follow-up OHIP-14 interview was carried out with older adults who remained communicative and whose cognitive decline was controlled. This follow-up aimed to assess any potential alterations in the older adults' quality of life following the completion of the interventions (Figure 8).

2.1.5.7.3 Clinical Assessments – Study Group and Control Group

The clinical data collected from the clinical assessments which were conducted during the three time intervals in between the Study Group interventions, determined whether there had been any developments and changes in the oral hygiene and periodontal status of the participating older adults, both at individual and group level (Figure 8).

2.2 Materials

2.2.1 Questionnaires and Interviews

Questionnaire and interview documents (Appendices 17, 18; pgs 508 - 569), provided information regarding various aspects in terms of attitude towards overall dental care and services by members of staff employed at SVPR and older adults residing at the long term care facility.

A comprehensive questionnaire/interview document was compiled by combining three questionnaires:

- The first section of the questionnaire and the interview questions was obtained from a previously validated questionnaire 'Oral Health in Adults', which has been used in several Faculty of Dental Surgery, University of Malta, surveys including the National Oral Health Survey.
- The second section of the questionnaire/interview questions was obtained from a previously validated questionnaire that explored the oral health and oral hygiene practices of staff members and older adults at SVPR, 'An Interdisciplinary Approach Towards Oral Maintenance Care at St. Vincent de Paul Residence'. This section of the questionnaire/interview holds significant importance, as it involves asking identical questions to participants currently working or residing at SVPR. The findings from this research project can then be compared with those obtained two decades ago from employees and residents who took part in the study conducted in 1999.

- The final part of the questionnaire/interview questions consisted of the Oral Health Impact Profile - 14, a designed and internationally validated questionnaire which assesses patients' perception of the impact of oral disorders on their quality of life. The questionnaire has been chosen to cover the entire population, ensuring the inclusion of partially and fully edentulous patients.

2.2.2 Clinical Assessments

The clinical assessments were carried out in wards using LED headlamps (TaffLED High Power Headlamp, 2500 lumen), mouth mirrors, CPITN and North Carolina 15 periodontal probes. Table 6 illustrates the instruments used during the clinical assessments. These periodontal probes were used to measure plaque accumulation, calculus present, pocket depths, recession, clinical attachment levels and to detect mobility. Naber's furcation probes were used to assess furcations.

Table 6 Measuring Instruments and Indices

Oral Measurements	Instrument Used	Indices and Documentation
Debris (plaque) Calculus	Explorer Periodontal Probe used as a miniature measuring ruler	Oral Hygiene Index - Greene and Vermillion Oral Hygiene Index (1964) (Dental Hygiene Assessment Document, Appendix 19; pgs. 570 - 587)
Basic Periodontal Examination	Community Index of Periodontal Treatment Needs Probe (CPITN)	British Society of Periodontology (Dental Hygiene Assessment Document, Appendix 19; pgs. 570 - 587)
6 point Periodontal Chart	CP15 University of North Carolina (UNC- 15) Periodontal Probe	- PPDs - Recession - CAL (6 point pocket chart, Appendix 19; pg. 570 - 587)
Bleeding on Probing – Sulcus Bleeding Index Score	Community Index of Periodontal Treatment Needs Probe (CPITN, having a 0.5mm diameter tip)	Muhlemann & Son 1971 (charted on bleeding score chart, Appendix 19; pg. 570 - 587)
Mobility	Two metallic handles of two instruments (mouth mirrors)	Grace and Smales 1989 (charted on 6 point pocket chart, Appendix 19; pg. 570 - 587)
Furcation	Naber's Furcation Probe	Glickman, I 1979 (Charted on 6 point pocket chart, Appendix 19; pg. 570 - 587)

Observations

1. Hyposalivation

Hyposalivation, the reduced production of saliva, is an important clinical observation often noted in older adults, particularly those residing in long-term care facilities. While not measured quantitatively in this study, its presence can have significant implications

for oral health. Saliva plays a critical role in maintaining oral homeostasis by lubricating the mouth, aiding in digestion, and protecting against bacterial growth. Although this study did not quantify salivary flow, the observation of dry mouth symptoms in the population suggests a need for further attention to the oral care needs of residents in long-term care.

2. Denture Hygiene

Denture hygiene was not assessed using specific denture cleanliness indices in this study but was instead evaluated through observational assessment for cleanliness or otherwise.

3. Mucosa Hygiene

Mucosa hygiene in this study was assessed through oral observation to determine whether the oral mucosa was clean or otherwise.

6-Point pocket charts and Bleeding Score charts were used to document pocket depths, recession, CAL, furcation, mobility and bleeding respectively (Appendix 19).

The Dental Hygiene Assessment Form (Appendix 19; pgs 570 - 587), provided further information regarding demographics, health issues, pharmacological, dietary, medical, dental, social and family histories.

The data gathered from the dental hygiene assessment form, was collated, inputted and used to determine the independent and dependent variables for comparison and correlation purposes to obtain analysis of statistical results.

2.2.3 Data Collation

All data, collated from the cross-sectional study (the questionnaire and interviews), and the longitudinal study (clinical data using oral hygiene and periodontal indices), were inputted in an excel sheet respectively, coded and imported into an SPSS programme. The data was then analysed using various statistical tests.

Statistical analysis involves summarizing continuous variables (such as mean, standard deviation, range, and median) and categorical variables (including absolute and relative frequencies).

To evaluate the non-linear relationship between ordinal or continuous parameters (like OHIP scores and self-assessment of OH), Spearman's correlation coefficient was used.

The two-sample t-student's test was utilized to compare OHIP scores between two groups (e.g., male/female), while the one-way ANOVA extension was employed to compare means among more than two groups (such as different professional groups), considering the large sample size and applying a parametric approach.

For comparing distributions of ordinal data between two independent groups (e.g., by gender, by type of ward), Mann-Whitney tests were performed. Kruskal-Wallis tests served the same purpose when dealing with more than two groups.

Chi-square independence and Fisher's exact tests were employed to examine associations between categorical variables (e.g., by gender, by type of ward).

To mitigate the risk of obtaining false-positive results (type I errors) when conducting multiple pairwise tests on a single dataset, the Bonferroni correction was applied. This

correction adjusts the significance threshold to account for the increased likelihood of identifying a significant result purely by chance as more hypotheses are tested.

Next, averaged values from grouped and weighted responses of staff members were calculated. This process was done to ensure that the sample accurately represented the broader population, thereby reducing bias and enhancing the reliability and validity of the research outcomes.

2.3 Chapter Summary

This chapter explores the aspects of the research design employed in this study and the instruments and documents used throughout the research, providing a comprehensive overview. It includes the process of participant selection, offering insight into the criteria and methodologies applied. Furthermore, ethical considerations pertinent to the study are discussed, underlining the importance of maintaining adherence to ethical standards.

In the next chapters, the outcomes of results derived from the data collection phase, will be presented in a statistical manner and integrated into the broader context of the research.

Chapter 3

Self-Reported Attitudes and Perceptions about Oral Health and Quality of Life of Staff Members St. Vincent de Paul Residence for Older Adults

3.1 Introduction

In analysing the demographic profile of the staff at SVPR, this chapter delves into the characteristics of the participants, including their age, gender, professional roles, and ward assignments. By examining these variables, the chapter highlights the distribution of respondents and identify any prevailing trends or patterns within the population. The study reveals a notable predominance of administrators, health carers, and State Registered Nurses, with fewer oral health professionals participating, due to their lower representation at SVPR. This section also highlights the age distribution of the participants and the varied educational backgrounds, providing a comprehensive overview of the workforce involved in this study. Furthermore, the categorization of wards based on cognitive health conditions explores the differences in oral hygiene practices and education needs among different settings.

3.2 Aim

The primary aim of this part of the research is to assess the attitudes towards daily oral care and oral health related quality of life of staff members at St. Vincent de Paul, a long term residence for older adults.

3.3 Methods and Materials

A cross-sectional study was conducted to establish foundational data on the prevalence of attitudes towards daily oral care among managerial staff, medical professionals, nursing staff, allied health professionals and caregiver.

As stated in Chapter 2, a questionnaire was created and distributed to administrative/clinical authorities and clinical staff members at St. Vincent De Paul Residence, including medical doctors, allied health professionals, ward staff members, and dental professionals. The questionnaire focused on assessing attitudes toward oral health, current practices among professionals aiding older adults in maintaining oral health, and the professionals' awareness of their own oral health. The selection of wards was done randomly using a simple random sampling procedure.

3.3.1 Inclusion and Exclusion Criteria Specific for Staff Members working at SVPR, LTCF

3.3.1.1 Inclusion Criteria:

- Staff members who were 18 years and over.
- All individuals who gave consent to participate.

3.3.1.2 Exclusion Criteria:

- Individuals under the age of 18
- Individuals who did not give consent to participate.

3.4 Sample

The sample consisted of 213 staff members, working as administrators, managers, doctors, nurses, allied health professionals or carers at St. Vincent de Paul Long Term Care Facility for Older Adults. Section 3.6.1 describes exhaustively the participant's socio-demographic profile. 13 staff members did not fill in the questionnaire while another 25 members of staff did not reply to all the questions.

Participants filled a questionnaire collecting information about:

- Section A: Teeth, Gingival Health and Tooth Brushing Techniques
 - Section B: Oral Health Education at St. Vincent de Paul Residence
 - Section C: Importance of Oral Health to Older Adults (Referrals by staff members)
 - Section D: Frequency of Toothbrushing and Denture Cleaning as requested by Older Adults/Visits at the Dental Clinic
 - Section E: Facilities in wards which enhance daily oral care/Accessibility to the dental clinic
1. Section F: OHIP-14 ((E.g. of Scores: Scores allocated to Pain and Discomfort responses: **1 Very Often; 2 Fairly Often; 3 Occasionally; 4 Hardly Ever; 5 Never; 6 Don't know**).

3.4.1 Presentation and Sequence of Results

In this chapter, results will be presented in a sequence as follows:

Results of Staff Members' Questionnaires according to questionnaire sections A – E and

OHIP – 14 questionnaire:

1. Gender
2. Ward
3. Professional Groups
4. Professional Group 1

3.5 Statistical Analysis

Statistical analysis consists of a general description for continuous variables (mean, standard deviation, range and median) and categorical variables (absolute and relative frequencies).

- Spearman's correlation coefficient was estimated to assess the non-linear association between ordinal or continuous parameters (for example: OHIP scores and self-assessment of OH).
- Two-sample t-student's test to compare OHIP scores between two groups (e.g. male/female). The extension one-way ANOVA was used to compare means between more than 2 groups (professional groups). Given the very large sample size, a parametric approach was applied for this purpose.
- Mann-Whitney tests were used to compare distributions of ordinal through two independent groups of patients (by gender, by type of ward)($U = ?$, $z = ?$ $p = ?$).
- Kruskal-Wallis tests were used to the same previous purpose when more than 2 groups were involved.
- χ^2 independence ($\chi^2 = (\text{degrees of freedom; } N = \text{sample size}) = \text{chi-squared statistic value; } p = p \text{ value}$) and Fisher's exact tests were conducted to assess the association between categorical variables (by gender, by type of ward).

Significance level used in analysis was set at 5% ($\alpha = 0.05$).

3.6 RESULTS

3.6.1 Demographics

The following results show the basic descriptive statistics for demographical and clinical profile for members of staff participating in this research study.

3.6.1.1 *Number of Participating Members of Staff and their Deployment Areas*

Table 7 SVPR Deployment Areas

Deployment Areas	N	%
Total	193	100.0
Day Clinic	6	3.1
Dental Clinic	4	2.1
Doctors' Quarter	4	2.1
JP 2 (Dementia Ward-Male)	3	1.6
Lourdes (Male-Ward)	11	5.7
JP 1 (Dementia Ward-Female)	10	5.2
JP 3 (Dementia Ward-Female)	8	4.1
JP 5 (Dementia Ward-Female)	4	2.1
Madre Tereza (Female Ward)	14	7.3
RB 1 (Female Ward)	13	6.7
RB 3 (Female Ward)	13	6.7
SF 3 (Female Ward)	8	4.1
SJ 2 (Mixed Ward)	12	6.2
SJ 4 (Mixed Ward)	15	7.8
SVPR*	68	35.2

*health workers who did not state where their deployment area was.

Questionnaires were gathered from the number of participants as seen in Table 7. The majority of participants, 7.8% (N=15), were employed at St. Joseph Ward 4. The ward had been chosen randomly in the control group and it was a ward where male residents reside. The staff members are male employees, namely the Charge Nurse, State Registered Nurses, State Enrolled Nurses and care-givers. The minority of participants, 2% (N=4), included doctors from the Doctors' Quarters, 4% (N=4) from John Paul 5, a female ward having cognitive impaired patients and therefore female employees and 4% (N=4) from the Dental Teaching Clinic, which also includes oral health professionals employed by the public service.

3.6.1.2 Deployment Area by Gender

Table 8 Deployment Area by Gender

Staff Members	Deployment of Staff Members by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	193	100.0	67	100.0	126	100.0
Day Clinic	6	3.1	0	.0	6	4.8
Dental Clinic	4	2.1	1	1.5	3	2.4
Doctor's Quarters	4	2.1	3	4.5	1	.8
JP1	10	5.2	1	1.5	9	7.1
JP2	3	1.6	0	.0	3	2.4
JP3	8	4.1	0	.0	8	6.3
JP5	4	2.1	0	.0	4	3.2
LOURDES	11	5.7	2	3.0	9	7.1
MT	14	7.3	8	11.9	6	4.8
RB1	13	6.7	5	7.5	8	6.3
RB3	13	6.7	2	3.0	11	8.7
SF3	8	4.1	1	1.5	7	5.6
SJ2	12	6.2	6	9.0	6	4.8
SJ4	15	7.8	7	10.4	8	6.3
SVPR	68	35.2	31	46.3	37	29.4

Traditionally, male nurses and carers were deployed in wards for male residents while female employees were deployed in wards for female residents. Table 8, indicates that the majority of female employees who responded to the questions asked in the questionnaire, are deployed in wards for females (N=53) and also in wards for males (N=20) and in mixed wards (N=6).

3.6.1.3 Professionals by Gender

Table 9 Number of Participants according to Profession

Staff Members	Number of Staff members according to Profession by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	175	100.0	59	100.0	116	100.0
Consultant	4	2.3	3	5.1	1	.9
Physiotherapist	9	5.1	2	3.4	7	6.0
Speech Language Pathologist	1	.6	1	1.7	0	.0
Occupational Therapist	4	2.3	1	1.7	3	2.6
Podiatrist	9	5.1	2	3.4	7	6.0
Day Clinic Nurses	6	3.4	0	.0	6	5.2
Charge Nurse	10	5.7	3	5.1	7	6.0
SRNs	25	14.3	4	6.8	21	18.1
Carers	43	24.6	11	18.6	32	27.6
Nursing Aid	1	.6	1	1.7	0	.0
Administrators	58	33.1	30	50.8	28	24.1
Retired Volunteer	1	.6	0	.0	1	.9
Dental Hygienists	1	.6	0	.0	1	.9
Dental Technologists	1	.6	1	1.7	0	.0
Dental Assistants	1	.6	0	.0	1	.9
Dental Carers	1	.6	0	.0	1	.9

Table 9 shows that according to the responses of the participants, the majority of health professionals participating included administrators, 33.1% (N= 58), health carers, 24.6% (N=43) and State Registered Nurses, 14.3% (N= 25). As can be observed, the least number of participants included oral health professionals, however this is attributed to

the fact that few oral health professionals are employed at SVPR. The majority of administrators being males (50.8%, N=30) and the majority of nurses and carers being female (51.7%; N=60).

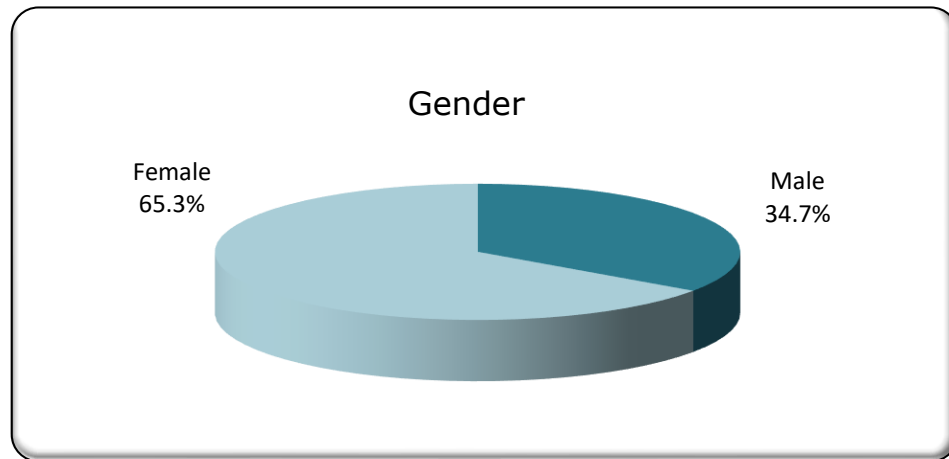


Figure 9 Gender of Health Professionals

Figure 9 indicates that two thirds of the staff members participating in the study, 65.3% (N=130.6), were females while 34.7% (N= 69.4) were males.

In order to extract reliable conclusions, it has to be considered that the distribution of gender is highly dependent on the job occupation. This is highlighted in Table 18, where it can be noted that the percentage of male administrators (50.8% N=30) is high and so is the percentage of State Registered Nurses and Carers (45.7%). that two thirds of the staff members participating in the study, 65.3% (N=130.6), were females while 34.7% (N= 69.4) were males.

3.6.1.4 Age by Gender

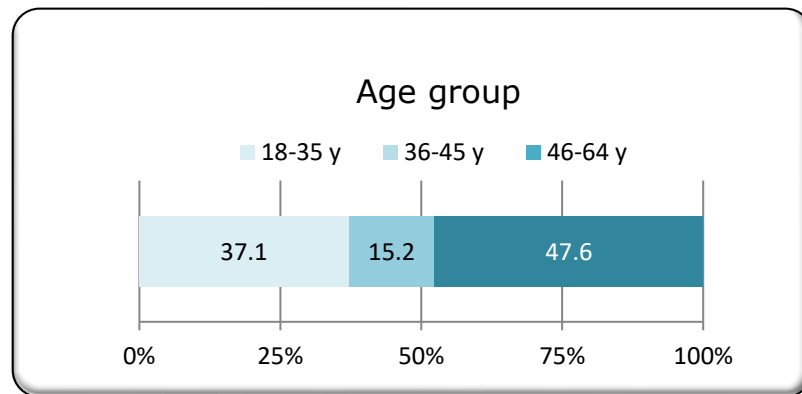


Figure 10 Age of Health Professionals

The mean age of participants was at 41.5 ± 12.8 years, the range varying from 21 to 62 years according to the distribution into intervals which can be observed in Figure 10.

Table 10 Age Group by Gender

Staff Members	Age Cohorts of Staff Members by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	187	100.0	65	100.0	122	100.0
11-18	1	.5	0	.0	1	.8
19-35	68	36.4	18	27.7	50	41.0
36-45	29	15.5	10	15.4	19	15.6
46-64	89	47.6	37	56.9	52	42.6

Table 10 shows that the majority of participants, 47.6% (N=89) were of the age of 46 years to pensionable age, i.e. 64 years. The majority of females 42.6% (N= 52) were between 46 to 64 years of age while 41% (N=50) between the age cohort of 19 to 35 respectively. The majority of males, 56.9% (N= 37) were 46 to 64 years of age.

3.6.1.5 Education by Gender

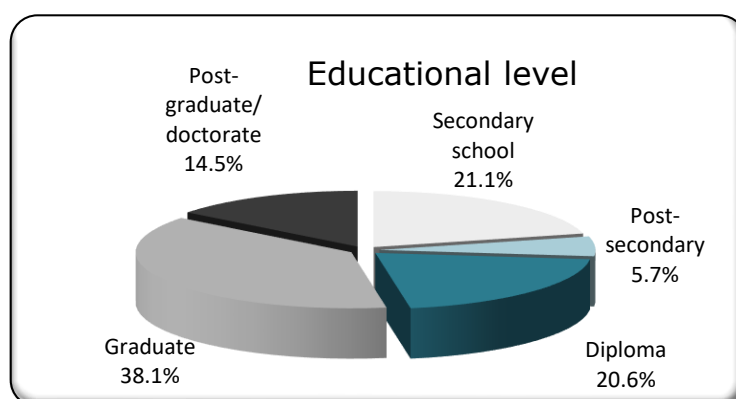


Figure 11 Level of Education of Health Professionals

Figure 11 shows that half of the staff members had a graduate level of education or even a higher level of education. Those health professionals who had a post graduate qualification or doctorate qualification amounted to 14.5% (N=28); 38.1% (N= 74) had a first degree; 20.6% (N=37) had a diploma qualification, 5.7% (N=11) received post-secondary education while 21.1% (N=38) received secondary education.

Table 11 Educational Level by Gender

Staff Members	Educational Level of Members of Staff by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	190	100.0	66	100.0	124	100.0
No Schooling	2	1.1	0	.0	2	1.6
Secondary School	38	20.0	12	18.2	26	21.0
Post-Secondary/Upper Secondary/Higher Technical/Vocational Level	11	5.8	2	3.0	9	7.3
Diploma	37	19.5	13	19.7	24	19.4
Graduate	74	38.9	27	40.9	47	37.9
Post-Graduate	23	12.1	9	13.6	14	11.3
Doctorate	5	2.6	3	4.5	2	1.6

Table 11 indicates that the majority of participants who received post-secondary education are females (50.8%, N=96) while 28% of males (N=54) had post-secondary education.

3.6.2 Type of Wards

Wards were classified according to the cognitive health conditions of the older adults residing in them. Therefore, wards were differentiated by dementia wards and non-dementia wards, as listed in Figure 7 (pg.69). The same previous statistical approach was applied to the analysis of differences by group. The distribution of professionals needs to be taken into consideration.

3.6.2.1 Deployment Area by Type of Ward

Table 12 SVPR Deployment Area by Type of Ward

Staff Members	SVPR Deployment Area by TYPE OF WARD					
	Total		Non-dementia		Dementia	
	N	%	N	%	N	%
Total	114	100.0	88	100.0	26	100.0
JP1	10	8.8	0	.0	10	38.5
JP2	4	3.5	0	.0	4	15.4
JP3	8	7.0	0	.0	8	30.8
JP5	4	3.5	0	.0	4	15.4
LOURDES	11	9.6	11	12.5	0	.0
MT	14	12.3	14	15.9	0	.0
RB1	13	11.4	13	14.8	0	.0
RB3	14	12.3	14	15.9	0	.0
SF3	9	7.9	9	10.2	0	.0
SJ2	12	10.5	12	13.6	0	.0
SJ4	15	13.2	15	17.0	0	.0

Table 12 includes all the tables crossed by these two groups. It can be noted that John Paul 1, John Paul 2, John Paul 3 and John Paul 5 are all wards where cognitively impaired older adults reside, while Lourdes, Madre Teresa, Ruzar Briffa 1, Ruzar Briffa 3, St. Frances 3, St. Joseph 2 and St, Joseph 4 wards have cognitively healthy older adults. This table shows the deployment distribution of staff members, who acknowledged the ward they are deployed at.

3.6.2.2 Profession by Type of Ward

Table 13 Profession of Staff Members by Type of Ward

	Profession of Staff Members by TYPE OF WARD					
	Total		Non-dementia		Dementia	
	N	%	N	%	N	%
Total	107	100.0	84	100.0	23	100.0
Charge Nurse	8	7.5	6	7.1	2	8.7
SRNs	22	20.6	11	13.1	11	47.8
Carers	36	33.6	29	34.5	7	30.4
Nursing Aid	1	.9	1	1.2	0	.0
Administrators	39	36.4	36	42.9	3	13.0
Unemployed	1	.9	1	1.2	0	.0

Table 13 shows that according to the participants replies, administrators (42.9%, N=36) and carers (35.7%, N=30) are the majority of staff members who have replied from the non-dementia wards, while State Registered Nurses (47.8%, N=11) and carers (30.4%, N=7) replied from the dementia ward.

3.6.3 Statistical Analysis of Questionnaire Data by Professional Group

3.6.3.1 Grouping of Professionals

Professions were recoded into two large groups:

- Administrators (doctors and nurses by profession in charge of corporate and clinical administrations), Consultants, Charge Nurses, State Registered Nurses and Carers (ACNC; N=142)
- Allied Health Professionals: Physiotherapists, Speech Language Pathologists, Occupational Therapists, Podiatrists and the Dental Team (AHP; N=36)

3.6.3.1.1 Group 1 – ACNC (Administrators, Nurses and Carers) Group

Table 14 Professionals Group 1

Professional Group 1	Number of Participants	Percentage
Administrators	58	40.8
Consultants	4	2.8
Charge Nurses	10	7.0
State Registered Nurses	25	17.6
Carers and Nursing Aids	45	31.7
Total	142	100

Table 14 illustrates Group 1 of professionals, who participated in the questionnaire. The majority, 40.8%, (N=58) of administrators included the administrative and clinical authorities at SVPR. 31.7% (N=45) were carers and nursing aids while 17.6% (N=25) were State Registered Nurses. 7% (N=10) of Charge Nurses answered the questionnaire while 2.8% (N=4) of Medical Consultants responded. No medical doctors who are employed at SVPR participated. Therefore, when analyzing statistics for the professional group I,

consultants (N=4 staff members were excluded, and four professional subgroups were compared.

3.6.3.1.2 Group 2 – AHP

Table 15 Professional Group 2

Professional Group 2	Number of Participants	Percentage
Physiotherapists	9	25.0
Speech Language Pathologists	1	2.8
Occupational Therapists	4	11.1
Podiatrists	9	25.0
Dental Team	13	36.1
Total	36	100

Table 15 displays the overall sample size and per professional group 2, which was remarkably low and therefore no inferential analysis was conducted.

The Professional Group distributions in this research project was 1:4, a good representation of the total distribution of professionals when this study was conducted.

3.6.3.2 Deployment of Professionals by Groups

Table 16 Deployment of Professionals at SVPR

Staff Members	Deployment of PROFESSIONALS at SVPR					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	178	100.0	142	100.0	36	100.0
Day Clinic	8	4.5	0	.0	8	22.2
Dental Clinic	4	2.2	0	.0	4	11.1
Doctor's Quarters	4	2.2	4	2.8	0	.0
JP1	10	5.6	10	7.0	0	.0
JP2	1	.6	1	.7	0	.0
JP3	8	4.5	8	5.6	0	.0
JP5	4	2.2	4	2.8	0	.0
LOURDES	11	6.2	11	7.7	0	.0
MT	13	7.3	13	9.2	0	.0
RB1	13	7.3	13	9.2	0	.0
RB3	13	7.3	12	8.5	1	2.8
SF3	7	3.9	7	4.9	0	.0
SJ2	12	6.7	12	8.5	0	.0
SJ4	15	8.4	15	10.6	0	.0
SVPR	55	30.9	32	22.5	23	63.9

Table 16 indicates the deployment of professionals according to the ward, clinic or quarters where they are deployed. The number of participants who stated their deployment area were 178.

3.6.4 Results obtained from the Questionnaire

The following are descriptive results for all questions from the questionnaire.

3.6.4.1 Section A: Oral Health and Hygiene of Health Professionals

Table 17 Staff Members: Questions in Section A - Statistical Significance of Results (Oral Health and Hygiene of Health Professionals)

	Gender	Type of Ward	Professional Groups	Professional Group I
Q1a. Health of teeth	0.009** (MW=3259.5; z=2.60)	0.240 (MW)	0.087 (MW)	0.172 (KW)
Q2. Frequency of Toothache/Discomfort	0.762 (MW)	0.759 (MW)	0.009** (MW=1836; z=2.62)	0.345 (KW)
Q3. Type of Preferred Dental Service	0.352 (Chi ²)	0.272 (Chi ²)	0.032* (Chi ² =6.89; df=1)	0.292 (Chi ²)
Q5. Reason for Visiting Dentist	0.590 (Chi ²)	0.710 (Chi ²)	0.017* (Chi ² =8.10; df=1)	0.825 (Chi ²)
Q6. Frequency of Toothbrushing	<0.001*** (MW=2670; z=4.32)	0.202 (MW)	0.055 (MW)	0.005** (KW; Chi ² =13.0; df=3)
Q7. Frequency of Toothbrushing Before Breakfast	0.001** (Chi ² =11.6; df=1)	0.020* (Chi ² =5.45; df=1)	0.812 (Chi ²)	0.171 (Chi ²)
Q7. Toothbrushing during other times	0.885 (Chi ²)	0.030* (Chi ² =4.72; df=1)	0.846 (Chi ²)	0.166 (Chi ²)
Q7b. Frequency of Toothbrushing/Day	<0.001*** (MW=2985; z=3.79)	1.000 (MW)	0.126 (MW)	0.067 (KW)
Q9. Toothbrushing Techniques	0.867 (Chi ²)	0.333 (Chi ²)	0.783 (Chi ²)	0.012* (Chi ² =21.2; df=9)
Q10. Mouthwash	0.335 (Chi ²)	0.177 (Chi ²)	0.047* (Chi ² =6.12; df=1)	0.509 (Chi ²)
Q13. Use of Dental floss/tape	0.032* (Chi ² =4.60; df=1)	0.753 (Chi ²)	0.023* (Chi ² =5.20; df=1)	0.513 (Chi ²)
Q14. Bleeding gums	0.043* (MW=3328; z=2.02)	0.002** (MW=731; z=2.89)	0.046** (MW=1996; z=1.99)	0.025* (KW; Chi ² =9.32; df=3)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables MW and KW Continuous Variables

Table 17 indicates the significance of responses given by staff members, according to gender, ward, professional groups and professional group I, in relation to their perceptions of personal oral health care and daily oral care.

3.6.4.1.1 Association between Questions in Section A and Gender:

Table 18 Health of Teeth by Gender

Staff Members		Health of Teeth of Staff members by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Q1.Teeth	Total	191	100.0	67	100.0	124	100.0
	Excellent	10	5.2	2	3.0	8	6.5
	Very Good	51	26.7	14	20.9	37	29.8
	Good	82	42.9	27	40.3	55	44.4
	Average	42	22.0	20	29.9	22	17.7
	Poor	6	3.1	4	6.0	2	1.6

A notable result which is significant and worth observing is that male staff members assessed their health of teeth as good, at a lower rate than females. This can be noted in Table 18, which shows that 35.9% (N=24) of the male population considered their health as average-poor when compared to 19.3% (N=24) of female population (U=3259.5, z=2.60; p=0.009).

Table 19 Toothbrushing by Gender

Staff Members	Toothbrushing by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	191	100.0	66	100.0	125	100.0
Never	4	2.1	3	4.5	1	.8
Less than once a day	19	9.9	13	19.7	6	4.8
Once a day	81	42.4	31	47.0	50	40.0
Two times a day	76	39.8	19	28.8	57	45.6
More than two times a day	11	5.8	0	.0	11	8.8

A significant result ($U=2670$; $z=4.32$; $p<0.001$) can be observed in Tables 17 (pg. 100) and 19, when comparing the frequency of toothbrushing during the day, between female and male staff members. As can be viewed in Table 19, Females (45.6%, $N=57$) brush their teeth twice a day when compared to 28.8% ($N= 19$) of male staff members ($U=2985$; $z=3.79$; $p<0.001$).

Table 20 Preferred Toothbrushing Time by Gender

Staff Members		Preferred Toothbrushing Time by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Before breakfast	Total	193	100.0	67	100.0	126	100.0
	No	112	58.0	50	74.6	62	49.2
	Yes	81	42.0	17	25.4	64	50.8

The result obtained by the response given by staff members indicating the time when they prefer to brush their teeth, also is significant. Table 20 shows that the majority of females (50.8%, N=64) prefer to brush their teeth before breakfast when compared to males (25.4%, N=17); (χ^2 (df 1; N=193) =11.6; p=0.001).

Table 21 Use of Toothbrushing Adjuncts by Gender

Staff Members		Use of Toothbrushing Adjuncts by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Dental floss/tape (Thread)	Total	193	100.0	67	100.0	126	100.0
	No	137	71.0	54	80.6	83	65.9
	Yes	56	29.0	13	19.4	43	34.1

The result obtained for the preferred use of toothbrushing adjunct for interdental spaces, by staff members, yielded a significant result (χ^2 (df 1; N=193)=4.60; p=0.032). Table 21 shows that 34.1% (N=43) of female staff members prefer to use dental floss/tape compared to 19.4% (N=13) of males.

Table 22 Bleeding from Gingivae by Gender

Staff Members	Bleeding from Gingivae by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	191	100.0	65	100.0	126	100.0
Yes	43	22.5	21	32.3	22	17.5
No	65	34.0	21	32.3	44	34.9
Sometimes	80	41.9	23	35.4	57	45.2
Never noticed	3	1.6	0	.0	3	2.4

Table 22 shows that bleeding was a symptom significantly more associated with male subjects ($U=3328.5$; $z=2.02$; $p=0.043$). The majority of males (32.3%, $N=21$) stated that they do bleed from the gingivae, compared to females 17.5% ($N= 21$).

3.6.4.1.2 Association between questions at Section A and Type of Ward

Table 23 Preferred Toothbrushing Time by Type of Ward

Staff Members		Preferred Toothbrushing Time by TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
Before breakfast	Total	114	100.0	88	100.0	26	100.0
	No	58	50.9	50	56.8	8	30.8
	Yes	56	49.1	38	43.2	18	69.2
At other times	Total	114	100.0	88	100.0	26	100.0
	No	100	87.7	74	84.1	26	100.0
	Yes	14	12.3	14	15.9	0	.0

Significant results which have been obtained refer to the preferred time of toothbrushing. Table 23 illustrates that within the dementia wards 69.2% (N=18) of respondents stated that they brush their teeth before breakfast. This result was significantly higher than the response rate obtained from respondents from the non-dementia wards, 43.2%, (N=38); (χ^2 (df 1; N=114) = 5.45; p=0.020). It can be noted that on the contrary, the rate of responses when asked about toothbrushing at other times from the stipulated time as listed in Table 32, was higher from respondents deployed at the non-dementia wards (15.9%, N=14) than those deployed at the dementia wards (0%, N=0); (χ^2 (df1; N=114) = 4.72; p=0.030).

Table 24 Bleeding of Gingivae by Type of Ward

Staff Members	Bleeding of Gingivae by TYPE OF WARD					
	Total		Non-dementia		Dementia	
	N	%	N	%	N	%
Total	113	100.0	87	100.0	26	100.0
Yes	33	29.2	31	35.6	2	7.7
No	35	31.0	27	31.0	8	30.8
Sometimes	43	38.1	27	31.0	16	61.5
Never noticed	2	1.8	2	2.3	0	.0

Table 24, shows that bleeding from the gingivae, was a more frequent sign among staff members deployed in non-dementia wards with a prevalence of 35.6% (N=31) compared to 7.7% (N=2) in the dementia wards (U=731; z=2.89; p=0.002).

3.6.4.1.3 Association between questions at Section A and Professional Group

There were significant differences in the oral hygiene habits amongst staff members from the Administrative, Consultants, Nursing and Carers Group and the Allied Health Professional Group.

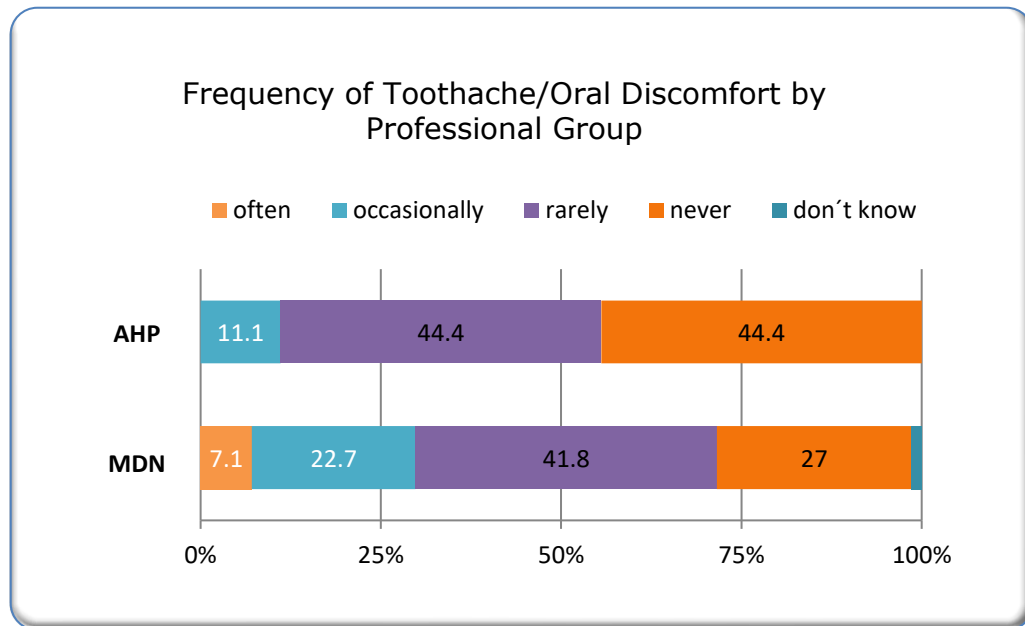


Figure 12 Frequency of Toothache or Oral Discomfort

Figure 12 shows that the AHP Group had less frequent problems related to the mouth than the ACNC group ($U=1836$; $z=2.62$; $p=0.009$).

Table 25 Dental Services sought by Professional Groups

Staff Members	Dental Services sought by PROFESSIONAL groups					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	177	100.0	141	100.0	36	100.0
Private dentist	146	82.5	119	84.4	27	75.0
Hospital Service	7	4.0	7	5.0	0	.0
Mixture of Both	20	11.3	12	8.5	8	22.2
Don't Remember	2	1.1	2	1.4	0	.0
Have Never Been	2	1.1	1	.7	1	2.8

Table 25 indicates that the majority of participants from both professional groups prefer the dental services offered by private dentists (ACNC: 84.4%, N=119 and AHP: 75%, N=27). 22.2% (N=8) of the AHP group also stated that they frequent both the private sector and also the dental hospital services when seeking a dental service (Chi² (df 1; N=177) = 6.89; p=0.032).

Table 26 Reason for Visits to the Dentist by Professional Groups

Staff Members	Reason for Visit to Dentist by PROFESSIONAL Groups					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	176	100.0	140	100.0	36	100.0
Pain/Trouble with teeth, gums or mouth	59	33.5	53	37.9	6	16.7
Treatment/Follow-up treatment	33	18.8	27	19.3	6	16.7
Routine check-up of teeth/Treatment	73	41.5	51	36.4	22	61.1
I don't know/Don't remember	5	2.8	3	2.1	2	5.6
I have never been	6	3.4	6	4.3	0	.0

Table 26 illustrates the differences regarding visits to the dentist. 37.9% (N=53) of administrators, consultants, nurses and carers and 16.7% (N=36) of allied health professionals, attend when they are in pain or experience problems with their teeth, gingivae or in their oral cavity (χ^2 (df 1; N =176) = 8.10; p=0.017).

Table 27 Toothbrushing Adjuncts Preferred by Professional Groups

Staff Members		Toothbrushing Adjuncts preferred by PROFESSIONAL Groups					
		Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
		N	%	N	%	N	%
Dental floss/tape (Thread)	Total	178	100.0	142	100.0	36	100.0
	No	122	68.5	103	72.5	19	52.8
	Yes	56	31.5	39	27.5	17	47.2
Mouthwash	Total	72	100.0	50	100.0	22	100.0
	Yes	38	52.8	30	60.0	8	36.4
	No	10	13.9	8	16.0	2	9.1
	Sometimes	22	30.6	11	22.0	11	50.0
	Don't know	2	2.8	1	2.0	1	4.5

Table 27, demonstrates minor differences in preference of toothbrushing adjuncts, following some specific trends. The AHP group, 47.2% (N=17) score higher than the ACNC group (27.5%; N=39) in the use of dental floss tape (χ^2 (df 1, N = 178) = 5.20; $p=0.023$). The ADH professional group scores low in the use of mouthwashes (36.4%, N=8) compared to the ACNC group (60%, N=30) (χ^2 (df 1; N =178) = 6.12; $p=0.047$).

Table 28 Bleeding from Gingivae by Professional Groups

Staff Members	Bleeding from Gingivae by Professional Groups					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	177	100.0	141	100.0	36	100.0
Yes	41	23.2	37	26.2	4	11.1
No	66	37.3	52	36.9	14	38.9
Sometimes	68	38.4	50	35.5	18	50.0
Never noticed	2	1.1	2	1.4	0	.0

Table 28 presents the percentages and numbers of professional groups who bleed from their gingivae. 26.2% (N=37) of the ACNC group reported gingival bleeding whilst only 11.1% (N=4) participants in the AHP professional group stated that they did so (U = 1996; z=1.99; p=0.046).

3.6.4.1.4 Association between questions at Section A and Professional Group 1

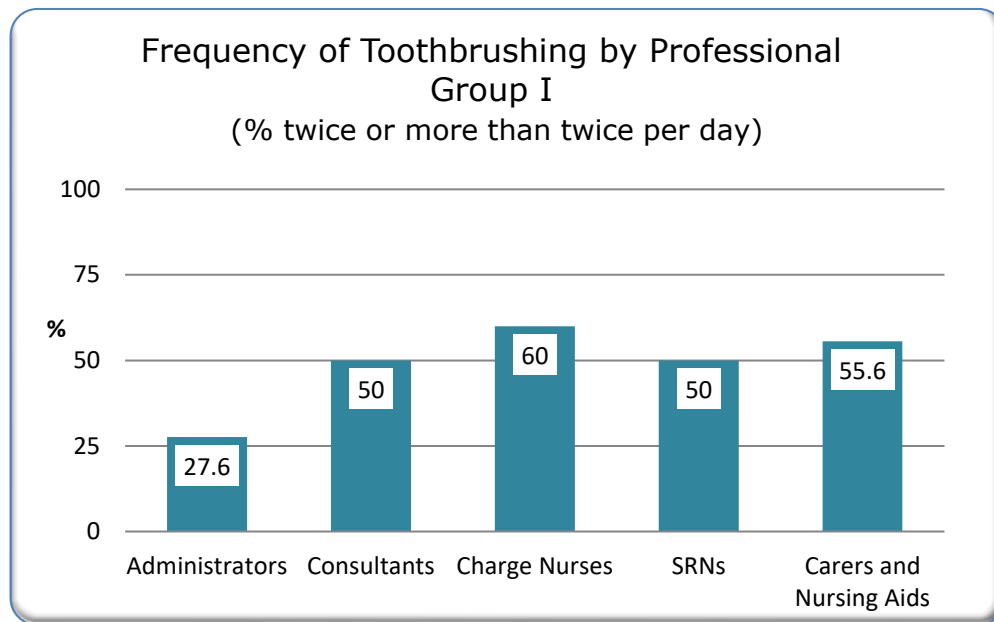


Figure 13 frequency of Toothbrushing by Professional Group I

Table 17 (pg. 100) shows that there are three significant results in this Section A at Professional Group I level, which are related to frequency of toothbrushing, toothbrushing technique and bleeding from gingivae.

Figure 13 demonstrates that there were significant differences in the frequency of toothbrushing amongst health members of Professional Group I, with administrators (27.6%, N=16) showing that they brush less frequently when compared to other professionals (KW; χ^2 (df 3; N= 142) = 13; p=0.005).

Table 29 Toothbrushing Technique by Professional Group I

Staff Members	Toothbrushing Technique by PROFESSIONAL GROUP 1											
	Total		Administrators		Consultants		Charge Nurses		SRNs		Carers and Nursing Aids	
	N	%	N	%	N	%	N	%	N	%	N	%
Total	141	100.0	58	100.0	4	100.0	10	100.0	25	100.0	44	100.0
Back and forth (Horizontal Motion)	10	7.1	3	5.2	0	.0	0	.0	4	16.0	3	6.8
Up and down (Vertical Motion)	35	24.8	9	15.5	0	.0	1	10.0	6	24.0	19	43.2
Circular Motion	34	24.1	20	34.5	1	25.0	1	10.0	5	20.0	7	15.9
A mixture of the above	61	43.3	25	43.1	3	75.0	8	80.0	10	40.0	15	34.1
Don't Know	1	.7	1	1.7	0	.0	0	.0	0	.0	0	.0

Table 29, demonstrate a significant response, indicating that the majority of Charge Nurses (80%, N=8), compared to the other professionals in this group, use a mixture of motions during the brushing technique (χ^2 (df 9; N=141) = 21.2; $p=0.012$).

Table 30 Bleeding from Gingivae by Professional Group I

Staff Members	Bleeding from Gingivae by PROFESSION GROUP I											
	Total		Administrators		Consultants		Charge Nurses		SRNs		Carers and Nursing Aids	
	N	%	N	%	N	%	N	%	N	%	N	%
Total	141	100.0	58	100.0	4	100.0	10	100.0	25	100.0	44	100.0
Yes	37	26.2	23	39.7	0	.0	1	10.0	1	4.0	12	27.3
No	52	36.9	14	24.1	2	50.0	4	40.0	11	44.0	21	47.7
Sometimes	50	35.5	20	34.5	2	50.0	4	40.0	13	52.0	11	25.0
Never noticed	2	1.4	1	1.7	0	.0	1	10.0	0	.0	0	.0

Table 30 depicts the bleeding from the gingivae percentage rate by members of the Professional Group I. This result was significant ($\chi^2(df\ 3; N=141)=9.32; p=0.025$) between groups since administrators (39.7%, N=23), showed the highest prevalence when compared to Charge nurses and State Registered Nurses ($\leq 10\%$).

3.6.4.2 Section B: An Interdisciplinary Approach Towards Oral Maintenance Care at St. Vincent de Paul Residence for Older Adults

Table 31 Staff Members: Questions in Section B - Statistical Significance of Results (Oral Health Education amongst Health Professionals)

	Gender	Type of Ward	Professional Groups	Professional Group I
Q16. Oral Health Education	0.041* (Chi ² =4.16; df=1)	0.577 (Chi ²)	0.471 (Chi ²)	0.273 (Chi ²)
Q17. Oral Health Education from School	0.002** (Chi ² =9.15; df=1)	0.023* (Chi ² =5.18; df=1)	0.424 (Chi ²)	0.003** (Chi ² =13.8; df=3)
Q17. Oral Health Education from LTCF	0.206 (Chi ²)	0.705 (Chi ²)	0.012* (Chi ² =6.38; df=1)	0.329 (Chi ²)
Q17. Oral Health Education from Dentist	0.330 (Chi ²)	0.001** (Chi ² =10.3; df=1)	<0.001*** (Chi ² =15.3; df=1)	0.027* (Chi ² =9.15; df=3)
Q18. Frequency of Opportunities to Learn about OH	0.747 (MW)	0.063 (MW)	0.001** (MW=1409.5; z=3.25)	0.661 (KW)
Q19. Frequency of Willingness to Receive OH Education	0.727 (MW)	0.013* (MW= 772.5; z=2.48)	0.731 (MW)	0.415 (KW)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables

MW and KW Continuous Variables

Table 31 represents the statistical values for answers given by health professionals employed at SVPR regarding their oral health education. Two main significant results were obtained.

3.6.4.2.1 Association between questions in Section B and Gender

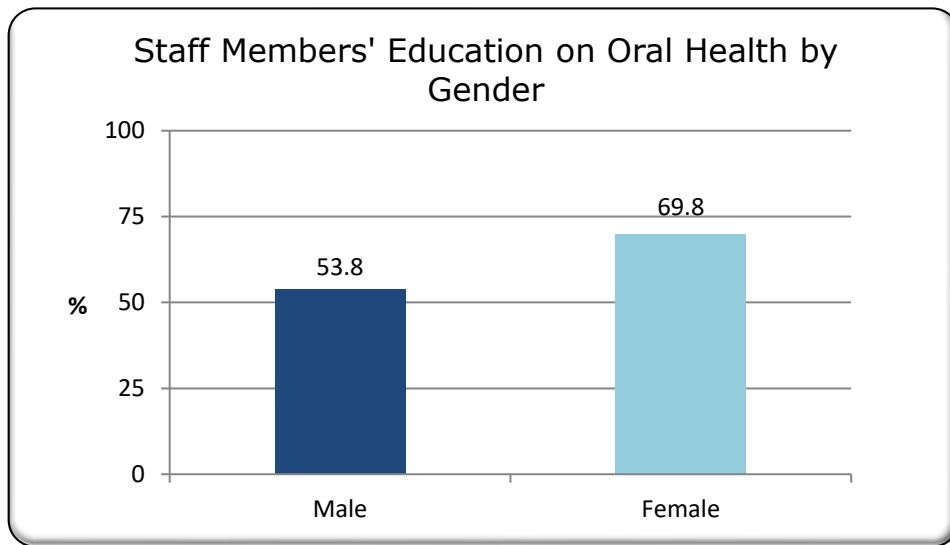


Figure 14 Oral Health Education Received by Staff Members by Gender

The first significant result (χ^2 (df 1, N=191) = 4.16; $p=0.041$), was obtained when comparing the oral health education received by males and females. In Figure 14, one can observe that more females (69.8%) stated that they did receive oral health education when compared to 53.8% of males.

Table 32 Sourcing of Oral Health Education amongst Health Professionals

Staff Members		Oral Health Educational Sourcing by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
School	Total	123	100.0	35	100.0	88	100.0
	No	61	49.6	22	62.9	39	44.3
	Yes	62	50.4	13	37.1	49	55.7
Curricular studies	Total	123	100.0	35	100.0	88	100.0
	No	108	87.8	28	80.0	80	90.9
	Yes	15	12.2	7	20.0	8	9.1
Media(television/ radio/social media)	Total	123	100.0	35	100.0	88	100.0
	No	83	67.5	24	68.6	59	67.0
	Yes	40	32.5	11	31.4	29	33.0
At the place of work	Total	123	100.0	35	100.0	88	100.0
	No	76	61.8	17	48.6	59	67.0
	Yes	47	38.2	18	51.4	29	33.0
Residence for older adults (talks/training course)	Total	123	100.0	35	100.0	88	100.0
	No	92	74.8	27	77.1	65	73.9
	Yes	31	25.2	8	22.9	23	26.1
Dentist	Total	123	100.0	35	100.0	88	100.0
	No	79	64.2	19	54.3	60	68.2
	Yes	44	35.8	16	45.7	28	31.8

The second significant result (χ^2 (df 1, N=123) = 9.15; $p=0.002$), was obtained from the response of staff members to sourcing of oral health education amongst health professionals. This can be observed in Table 32, which indicates that the majority of females (55.7%, N=49) stated that they obtained their oral health education mainly from primary and secondary schools while 37.1% (N=13) stated the same.

3.6.4.2.2 Association between questions at Section B and Type of Ward

Table 33 Source of Oral Health Education amongst Staff Members by Type of Ward

Staff Members		Source of Oral health Education amongst Staff Members					
		TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
School	Total	72	100.0	56	100.0	16	100.0
	No	35	48.6	31	55.4	4	25.0
	Yes	37	51.4	25	44.6	12	75.0
	No	48	66.7	37	66.1	11	68.8
	Yes	24	33.3	19	33.9	5	31.3
Dentist	Total	72	100.0	56	100.0	16	100.0
	No	44	61.1	29	51.8	15	93.8
	Yes	28	38.9	27	48.2	1	6.3

Results in Table 33 show that participants deployed at dementia (75%, N=12), wards obtained Oral Health Education at school when compared to 44.6% (N=25) of staff members deployed in the non-dementia wards (χ^2 (df 1; N=72) = 5.18; $p=0.023$).

Participants deployed at non-dementia wards (48.2%, N=27), stated that they obtained oral health information from the dentist when compared to 6.3% (N=1) staff members deployed in the dementia wards (χ^2 (df 1; N=72) = 10.3; $p=0.001$).

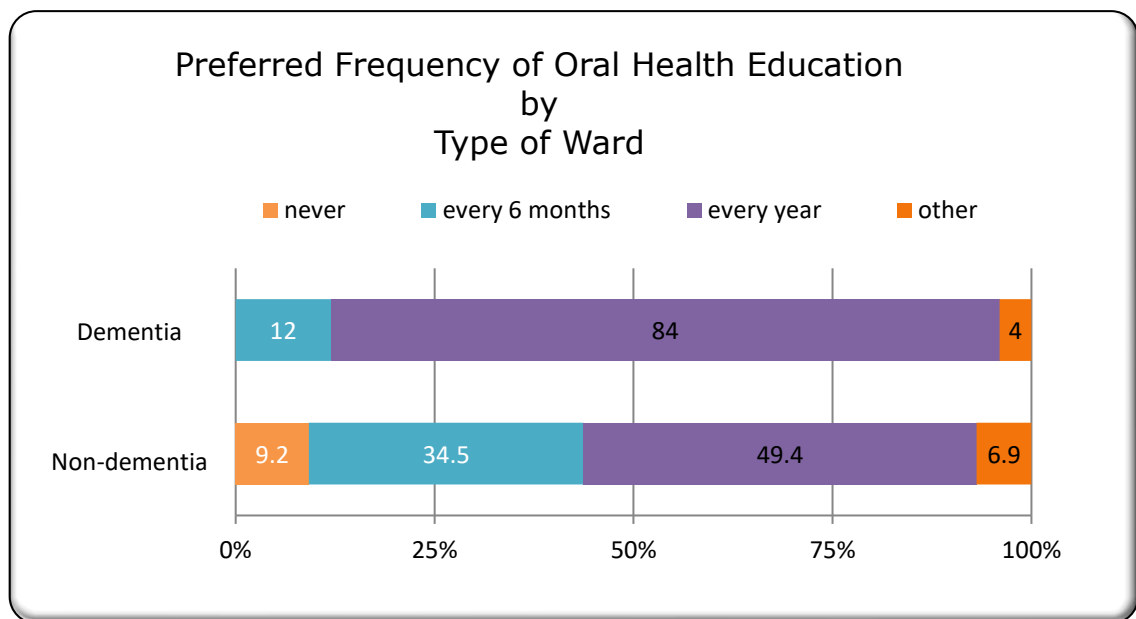


Figure 15 Preferred Frequency of Oral Health Education by Type of Ward

Significant results were also obtained from results depicting how much the staff members in the dementia and the non-dementia wards, wanted to receive oral health education ($U=772.5$; $z=2.48$; $p=0.013$). Figure 15 illustrates a graph showing that staff members in the non-dementia ward (34.5%, $N=30$) wanted to receive more frequent oral health education, every 6 months, than those deployed at demented wards (12%, $N=3$).

3.6.4.2.3 Association between questions at Section B and Professional Group

Table 34 Oral Health Education Sourcing for Professionals by Professional Group

Staff Members		Oral Health Educational Sourcing by PROFESSIONAL Group					
		Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
		N	%	N	%	N	%
Residence for older adults (talks/training course)	Total	114	100.0	90	100.0	24	100.0
	No	85	74.6	62	68.9	23	95.8
	Yes	29	25.4	28	31.1	1	4.2
Dentist	Total	114	100.0	90	100.0	24	100.0
	No	72	63.2	49	54.4	23	95.8
	Yes	42	36.8	41	45.6	1	4.2

Table 34 indicates significant differences when comparing the ACNC professional group to the AHP professional group as to where they obtained their oral health education. 31.1% (N=28) of the ACNC group compared to 4.2% (N=1) of the AHP group received their education/information about oral health at the residence for older people (Chi² (df 1; N=114) = 6.38; p=0.012).

45.6% (N= 41) of the ACNC group compared to 4.2% (N=1) of the AHP obtained oral health information from their private dentist (Chi² (df 1; N=114) = 15.3; p<0.001).

Table 35 Opportunities for Professional Groups to learn about Oral Health

Staff Members	Opportunities by PROFESSIONAL Groups to learn about Oral Health					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	159	100.0	125	100.0	34	100.0
Never	23	14.5	22	17.6	1	2.9
Once	69	43.4	57	45.6	12	35.3
More than once	62	39.0	45	36.0	17	50.0
Frequently	5	3.1	1	.8	4	11.8

Table 35 shows that 17.6%, (N=22) of ACNC professionals stated that they never had the opportunity to learn about oral health compared to only 2.9% (N=1) of the AHP group (U=1409.5; z=3.25; p=0.001).

3.6.4.2.4 Association between questions at Section B and Professional Group 1

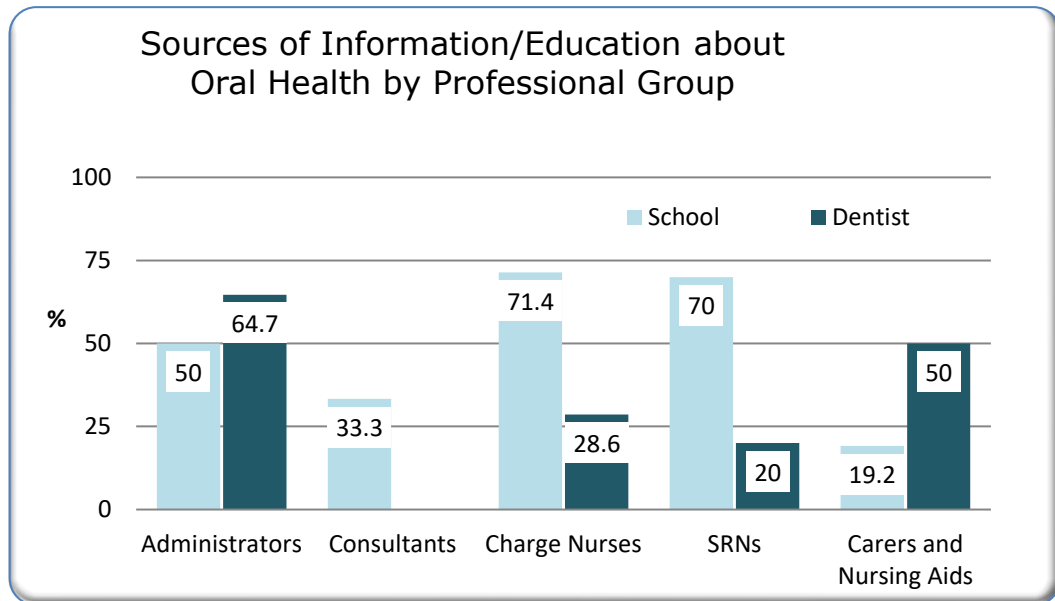


Figure 16 Sourcing of Oral Health Education by Professional Group

The sourcing of the information about oral hygiene amongst the staff members of Professional Group I, was significantly different. Figure 16 demonstrates that the majority of Consultants (33.3%, N=1) and nurses (SRNs: 70%, N=14 ; Charge Nurses: 71.4%, N=5) obtained their Oral Health Education from school, through the School Intervention Programme (χ^2 (df 3; N=90) = 13.8; p=0.003). Consultants did not receive oral health information from dentists, 20% (N=4) of SRNs; 28.6% (N=2) of Charge Nurses received oral health information from the dentist compared to 64.7% (N=22) of administrators and 50% (N=13) of carers who stated that they received oral health information from the dentist (χ^2 (df 3; N=90) = 9.15; p=0.027).

3.6.4.3 Section C: Staff Members' Perceptions regarding oral health of older adults and their priority to assist older adults in daily oral care

Table 36 Staff Members: Questions in Section C - Statistical Significance of Results (Health Professionals' Perceptions regarding Oral Health of Older Adults and their priority to Assist older adults in Daily Oral Care)

	Gender	Type of Ward	Professional Groups	Professional Group I
Q22. The Importance of Oral Health to Older Adults	0.121 (MW)	<0.001*** (MW=679; z=3.72)	0.399 (MW)	0.051 (KW)
Q23. Asked to Assist Older Adults in Daily Oral Care	0.015* (MW=3178; z=2.44)	0.217 (MW)	<0.001*** (MW=1076; z=5.22)	0.321 (KW)
Q24. Asked by Dentist to assist Older Adults in DOC	0.211 (Chi ²)	0.453 (Chi ²)	0.207 (Chi ²)	0.007** (Chi ² =12.0; df=3)
Q24. Asked by Nurse to assist Older Adults in DOC	0.355 (Chi ²)	0.004** (Chi ² =8.14; df=1)	0.001** (Chi ² =11.2; df=1)	0.053 (Chi ²)
Q24. Asked by Resident to assist in DOC	0.391 (Chi ²)	0.750 (Chi ²)	0.010* (Chi ² =6.72; df=1)	0.795 (Chi ²)
Q25. Asked to assist in brushing of dentures	0.456 (Chi ²)	0.047* (Chi ² =3.96; df=1)	0.555 (Chi ²)	0.491 (Chi ²)
Q25. Asked to assist in brushing of teeth	0.289 (Chi ²)	0.969 (Chi ²)	0.024* (Chi ² =5.10; df=1)	0.621 (Chi ²)
Q25. Asked to assist in removal of dentures	0.027* (Chi ² =4.91; df=1)	0.164 (Chi ²)	<0.001*** (Chi ² =32.2; df=1)	0.016* (Chi ² =10.3; df=3)
Q26. Recommendation of Toothbrushing Facilitating Aids	0.395 (MW)	0.590 (MW)	0.002** (MW=1580.5; z=3.11)	0.889 (KW)
Q27. Encouraging Older Adults to Brush	0.054 (MW)	0.157 (MW)	0.013* (MW=1895.5; z=2.48)	0.734 (KW)
Q28. Following of Dental Care Plans in Medical Histories	0.157 (MW)	0.779 (MW)	<0.001*** (MW=1470.5; z=3.56)	0.048* (KW; Chi ² =7.89; df=3)
Q29. Reasons for not following Dental Care Plans	0.080 (Chi ²)	0.668 (Chi ²)	0.021* (Chi ² =7.69; df=1)	0.264 (Chi ²)
Q30. Referrals of Older Adults to Dental Advice/Treatment	0.730 (MW)	0.798 (MW)	0.002** (MW=1556.5; z=3.12)	0.228 (KW)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables
MW and KW Continuous Variables

3.6.4.3.1 Association between questions at **Section C** and Gender

Table 37 Staff Member's Response to Older Adults asking for Assistance in Daily Oral Care by Gender

	Staff Members' Response to Older Adults asking for Assistance in Daily Oral Care by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	190	100.0	65	100.0	125	100.0
Never	60	31.6	23	35.4	37	29.6
Sometimes	74	38.9	32	49.2	42	33.6
Frequently	38	20.0	7	10.8	31	24.8
Always	17	8.9	2	3.1	15	12.0

Tables 36 (pg. 124) and 37, refer to the significant results of staff members' response when they were asked whether older adults do ask them to assist them in daily oral care. It can be noted in Table 36 that 36.8% (N= 46) of female staff members were asked frequently or always to assist in routine oral care of residents when compared to 13.9% (N=9) of male members of staff (U=3178; z=2.44; p=0.015).

Table 38 Assisting Older Adults in Daily Oral Care by Gender

Staff Members		Assisting Older Adults in Daily Oral Hygiene by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Rinsing and brushing of dentures	Total	130	100.0	42	100.0	88	100.0
	No	53	40.8	18	42.9	35	39.8
	Yes	77	59.2	24	57.1	53	60.2
Brushing of teeth	Total	130	100.0	42	100.0	88	100.0
	No	50	38.5	17	40.5	33	37.5
	Yes	80	61.5	25	59.5	55	62.5
Removal of dentures before bedtime	Total	130	100.0	42	100.0	88	100.0
	No	43	33.1	17	40.5	26	29.5
	Yes	87	66.9	25	59.5	62	70.5

Table 38 indicates that one of the main tasks was to assist older adults to remove dentures before bedtime (χ^2 (df1; N=130) = 4.91; $p=0.027$). These differences by gender, could be highly influenced by the occupation of responding participants. 70.5% (N=62) of female staff members stating that they do assist older adults to remove dentures before bedtime, compared to 59.5% (N=25) of male staff members.

3.6.4.3.2 Association between questions at Section C and Type of Ward

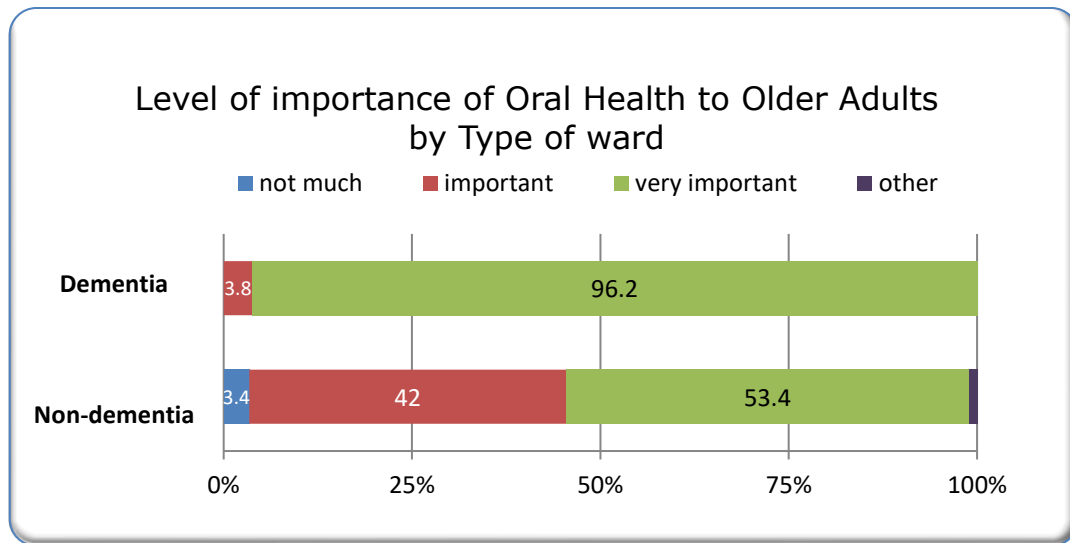


Figure 17 Staff Members' Perceptions regarding the Importance of Oral Health to Older Adults

There was a significant result which was obtained from the question asked to staff members regarding their perception of how important oral health is to older adults. In Figure 17, it can be observed that all participants (96.2%, N=25) from the dementia group agreed that oral health is very important to older people. This percentage can be compared to 53.4% (N=47) of staff members deployed at the non-dementia wards ($U=679$; $z=3.72$; $p<0.001$).

Table 39 Staff members' reaction when questioned about who requests their assistance in providing daily oral care to older adults by Type of Ward

Staff Members		Staff members' response when questioned about who asks for their assistance in providing daily oral care to older adults by TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
Dentist/Dental Hygienist	Total	86	100.0	65	100.0	21	100.0
	No	54	62.8	39	60.0	15	71.4
	Yes	32	37.2	26	40.0	6	28.6
Nurse	Total	86	100.0	65	100.0	21	100.0
	No	43	50.0	38	58.5	5	23.8
	Yes	43	50.0	27	41.5	16	76.2
Physiotherapist/ Occupational Therapist	Total	86	100.0	65	100.0	21	100.0
	No	83	96.5	63	96.9	20	95.2
	Yes	3	3.5	2	3.1	1	4.8
Doctor	Total	86	100.0	65	100.0	21	100.0
	No	75	87.2	59	90.8	16	76.2
	Yes	11	12.8	6	9.2	5	23.8
Residents	Total	86	100.0	65	100.0	21	100.0
	No	59	68.6	45	69.2	14	66.7
	Yes	27	31.4	20	30.8	7	33.3

Table 39, illustrates that staff members deployed at dementia wards, were asked more frequently to assist older adults in daily oral care when compared to staff members deployed in non-dementia wards. Staff members were asked by nurses mostly (76.2%, N=16) when compared to the non-dementia group, 41.5% (N=27) (χ^2 (df 1; N=86) = 8.14; $p=0.004$).

Table 40 Tasks asked by Older Adults to Staff Members regarding help with Daily Oral Care

Staff Members		Staff Members asked by Older Adults by TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
Rinsing and brushing of dentures	Total	86	100.0	65	100.0	21	100.0
	No	33	38.4	29	44.6	4	19.0
	Yes	53	61.6	36	55.4	17	81.0
Brushing of teeth	Total	86	100.0	65	100.0	21	100.0
	No	34	39.5	25	38.5	9	42.9
	Yes	52	60.5	40	61.5	12	57.1
Removal of dentures before bedtime	Total	86	100.0	65	100.0	21	100.0
	No	24	27.9	22	33.8	2	9.5
	Yes	62	72.1	43	66.2	19	90.5

Table 40 shows a significant result (χ^2 (df 1; N=86) = 3.96; $p=0.047$), when comparing responses regarding the rinsing and brushing of dentures, given by staff members deployed in dementia wards (81%, N=17) and staff members deployed in non-dementia wards (55.4%, N=36).

3.6.4.3.3 Association between questions at **Section C** and **Professional Group**

Table 41 Response by Staff Members when asked about the Importance of Oral Health to Older Adults by Professional Group

Staff Members	Importance of Oral Health to Older Adults by PROFESSIONAL Group					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	177	100.0	142	100.0	35	100.0
Not much	5	2.8	3	2.1	2	5.7
Important	58	32.8	50	35.2	8	22.9
Very Important	112	63.3	87	61.3	25	71.4
Other	2	1.1	2	1.4	0	.0

Although Table 41, indicates a non-statistically significant result ($p=0.399$), for the response of staff members, by professional groups, when asked how much they think that oral health is important to older adults. Although this result is not statistically significant, it is highly interesting since both groups showed a similar opinion about the importance of oral health for older people.

Table 42 Staff members' response when asked about assisting older adults in daily oral care by Professional Group

Staff Members	Assisting older adults in Daily Oral Care by PROFESSIONAL Group					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	175	100.0	141	100.0	34	100.0
Never	55	31.4	31	22.0	24	70.6
Sometimes	68	38.9	60	42.6	8	23.5
Frequently	36	20.6	34	24.1	2	5.9
Always	15	8.6	15	10.6	0	.0
Other	1	.6	1	.7	0	.0

Table 42 depicts that the majority, 24.1% (N=34) of ACNC group were frequently asked to assist older adults in daily oral care, compared to Allied health Professionals, 5.9% (N=2), (U=1076; z=5.22; p<0.001).

Table 43 Tasks delegated to Staff members to assist Older Adults in Daily Oral Care by Professional Group

Staff Members		Asked to assist older adults in daily oral care by PROFESSIONAL Group					
		Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
		N	%	N	%	N	%
Dentist/Dental Hygienist	Total	120	100.0	110	100.0	10	100.0
	No	66	55.0	64	58.2	2	20.0
	Yes	54	45.0	46	41.8	8	80.0
Nurse	Total	120	100.0	110	100.0	10	100.0
	No	59	49.2	52	47.3	7	70.0
	Yes	61	50.8	58	52.7	3	30.0
Physiotherapist/ Occupational Therapist	Total	120	100.0	110	100.0	10	100.0
	No	116	96.7	106	96.4	10	100.0
	Yes	4	3.3	4	3.6	0	.0
Doctor	Total	120	100.0	110	100.0	10	100.0
	No	107	89.2	97	88.2	10	100.0
	Yes	13	10.8	13	11.8	0	.0
Residents	Total	120	100.0	110	100.0	10	100.0
	No	91	75.8	81	73.6	10	100.0
	Yes	29	24.2	29	26.4	0	.0

Table 43 demonstrates that the ACNC group, 26.4% (N=29) are delegated to assist older adults in daily oral care by residents themselves (χ^2 (df 1; N=120) = 6.72; $p=0.010$) while AHP were not asked at all.

52.7% (N=58) of the ACNC group were also asked to assist by nurses themselves, compared to 30% (N=3) of Allied Health Professionals (χ^2 (df 1; N=120) = 11.2; $p=0.001$).

Table 44 Tasks done by Staff Members to assist older adults in daily oral care by Professional Group

Staff Members		Tasks done by Staff Members to assist older adults in daily oral care by PROFESSIONAL Group					
		Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
		N	%	N	%	N	%
Rinsing and brushing of dentures	Total	120	100.0	110	100.0	10	100.0
	No	50	41.7	45	40.9	5	50.0
	Yes	70	58.3	65	59.1	5	50.0
Brushing of teeth	Total	120	100.0	110	100.0	10	100.0
	No	48	40.0	46	41.8	2	20.0
	Yes	72	60.0	64	58.2	8	80.0
Removal of dentures before bedtime	Total	120	100.0	110	100.0	10	100.0
	No	39	32.5	31	28.2	8	80.0
	Yes	81	67.5	79	71.8	2	20.0

Table 44, demonstrates that the ACNC Group (71.8%, N=79), were asked mostly to remove dentures of older adults before bedtime when compared to the AHP group (20%, N=2) (χ^2 (df 1, N=120) = 32.2; $p < 0.001$).

On the other hand, the AHP group (80%, N=8), were asked in a higher proportion when compared to the ACNC group (58.2%, N=64) to brush teeth of older adults (χ^2 (df 1; N=120) = 5.10; $p = 0.024$).

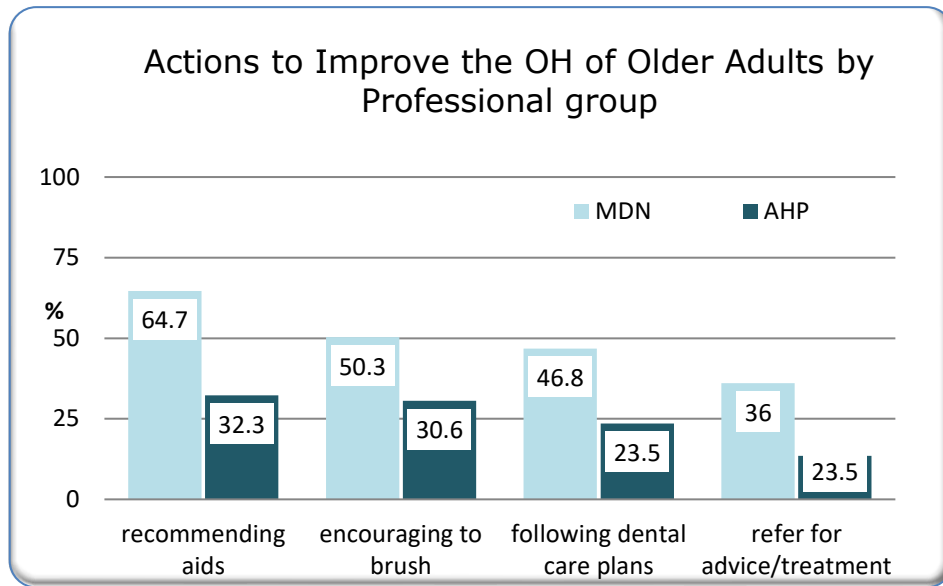


Figure 18 Tasks to Improve Oral Hygiene of Older Adults by Professional Group

Figure 18 illustrates that compared to the Allied Health Professionals, the ACNC Group, is the one which recommends mostly facilitating aids ($U=1580.5$; $z=3.11$; $p=0.002$), encourage toothbrushing ($U=1895.5$; $z=2.48$; $p=0.013$), and refer older adults for treatment and advice ($U=1556.5$; $z=3.12$; $p=0.002$). This group is also the one to follow mostly dental care plans ($U=1470.5$; $z=3.56$; $p<0.001$).

Table 45 Reason why Staff members do not check the Oral Care Plan by Professional Group

Staff Members	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	39	100.0	20	100.0	19	100.0
Dental care plans are not available	9	23.1	8	40.0	1	5.3
Not aware of dental care plans in medical histories	20	51.3	9	45.0	11	57.9
Other. Not within my professional tasks	10	25.6	3	15.0	7	36.8

Table 45, indicates that the majority of professionals in the ACNC, do not refer to the oral care plans in older adults' medical history because they think that care plans are not made available (40%, N=8) when compared to 5.3% (N=1) of AHP group ($U=1470.5$, $z=3.56$, $p<0.001$) while the majority (36.8%, N=7) of Allied Health Professionals stated that they do not look at the care plans in the medical histories when compared to 15% (N=3) of the ACNC, because dental care plans do not fall under their remit of professional tasks (χ^2 (df 1; N=39) = 7.69; $p=0.021$).

3.6.4.3.4 Association between questions at Section C and Professional Group 1

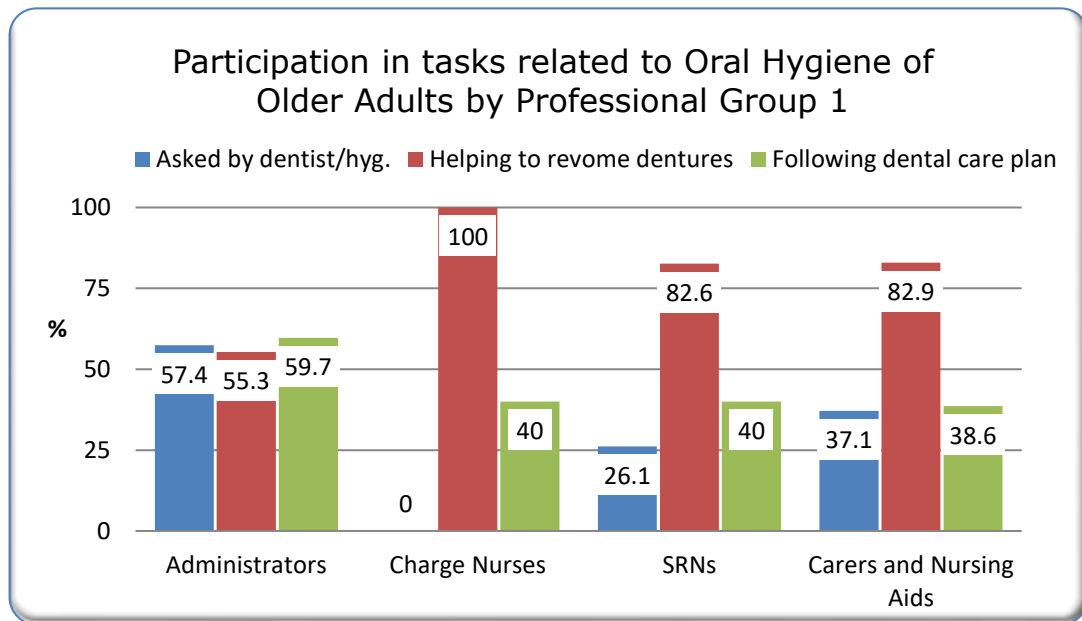


Figure 19 Oral Hygiene Tasks by Professional Group I

Figure 19, summarizes the significant differences between staff members in the Professional Group I. The majority of administrators (57.4%), were asked by the dentist and/or dental hygienist to assist in routine oral care of older adults (χ^2 (df 3; N=110) = 12.0; $p=0.007$). Moreover, the majority of administrators follow the dental care plans (KW; χ^2 (df 3; N=139) = 7.89; $p=0.048$). On the other hand, administrators were less involved in the specific task of removing dentures before going to bed (χ^2 (df 3; N=110) = 10.3; $p=0.016$).

3.6.4.4 Section D: Information from Staff Members refer older adults for treatment and/or visit the dental clinic, SVPR.

Table 46 Staff Members: Questions in Section D - Statistical Significance of Results (Referrals of Older Adults for Treatment and visits to the Dental Clinic, SVPR by Health Professionals)

	Gender	Type of Ward	Professional Groups	Professional Group I
Q33. Residents asking to visit dentist	0.543 (MW)	0.449 (MW)	0.044* (MW=1821.5; z=2.02)	0.751 (KW)

*p<0.05; **p<0.01; ***p<0.001

Chi ² Categorical variables

MW and KW Continuous Variables

3.6.4.4.1 Association between questions at Section D and Professional Group

Table 47 Staff Members response to whether residents ask to visit a dentist by Professional Group

Staff Members	Residents ask to visit Dentist by PROFESSIONAL Group					
	Total		Administrators, Consultants, Nurses and Carers		Allied Health Professionals	
	N	%	N	%	N	%
Total	171	100.0	138	100.0	33	100.0
Never	53	31.0	39	28.3	14	42.4
Sometimes	98	57.3	80	58.0	18	54.5
Frequently	16	9.4	15	10.9	1	3.0
Always	4	2.3	4	2.9	0	.0

Table 47 shows that only one response resulted to be significant. Staff members were asked whether older adults ask to visit the dentist. Table 47 indicates that the majority of staff members within the ACNC group (71.8%, N=99) responded that they do compared to the AHP Group (57.5%, N=19), (U=1821.5; z=2.02; p=0.044).

3.6.4.4.2 Association between questions at Section D by Type of Ward and by Professional Group 1:

The associations between the questions in Section D of the questionnaire by Type of Ward and by Type of Professional Group I, showed that there were no significant differences in these two sections of the questionnaire.

3.6.4.5 Section E: Awareness and Accessibility of Toothbrushing Basic Necessities and Existence of Teaching Dental Clinic at SVPR, by Staff Members

Table 48 Staff Members: Questions in Section E - Statistical Significance of Results (Awareness and Accessibility to Toothbrushing Necessities and to the Teaching Dental Clinic, SVPR)

	Gender	Type of Ward	Professional Groups	Professional Group I
Q35. Availability of Kidney Dishes	0.143 (Chi ²)	0.096 (Chi ²)	0.009** (Chi ² =6.73; df=1)	0.159 (Chi ²)
Q35. Availability of Toothbrushes	0.245 (Chi ²)	<0.001*** (Chi ² =20.4; df=1)	0.300 (Chi ²)	0.012* (Chi ² =11.0; df=3)
Q35. Availability of Mouth trays	0.551 (Chi ²)	0.031* (Chi ² =5.03; df=1)	<0.001*** (Chi ² =13.5; df=1)	0.055 (Chi ²)
Q35. Availability Denture Containers	0.303 (Chi ²)	0.001** (Chi ² =13.2; df=1)	0.144 (Chi ²)	0.057 (Chi ²)
Q35. Availability of Denture Fixative	0.022* (Chi ² =5.22; df=1)	<0.001*** (Chi ² =24.7; df=1)	1.000 (Fis)	0.487 (Chi ²)
Q37. Accessibility of Dental Clinic	0.062 (Chi ²)	1.000 (Fis)	<0.001*** (Chi ² =12.5; df=1)	0.611 (Chi ²)
Q37. No due Lack of Availability of Transport from Wards to Dental Clinic	0.917 (Chi ²)	1.000 (Fis)	0.002** (Fis)	0.606 (Chi ²)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables
MW and KW Continuous Variable

3.6.4.5.1 Association between questions at Section E and Gender

Table 48 (pg. 138) indicates that there is one significant result in this section, which is related to the availability to denture fixative.

Table 49 Availability of Toothbrushing Necessities at SVPR by Gender

Staff Members		Availability of Toothbrushing Necessities at SVPR by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Denture fixative	Total	116	100.0	40	100.0	76	100.0
	Yes	47	40.5	11	27.5	36	47.4
	No	58	50.0	26	65.0	32	42.1
	Don't know	11	9.5	3	7.5	8	10.5

Table 49, illustrates that the majority of staff members, stated that denture fixative is not available at SVPR. This is not a toothbrushing aid or adjunct, however female respondents (47.4%, N=36) compared to 27.5% (N=11) male respondents, replied that denture fixative is available. 65% (N=26) of males while 42.1% (N=32) of females stated that this is not available at SVPR (χ^2 (df 1; N=157) = 5.22; $p=0.022$).

3.6.4.5.2 Association between questions at Section E and Type of Ward

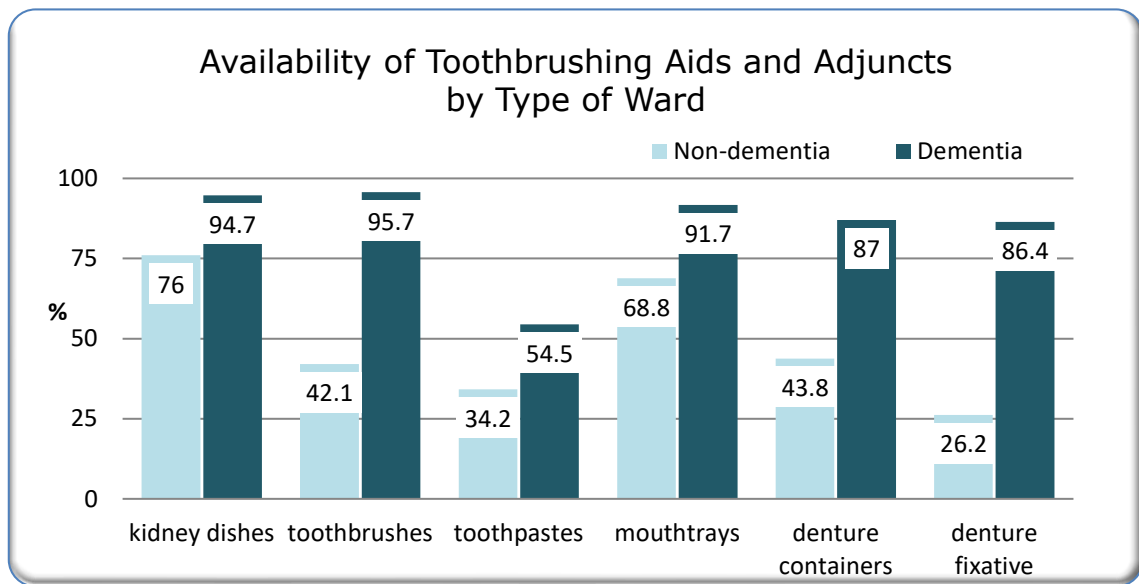


Figure 20 Availability of Toothbrushing Aids and Adjuncts as stated by Staff Members by Type of Ward

As illustrated in Table 48 (pg. 138), Figure 20 depicts the results obtained pertaining to the basic necessities used during toothbrushing at SVPR. Staff members deployed at dementia wards (95.7%, N=22) stated that there is an availability of toothbrushes, compared to staff members deployed at non-dementia wards (42.1%, N=32) (χ^2 (df 1; N=99) = 20.4; $p < 0.001$); staff members deployed at dementia wards (91.7%, N=22) stated that there are mouth trays compared to those deployed at the non-dementia wards (68.8%, N=53) (χ^2 (df 1; N= 101) = 5.03; $p = 0.031$), staff members deployed at dementia wards stated that there are denture containers (87%, N=20) compared to those deployed at the non-dementia wards (43.8%, N=32); (χ^2 (df 1; N= 96) = 13.2; $p = 0.001$) and staff members deployed at dementia wards (86.4%, N=19) stated that there is denture fixative available at SVPR compared to 26.2% (N=17) staff members deployed in non-dementia wards (χ^2 (df 1; N=87) = 24.7; $p < 0.001$).

3.6.4.5.3 Association between questions at Section E and Professional Group

Table 48 (pg. 138), shows that four significant responses were obtained by staff members, as distributed by professional group.

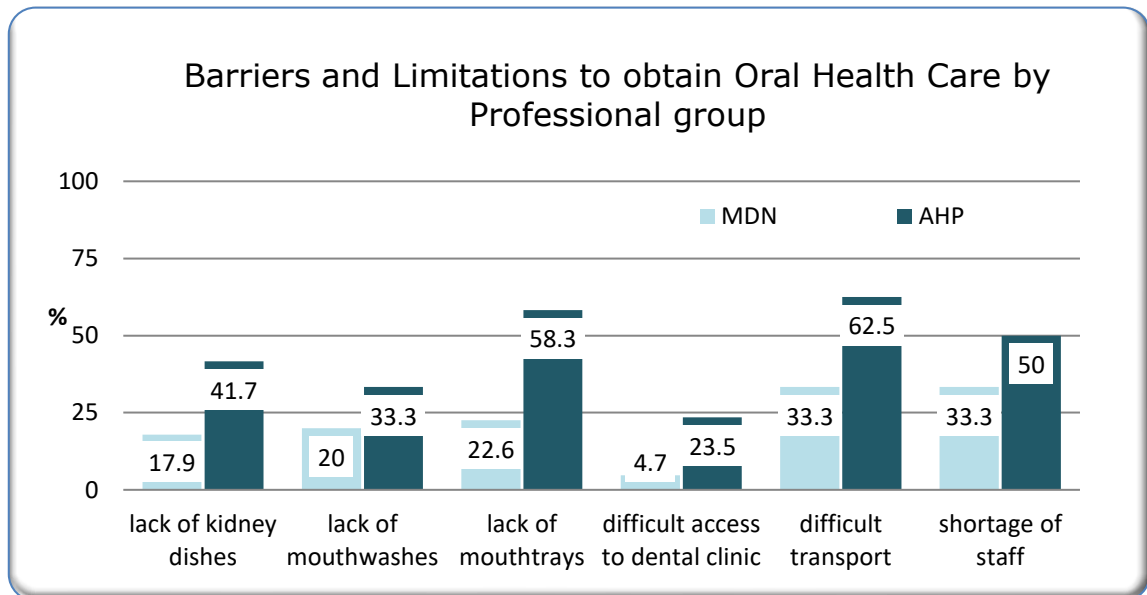


Figure 21 Hindrance to obtain appropriate Oral Health Care by Professional Group

Figure 21, indicates that the Allied Health Professional group members stated that some barriers at SVPR, hinder the appropriate oral health care to older adults. These include, lack of kidney dishes for bed-ridden older adults ($\chi^2(df\ 1; N=141) = 6.73; p=0.009$), lack of mouth trays ($\chi^2(df\ 1; N= 148) = 13.5; p<0.001$), difficulty to access the dental clinic ($\chi^2(df\ 1; N=161) = 12.5; p<0.001$), difficulty to get internal transport to help older adults access the dental clinic ($p=0.002$ Fis).

3.6.4.5.4 Association between questions at Section E and Professional Group 1

Table 50 Availability of Necessities by Professional Group 1

Staff Members		Availability of Necessities for Daily Oral Care of Older Adults by PROFESSION GROUP 1											
		Total		Administrators		Consultants		Charge Nurses		SRNs		Carers and Nursing Aids	
		N	%	N	%	N	%	N	%	N	%	N	%
Toothbrushes	Total	120	100.0	49	100.0	3	100.0	10	100.0	23	100.0	35	100.0
	Yes	62	51.7	22	44.9	2	66.7	7	70.0	18	78.3	13	37.1
	No	56	46.7	26	53.1	1	33.3	3	30.0	5	21.7	21	60.0
	Don't know	2	1.7	1	2.0	0	.0	0	.0	0	.0	1	2.9

There was only one significant reply from Section E at Professional Group Level I, as Table 50, indicates that Charge Nurses (70%, N=7) and SRNs (78.3%, N=18), were the professional members of staff who stated that there is an availability of toothbrushes for older adults at SVPR (χ^2 (df 3; N=120) = 11.0; $p=0.012$) compared to other professionals.

3.6.4.6 The Oral Health Impact Profile – 14 Questionnaire

3.6.4.6.1 Description of OHIP – 14 Results

Table 51 Summary of OHIP -14 Results

OHIP	N	Mean	Standard Deviation	Minimum	Maximum
OHIP FUNC	186	31.0	4.1	12.0	50.0
OHIP PSYC	186	30.0	5.1	11.0	39.0
OHIP TOTAL	186	61.0	8.3	28.0	77.0

Table 51 and Figure 22 provide a summary of the OHIP – 14 results by means of the functional, psychosocial and total scores.

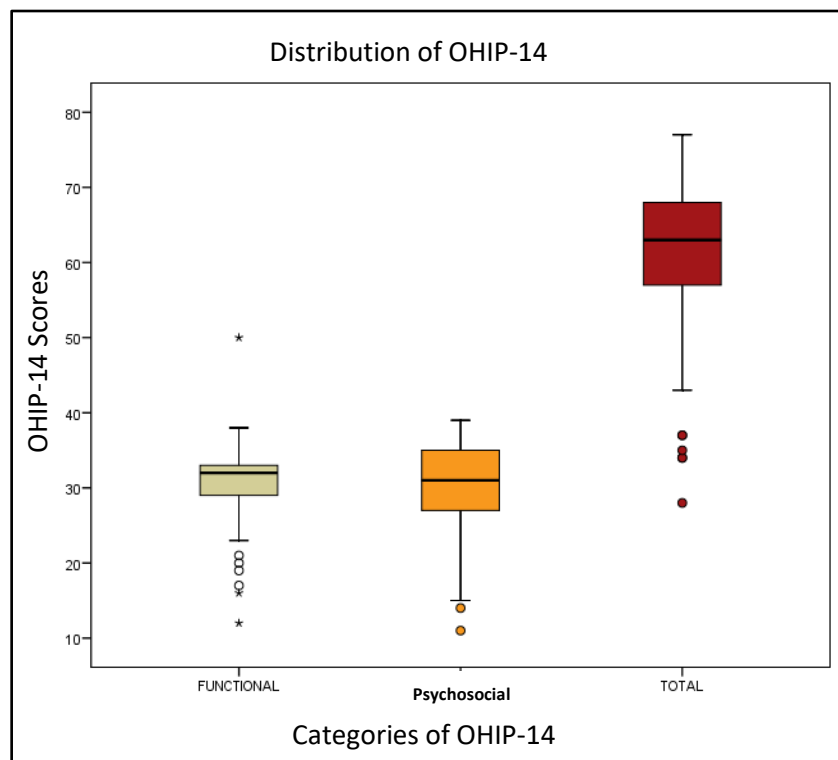


Figure 22 Distribution of OHIP-14 Values of Results

Figure 22 illustrates a plot showing various medians of functional, psychosocial and total OHIP-14 Scores.

Functional: With the median score in the lower 30s and considering that a score of 1 represents being 'very affected,' this suggests that the staff experiences significant functional limitations due to oral health issues. The outliers at the higher score end, closer to 5, represent staff members who are less affected functionally. The narrow interquartile range (IQR) suggests that most staff members have similar levels of functional limitation, although the outliers indicate there are exceptions.

Psychosocial: This category has a higher median score compared to the functional category, which might suggest that the staff members feel less Psychosocial impact from oral health issues on average. The larger IQR indicates a wider range of experiences in Psychosocial impact compared to functional limitations. The outliers at the lower end of the score range indicate some staff members are significantly more affected Psychosocially.

Total: The Total category has the highest median score, which in this context means that, overall, staff members are less impacted by oral health issues when both functional and Psychosocial aspects are considered together. The larger variability (IQR) in this category suggests a wider range of total impact levels on the staff members' quality of life. The high-end outliers indicate there are some staff members who are very little affected in total.

Given this scoring system, the presence of high-end outliers in the 'functional' and 'psychosocial' indicates there are staff members who experience few functional or

psychosocial problems related to oral health. However, the overall higher 'total' scores across the staff indicate a generally less severe impact on quality of life due to oral health, which might mean that the staff is generally in good oral health, or they do not perceive their oral health issues as significantly detrimental to their quality of life.

3.6.4.7 Relationship of key questions about Oral Hygiene with OHIP-14 scores

3.6.4.7.1 Association between the Oral Health Status and OHIP Scores, using Spearman's Correlation Coefficient and Mann-Whitney's Test

Table 52 Association between OHS of Staff members and OHIP Scores

Association between OH Status of Staff Members and OHIP Scores	FUNCTIONAL	PSYCHOSOCIAL	TOTAL
Health of Teeth	$r = -0.27$; $p < 0.001^{***}$	$r = -0.28$; $p < 0.001^{***}$	$r = -0.31$; $p < 0.001^{***}$
Health of Gums	$r = -0.35$; $p < 0.001^{***}$	$r = -0.30$; $p < 0.001^{***}$	$r = -0.36$; $p < 0.001^{***}$
Visit to the Dentist	$r = -0.08$; $p = 0.278$	$r = -0.04$; $p = 0.626$	$r = -0.05$; $p = 0.183$
Frequency of Toothbrushing	$r = 0.11$; $p = 0.126$	$r = 0.10$; $p = 0.165$	$r = 0.13$; $p = 0.079$
Oral Health Education	0.739 (MW)	0.113 (MW)	0.368 (MW)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Spearman's Correlation

Table 52 indicates that as the oral health status of staff members improved, they very frequently reported higher OHIP-14 scores, reflecting fewer oral health-related problems and a better quality of life. The statistically significant p-values (< 0.001) confirm these associations.

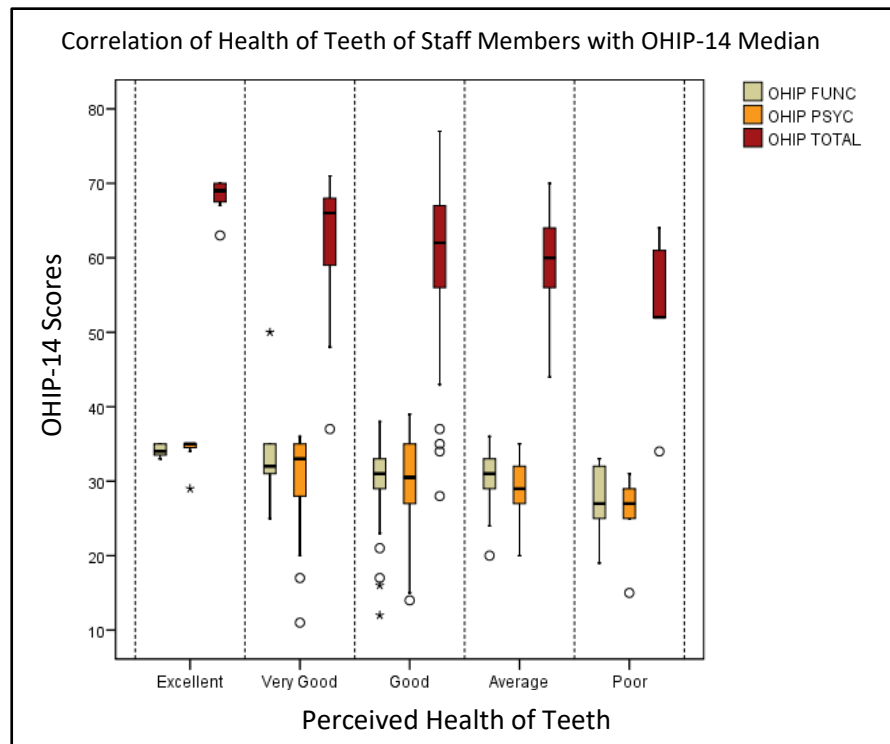


Figure 23 Association of Health of Teeth of Staff Members with OHIP-14 Scores

Figure 23 shows that there was no additional association which has been identified when correlating Health of Teeth and other questions in the section with the OHIP-14 score.

3.6.4.7.2 Association between OHIP scores by Gender, by Ward, by Professional Group and by Professional Group I

The association between the OHIP scores by gender, by ward, by professional groups and by professional group I, were all similar and not significant.

3.6.5 Discussion and Conclusion

Section 1: Demographic Profile Analysis:

The demographics of the researched population, including age, gender, professional group, and ward distribution, examine the distribution of respondents across these demographic categories and identifies any notable trends or patterns.

According to the responses of the participants, the majority of health professionals involved, included administrators (33.1%, N=58), health carers (24.6%, N=43), and State Registered Nurses (14.3%, N=25). Notably, there were fewer oral health professionals and other allied health professionals participating, which can be attributed to the relatively low number of oral health professionals employed at SVPR. The Professional Group distributions in this research project was 1:4, therefore for every Allied Health Professional, there were 4 members of the Professional Group 2 employed, (Administrators, Consultants, Charge Nurses, State Registered Nurses and Carers) which indicates that the distribution of professionals, was a true representation of the total distribution of professionals when this study was conducted.

The mean age of participants was 41.5 ± 12.8 years, with ages ranging from 21 to 62 years.

A significant portion of participants (47.6%, N=89) fell within the age range of 46 years to the pensionable age of 64 years. Among females, the majority (42.6%, N=52) were between 46 and 64 years old, while 41% (N=50) were aged between 19 and 35. Among males, 56.9% (N=37) were in the 46 to 64 age bracket. Approximately half of the staff members had completed a graduate level of education or higher.

Wards were categorized based on the cognitive health conditions of the older adults residing in them, distinguishing between dementia wards and non-dementia wards.

Section 2: Results Analysis by Gender:

The collected data was analyzed to examine gender disparities among staff members, in daily oral hygiene routines.

A noteworthy finding, deserving attention, is the discrepancy in self-assessed dental health between male and female staff members. A higher proportion of male participants rated their dental health as average-poor (35.9%) compared to females (19.3%), a statistically significant difference ($U=3259.5$, $z=2.60$; $p=0.009$). Therefore, females rated their dental health better than males.

Significant differences emerged when examining toothbrushing habits by gender. When results were compared it was evident that females (45.6%, $N=57$) brushed their teeth twice daily, significantly more than males (28.8%, $N=19$), ($U=2670$; $z=4.32$; $p<0.001$).

Furthermore, a significant difference (χ^2 (df 1; $N=193$) =11.6; $p=0.001$) was observed in the preferred timing of toothbrushing; the majority of females (50.8%, $N=64$) preferred brushing before breakfast, while only 25.4% of males ($N=17$) shared this preference.

Further significant findings included preference of interdental aids with a higher proportion of female staff members (34.1%, $N=43$) opting for dental floss/tape (χ^2 (df 1; $N=193$)=4.60; $p=0.032$). In their study, Newton & Asimakopoulou (2017), results showed that more participants indicated brushing their teeth twice daily. Morning

toothbrushing exhibited statistically higher automaticity scores in comparison to evening toothbrushing, implying that the latter may be less regularly performed due to variations in evening schedules, potentially resulting in overlooked opportunities for oral care. Similarly, to this research study, the authors noted that age and gender were significantly linked to automaticity scores for toothbrushing, with older individuals and females demonstrating greater levels of automaticity, perhaps reflecting their higher involvement in health-related behaviours.

Furthermore, Lipsky et. Al. (2021), stated that males tend to neglect their oral health and maintain inferior oral hygiene practices. The authors' review revealed that males are more inclined to neglect their oral health, exhibit poorer oral hygiene practices, and suffer from higher rates of periodontal disease. Additionally, males visit dentists less frequently and tend to seek oral treatment more often for immediate issues rather than disease prevention, in contrast to females. Females generally display more favourable attitudes toward dental visits and exhibit better oral health behaviours compared to males. This includes interdental cleaning.

Bleeding during oral care was significantly associated with male subjects ($U=3328.5$; $z=2.02$; $p=0.043$), indicating a higher proportion of males (32.3%, $N=21$), reporting gingival bleeding compared to females (17.5%, $N=21$).

The level of oral health education followed similar significant gender disparities. A higher percentage of females (69.8%) received oral health education compared to males (53.8%), a statistically significant finding (χ^2 (df 1, $N=191$) = 4.16; $p=0.041$). Further results confirmed that more females (55.7%, $N=49$) received education from primary

and secondary schools compared to males (37.1%, N=13); (χ^2 (df 1, N=123) = 9.15; $p=0.002$).

Additionally, when asked about assisting older adults with oral care, female staff members (36.8%, N=46), reported being asked more frequently than males (13.9%, N=9); ($U=3178$; $z=2.44$; $p=0.015$), with one of the main tasks being to assist older adults to remove dentures before bedtime when compared to other times during the day (χ^2 (df1; N=130) = 4.91; $p=0.027$).

The availability of denture fixative was also subject to gender differences; while not a toothbrushing adjunct, it is noteworthy that more females (47.4%, N=36), reported its lack of availability compared to males (40.5%, N=11); (χ^2 (df 1; N=157) = 5.22; $p=0.022$). This compares well with Newton & Asimakopoulou (2017) discussion of their findings where there was a notable association between gender and the automaticity scores for toothbrushing, wherein females and older adults exhibited higher levels of automaticity. This observation may suggest that older adults and females staff members exhibit increased engagement in health-related practices.

Notwithstanding the significant differences and disparities by gender were evident in various aspects of oral care practices, education and resources, the oral health-related quality of life, as measured with OHIP were similar between male and female participants. This lack of significant differences in oral health-related quality of life between male and female participants indicates that although differences were noted previously in oral care practices, education and resources, this does not necessarily equate to any significant self-reported changes in one's quality of life.

Section 3: Results Analysis by Ward:

This section further explores questionnaire findings based on various wards among SVPR staff surveyed for this study. It explores how differences in ward demographics might affect daily oral hygiene habits and identifies any discrepancies or similarities across different ward settings.

Significant findings in relation to ward deployment reveal notable differences in toothbrushing habits, gingival bleeding prevalence, oral health education sources, desire for education frequency, assistance in daily oral care, and availability of oral care necessities.

In terms of toothbrushing habits, respondents from dementia wards reported a significantly higher preference for brushing before breakfast (69.2%, N=18) compared to non-dementia wards (43.2%, N=38) (χ^2 (df=1; N=114) = 5.45; $p=0.020$). Conversely, non-dementia ward respondents showed a higher frequency of brushing at non-standard times (15.9%, N=14) compared to dementia wards (0%, N=0); (χ^2 (df1; N=114) = 4.72; $p=0.030$).

This is consistent with the findings in Abegg et al., (2000) discussion where the authors stated that individuals who have more flexible daily routines might find it easier to incorporate toothbrushing into various parts of their day, leading to more frequent and effective oral hygiene habits. This flexibility could allow them to adapt their brushing schedule to different situations or unexpected changes in their day, ensuring they maintain good oral health consistently. Therefore, staff members who are deployed in wards for cognitively healthy older adults have more flexible hours and therefore can

incorporate toothbrushing during other non-standard times during the day when compared to staff members who are deployed in wards for cognitively unhealthy older adults, who are most of the time dependent on their health carers. These staff members with rigid routines might struggle to fit toothbrushing into their schedule if it doesn't align with their set activities, potentially leading to less frequent or less effective brushing habits.

This highlights the importance of not only the frequency but also the adaptability of daily routines in promoting healthy habits like toothbrushing. It suggests that promoting flexibility in daily schedules could be beneficial for overall oral health.

Gingival bleeding was more prevalent among staff in non-dementia wards (35.6%, N=31) compared to staff members deployed at dementia wards (7.7%, N=2); (U=731; z=2.89; p=0.002).

Regarding oral health education, there were no significant differences in whether staff received oral health education being deployed in dementia or non-dementia wards (p=0.577). However, significant differences emerged in the source of education. Dementia ward staff predominantly received education at school (75%, N=12) rather than from dentists (χ^2 (df 1; N=72) = 5.18; p=0.023), while the opposite was observed for non-dementia ward staff members (48.2%, N=27) who stated that they received oral health education mostly from dentist (χ^2 (df 1; N=72) = 10.3; p=0.001).

In terms of desire for more oral health education, non-dementia ward staff expressed a greater wish for more frequent education (every 6 months) compared to dementia ward staff (U=772.5; z=2.48; p=0.013).

This result tallies well with the one above, since it has been concluded that staff members did not receive their education directly from dental professionals and therefore they aspire to receive more dental talks at the place of work.

Staff members from the dementia wards (96%, N=25) stated that they think that oral health is very important to older adults when compared to the staff members working in the non-dementia wards (53.4%, N=47); (U=679; z=3.72; p<0.001). Assistance in daily oral care was more frequently requested from staff in dementia wards (χ^2 (df 1; N=86) = 8.14; p=0.004) primarily by nurses (76.2%, N=16), compared to non-dementia ward staff (41.5%, N=27).

Significant differences were also observed in responses regarding denture rinsing and brushing, with higher rates reported in dementia wards (81%, N=17) compared to non-dementia wards (55.4%, N=36); (χ^2 (df 1; N=86) = 3.96; p=0.047).

Moreover, there were significant disparities in the availability of basic oral care necessities between dementia and non-dementia wards with dementia wards consistently reporting higher availability of toothbrushes (χ^2 (df 1; N=99) = 20.4; p<0.001), mouth trays (χ^2 (df 1; N= 101) = 5.03; p=0.031), denture containers (χ^2 (df 1; N= 96) = 13.2; p=0.001), and denture fixatives (χ^2 (df 1; N=87) = 24.7; p <0.001).

Despite these differences, OHIP-14 scores were similar between staff deployed in dementia and non-dementia wards. The OHIP-14 scores of both groups, staff members deployed at dementia wards and those deployed at non-dementia wards, were found to be similar. This suggests that there were no significant differences in oral health-related quality of life between staff members working in these different ward settings.

Mohammadi, Franks & Hines (2015), commented that current research indicates that care staff for residential older adults, often hesitate to prioritize oral care, primarily due to limited knowledge and psychosocial barriers associated with working on someone else's mouth. While staff routinely manage residents' urinary and faecal incontinence, they encounter deeper psychosocial hurdles when it comes to oral care, driven by personal values regarding oral health or the belief that residents should manage their own dental hygiene.

Additionally, residents with dementia, who may exhibit behavioural challenges, often have their oral hygiene neglected as they resist or react aggressively to care from aged care staff. Studies reveal instances where residents with dementia refuse to cooperate with oral hygiene practices initiated by staff. Consequently, staff members frequently opt not to implement oral care routines for these "challenging" residents, perpetuating a cycle of oral neglect and subsequent health issues.

Section 4: Results Analysis by Professional Group:

Additional results are analyzed concerning the professional groups of the participants. It contrasts daily oral hygiene practices across different professional categories like Administrators, Medical Consultants, Nurses, Carers, and Allied Health Professionals, evaluating how their roles might influence oral care routines.

Significant differences in oral hygiene habits were observed between staff members from the ACNC professional group and the AHP Group. The AHP Group reported fewer mouth-related problems compared to the ACNC Professional Group ($U=1836$; $z=2.62$; $p=0.009$), highlighting a reliable distinction between the two professional groups. When

it comes to dental services preference, both professional groups predominantly favoured private dentists (ACNC: 84.4%, N=119; AHP: 75%, N=75) to hospital services, with a significant statistical result (χ^2 (df 1; N=177) = 6.89; $p=0.032$). Additionally, a notable discrepancy was observed in routine dental check-up habits; while the majority of AHP group (61.1%, N=22) visited the dentist for routine check-ups and treatment, the ACNC staff members tended to seek dental care primarily when experiencing pain or oral problems (χ^2 (df 1; N =176) = 8.10; $p=0.017$).

Preferences for toothbrushing adjuncts also showed differences, with the Allied Health Professional Group scoring higher in the use of dental floss tape (47.2%, N=17); (χ^2 (df 1, N = 178) = 5.20; $p=0.023$).

Furthermore, a significant difference was noted in mouthwash usage, with a higher proportion of ACNC professionals (60%, N=30) reporting its use compared to the AHP Group (36.4%, N=8); (χ^2 (df 1; N =178) = 6.12; $p=0.047$).

Regarding gingival bleeding, a significantly higher percentage of ACNC professionals (26.2%, N=37) reported experiencing it, compared to the AHP Group (11.1%, N=4); (U = 1996; $z=1.99$; $p=0.046$).

The OHIP-14 scores of both professional groups were found to be similar. This indicates that there were no significant differences in oral health-related quality of life between the two groups.

In summary, distinct patterns in oral hygiene habits, dental care preferences, and gingival health were evident between the ACNC professional group and the AHP Group,

underscoring the importance of considering professional distinctions in oral health interventions and education initiatives.

Section 5: Results Analysis by Professional Group I:

Expanding on the prior section, this section offers a thorough examination of particular professional groups, with a spotlight on Professional Group I, which includes Administrators, Medical Consultants, Charge Nurses, State Registered Nurses and Carers. It investigates distinctive factors impacting oral care practices in this group and discusses implications for enhancing tailored oral care strategies.

Within Professional Group I, which consists of several significant findings emerged related to toothbrushing frequency, technique, gingival bleeding, sourcing of oral hygiene information, and involvement in oral care tasks.

Firstly, there were significant differences in toothbrushing frequency among Professional Group I members, with administrators exhibiting lower brushing frequency compared to other professionals (KW; χ^2 (df 3; N= 142) = 13; $p=0.005$). Regarding toothbrushing technique, a significant majority of Charge Nurses (80%) reported using a mixture of motions during brushing, distinguishing them from other professionals in the group (χ^2 (df 9; N=141) = 21.2; $p=0.012$).

The prevalence of gingival bleeding also varied significantly among Professional Group I members, with administrators showing the highest rate compared to Charge Nurses and State Registered Nurses (χ^2 (df 3; N=141)=9.32; $p=0.025$). A statement made by Baudet et. al. (2020), regarding the significance of gingival bleeding as an indicator of gingival inflammation and periodontal disease, suggests that individuals who perceive gingival

bleeding as insignificant and fail to take action to address it, may demonstrate a lack of understanding of periodontal health. This lack of understanding may extend to health professionals as well, potentially influencing their decisions regarding gingival health and impacting the advice given to patients.

Sourcing of oral hygiene information differed significantly within the ACNC group predominantly obtaining education from school intervention programs (χ^2 (df 3; N=90) = 13.8; $p=0.003$), while administrators and carers were more likely to receive information from dentists (χ^2 (df 3; N=90) = 9.15; $p=0.027$). Notably, administrators were frequently asked by dentists or dental hygienists to assist in routine oral care of older adults (χ^2 (df 3; N=110) = 12.0; $p=0.007$), and they predominantly followed dental care plans (KW; χ^2 (df 3; N=139) = 7.89; $p=0.048$). However, they were less involved in the specific task of removing dentures before bedtime (χ^2 (df 3; N=110) = 10.3; $p=0.016$), when compared to the other members of the Professional Group 1.

Additionally, Charge Nurses and State Registered Nurses were more likely to report the availability of toothbrushes for older adults at SVPR compared to other professionals (χ^2 (df 3; N=120) = 11.0; $p=0.012$).

These findings highlight distinct patterns in oral hygiene practices, information sourcing, and involvement in oral care tasks within Professional Group 1, underscoring the importance of tailored interventions and education initiatives to address specific needs and practices within this professional group.

The OHIP-14 scores of the professionals participating in Professional Group I were found to be similar. This suggests that there were no significant differences in oral health-related quality of life among the members of this professional group.

However, the Total OHIP-14 scores suggested that staff indicate that they suffer less severe oral health related impacts on quality of life.

As stated by Niesten & McKenna (2020), it's crucial for healthcare professionals to understand the importance of oral health and quality of life which is multifaceted and frequently undervalued, especially among the older adults and the repercussions and work towards preserving and enhancing oral health-related quality of life. Medical practitioners can significantly contribute to this endeavour by incorporating oral health assessments into comprehensive medical evaluations, advocating for good oral hygiene practices, and promoting awareness about the pivotal role of oral health in maintaining overall well-being.

As stated by Hearn & Slack-Smith (2015), various barriers impede the provision of oral care in residential aged care facilities (LTCF), stemming from different stakeholders within the healthcare system. Healthcare providers face challenges such as the limited prioritization of oral care due to competing demands and constraints in public dental support. Transporting frail residents to dental facilities presents logistical hurdles, compounded by the lack of clear referral pathways and information on residents' dental history. LTCF managers deal with heavy administrative burdens, a scarcity of oral hygiene aides, and communication difficulties with dentists and dental hygienists. Sometimes, dentists encounter reluctance or difficulties to provide services outside practices, financial constraints, and insufficient education in geriatric dentistry.

Oral health practitioners are under-utilized, maintaining traditional hierarchies and lacking emphasis on guidance and support. Nurses and care assistants struggle with oral health not being a daily priority, time constraints, turnover, and limited training. Family and carers experience barriers like the absence of dental check-ups, low priority given to dental treatment, and reluctance of LTFC staff to involve them in oral health care. Cross-sector collaboration is hindered by policy incompatibility, insufficient commitment to address service provision as part of an interdisciplinary team, and limited financial support for collaborative engagement. Addressing these multifaceted barriers is essential for enhancing oral care standards and improving the overall oral health of older adults residents in LTCFs.

Conclusion:

Thus, this chapter encapsulates the main findings derived from the questionnaire analysis among SVPR staff. It explores their relevance to self-reported oral health, with particular significant results on gingival bleeding which were obtained at all levels of research, therefore at Gender level, Type by Ward level, Professional Groups Level and at Professional Group Level I. The results also reflect the staff members' oral health motivation, implications to healthcare practice and oral behaviours. It emphasizes the several factors which have been summarized, in influencing oral care interventions for older adults which might also cause discrepancies which may impact the older adults' oral health.

Chapter 4

Self-Reported Attitudes and Perceptions about

Oral Health and Quality of Life of Older Adults Residing at St. Vincent de Paul Residence

4.1 Introduction

Understanding the complex interplay between oral health and overall quality of life is crucial, especially for older adults who often face unique challenges in maintaining good oral hygiene. This chapter delves into a detailed analysis of attitudes towards daily oral care and its impact on quality of life among older adults residing at St. Vincent de Paul. By conducting a cross-sectional study involving 103 participants, this research aims to show demographic and clinical profiles, and to evaluate how factors such as gender, ward type, and educational background influence oral health behaviours and perceptions.

Through a thorough examination of the OHIP-14 questionnaire responses at two distinct time points, this chapter provides insights into the current state of oral health among the participants and also highlights changes over time. The results offer an understanding of how oral health affects quality of life, particularly within different demographic and clinical contexts.

The findings presented in this chapter reveal significant disparities in oral health experiences between genders, educational levels, and types of wards, including those with dementia. These disparities underscore the need for tailored oral health interventions and highlight the potential gaps in current care practices. By addressing these variations, this chapter aims to contribute to the development of more effective, personalized oral health strategies for older adults, ultimately enhancing their overall well-being and quality of life.

4.2 Aim

The primary aim of this part of the research is to assess the prevalence of attitudes towards daily oral care and oral health related quality of life of older adults, residing at St. Vincent de Paul, a long-term facility care for older adults.

4.3 Methods and Methods

A cross-sectional analysis was performed to gather initial data on the prevailing attitudes among older adults residents of St. Vincent De Paul Residence. The interviews (Appendix 18) were conducted exclusively with consenting older adults residents, who were capable of communicating and willing to participate at that moment in time, within the selected wards for the research study (Figure 24; pg. 164). Prior to interviews, consent was obtained through an intermediary, the Charge Nurse, responsible for the respective wards. The aim was to assess their oral health needs and the support required from the interdisciplinary team.

4.3.1 Inclusion and Exclusion Criteria Specific for Older Adults Residing at SVP Residence

4.3.1.1 Inclusion Criteria

- Older adults who are 60 years of age or over.
- All participants including those with physical, medical and cognitive impairment (Cognitively impaired participants: only those chosen by the ward manager, who had mild dementia and were able to communicate)
- All individuals giving consent to participate or their assent together with the consent of the next of kin.

4.3.1.2 Exclusion Criteria

- Adults who reside at SVPR but are under the age of 60
- Older adults who did not give consent to participate.
- Cognitively impaired older adults who were not chosen by the ward manager due to their inability to communicate or who did not give their assent to participate simultaneously with the consent of the next of kin.

4.4 Sample

The sample consisted of 383 older adults residing in a long term care facility, St. Vincent de Paul Residence. Section 4.5.1., describes exhaustively the older adults' socio-demographic profile. Figure 24 illustrates that 103 replied to the questions which were asked during the interview, 7 did not respond when approached, 1 older adult did not consent, another older adult passed away while 271 were cognitively impaired older adults. Therefore respondents were classified according to their ability to respond.

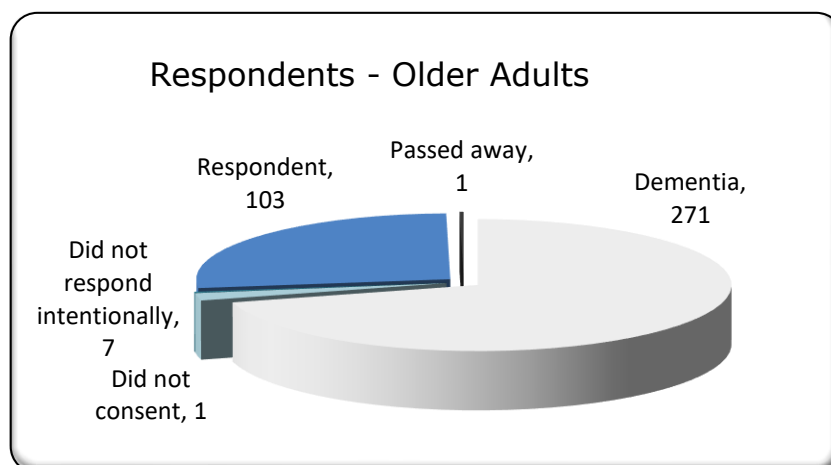


Figure 24 Percentage of Effective Respondents from Potential Respondents

Older adults responded to a questionnaire during an interview. Information gathered included:

- Section A: Teeth, Gingival Health and Tooth Brushing Techniques
- Section B: Oral Health Education at St. Vincent de Paul Residence
- Section C: Importance of Oral Health to Older Adults
- Section D: Smoking habits
- Section E: Facilities in wards which enhance daily oral care/Accessibility to the dental clinic
- Section F: OHIP-14

4.4.1 Presentation of Results and Sequence of Results

In this chapter, results will be presented in a sequence as follows:

Results of Older Adults' interviews, according to questionnaire sections A – E and OHIP

– 14 questionnaire:

2. Gender
3. Ward
4. Educational Level (No significant results obtained)
5. Oral Hygiene and Quality of Life Interview at T1 (1st OHIP-14 interview conducted before the clinical assessments and interventions) and T2 (2nd OHIP-14 interview conducted after the clinical assessments and interventions).

(Scores allocated to Pain and Discomfort responses: **1 Very Often; 2 Fairly Often; 3 Occasionally; 4 Hardly Ever; 5 Never; 6 Don't know**).

4.5 Statistical Analysis

Statistical analysis consists of a general description for continuous variables (mean, standard deviation, range and median) and categorical variables (absolute and relative frequencies).

- Spearman's correlation coefficient was estimated to assess the non-linear association between ordinal or continuous parameters (for example: OHIP score and frequency of OH habits).
- Mann-Whitney tests were used to compare distributions of ordinal through two independent groups of patients (by gender, by type of ward).
- Kruskal-Wallis tests were used to the same previous purpose when more than 2 groups were involved (by district).
- χ^2 independence and Fisher's exact tests were conducted to assess the association between categorical variables (by gender, by type of ward).
- Wilcoxon's test was conducted to assess changes at OHIP scores between both sessions.

Significance level used in analysis was set at 5% ($\alpha=0.05$).

4.6 RESULTS

4.6.1 Demographics

The following results show the descriptive statistics for demographics and clinical profile for the older adults participating in this research study.

4.6.1.1 Types of Wards

Wards were classified depending the cognitive health condition of the older adults. Therefore, wards were classified as dementia wards and non-dementia wards.

Table 53 Types of Residential Wards for Older Adults

Older Adults	TYPES OF WARD					
	Total		Non-dementia		Dementia	
	N	%	N	%	N	%
Total	382	100.0	289	100.0	93	100.0
Mother Tereza 1	39	10.2	39	13.5	0	.0
Lourdes	38	9.9	38	13.1	0	.0
SJ2	36	9.4	36	12.5	0	.0
SJ4	41	10.7	41	14.2	0	.0
RB1	34	8.9	34	11.8	0	.0
RB3	34	8.9	34	11.8	0	.0
ST Frances 2	40	10.5	40	13.8	0	.0
JP3	23	6.0	0	.0	23	24.7
JP2	22	5.8	0	.0	22	23.7
JP1	24	6.3	0	.0	24	25.8
JP5	24	6.3	0	.0	24	25.8
ST Frances 3	27	7.1	27	9.3	0	.0

Table 53 indicates the distribution of older adults residing in respective wards according to their cognitive health.

Table 54 Interview by Type of Ward

Older Adults	Interview by TYPE OF WARD					
	Total		Non-dementia		Dementia	
	N	%	N	%	N	%
Total	382	100.0	289	100.0	93	100.0
Yes	103	26.9	84	29.1	19	20.4
No	279	73.1	205	70.9	74	79.6

Table 54 illustrates the distribution of older adults who participated in the interviewing process residing in respective wards. Since the dementia group included only n=19 older adults, statistical analysis indicated that it was difficult to obtain high significant associations.

4.6.1.2 Number of Participating Older Adults and their Residing Wards

Table 55 SVPR Residing Wards of Older Adults

Residing Wards	Type of Ward (Gender and Cognitive Status)	Number of Older Adults Responding to Interview Questions	%
Total	103	103	100.0
Mother Tereza 1	Female Ward	13	12.6
Lourdes	Male Ward	12	11.7
SJ2	Mixed Gender Ward	10	9.7
SJ4	Male Ward	8	7.8
RB1	Female Ward	5	4.9
RB3	Female Ward	12	11.7
ST Frances 2	Female Ward	10	9.7
JP3	Female Dementia Ward	11	10.7
JP5	Female Dementia Ward	8	7.8
ST Frances 3	Female Ward	14	13.6

Table 55 shows that the majority of respondents resided in female wards. The least respondents were in Ruzar Briffa 1 Ward while the majority of respondents resided at St. Frances 3.

4.6.1.3 Gender of Older Adults

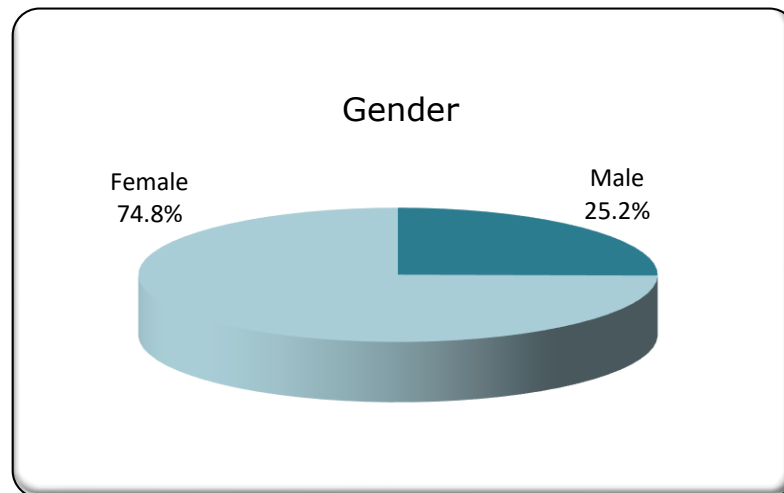


Figure 25 Gender of Older Adults

Figure 25 shows the gender distribution of older adults who responded to the interview questions with the majority of them being female (74.8%, N=77), which reflects the population distribution within the residence which is 1 male:4 females

4.6.1.4 Age

Table 56 Mean Age of Older Adults Participating in Interview

N	103
Mean Age	81.7
Standard Deviation	11.6
Minimum	35.0
Maximum	105.0
Median	85.0

Table 56 indicates that the mean age of the older adults was at 82 (+/- 11.6 years) years of age.

4.6.1.5 Education

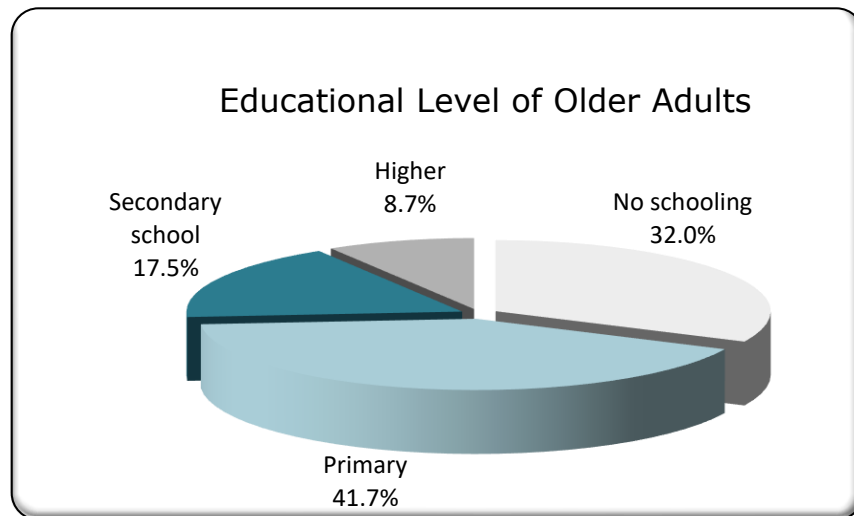


Figure 26 Educational Level of Older Adults

Figure 26 shows the level of education amongst older adults who responded to the interview questions. Most of the respondents had no schooling (32%, N= 33) or had received primary schooling (41.7%, N=43), 17.5% (N=18) received secondary schooling and 8.7% (N=9), received higher education. This is reflective of the reality of the education standard in Malta during the 1940s.

4.6.1.6 Profession

Table 57 Occupations of Older Adults

Occupations of Older Adults	N	%
Total	97	100.0
Professional, Company Director, Manager, Higher Government/Army official/Small Business Owner	5	5.2
Clerk, Supervisor, Technician, Foreman	10	10.3
Kitchen Assistant, Hairdresser, Postal Worker, Warden, Manual Labourer, Messenger, Waiter	47	48.5
Unemployed	35	36.1

As can be observed in Table 57, older adults had several employments, with the majority (48.5%, N=47) stating that they were employed as Kitchen Assistants, Hairdresser, Postal Worker, Warden, Manual Labourer, Messenger, Waiter while 36.1% (N=35) stated that they had been unemployed. Very few (5.2%, N=5) had a high ranking occupation.

4.6.1.7 Type of Dentition

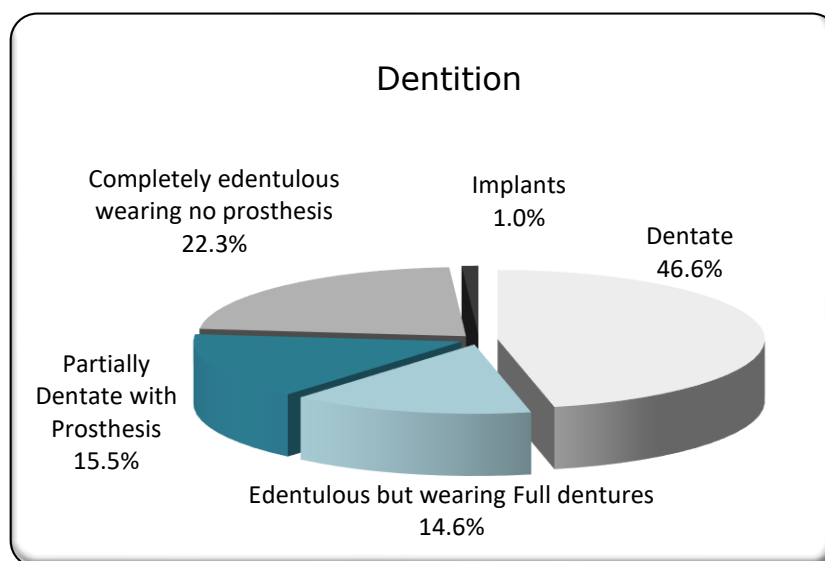


Figure 27 Type of Dentition and/or Prosthesis of Older Adults

In Figure 27, one can observe that the majority of respondents retained their own dentition (46.6%, N=48) while 22.3% (N=23) were completely edentulous and had no prosthesis. It's interesting to note that 1% (N=1) of respondents had implants.

4.6.1.8 General Physical and Cognitive Assessment

Table 58 General Physical and Cognitive Assessment of Older Adults

General Physical and Cognitive Assessment of Older Adults		N	%
Cognitive Health	Total	102	100.0
	Alert	77	75.5
	Semi-alert	24	23.5
	Non-communicable	1	1.0
Mobility	Total	103	100.0
	Ambulatory	59	57.3
	Non-ambulatory	44	42.7
Dexterity	Total	102	100.0
	Good	80	78.4
	Poor	22	21.6

Table 58 illustrates the physical and cognitive conditions of the older adults who formed part of the sample. The majority (75.5%, N=77), were fully cognitively healthy, were ambulatory (57.3%, N=59) while 78.4% (N=80) had no dexterity problems.

4.6.1.9 OHIP-14

T1: Results of 99 respondents.

T2: Results of 39 respondents.

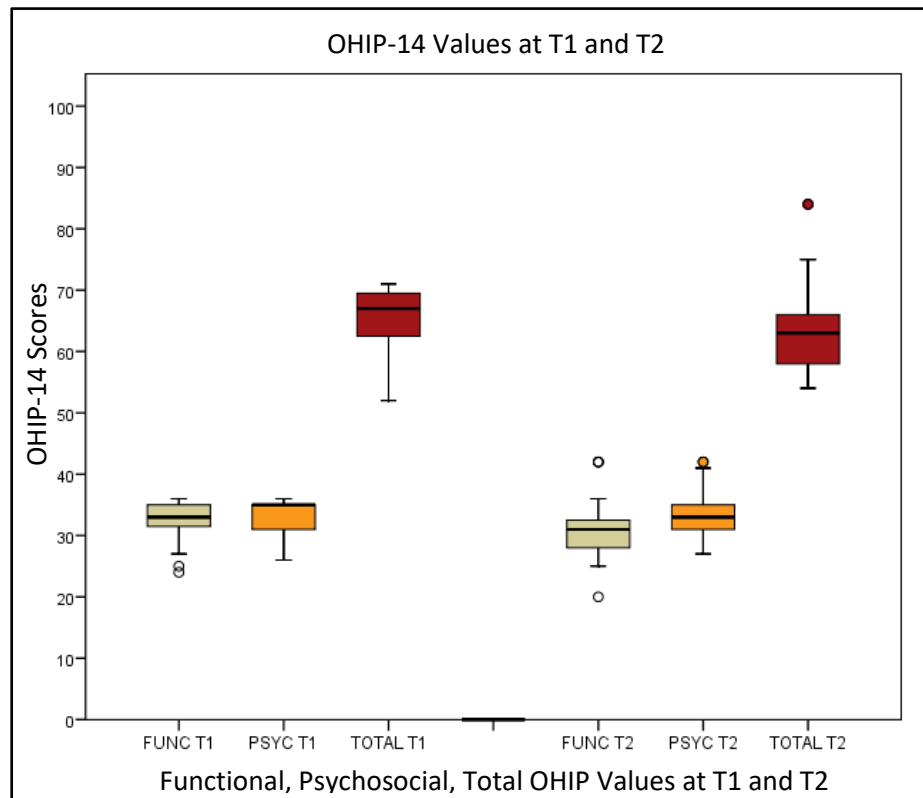


Figure 28 Distributions of Older Adults Responding to OHIP-14 Questions at T1 and T2

Figure 28 gathers 58% of cases which are divided by the median. The lower and upper box limits are the first and third quartiles. Just beneath are the 25% and 75% of the sample respectively. Vertical segments are extended until acceptable values, showing atypical in circles and extremes with an asterisk symbol. The graph represents restricted distributions for N=39 older adults who responded to the OHIP-14 questions twice. This was done for comparative reasons.

4.6.2 Results obtained from Interview

The following are descriptive results for all the questions from the Interview.

4.6.2.1 Section A: Oral Health and Hygiene of Older Adults

Table 59 Older Adults: Questions in Section A - Statistical Significance of Results (Oral Health and Hygiene of Older Adults)

	Gender	Ward	Educational Level	OH Quality Of Life (T1)
Q2. Frequency toothache/discomfort	0.027* (MW=692; z=1.12)	0.416 (MW)	r= 0.06; p=0.568	r= 0.39; p<0.001***
Q4. Visit to dentist	0.014* (MW=592; z=2.46)	0.646 (MW)	r= -0.03; p=0.750	r= -0.16; p=0.118
Q5. Reason for visiting to dentist	0.435 (Chi ²)	0.196 (Chi ²)	0.090 (Chi ²)	0.017* (Chi ² =12.0; df=4)
Q7. After Breakfast	1.000 (Fis)	1.000 (Fis)	0.776 (Chi ²)	0.010* (Chi ²)
Q7. After lunch	0.038* (Chi ² =4.29; df=1)	0.022* (Fis)	0.997 (Chi ²)	0.873 (Chi ²)
Q7. Before bed	0.114 (Chi ²)	0.046* (Fis)	0.858 (Chi ²)	0.859 (Chi ²)
Q10. Fluoride paste	1.000 (Fis)	0.036* (Fis)	0.442 (Chi ²)	0.051 (Chi ²)
Q14. Bleeding gums	0.003** (MW=2180; z=3.32)	0.676 (MW)	r=-0.06; p=0.729	r= 0.24; p=0.168

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables
MW and KW Continuous Variables

Table 59 indicates the significant results obtained from questions of Section A, asked to older adults, regarding their oral health and hygiene, during the interview.

4.6.2.1.1 Association between questions at Section A and Gender

Table 60 Frequency of Toothache and Discomfort amongst Older Adults at SVPR by Gender

Older Adults	Frequency of Toothache and Discomfort amongst Older Adults by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	100	100.0	26	100.0	74	100.0
Often	4	4.0	2	7.7	2	2.7
Occasionally	6	6.0	3	11.5	3	4.1
Rarely	15	15.0	6	23.1	9	12.2
Never	70	70.0	15	57.7	55	74.3
Don't Know	5	5.0	0	.0	5	6.8

Table 60 indicates that 74.3% (N= 55) of females stated that they never experienced toothaches or oral discomfort while 57.7% (N=15) of males stated the same fact (U=692; $z=1.12$; $p=0.027$).

Table 61 Older Adults' Visits at the Dentists by Gender

Older Adults	Older Adults' Visits at the Dentists by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	100	100.0	26	100.0	74	100.0
Never been to a dentist	16	16.0	3	11.5	13	17.6
Not in the last 12 months	51	51.0	10	38.5	41	55.4
Once	13	13.0	4	15.4	9	12.2
Twice	7	7.0	5	19.2	2	2.7
Three or more times	6	6.0	3	11.5	3	4.1
I don't know/Don't remember	7	7.0	1	3.8	6	8.1

As shown in Table 61, male older adults visit the dentist more than female older adults do. Consequently, male participants usually visit the dentist at a higher rate, 30.7% (N=8), twice or more times during the last year compared to 6.8% (N=5) of female participants (U=592; z=2.46; p=0.014).

Table 62 Older Adults' Preferred Time of Toothbrushing by Gender

Older Adults		Older Adults' Preferred Time of Toothbrushing by Gender					
		Time of Toothbrushing by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
After lunch	Total	40	100.0	8	100.0	32	100.0
	No	12	30.0	0	.0	12	37.5
	Yes	28	70.0	8	100.0	20	62.5

Table 62 illustrates the percentages of male older adults' who brush their teeth after lunch, which is at a higher percentage than women; 100% (N=8) vs. 62.5% (N=20) respectively (Chi² (df=1; N=40)=4.29; p=0.038).

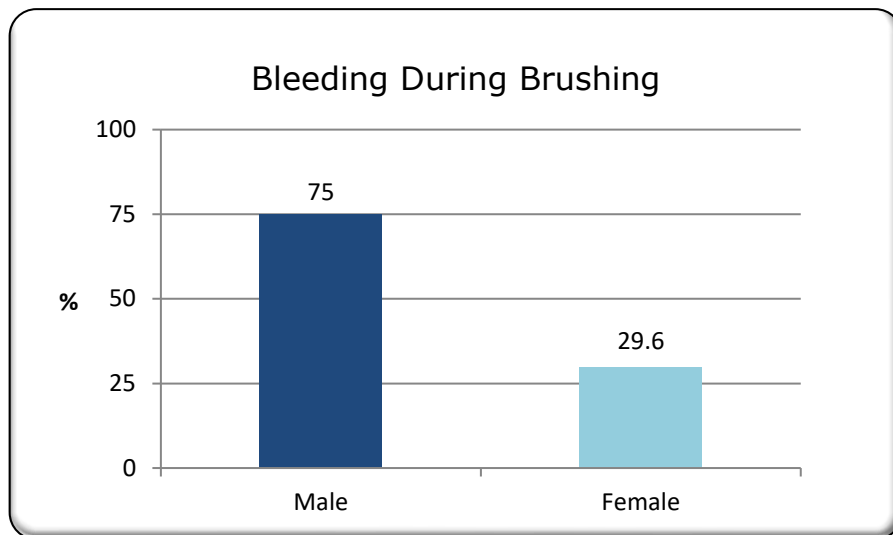


Figure 29 Bleeding from Gingiva of Older Adults by Gender

Figure 29 indicates a significant result and which highlights bleeding during brushing. Male older adults, 75%, (N=6) are more prevalent than women, 29.6% (N=8) (U=2180; $z=3.32$; $p=0.003$).

4.6.2.1.2 Association between questions at Section A and Ward

Table 63 Older Adults' Preferred Time of Toothbrushing by Type of Ward

Older Adults		Older Adults' Preferred time of Toothbrushing by TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
After lunch	Total	40	100.0	35	100.0	5	100.0
	No	12	30.0	8	22.9	4	80.0
	Yes	28	70.0	27	77.1	1	20.0
Before going to bed	Total	40	100.0	35	100.0	5	100.0
	No	8	20.0	5	14.3	3	60.0
	Yes	32	80.0	30	85.7	2	40.0

Table 63 indicates that older adults without dementia brush their teeth after lunch and before bed, when compared to patients with dementia ($p=0.022$ (Fis) and $p=0.046$ (Fis) respectively).

Table 64 Use of Fluoride Toothpaste by Older Adults by Type of Ward

Older Adults		Use of Fluoride Toothpaste by Older Adults by TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
Toothpaste with fluoride	Total	38	100.0	33	100.0	5	100.0
	Yes	19	50.0	19	57.6	0	.0
	No	5	13.2	3	9.1	2	40.0
	Don't know	14	36.8	11	33.3	3	60.0

Table 64 shows that older adults who are cognitively healthy use fluoride toothpaste compared to those who reside in dementia wards ($p=0.036$ (Fis)).

4.6.2.1.3 Association between questions at Section A and Educational Level

No significant results were obtained from the interview questions asked to older adults, in Section A at educational level.

4.6.2.1.4 Association between questions at **Section A** and OH QoL Level

Table 65 Frequency of Older Adults' Toothache and /or Oral Discomfort OHIP Total T1

Older Adults	Frequency of Older Adults' Toothache and/or Oral Discomfort OHIP TOTAL T1							
	Total		<60		60-69		>=70	
	N	%	N	%	N	%	N	%
Total	99	100.0	27	100.0	46	100.0	26	100.0
Often	4	4.0	1	3.7	3	6.5	0	.0
Occasionally	6	6.1	3	11.1	3	6.5	0	.0
Rarely	14	14.1	5	18.5	8	17.4	1	3.8
Never	70	70.7	14	51.9	31	67.4	25	96.2
Don't Know	5	5.1	4	14.8	1	2.2	0	.0

Table 65 shows that older adults who experienced a higher frequency of toothache and oral discomfort, experienced a lower OHIP-14 score, as logically expected. ($r = -0.39$; $p < 0.001$). Therefore, this means that the quality of life of the older adults was associated negatively with higher levels of reported toothache and oral discomfort.

Table 66 Trends of Toothaches and Oral Discomfort and Routine Checkups/Treatment relation to OHIP-14

Older Adults	OHIP TOTAL T1							
	Total		<60		60-69		>=70	
	N	%	N	%	N	%	N	%
Total	98	100.0	27	100.0	45	100.0	26	100.0
Pain/Trouble with teeth, gums or mouth	32	32.7	13	48.1	16	35.6	3	11.5
Treatment/Follow-up treatment	20	20.4	4	14.8	11	24.4	5	19.2
Routine check-up of teeth/Treatment	19	19.4	1	3.7	10	22.2	8	30.8
I don't know/Don't remember	14	14.3	6	22.2	4	8.9	4	15.4
I have never been	13	13.3	3	11.1	4	8.9	6	23.1

Table 66 illustrates the trends related to toothaches/oral discomfort; routine check-ups/treatment and OHIP-14 Total (T1). The rate was 48.1% (N=13) in the range OHIP<60; 35.6% (N=16) in the range 60-69; which then dropped to 11.5% (N=3) in the range OHIP>70. It is interesting to note that the trend in routine check-up/treatment was the contrary. The rate was 3.7% (N=1) in the age cohort OHIP<60; 22.2% (N=10) in the range of 60-69; which then increased to 30.8% (N=8). (χ^2 (df=4; N=98) = 12; p=0.017).

Therefore, patients who reported pain/discomfort had lower OHIP-14 scores, meaning that their oral health-related quality of life was negatively influenced.

4.6.2.2 Section B: Oral Health Education of Older Adults at St. Vincent de Paul Residence

Table 67 Older Adults: Questions in Section B - Statistical Significance of Results (Oral Health Education of Older Adults Residing at SVPR)

	Gender	Ward	Educational Level	OH Quality of Life (T1)
Q19. Willingness to receive education/information regarding oral health care at SVPR	0.001** (MW=240; z=3.19)	0.449 (MW)	r= 0.21; p=0.082	r= -0.10; p=0.430
Q20. Participation in dental talks at SVPR	0.049* (Chi ² =3.87; df=1)	0.138 (Chi ²)	0.888 (Chi ²)	0.505 (Chi ²)
Q21. Reasons for not participating in dental talks at SVPR	0.030* (Chi ² =4.98; df=2)	0.002** (Chi ² =12.2; df=2)	0.166 (Chi ²)	0.648 (Chi ²)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables
MW and KW Continuous Variables

Table 67 shows the significant results for Section B interview questions held amongst older adults residing at SVPR. The significant results obtained were those related to dental talks held at the facility by gender and the reason why older adults do not participate in dental talks by wards.

4.6.2.2.1 Association between questions at Section B and Gender

Table 68 Willingness of Older Adults to receive Oral Health Information in Wards by Gender

Older Adults	Willingness of Older Adults' to Participate in Ward Dental Talks by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	92	100.0	22	100.0	70	100.0
Never	47	51.1	6	27.3	41	58.6
Every 6 months	14	15.2	5	22.7	9	12.9
Every year	8	8.7	5	22.7	3	4.3
Other comment	23	25.0	6	27.3	17	24.3

Table 68 shows that the majority of male participants (45.4%, N=10) would like to receive oral health education/information compared to female older adults (17.2%, N=12); (U=240; z=3.19; p=0.001).

Table 69 Participation of Older Adults' in Ward Dental Talks by Gender

Older Adults	Participation of Older Adults' in Ward Dental Talks by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	99	100.0	26	100.0	73	100.0
Yes	9	9.1	5	19.2	4	5.5
No	85	85.9	21	80.8	64	87.7
Don't know/cannot remember	5	5.1	0	.0	5	6.8

Table 69 illustrates the responses given by the majority of male older adults (19.2%, N=5) compared to female older adults (5.5%, N=4), stating that they have participated in ward dental talks (Chi ²(df=1; N=99) =3.87; p=0.049).

Table 70 Reason for Older Adults' Lack of Participation in Ward Dental Talks by Gender

Older Adults	Reason for Older Adults' Lack of Participation in Ward Dental talks by Gender					
	Total		Male		Female	
	N	%	N	%	N	%
Total	71	100.0	21	100.0	50	100.0
Never held	30	42.3	4	19.0	26	52.0
Not aware of any talks held	24	33.8	9	42.9	15	30.0
Nobody informed me	17	23.9	8	38.1	9	18.0

Table 70 indicates that the majority of female older adults (52%, N=26) compared to 19% (N=4) of males, stated that they never participated in ward dental talks because they were never held (χ^2 (df=2; N=71) = 4.98; p=0.030).

4.6.2.2.2 Association between questions of Section B and Type of Wards

Table 71 Reasons given by Older Adults for not participating in Ward Dental Talks

Older Adults	Reasons given by Older Adults for not participating on Dental Talks by TYPE OF WARD					
	Total		Non-dementia		Dementia	
	N	%	N	%	N	%
Total	71	100.0	58	100.0	13	100.0
Never held	30	42.3	19	32.8	11	84.6
Not aware of any talks held	24	33.8	22	37.9	2	15.4
Nobody informed me	17	23.9	17	29.3	0	.0

Table 71 shows that the majority of older adults in the dementia wards (84.6%, N=11) compared to 32.8% (N=19) residing in the non-dementia wards stated that dental talks are not held while 29.3% (N=17) of residents residing in non-dementia, compared to no patients in the dementia wards stated that nobody has ever informed them about dental talks being held in wards (χ^2 (df=2; N=71) = 12.2; p=0.002).

4.6.2.2.3 Association between questions at Section B, Educational Level and OHIP-14

No significant results were obtained from the interview questions asked to older adults, in Section B at educational level and with OHIP-14.

4.6.2.3 Section C: Importance of Oral Health to Older Adults

Table 72 Older Adults: Questions in Section C – Statistical Significance of Results (Importance of Oral Health to Older Adults)

	Gender	Ward	Educational Level	OH Quality of Life (T1)
Q22. Importance Oral Hygiene to Older Adults	0.310 (MW)	0.004** (MW=406; z=2.89)	r= 0.05; p=0.628	r= 0.05; p=0.628
Q23. Asked to be assisted	0.473 (MW)	0.371 (MW)	r= 0.18; p=0.081	r= -0.30; p=0.004**
Q27. Encouraged to brush	0.591 (MW)	0.567 (MW)	r= 0.07; p=0.517	r= -0.26; p=0.018*
Q28. Follow oral hygiene instructions	0.895 (MW)	0.058 (MW)	r= 0.21; p=0.048*	r= -0.18; p=0.101
Q31. Visit dental clinic	0.172 (Chi ²)	0.083 (Chi ²)	0.306 (Chi ²)	0.031* (Chi²=7.69; df=2)
Q33. For Scaling/polishing	0.007** (Chi²=7.22; df=1)	0.136 (Chi ²)	0.800 (Chi ²)	0.517 (Chi ²)
Q33. For Dentures	0.861 (Chi ²)	0.280 (Chi ²)	0.430 (Chi ²)	0.036* (Chi²=6.66; df=2)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables
MW and KW Continuous Variables

Table 72 illustrates the significant results which are highlighted, and which were obtained from questions asked to older adults during their interview. These questions pertained to Section C: Importance of Oral Health to Older Adults.

4.6.2.3.1 Association between questions of **Section C** and Gender

Table 73 Dental treatment sought by Older Adults by Gender

Older Adults		Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Scaling/ Polishing	Total	36	100.0	12	100.0	24	100.0
	No	27	75.0	6	50.0	21	87.5
	Yes	9	25.0	6	50.0	3	12.5

Table 73 indicates that 50% (N=6) of male older adults visited the dentist for scaling/polishing when compared to 12.5% (N=3) of female older adults (Chi² (df=1; N=36) =7.22; p=0.007).

4.6.2.3.2 Association between questions of Section C and Ward

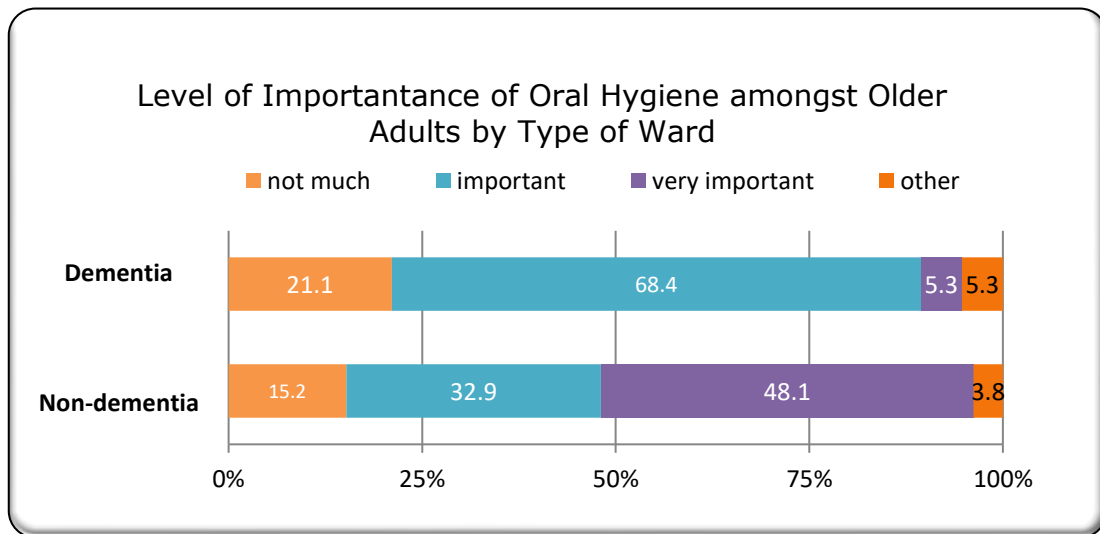


Figure 30 Importance of Oral Hygiene to Older Adults by Ward

Figure 30 shows that the majority of older adults residing in non-dementia wards stated that oral hygiene is very important to them when compared to those residing in wards for cognitively impaired older adults ($U=406$; $z=2.89$; $p=0.004$).

4.6.2.3.3 Association between questions of Section C and Educational Level

Table 74 Older Adults who follow Oral Hygiene Instructions by Educational Level

Older Adults	Older Adults who Follow Oral Hygiene Instructions by EDUCATIONAL LEVEL									
	Total		No Schooling		Primary		Secondary		Upper	
	N	%	N	%	N	%	N	%	N	%
Total	84	100.0	26	100.0	38	100.0	12	100.0	8	100.0
Never	34	40.5	14	53.8	14	36.8	6	50.0	0	.0
Sometimes	19	22.6	3	11.5	12	31.6	1	8.3	3	37.5
Frequently	16	19.0	7	26.9	5	13.2	2	16.7	2	25.0
Always	15	17.9	2	7.7	7	18.4	3	25.0	3	37.5

Table 74 indicates that the majority of older adults (37.5%, N=3) who follow oral hygiene instructions are those who have a higher level of education when compared to those who have no educational background (7.7%, N=2). The table also indicates that the percentage of the category 'always' increased as the educational level progressed ($r=0.21$; $p=0.048$).

4.6.2.3.4 Association between questions of Section C and OH Quality of Life (T1)

As observed in Table 72 (pg.188), significant results were obtained where older adults with self-reported lower oral health-related quality of life, asked to be assisted more frequently ($r= -0.30$; $p=0.004$). This means that older adults who stated that oral health related quality of life did affect them, asked for more assistance. These adults were encouraged to brush more frequently ($r=-0.26$; $p=0.018$). They visited the dental clinic more frequently (χ^2 (df=2; N=90) = 7.69; $p=0.031$) and they visited the dentist mainly because of problems with dentures (χ^2 (df=2; N=90) = 6.66; $p=0.036$).

4.6.2.4 Section D: Smoking Habits

Table 75 Older Adults: Questions in Section D - Statistical Significance of Results (Smoking Habits: Older Adults)

	Gender	Ward	Educational Level	OH Quality of Life (T1)
Q34. Smoking	<0.001*** (Chi ² =16.6; df=1)	0.104 (MW)	0.080 (Chi ²)	0.573 (Chi ²)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables

MW and KW Continuous Variables

Table 75 indicates that there is one significant result when asking older adults about their smoking habits. The rate of smoking is significantly higher between male participants. 30.8% compared to 2.7% in female group (Chi² (df=1; N=99) = 16.6; p<0.001).

4.6.2.4.1 Association between questions of Section D and Types of Wards, Educational Level and OH Quality of Life (T1)

No significant results were obtained from the interview questions asked to older adults, in Section D at Ward Level, Educational level and with OHIP-14.

4.6.2.5 Section E: Facilities in SVPR Wards which enhance Daily Oral Care and Accessibility to the Dental Clinic

Table 76 Older Adults: Questions in Section E - Statistical Significance of Results (Facilities in SVPR Wards which enhance Daily Oral Care and Accessibility to the Dental Clinic)

	Gender	Ward	Educational Level	OH Quality of Life (T1)
Q36. Basins in rooms	0.020* (Chi ² =5.44; df=1)	0.319 (Chi ²)	0.073 (Chi ²)	0.235 (Chi ²)
Q36. Water supply in rooms	0.091 (Chi ²)	0.771 (Chi ²)	0.054 (Chi ²)	0.903 (Chi ²)
Q36. Accessible bathrooms	0.030* (Chi ² =4.71; df=1)	0.065 (Chi ²)	0.421 (Chi ²)	0.204 (Chi ²)
Q37. Toothbrushes	0.124 (Chi ²)	0.048* (Chi ² =3.92; df=1)	0.122 (Chi ²)	0.149 (Chi ²)
Q37. Toothpastes	0.144 (Chi ²)	0.020* (Chi ² =5.42; df=1)	0.057 (Chi ²)	0.236 (Chi ²)
Q38. Lack of Availabilities since No one orders/buys necessities	0.017* (Chi ² =5.66; df=1)	0.145 (Chi ²)	0.590 (Chi ²)	0.588 (Chi ²)
Q38. Insufficient funds	1.000 (Fis)	1.000 (Fis)	0.597 (Chi ²)	0.616 (Chi ²)
Q38. Other reasons	0.044* (Chi ² =4.04; df=1)	0.789 (Chi ²)	0.629 (Chi ²)	0.879 (Chi ²)

*p<0.05; **p<0.01; ***p<0.001

Chi² Categorical variables;

MW; KW Continuous Variables

Table 76 indicates the highlighted significant results obtained from questions asked to older adults during the interview. These questions were included in Section E and where related to facilities available at SVPR which encourage daily oral care and accessibility to SVPR dental clinic.

4.6.2.5.1 Association between questions of Section E and Gender

Table 77 Accessible Features to enhance Daily Oral care at SVPR by Gender

Older Adults		Accessible Features to enhance Daily Oral Care at SVPR by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
Accessible basins in rooms	Total	92	100.0	25	100.0	67	100.0
	Yes	79	85.9	18	72.0	61	91.0
	No	13	14.1	7	28.0	6	9.0
Water supply in rooms	Total	93	100.0	25	100.0	68	100.0
	Yes	80	86.0	19	76.0	61	89.7
	No	13	14.0	6	24.0	7	10.3
Accessible bathrooms	Total	91	100.0	25	100.0	66	100.0
	Yes	69	75.8	15	60.0	54	81.8
	No	22	24.2	10	40.0	12	18.2

Table 77 indicates that the majority of female older adults' state that basins (91%, N=61; $\chi^2(df=1; N=92)=5.44; p=0.020$), and bathrooms (81.8%, N=54; $\chi^2(df=1; N=91) = 4.71; p=0.030$) are available in wards, when compared to male older adults.

Table 78 Reason for Lack of Supplies to facilitate Daily Oral Care by Gender

Older Adults		Reason for Lack of Supplies to Facilitate Daily Oral Care by Gender					
		Total		Male		Female	
		N	%	N	%	N	%
No one orders/buys them	Total	97	100.0	26	100.0	71	100.0
	No	89	91.8	21	80.8	68	95.8
	Yes	8	8.2	5	19.2	3	4.2
Other	Total	95	100.0	26	100.0	69	100.0
	No	78	82.1	18	69.2	60	87.0
	Yes	17	17.9	8	30.8	9	13.0

Table 78 shows that the majority of male older adults (19.2%, N=5) stated that necessities are not available because there isn't a designated person who orders them ($\chi^2=(df=1; N=97) = 5.66; p=0.017$).

4.6.2.5.2 Association between questions of Section E and Type of Wards

Table 79 Availabilities of Supplies to enhance Daily Oral Care by Type of Wards

Older Adults		Availabilities of Supplies to enhance Daily Oral care by TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
Toothbrushes	Total	88	100.0	70	100.0	18	100.0
	Yes	13	14.8	13	18.6	0	.0
	No	75	85.2	57	81.4	18	100.0
Toothpastes	Total	93	100.0	70	100.0	23	100.0
	Yes	14	15.1	14	20.0	0	.0

Table 79 indicates that the majority of older adults residing in wards for cognitively impaired older adults stated that basic necessities for toothbrushing are not available reaching significance for toothbrushes (18.6%, N=13). ($\chi^2(df=1; N=88)=3.92; p=0.048$) and toothpastes (20%, N=14). ($\chi^2(df=1; N=93) = 5.42; p=0.020$).

4.6.2.5.3 Association between questions of Section E and Educational Level and OH Quality of Life (T1)

No significant results were obtained from the interview questions asked to older adults, in Section E at Educational level and with OHIP-14.

4.6.2.6 OHIP-14

4.6.2.6.1 Association between OHIP scores and Gender

OHIP-14 scores for male and female older adults were accepted as similar since no significant differences were observed.

4.6.2.6.2 Association between OHIP scores and Type of Ward

Table 80 OHIP-14 Scores by Type of Wards

OHIP-14 Scores by Type of Wards	p-value
FUNCTIONAL 1st	0.085
PSYCHOSOCIAL 1st	0.066
TOTAL SCORE 1st	0.017*
FUNCTIONAL 2nd	0.701
PSYCHOSOCIAL 2nd	0.272
TOTAL SCORE 2nd	0.396

*p<0.05; **p<0.01; ***p<0.001

Mann-Whitney's Test

Table 80 and Figure 31 illustrates that in the first assessment, cognitively impaired older adults scored higher scores than the cognitively healthy ones. This is an indication that older adults who suffered from dementia perceived their oral health-related quality of life as good. Trends were remarkable, leading to significant differences for the total OHIP score (p=0.017). This indicates that cognitively impaired older adults felt that their oral health

did not impact their functional and Psychosocial health when compared to cognitively healthy individuals. During the second session of interviews, these differences became inexistent.

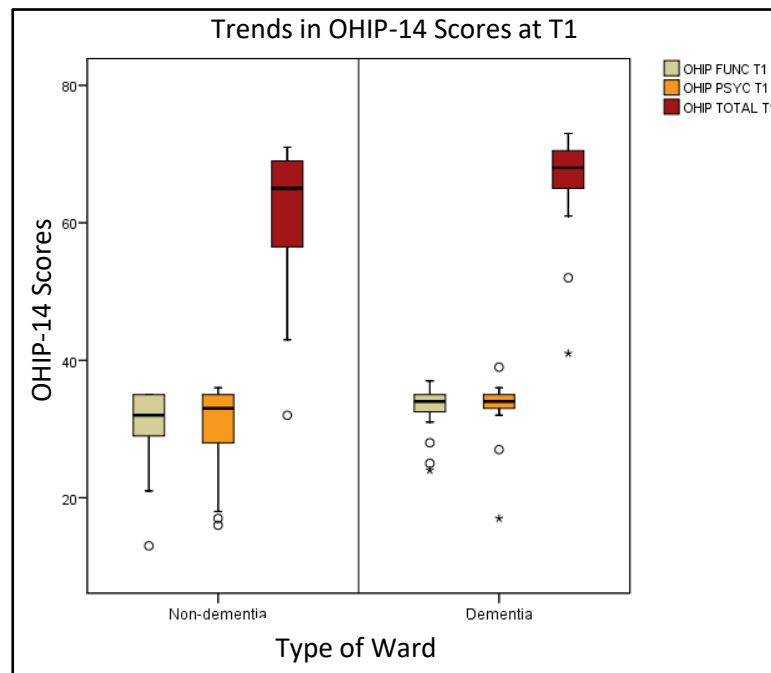


Figure 31 Trends in OHIP-14 Scores

4.6.2.6.3 Association between questions of OHIP-14 and Educational Level

No differences were obtained between the association of OHIP-14 responses and the level of education.

4.6.2.6.4 Association between OHIP scores and OH QoL

Table 81 OHIP-14 Scores and OH QOL

OHIP-14 Scores and OH QOL	p-value
FUNCTIONAL 1st	$r = 0.90; p < 0.001^{***}$
PSYCHOSOCIAL 1st	$r = 0.91; p < 0.001^{***}$
TOTAL SCORE 1st	$r = 1.00; p < 0.001^{***}$
FUNCTIONAL 2nd	$r = 0.49; p = 0.002^{**}$
PSYCHOSOCIAL 2nd	$r = 0.64; p < 0.001^{***}$
TOTAL SCORE 2nd	$r = 0.64; p < 0.001^{***}$

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Spearman's Correlation

In Table 81, the OHIP-14 total score at T1 showed a strong correlation with its subscales at T1. Correlations got weaker at T2 when compared to T1 including subscales and total scores.

4.6.2.6.5 Similarity of Distributions between Timepoint 1 and Timepoint 2

Table 82 Distribution of OHIP-14 Scores by Time (T1 vs T2)

	FUNCTIONAL	PSYCHO	TOTAL
1st vs. 2nd session	0.011*	0.718	0.099

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (Wilcoxon's Test)

Table 82 shows that there were significant differences involving the functional dimension ($p = 0.011$). Medians of distributions were 33 and 31 at time T1 and T2 respectively, suggesting loss of functional quality of life over time.

However, there were no changes regarding the psychosocial domain and the overall total scores.

4.6.3 Discussion and Conclusion

Section 1: Demographic Profile Analysis

This chapter aimed at evaluating attitudes towards daily oral care and quality of life among older adults at St. Vincent de Paul. A cross-sectional analysis involving 103 participants was conducted, revealing demographic and clinical profiles. The outcomes from interviews with older adults, categorized by questionnaire sections A to E and OHIP-14 questionnaire, were based on gender distribution, the ward of residence, educational attainment and on the state of oral hygiene and its impact on quality of life at two points in time.

Respondents had a mean age of 82 (+/-11.6 years) years. Most respondents were female while most of the respondents had limited education and employment opportunities. The majority retained their own teeth, were cognitively healthy, and had no mobility issues. However, this does not imply that the teeth were intact or that they were providing a functional dentition. Although attempts were made to analyze the association between cognitive health and ward residency, the small cognitively impaired group hindered significant findings. The OHIP-14 questionnaire revealed insights into oral health and quality of life of 99 participants in the initial session of interviewing, and 39 older adults in the follow-up session. Therefore, the OHIP-14 questionnaire was administered at two points in time (T1 and T2). In the initial session (T1), 99 older adults responded, whereas only 39 participated in the follow-up session (T2). These sessions provided valuable insights into participants' perceptions of their oral health and its impact on their overall quality of life over time.

Section 2: Results' Analysis by Gender

The findings reveal distinct patterns in oral health behaviours and experiences between male and female older adults. Notably, a higher proportion of females ($U=692$; $z=1.12$; $p=0.027$), reported no toothaches or discomfort compared to males, indicating potential differences in dental care practices or an acceptance/adaptation to their health status. This confirms what Janssens & Kossioni (2020) have stated in their publication 'Oral Health Promotion in Primary and Institutional Care', when stating that men have worse oral health, with higher levels of cavities, more retained roots, and dental restorations.

On the other hand, the findings in this research project indicated that male participants exhibited a higher frequency of dental visits ($U=592$; $z=2.46$; $p=0.014$), brushing after lunch ($\chi^2(df=1; N=40)=4.29$; $p=0.038$) and a preference for receiving oral health education ($U=240$; $z=3.19$; $p=0.001$). This result contrasted with the findings of Lipsky, Su, Crespo, & Hung (2021), who stated that men tend to visit dentists less frequently and prioritize treatment for immediate issues over preventive care, thus differing from women's behaviour.

Moreover, a significant disparity was observed in the prevalence of bleeding during brushing, with males experiencing it more frequently ($U=2180$; $z=3.32$; $p=0.003$). This is contradicting, considering that more male older adults attended for dental visits compared to females. Similarly, Wulandari et al., (2022), stated that literature shows age and gender played crucial roles in determining the prevalence and severity of periodontal problems. Additionally, males showed a higher inclination towards attending ward dental talks and undergoing dental scaling/polishing, while smoking

rates were particularly higher among them. On the other hand, females tended to perceive better availability of amenities like basins and bathrooms in wards. These findings underscore the importance of considering gender-specific factors in oral health promotion and care initiatives, to address disparities and tailor interventions effectively. This also highlights the possibility that older adults are not made aware by the managerial staff, of the actual oral health services which are available at SVPR.

Section 3: Results' Analysis by Type of Ward

Noteworthy differences emerged between older adults with and without dementia regarding oral hygiene practices and perceptions. Those without dementia tend to adhere more diligently to brushing routines, particularly after lunch ($p=0.022$ (Fis)) and before bed ($p=0.046$ (Fis)), and were more likely to use fluoride toothpaste ($p=0.036$ (Fis)). Conversely, residents in dementia wards often lack access to dental talks and perceive a lower importance placed on oral hygiene education (χ^2 (df=2; N=71) = 12.2; $p=0.002$). Moreover, the participants perceived a significant shortage of basic necessities for toothbrushing in dementia wards, as evidenced by the self-reported scarcity of toothbrushes (χ^2 (df=1; N=88)=3.92; $p=0.048$) and toothpaste (χ^2 (df=1;N=93) = 5.42; $p=0.020$).

Additionally, initial assessments revealed higher OHIP scores (χ^2 (df=4;N=19)=12; $p=0.017$) among the cognitively impaired older adults, that indicated better oral health related quality of life, thus suggesting greater oral health challenges in this population since cognitively unhealthy older adults might not perceive that their quality of life might be poor. These findings underscore the importance of personalised oral health

interventions for individuals with cognitive impairment and highlight the need for improved access to dental care and education within dementia care settings. As stated by Zenthofer et al., (2016), a higher demand for care among individuals with dementia is required, emphasizing the crucial need for dental health education among caregivers who are in frequent contact with older adults who are affected by this condition.

Section 3: Results' Analysis by Educational Level

The interview results pertaining to various aspects of oral health and related factors among older adults did not yield statistically significant findings at the educational level. Despite this, some trends were observed. For instance, a higher proportion of older adults with a higher educational background reported following oral hygiene instructions compared to those with no educational background. Additionally, there was an apparent increase in adherence to oral hygiene instructions as educational levels advanced ($r=0.21$; $p=0.048$).

However, no significant associations were found between educational level and other variables such as oral health education, smoking habits, accessibility to dental facilities, and responses to OHIP-14 questions. While the absence of statistically significant results suggests that educational level alone may not directly influence certain aspects of oral health behaviour and perceptions, further exploration may provide deeper insights into these relationships. This finding is similar to that of Wulandari et. al. (2022), who stated that the level of education showed no significant correlation with the severity of periodontitis among the older adults population who were included in their study.

Section 5: Results' Analysis by OH-Quality of Life

In summary, significant differences emerged in the functional dimension ($p=0.011$), indicating a decline in functional quality of life over time, with medians dropping from 33 to 31 between T1 and T2. Conversely, there were no notable changes in the psychosocial domain ($p=0.718$).

Although the total OHIP-14 score showed a slight, non-significant reduction ($p=0.099$), with medians decreasing from 67 to 63, older adults experiencing more frequent toothaches and oral discomfort exhibited lower OHIP-14 scores ($r= -0.39$; $p<0.001$). This aligns with expectations, as higher frequencies of toothaches and oral issues correlated with lower OHIP-14 scores which indicates that older adults were affected in terms of oral health related quality of life ($r= -0.39$; $p<0.001$). The trends regarding toothaches/oral discomfort and routine check-ups/treatment in relation to OHIP-14 scores were notable. Additionally, older adults with lower quality of life sought assistance more frequently ($r= -0.30$; $p=0.004$), increased their brushing frequency ($r= -0.26$; $p=0.018$), visited the dental clinic more often ($p=0.031$), and faced denture-related problems ($p=0.036$).

Interestingly, initially, cognitively impaired older adults scored higher than cognitively healthy ones, leading to significant differences in total OHIP score ($p=0.017$), but these differences disappeared during subsequent assessments. No significant differences were found between OHIP-14 responses and level of education.

Furthermore, the total OHIP-14 score at T1 exhibited a strong correlation with its subscales at T1, but correlations weakened at T2. This confirms what Niesten &

McKenna (2020) stated that Oral health-related quality of life (OHRQoL) assesses how oral well-being influences an individual's physical, Psychosocial, and social functioning, thereby affecting their overall quality of life. The significance of oral health on quality of life is multiple and often underestimated, particularly among older adults.

Conclusion

This chapter conducted a comprehensive analysis of attitudes towards daily oral care and quality of life among older adults at St. Vincent de Paul. The demographic profile analysis revealed insights into participants' characteristics, highlighting disparities in oral health behaviours and experiences by gender, ward type, educational level and oral health quality of life. The findings underscore the necessity for gender-specific and personalized interventions, particularly for those with cognitive impairment.

Moreover, the examination of quality of life dimensions over time illuminated the impact of oral health on overall well-being, emphasizing the importance of timely dental care and addressing oral discomfort. Further research with larger sample sizes may offer deeper insights into these relationships, guiding more effective oral health promotion strategies and interventions which can be adapted to the diverse needs of older adults.

Chapter 5

Oral Hygiene and Periodontal Indices

as

Key Performance Indicators

Clinical Assessments of Older Adults at

St. Vincent de Paul Residence

5.1 Introduction

The assessment of oral health among older adults is integral to understanding the efficacy of dental care interventions and the overall quality of life in long-term care settings. This chapter focuses on evaluating clinical parameters and their evolution over a two-and-a-half-year period, using oral hygiene and periodontal indices as primary metrics. These indices, recognized as Key Performance Indicators (KPIs), are pivotal for monitoring and improving oral health outcomes, as they provide valuable insights into the effectiveness of dental care practices and the functionality of healthcare teams within these settings.

Conducted from May 2019 to September 2021, this longitudinal study aimed to track changes in oral health by comparing a study group receiving targeted educational and clinical interventions with a control group without such interventions. The study was adapted in response to patient reallocations and the challenges posed by the Covid-19 pandemic. Through clinical assessments conducted at three intervals, the research revealed notable trends and shifts in key performance indicators related to oral health.

5.2 Aim

The primary aim of this part of the research is to describe and assess clinical parameters and changes over the period of observation using oral hygiene and periodontal indices as Key Performance Indicators.

5.3 Methods and Materials

A longitudinal clinical research study, spanning two and a half years involved gathering data through clinical assessments. The same wards selected randomly for the prior cross-sectional research project were chosen with some adjustments were necessary due to reallocation of patients and Covid-19 pandemic. This has been detailed in Chapter 2.

Clinical data from assessments conducted at three intervals between interventions on the study group were analyzed to track changes in oral hygiene and periodontal health among older adults. The same was done on the control group, which for comparative reasons, did not receive any interventions.

Clinical assessments were conducted using LED headlamps (TaffLED High Power Headlamp, 2500 lumen), mouth mirrors, CPITN, and North Carolina 15 periodontal probes. These probes assessed plaque accumulation, calculus, pocket depths, recession, clinical attachment levels, and mobility. Furcation assessment was done using Naber's probes. Pocket charts and Bleeding Score charts documented various parameters. Additional information on demographics, health, medications, diet, medical and dental history, and social/family background was obtained through the Dental Hygiene Assessment Form (Appendix 18). The data from this form aided in identifying independent and dependent variables for statistical analysis, allowing for comparison and correlation of results.

5.4 Sample

The characteristics of the sample of older adults participating in the clinical longitudinal study was described in Chapter 2.

Table 83 Older Adults' Compliance Rates

	N	%
Compliance Visit 1	Total	384 100.0
	Consent/Assessment Done	149 38.8
	No Consent	134 34.9
	Not Compliant	23 6.0
	Deceased	10 2.6
	Transferred before assessment was initiated	12 3.1
	Hospitalised	1 0.3
	Partial Assessment	15 3.9
	Not recorded	40 10.4
Compliance Visit 2	Total	384 100.0
	Consent/Assessment Done	130 33.9
	No Consent	131 34.1
	Not Compliant	29 7.6
	Deceased	27 7.0
	Transferred before assessment was initiated	12 3.1
	Partial Assessment	15 3.9
	Not recorded	40 10.4
Compliance Visit 3	Total	384 100.0
	Consent/Assessment Done	117 30.5
	No Consent	134 34.9
	Not Compliant	32 8.3
	Deceased	38 9.9
	Transferred before assessment was initiated	12 3.1
	Partial Assessment	10 2.6

Table 83 provides the counts of older adults' who gave consent and were compliant or allowed a partial clinical assessment to be conducted throughout the three visits of the clinical assessment research project. The three visits commenced on: Visit 1 (V1), May 2019; Visit 2 (V2) in February 2021 and Visit 3 (V3) in September 2021 respectively.

These number of patients include those who have consented and those who allowed partial assessment to be carried out.

- At V1, n=164 patients consented and assessed
- At V2, n=145 patients consented and assessed
- At V3, n=127 patients consented and assessed

Table 84 Older Adults' Consistent Compliance by Ward at All Three Visits

Wards	N	%
Total	123	100.0
Mother Tereza 1	10	8.1
Lourdes	15	12.2
SJ2	16	13.0
SJ4	17	13.8
RB1	14	11.4
RB3	3	2.4
JP3	5	4.1
JP2	6	4.9
JP1	7	5.7
JP5	18	14.6
ST Frances 3	12	9.8

Table 84 shows that the number of patients who were compliant over changes of time were n=123. These were the older adults who showed compliance consistently.

5.4.1 Statistical Analysis

Statistical analysis consists of a general descriptive for continuous variables (mean, standard deviation, range and median) and categorical variables (absolute and relative frequencies).

A non-parametric approach was considered to carry out the statistical tests to assess changes at parameters and the relationship of changes with independent factors (ward type, ward gender, ward group, dexterity, mobility and cognitive health). This was done so due to the many parameters which were measured in restricted samples, having remarkable counts.

- Wilcoxon tests were used to compare distributions of ordinal and continuous parameters between visits V1 and V3.
- McNemar's tests were conducted to assess changes in categorical the association between categorical variables (by gender, by type of ward).
- Mann-Whitney tests were used to compare distributions of the difference of the parameter (V3-V1) through two independent groups of patients.
- Kruskal-Wallis tests were used when more than 2 groups were involved (e.g.: ward gender, cognitive health).
- χ^2 independence tests were conducted to assess the association between categorical variables (by gender, by type of ward).
- z-tests are statistical tests used to determine if there are significant differences in data. There are three main types: the z-Test for a Single Mean checks if the mean of a sample significantly deviates from a known population mean; the z-

Test for Two Means compares the means of two large, independent samples with known variances to see if they differ significantly; and the z-Test for Proportions examines if the proportion of a specific outcome in one group is different from a known proportion or from that in another group. These tests help researchers identify statistically significant differences in their data.

- The Bonferroni Correction is a statistical adjustment used to counteract the problem of multiple comparisons.

Significance level used in analysis was set at 5% ($\alpha=0.05$).

5.5 Results

5.5.1 Dentition of Older Adults

Table 85 Dentition of Older Adults

	N	%
Total	226	100.0
Own dentition	117	51.8
Edentulous with full dentures	22	9.7
Both own dentition and partial dentures	16	7.1
Completely edentulous	68	30.1
Implants	2	.9
Roots only	1	.4

Table 85 depicts the dentition of the older adults who participated in the clinical study.

Tables 86, 87 and 88 illustrate the dentition of older adults from visit 1 to visit 3

Table 86 Dentition of Older Adults at Visit 1

	N	%
Total	160	100.0
Partially Edentulous	96	60.0
Edentulous	64	40.0

Table 87 Dentition of Older Adults at Visit 2

	N	%
Total	135	100.0
Partially Edentulous	77	57.0
Edentulous	58	43.0

Table 88 Dentition of Older Adults at Visit 3

	N	%
Total	121	100.0
Partially Edentulous	66	54.5
Edentulous	55	45.5

5.5.2 Overall Changes

5.5.2.1 Missing Teeth

5.5.2.1.1 Changes Over Time of Missing Teeth from Visit 1 to Visit 3

Table 89 Significant Results of Missing Teeth from Visit 1 to Visit 3

Missing Teeth V1-V3	p-value
Number	<0.001*** (z=3.78)
Percentage	<0.001*** (z=3.78)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 89 indicates that both results were significant.

Table 90 Changes in number of Missing Teeth from Visit 1 to Visit 3

Missing Teeth	N	Mean	Median
Number Missing Teeth V1	119	25.12	30.00
Number Missing Teeth V2	119	25.45	30.00
Number Missing Teeth V3	118	25.56	30.00

Table 90 indicates the mean obtained in changes of number of missing teeth. The mean value is 25.1 at V1, which increased to 25.6 at V3 (p<0.001; z=3.78).

Table 91 Changes in the Mean Percentages of Missing Teeth from Visit 1 to Visit 3

Percentage Missing Teeth	N	Mean	Median
Visit 1	119	78.49%	93.75
Visit 2	119	79.54%	93.75
Visit 3	118	79.87%	93.75

Table 91 shows that the mean percentage of 78.5% of missing teeth at V1, increased to 79.9% at V3 ($p < 0.001$; $z = 3.78$).

There was a slight increase in the median count of missing teeth from V1 to V2, which then stabilizes from V2 to V3.

5.5.2.2 Mucosa and Denture Hygiene

5.5.2.2.1 Changes of Mucosa and Denture Hygiene from Visit 1 to Visit 3

Table 92 Significance of Results of Mucosa and Denture Hygiene

Mucosa and Denture Hygiene	p-value
Mucosa	0.002**
Denture	1.000

*p<0.05; **p<0.01; ***p<0.001

McNemar's Test

Table 92 indicates that there was a significant result for mucosa hygiene over time however no significant results were obtained for denture hygiene.

Table 93 Changes in Mucosa Hygiene from visit 1 to Visit 3

Improvement Mucosa Hygiene		N	%
Visit 1	Total	119	100.0
	Yes, debris present	59	49.6
	No, debris not present	60	50.4
Visit 2	Total	121	100.0
	Yes, debris present	46	38.0
	No, debris not present	75	62.0
Visit 3	Total	121	100.0
	Yes, debris present	42	34.7
	No, debris not present	79	65.3

Table 93 indicates that there was an improvement in mucosa hygiene from 49.6% at V1 to 34.7% at V3 (p=0.002).

Table 94 Changes in Denture Hygiene from Visit 1 to Visit 3

Improvement in Denture Hygiene		N	%
Visit 1	Total	121	100.0
	Yes, debris present	5	4.1
	No, debris not present	19	15.7
	No denture	97	80.2
Visit 2	Total	118	100.0
	Yes, debris present	4	3.4
	No, debris not present	18	15.3
	No denture	96	81.4
Visit 3	Total	123	100.0
	Yes, debris present	3	2.4
	No, debris not present	16	13.0
	No denture	104	84.6

Table 94 illustrates that denture hygiene also improved from 20.8% at V1 to 15.8% at V3 in patients wearing dentures, however this result did not yield a scientifically significant result.

5.5.2.3 PPDs

5.5.2.3.1 Changes of PPDs in Sextants from Visit 1 to Visit 3

Table 95 Significant Results of Periodontal Depths in Various Sextants

PPDs	p-value
Average PPD UR	0.026* (z=2.22)
Average PPD UA	0.013* (z=2.48)
Average PPD LR	0.007** (z=2.68)
Average PPD LA	0.010* (z=2.58)
Worst PPD UR	0.010* (z=2.59)
Worst PPD LR	0.037* (z=2.09)
Worst PPD LL	0.002** (z=3.04)
Worst PPD LA	0.021* (z=2.30)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 95 shows that PPDs showed a significant increase in most of sites within the oral cavity of older adults.

Table 96 Changes in Average Periodontal Probing Depths in Sextants from Visit 1 to Visit 3

Average Periodontal Pocket Depths	N	Mean	Median
V1 Av PPD UR	33	2.25	2.00
V2 Av PPD UR	34	2.50	2.19
V3 Av PPD UR	30	2.66	2.50
V1 Av PPD UA	40	2.37	2.00
V2 Av PPD UA	40	2.62	2.22
V3 Av PPD UA	39	2.60	2.28
V1 Av PPD LR	35	2.42	2.00
V2 Av PPD LR	35	2.55	2.17
V3 Av PPD LR	32	2.93	2.43
V1 Av PPD LA	49	2.24	2.00
V2 Av PPD LA	49	2.51	2.31
V3 Av PPD LA	46	2.49	2.50

Table 96 illustrates the significant changes in the average periodontal probing depths in several sextants.

The average mean value of PPDs increased from 2.25mm to 2.66mm, especially in the upper right sextant ($p=0.026$; $z=2.22$). PPDs also increased in the upper anterior sextant from 2.37mm to 2.60mm from visit 1 to visit 3 ($p=0.013$; $z=2.48$). There has been an increase from the 1st visit to the 2nd visit and a slight decrease from the 2nd visit to the 3rd visit. Changes in average PPDs in the lower right sextant which increased from a median value of 2.42mm to 2.93mm from visit 1 to visit 3 ($p=0.007$; $z=2.68$) can also be observed. The mean values of the PPDs in the lower anterior sextant, show an increase from a 2.24mm score to a 2.49mm score ($p=0.010$; $z=2.58$) from visit 1 to visit 3. There was an increase between visit 1 and visit 2 which was followed by a decrease between visit 2 and visit 3.

Table 97 Changes in the Worst PPDs in the Lower Right Sextant from Visit 1 to Visit 3

Worse Periodontal Pocket Depths	N	Mean	Median
V1 worse PPD LR	35	3.20	2.00
V2 worse PPD LR	34	3.53	3.00
V3 worse PPD LR	32	3.84	3.00
V1 worse PPD LL	34	3.03	2.00
V2 worse PPD LL	35	3.54	3.00
V3 worse PPD LL	31	4.16	4.00
V1 worse PPD LA	49	3.22	2.00
V2 worse PPD LA	49	3.49	3.00
V3 worse PPD LA	46	3.67	3.00

Table 97 indicates the significant results obtained of worse PPD in some sextants. The worse PPD value in the lower right sextant increased from 3.20mm to 3.84mm ($p=0.037$; $z=2.09$). The mean values of the worse PPDs in the lower left sextant got worse over time from visit 1 to visit 3, from 3.03mm to 4.16mm ($p=0.002$; $z=3.04$) while the worse mean PPD values in the lower anterior sextant increased over time from 3.22mm to 3.67mm from visit 1 to visit 3 ($p= 0.021$; $z=2.30$).

5.5.3 Recession

5.5.3.1 Changes of Recession in Sextants from Visit 1 to Visit 3

Table 98 Significant Results of Recession in Various Sextants

Recession	p-value
Average REC UA	0.040* (z=2.06)
Average REC LR	0.002** (z=3.12)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test
z-statistical Tests

Table 98 shows that significant results were obtained in the upper anterior sextant and in the lower right sextant. The average recession increased significantly from Visit 1 to Visit 3.

Table 99 Changes in Average Recession in Sextants from Visit 1 to Visit 3

Average Recession	N	Mean	Median
V1 Av REC UA	39	2.08	1.60
V2 Av REC UA	39	2.49	2.07
V3 Av REC UA	36	2.52	2.19
V1 Av REC LR	35	2.58	2.17
V2 Av REC LR	35	2.80	2.83
V3 Av REC LR	31	3.17	3.50

Table 99 shows the changes in the average recession in the upper anterior sextant and in the lower right sextant. An increase in the average recession mean value in the upper anterior sextant from visit 1 to visit 3 can be noted. This increased from 2.08mm to 2.52mm (p=0.040; z=2.06) while the average mean scores of recession in the lower right sextant increased from 2.58mm to 3.17mm from visit 1 to visit 3 (p=0.002; z=3.12).

5.5.4 CAL

5.5.4.1 Significant Results in Changes of CAL in Sextants from Visit 1 to Visit 3

Table 100 Significance of Changes of CAL in Various Sextants

Average Clinical Attachment Loss	p-value
Average CAL UA	0.010* (z=2.59)
Average CAL LR	0.001** (z=3.28)
Average CAL LA	0.013* (z=2.48)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Test

Table 100 shows that the average CAL increased significantly from visit 1 to visit 3 in sextants of upper anterior, lower right and lower anterior.

Table 101 Changes in Average of CAL in Sextants from Visit 1 to Visit 3

Average Clinical Attachment Loss	N	Mean	Median
V1 Av CAL UA	39	4.38	3.42
V2 Av CAL UA	39	5.06	4.33
V3 Av CAL UA	38	5.05	4.88
V1 Av CAL LR	34	4.91	4.93
V2 Av CAL LR	33	5.53	5.33
V3 Av CAL LR	32	5.98	5.75
V1 Av CAL LA	48	5.21	4.74
V2 Av CAL LA	47	5.93	5.83
V3 Av CAL LA	46	5.60	5.71

Table 101 indicates the changes in average CAL of upper anterior sextants which increased from visit 1 to visit 2 and decreased very slightly at visit 3 (p=0.010; z=2.59). The table also shows changes in average CAL in the lower right sextants, increasing from

4.91mm to 5.98mm ($p=0.001$; $z=3.28$). The average CAL in the lower anterior sextants, also increased over time from Visit 1 to Visit 2 but then decreased again from Visit 2 to Visit 3 from 5.93mm to 5.60mm ($p=0.013$; $z=2.48$).

5.5.5 Bleeding

5.5.5.1 Changes of Bleeding Score and Bleeding Index (%) in Sextants from Visit 1 to Visit 3

Table 102 Significance of Changes of Bleeding in Various Sextants

Bleeding	p-value
Bleeding score UR	0.012* (z=2.52)
Bleeding score UL	0.004** (z=2.89)
Bleeding score UA	0.012* (z=2.50)
Bleeding score LR	0.004** (z=2.89)
Bleeding score LL	0.001** (z=3.43)
Total bleeding score	0.003** (z=2.96)
Bleeding index UR	0.002** (z=3.09)
Bleeding index UL	0.004** (z=2.89)
Bleeding index UA	0.004** (z=2.87)
Bleeding index LR	0.004** (z=2.89)
Bleeding index LL	<0.001*** (z=3.92)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 102 indicates that the bleeding score and bleeding index increased significantly since Visit 1 to Visit 3 in most of sextants.

Table 103 Changes in Bleeding Scores Upper Right Sextants from Visit 1 to Visit 3

Bleeding Scores	N	Mean	Median
V1 Bleeding UR	38	4.23	4.00
V2 Bleeding UR	37	4.07	5.00
V3 Bleeding UR	34	4.36	5.00
V1 Bleeding UL	32	3.67	4.00
V2 Bleeding UL	31	4.17	4.67
V3 Bleeding UL	31	4.35	5.00
V1 Bleeding UA	46	3.87	4.00
V2 Bleeding UA	45	4.16	4.60
V3 Bleeding UA	46	4.32	5.00
V1 Bleeding LR	37	3.65	4.00
V2 Bleeding LR	37	4.11	4.50
V3 Bleeding LR	37	4.32	5.00
V1 Bleeding LL	38	3.76	3.79
V2 Bleeding LL	36	4.20	4.50
V3 Bleeding LL	38	4.23	4.63

Table 103 shows that the bleeding scores in the upper right sextants increased from 4.2 to 4.36 from visit 1 to visit 3. ($p=0.012$; $z=2.52$). The bleeding scores in the upper left sextants increased from 3.67 to 4.35 from visit 1 to visit 3 ($p=0.004$; $z=2.89$) while the bleeding scores in the upper anterior sextants also increased from 3.87 to 4.32 from visit 1 to visit 3 ($p=0.012$; $z=2.50$). An increase in the bleeding scores in the left right sextant, 3.65 to 4.32 from the 1st visit to the 3rd visit ($p=0.004$; $z=2.89$) and in the left lower sextants, 3.76 to 4.23, from visit 1 to visit 3 ($p=0.001$; $z=3.43$) was observed.

Table 104 Changes in Percentage Bleeding Index in Sextants from Visit 1 to Visit 3

Percentage Bleeding Index	N	Mean	Median
V1 pct Bleeding Index UR	37	74.22	80.00
V2 pct Bleeding Index UR	36	81.37	100.00
V3 pct Bleeding Index UR	34	87.23	100.00
V1 pct Bleeding Index UL	32	73.41	80.00
V2 pct Bleeding Index UL	31	82.89	91.67
V3 pct Bleeding Index UL	31	87.07	100.00
V1 pct Bleeding Index UA	45	76.05	80.00
V2 pct Bleeding Index UA	45	83.10	92.00
V3 pct Bleeding Index UA	46	86.40	100.00
V1 pct Bleeding Index LR	37	73.10	80.00
V2 pct Bleeding Index LR	37	81.33	90.00
V3 pct Bleeding Index LR	37	86.41	100.00
V1 pct Bleeding Index LL	37	71.60	75.00
V2 pct Bleeding Index LL	36	83.00	90.00
V3 pct Bleeding Index LL	38	84.59	92.71

Table 104 shows an increase in the bleeding index in the upper right sextant from 74.22% to 87.23%, from Visit 1 to Visit 3 ($p=0.002$; $z=3.09$). An increase in bleeding scores from visit 1 to visit 3, in the upper left sextants from 73.41% to 87.07% ($p=0.004$; $z=2.89$) was also noted together with an increase in the bleeding index from visit 1 to visit 3, in the upper anterior sextants, from 76.05% to 86.40% ($p=0.004$; $z=2.87$). The bleeding index from visit 1 to visit 3 in the lower left sextants increased from 71.60% to 84.59% ($p<0.001$; $z=3.92$).

Table 105 Changes in Total Bleeding Scores from Visit 1 to Visit 3

Total Bleeding Scores	N	Mean	Median
V1 Total Bleeding	66	3.95	4.00
V2 Total Bleeding	64	4.34	4.67
V3 Total Bleeding	65	4.37	4.84

Table 105 indicates that there has been an increase in the average total number of bleeding scores from visit 1 to visit 3, from 3.95 to 4.37 ($p=0.003$; $z=2.96$).

5.5.6 Furcation

5.5.6.1 Significant Results in Changes of Furcation Mode in Sextants from Visit 1 to Visit 3

No significant changes in furcations from visit 1 to visit 3 were observed.

5.5.7 Mobile Teeth

5.5.7.1 Changes of Teeth Mobility in Sextants from Visit 1 to Visit 3

Table 106 Significance of Changes of Tooth Mobility in Various Sextants

Tooth Mobility	p-value
Number	0.035* (z=2.11)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 106 show the statistically significant result in the change in number of mobile teeth in sextants.

Table 107 Changes in Number of Mobile Teeth from visit 1 to Visit 3

Number of Mobile Teeth	N	Mean	Median
V1 N mobile teeth	23	1.39	1.00
V2 N mobile teeth	27	1.89	2.00
V3 N mobile teeth	29	1.76	1.00

Table 107 indicates the mean number of mobile teeth which increased from visit 1 to visit 3 from 1.39 to 1.76 (p=0.035; z=2.11) although there was an increase in the number of mobile teeth from the 1st visit to the 2nd and a decrease in the number of mobile teeth from the 2nd to the 3rd visit. The mean percentage of 28.4% of mobile teeth from visit 1 also increased up to 41.3% at clinical assessment 3.

5.5.8 Debris

Table 108 Changes in Range of Total Debris Index from Visit 1 to Visit 3

Total Debris Index		N	%
V1 Debris Index	Total	69	100.0
	Fair	11	15.9
	Poor	58	84.1
V2 Debris Index	Total	67	100.0
	Fair	4	6.0
	Poor	63	94.0
V3 Debris Index	Total	66	100.0
	Good	1	1.5
	Fair	7	10.6
	Poor	58	87.9

Table 108 gives an overview of the changes in the range of the debris index according to the debris index score (DI-S) as listed in the Simplified Oral Hygiene Index-S (Greene and Vermillion, 1964). This table indicates that the number of older adults' debris index scores were inconsistent and varied from the first visit to the 3rd visit. The overall debris index status (fair and poor) got worse from the 1st visit to the 2nd visit but then improved again from the 2nd visit to the 3rd visit (good, fair and poor).

5.5.8.1 Changes of Debris Index in Sextants from Visit 1 to Visit 3

Table 109 Significance of Debris Index in Various Sextants

Debris Index	p-value
Debris index LR	0.049* (z=1.97)
Debris index LL	0.001** (z=3.25)
Debris index LA	0.001** (z=3.29)
Total Debris index U	0.019* (z=2.34)
Total Debris index L	<0.001*** (z=4.00)
Total Debris index	0.015* (z=2.44)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 109 indicates a significant increase in debris index in both arches, thus maxillary arch and mandibular arch from visit 1 to visit 3.

Table 110 Changes in Debris Index from Visit 1 to Visit 3 in Lower Right Sextants

Debris Index	N	Mean	Median
V1 Debris Index LR T	34	2.18	2.50
V2 Debris Index LR T	39	2.44	3.00
V3 Debris Index LR T	39	2.67	3.00
V1 Debris Index LL T	36	2.17	2.00
V2 Debris Index LL T	38	2.45	3.00
V3 Debris Index LL T	40	2.73	3.00
V1 Debris Index LA T	56	2.34	3.00
V2 Debris Index LA T	55	2.62	3.00
V3 Debris Index LA T	54	2.76	3.00
V1 Debris Index Total U	52	5.23	4.00
V2 Debris Index Total U	53	5.75	6.00
V3 Debris Index Total U	52	6.04	6.00
V1 Debris Index Total L	59	4.71	4.00
V2 Debris Index Total L	59	5.63	6.00
V3 Debris Index Total L	59	6.24	6.00

Table 110 shows the changes in the mean debris index in sextants and arches. The increase in the mean debris index increased in the lower right sextants from visit 1 to visit 3 ($p=0.049$; $z=1.97$); the lower left sextants from visit 1 to visit 3 (0.001 ; $z=3.25$); the left anterior sextants from visit 1 to visit 3 ($p=0.001$; $z=3.29$); the upper maxillary arch from visit 1 to visit 3 ($p=0.019$; $z=2.34$) and in the lower mandibular arch from visit 1 to visit 3 ($p<0.001$; $z=4.00$).

Table 111 Changes in Total Debris Index from Visit 1 to Visit 3

Total Debris Index	N	Mean	Median
V1 Total Debris Index	69	2.44	3.00
V2 Total Debris Index	68	2.79	3.00
V3 Total Debris Index	68	2.65	3.00

Table 111 indicates the increase in total debris index within the oral cavities from visit 1 to visit 2 and a decrease from visit 2 to visit 3 ($p=0.015$; $z=2.44$).

5.5.9 Calculus

Table 112 Changes in Range of Calculus Index from Visit 1 to Visit 3

Calculus Index -Score		N	%
Visit 1	Total	63	100.0
	Good	19	30.2
	Fair	15	23.8
	Poor	29	46.0
Visit 2	Total	65	100.0
	Good	6	9.2
	Fair	11	16.9
	Poor	48	73.8
Visit 3	Total	65	100.0
	Good	5	7.7
	Fair	11	16.9
	Poor	49	75.4

Table 112 gives an overview of the changes in the range of the calculus index according to the calculus status (CI-S) as listed in the Simplified Oral Hygiene Index-S (Greene and Vermillion, 1964). This table indicates that the number of older adults' calculus index scores became poorer over time while the number of older adults' who had minimal calculus during the first visit (good), decreased over time.

5.5.9.1 Changes of Calculus Index in Sextants from Visit 1 to Visit 3

Table 113 Significance of Calculus Index in Various Sextants

Calculus	p-value
Calculus index UR	0.017* (z=2.38)
Calculus index UL	0.003** (z=2.99)
Calculus index UA	<0.001*** (z=3.85)
Calculus index LR	0.008** (z=2.64)
Calculus index LL	<0.001*** (z=3.68)
Calculus index LA	0.002** (z=3.04)
Total Calculus index U	<0.001*** (z=3.61)
Total Calculus index L	<0.001*** (z=4.56)
Total Calculus index	<0.001*** (z=4.37)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 113 indicates that calculus index increased significantly in all sextants since visit 1 to visit 3.

Table 114 Changes in Calculus Index from Visit 1 to Visit 3 Upper Right Sextants

Calculus Index	N	Mean	Median
V1 Calculus Index UR	36	1.47	2.00
V2 Calculus Index UR	38	2.08	3.00
V3 Calculus Index UR	38	2.18	3.00
V1 Calculus Index UL	28	1.61	2.00
V2 Calculus Index UL	33	2.18	3.00
V3 Calculus Index UL	35	2.31	3.00
V1 Calculus Index UA	42	1.36	1.00
V2 Calculus Index UA	47	1.87	2.00
V3 Calculus Index UA	46	2.28	3.00
V1 Calculus Index UA	42	1.36	1.00
V2 Calculus Index UA	47	1.87	2.00
V3 Calculus Index UA	46	2.28	3.00
V1 Calculus Index UA	42	1.36	1.00
V2 Calculus Index UA	47	1.87	2.00
V3 Calculus Index UA	46	2.28	3.00
V1 Calculus Index LR	36	1.33	1.00
V2 Calculus Index LR	39	2.03	3.00
V3 Calculus Index LR	39	2.08	3.00
V1 Calculus Index LL	36	1.33	1.00
V2 Calculus Index LL	38	2.13	3.00
V3 Calculus Index LL	40	2.23	3.00
V1 Calculus Index LA	49	1.90	2.00
V2 Calculus Index LA	55	2.27	3.00
V3 Calculus Index LA	54	2.43	3.00

Table 114 indicates that the changes in the calculus index in the upper right sextants increased from 1.47 to 2.18 from visit 1 to visit 3 ($p=0.017$; $z=2.38$); in the upper left sextants it increased from 1.61 to 2.31 from visit 1 to visit 3 ($p=0.003$; $z=2.99$); in the upper anterior sextants it increased from 1.36 to 2.28 from visit 1 to visit 3 ($p<0.001$; $z=3.85$). Increase in calculus index was also observed in the lower right sextants from 1.33 to 2.08 ($p=0.008$; $z=2.64$), lower left sextants, 1.33 to 2.23 from visit 1 to visit 3

($p<0.001$; $z=3.68$) and lower anterior sextant from visit 1 to visit 3, from 1.90 to 2.43 ($p=0.002$; $z=3.04$).

Table 115 Changes in the Total Calculus Index Uppers (Maxillary Arch)

Total Maxillary Calculus Index	N	Mean	Median
V1 Calculus Index Total U	45	3.44	3.00
V2 Calculus Index Total U	52	4.52	3.00
V3 Calculus Index Total U	51	5.18	5.00

Table 115 illustrates the increase in the total calculus index in the upper arch (maxillary arch) from visit 1 to visit 2 from 3.44 to 5.18 ($p<0.001$; $z=3.61$).

Table 116 Changes in the Total Calculus Index Lower (Mandibular Arch) from Visit 1 to Visit 3

Total Mandibular Calculus Index	N	Mean	Median
V1 Calculus Index Total L	58	3.26	3.00
V2 Calculus Index Total L	60	4.73	4.00
V3 Calculus Index Total L	60	5.10	5.50

Table 116 indicates the changes from visit 1 to visit 3 in total calculus index in the lower arches (mandibular arches) ($p<0.001$; $z=4.56$).

Table 117 Changes in the Total Calculus Index from Visit 1 to Visit 3

Total Calculus Index	N	Mean	Median
V1 Calculus Index	67	1.51	1.67
V2 Calculus Index	68	2.30	2.67
V3 Calculus Index	68	2.29	3.00

Table 117 highlights the increase in the total calculus index from 1.51 to 2.29 from visit 1 to visit 3 ($p < 0.001$; $z = 4.56$). However, there was an increase from the 1st visit to the 2nd visit and a slight decrease from the 2nd visit to the 3rd visit.

5.5.10 Oral Hygiene Index Score

Table 118 Changes in the Percentage Oral Hygiene Index Status from Visit 1 to Visit 3

Oral Hygiene Index		N	%
Visit 1	Total	69	100.0
	Good	3	4.3
	Fair	28	40.6
	Poor	38	55.1
Visit 2	Total	68	100.0
	Good	2	2.9
	Fair	11	16.2
	Poor	55	80.9
Visit 3	Total	69	100.0
	Good	1	1.4
	Fair	12	17.4
	Poor	56	81.2

Table 118 gives an overview of the changes in the Oral Hygiene Index Status according the Simplified Oral Hygiene Index-S (Greene and Vermillion, 1964). This table indicates that the number of older adults' oral hygiene index status became poorer over time. 55.1% of older adults have poor OH during visit 1 and 81.2% had poor OH during visit 3.

5.5.10.1 Changes of the Oral Hygiene Scores from Visit 1 to Visit 3

Table 119 Significance of Oral Hygiene Index Score

	p-value
OH index	<0.001*** (z=4.25)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 119 indicates a statistically significant result in the overall oral hygiene index score from visit 1 to visit 3.

Table 120 Changes in Oral Hygiene Index from Visit 1 to Visit 3

	N	Mean	Median
V1 Oral Hygiene Index	69	3.88	3.80
V2 Oral Hygiene Index	68	4.87	5.50
V3 Oral Hygiene Index	69	4.90	5.83

Table 120 shows that mean oral hygiene index score increased from 3.88 in visit 1 to 4.90 in visit 3) (p<0.001; z=4.25).

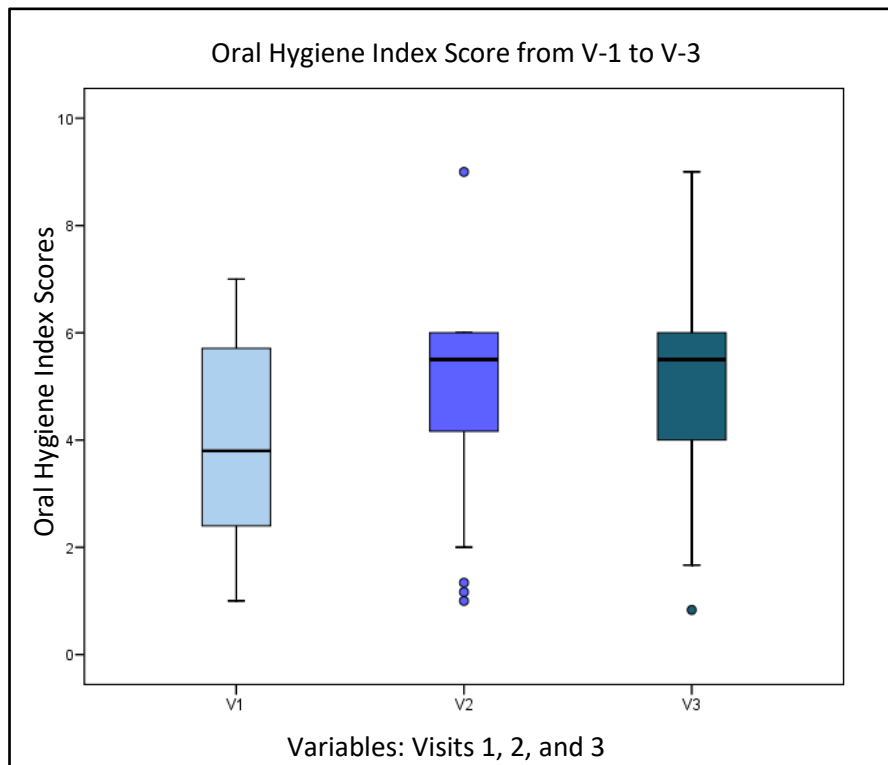


Figure 32 Pattern of the Oral Hygiene Index Score

Figure 32 shows that from V1 to V3, there appears to be a shift towards higher median scores of Oral Hygiene Index Scores and greater extremes (especially on the higher end), while V2 shows a concentration of scores on the lower end with some significant exceptions.

5.5.11 BPE

5.5.11.1 Changes of Basic Periodontal Examination from Visit 1 to Visit 3

Table 121 Significance of BPE Scores

Basic Periodontal Examination	p-value
BPE in Sextant 2	0.004** (z=2.89)

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistical Tests

Table 121 shows that there was a statistical significance in changes of BPE in the anterior upper sextant over time.

Table 122 Changes in BPE 2 from Visit 1 to Visit 3

	N	Median
V1 BPE in the 2 nd sextant	42	2.00
V2 BPE in the 2 nd sextant	37	2.00
V3 BPE in the 2 nd sextant	35	3.00

Table 122 indicates that in the upper anterior sextant, the median BPE significantly increased from BPE 2 to BPE 3 from visit 1 to visit 3 (p=0.004; z=2.89).

5.6 Effect of Ward by Gender

5.6.1 Aim

The aim of this section of results is to assess the differences in clinical changes from Visit 1 to Visit 3 according to ward gender.

5.6.1.1 Changes of Clinical Parameters from Visit 1 to Visit 3 by Ward Gender

Table 123 Significant results in Changes of Clinical Parameters from Visit 1 to Visit 3 at Ward Gender Level

	p-value	male vs. female	male vs. mixed	female vs. mixed
Average REC UL	0,035* (Chi ² =6.73)	0,186	0,057	1,000
Average CAL UR	0,023* (Chi ² =7.56)	0,033* (z=2,53)	0,159	1,000
Average CAL UL	0,018* (Chi ² =8.09)	0,093	0,078	0,447
Average CAL UA	0,047* (Chi ² =6.10)	0,177	0,222	0,390
Debris index LA	0,018* (Chi ² =8.03)	0,021* (z=2,69)	0,276	1,000
Total Debris index L	0,008** (Chi ² =9.68)	0,009** (z=2,94)	0,132	1,000
Total Debris index	0,026* (Chi ² =7.34)	0,027* (z=2,60)	0,485	1,000

*p<0.05; **p<0.01; ***p<0.001

Kruskal-Wallis test
Chi²-statistic (df=2)
Mann-Whitney's test
Bonferroni's correction
z-statistics

In Table 123 significant results and differences in changes of clinical parameters from Visit 1 to Visit 3 at ward gender level were remarkably low.

Table 124 Changes in Average Recession in the Upper Left Sextant by Ward Gender

Average Recession Upper Lower Sextant		WARD GENDER			
		Total	Male	Female	Mixed
Visit 1	N	28	14	9	5
	Mean	2.71	3.46	2.59	.83
	Median	2.77	3.56	2.71	.50
Visit 2	N	30	14	11	5
	Mean	2.72	3.21	2.61	1.58
	Median	2.62	3.58	2.33	1.50
Visit 3	N	25	14	6	5
	Mean	2.68	2.49	3.95	1.66
	Median	2.50	2.64	4.17	2.00

Table 124 shows that the average recession in the upper left sextant. This reduced in wards for male older adults (median -0.71) compared to the average recession in wards for females older adults (median +0.56) and in mixed wards (median +0.75) ($\chi^2 = (df2; N=25) = 6.73; p = 0,035$).

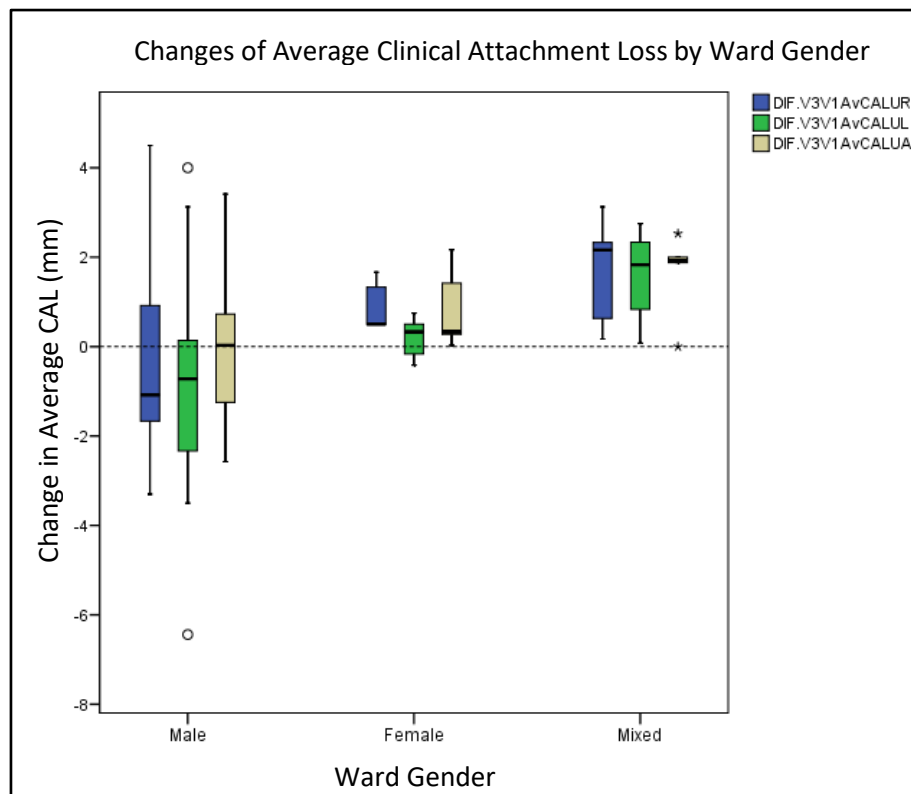


Figure 33 Changes of Average CAL by Ward Gender

Figure 33 indicates that there were differences in changes of average CAL in the upper sextants ($\chi^2 = (df2; N=30) = 6.73; p = 0.023$). while there was a greater reduction of CAL in male wards compared to female wards and mixed wards.

Males appear to have a slightly decreased average CAL in the upper left sextant, with little change in the other sextants.

Females display stability in CAL across all quadrants, with individual cases varying as indicated by the outliers.

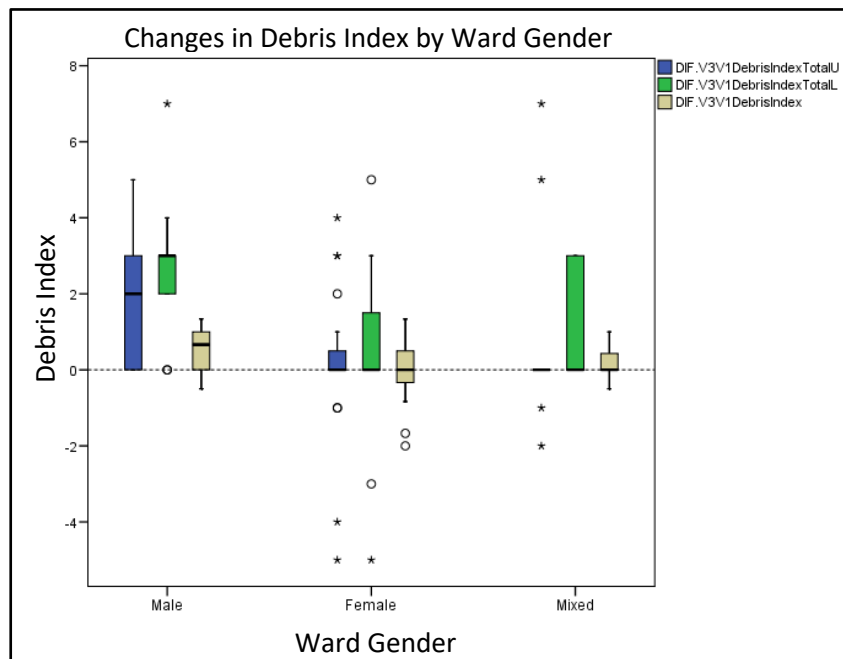


Figure 34 Changes in Debris Index by Ward Gender

Figure 34 shows that the changes in debris index were stronger in the male wards when compared to the female and mixed wards.

From Visit 1 to Visit 3, males showed an increase in the mean Debris Index (0.52), indicating that, on average, more debris accumulated over time. This is reflected by the positive difference in the mean Debris Index.

On the other hand, females had a slight decrease in the mean Debris Index (-0.07) over the same period, indicating that, on average, there was a small reduction in debris accumulation, or at least less accumulation compared to males.

5.7 Changes in Clinical Parameters and their Effect on Ward Type, Ward Group, Dexterity in Older Adults and Ambulance of Older Adults from Visit 1 to Visit 3

5.7.1 Aim

The aim of this section of results is to assess the differences in clinical changes from Visit 1 to Visit 3 according to 1) ward type: according to whether older adults reside in wards for cognitively impaired residents or cognitively healthy residents (dementia wards and non-dementia wards); 2) Ward Group: according to whether patients were grouped in the study group or the control group; 3) Dexterity: according to the dexterity of older adults and 4) Mobility: according to the ability of older adults to be ambulant.

Table 125 Significant Results in Changes of Clinical Parameters from Visit 1 to Visit 3 by Ward Type, Ward Group, Dexterity and Ambulance

	Ward Type Dementia/Non-Dementia Wards	Ward Group Study Group/Control Group	Dexterity Good/Poor	Mobility (Ambulance) Ambulatory/Non-Ambulatory
Mucosa hygiene	0,860	0,002** (z=3.09)	0,666	0,295
Worst PPD LA	0,679	0,002** (z=3.11)	0,948	0,403
Average REC LR	0,047* (z=1.98)	0,494	0,639	0,159
Average CAL LR	0,034* (z=2.12)	0,926	0,521	0,132
Bleeding score UA	0,002** (z=3.17)	0,061	0,455	0,777
Bleeding score LR	0,045* (z=2.00)	0,308	0,958	0,828
Bleeding score LL	0,001** (z=3.48)	0,658	0,158	0,545
Total bleeding score	0,017* (z=2.38)	0,421	0,445	0,501
Bleeding index UA	0,002** (z=3.12)	0,032* (z=2.15)	0,535	0,963
Bleeding index LR	0,045* (z=2.00)	0,308	0,958	0,828
Bleeding index LL	0,001** (z=3.43)	0,658	0,203	0,701
Bleeding index LA	0,015* (z=2.43)	0,345	0,543	0,893

BPE Sextant 3	0,796	0,016* (z=2.42)	0,474	0,657

*p<0.05; **p<0.01; ***p<0.001

Wilcoxon's Test

z-statistic test

Table 125 illustrates the statistically significant results obtained from visit 1 to visit 3, by ward type: 10 significant results; ward group: 4 significant results.

5.7.2 Changes of Clinical Parameters from Visit 1 to Visit 3 by Ward Type [Dementia Wards vs Non Dementia Wards]

Table 126 Changes in Average Recession Lower Right Sextant (mm) by Ward Type

Average Recession Lower Right Sextants		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	35	25	10
	Mean	2.58	2.61	2.51
	Median	2.17	2.17	2.37
Visit 2	N	35	25	10
	Mean	2.80	2.73	2.98
	Median	2.83	3.08	2.83
Visit 3	N	31	23	8
	Mean	3.17	2.88	4.01
	Median	3.50	3.04	3.83

Table 126 shows that the mean and median average recession in the lower right sextants increased in non-dementia wards by 0.27mm and 0.87mm respectively while in the dementia wards the mean and median averages of recession in the same sextant increased by 1.5mm and 1.46mm respectively. ($z=1.98$; $p=0.047$). This results indicates that in the lower right sextants, recession increased more over time, in the dementia wards.

Table 127 Changes in Average CAL (mm) by Ward Type

Average CAL Lower Right Sextants		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	34	24	10
	Mean	4.91	4.93	4.89
	Median	4.93	5.01	4.92
Visit 2	N	33	24	9
	Mean	5.53	5.46	5.72
	Median	5.33	5.75	5.33
Visit 3	N	32	24	8
	Mean	5.98	5.49	7.46
	Median	5.75	5.10	6.67

Table 127 indicates that in the same sextant, lower right as in recession, there were significant differences in changes of average CAL, the median being +0.75 in the non-dementia ward and +2.25 in the dementia wards. The average CAL in the lower right sextant kept increasing and was higher at the 3rd clinical assessment held in dementia wards ($z=1.98$; $p=0.034$).

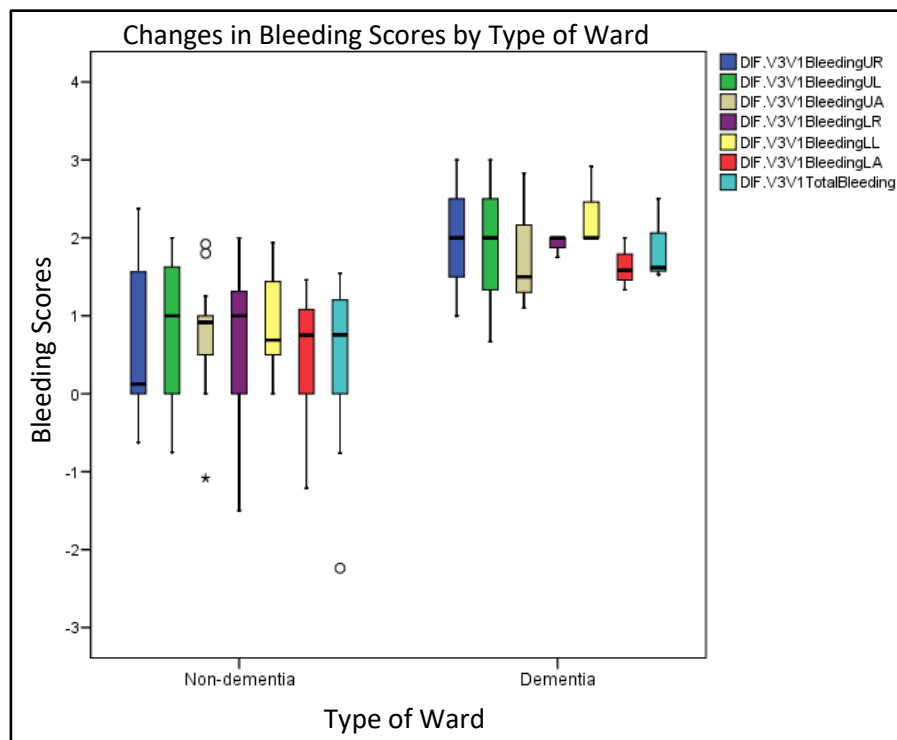


Figure 35 Changes in Bleeding Scores by Type of Ward

Figure 35 shows the most important finding which involves bleeding assessments with bleeding scores being larger and increasing in the dementia wards from visit 1 to visit 3.

Table 128 Changes in Bleeding Score Upper Anterior Sextant by Type of Ward

Changes in Bleeding Score Upper Anterior Sextant		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	46	36	10
	Mean	3.87	4.01	3.37
	Median	4.00	4.00	3.05
Visit 2	N	45	35	10
	Mean	4.16	4.10	4.39
	Median	4.60	4.40	5.00
Visit 3	N	46	36	10
	Mean	4.32	4.16	4.89
	Median	5.00	4.90	5.00

Table 128 shows that bleeding in the upper anterior sextants yielded a significant result when comparing the median of bleeding scores changes between wards for cognitively healthy (1.75) and cognitively impaired older adults indicating that bleeding increased and was higher in the dementia wards (0.09) ($z=3.17$; $p=0.002$).

Table 129 Changes in Bleeding Score Lower Right Sextant by Type of Ward

Changes in Bleeding Scores Lower Right Sextant		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	37	27	10
	Mean	3.65	3.69	3.56
	Median	4.00	4.00	3.50
Visit 2	N	37	27	10
	Mean	4.11	3.94	4.58
	Median	4.50	4.50	5.00
Visit 3	N	37	27	10
	Mean	4.32	4.09	4.94
	Median	5.00	4.50	5.00

Table 129 shows that when the results obtained for bleeding scores in the lower right sextants were compared between dementia wards (1.38) and non-dementia wards (0.50), a significant result was obtained over time ($z= 2.00$; $p=0.045$). Bleeding scores increased and were higher in the dementia wards.

Table 130 Changes in Bleeding Scores Lower Left Sextants by Type of Ward

Changes in Bleeding Scores Lower Left Sextant		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	38	27	11
	Mean	3.76	3.96	3.27
	Median	3.79	4.00	3.00
Visit 2	N	36	26	10
	Mean	4.20	4.13	4.38
	Median	4.50	4.50	4.63
Visit 3	N	38	28	10
	Mean	4.23	3.99	4.90
	Median	4.63	4.00	5.00

Table 130 indicates the different bleeding scores obtained from visit 1 to visit 3 when comparing the lower left sextants of older adults residing in dementia wards (2.00) and those who reside in non-dementia wards (0.38) ($z=3.48$; $p=0.001$). The median bleeding score in this sextant increased and was higher in the dementia wards.

Table 131 Changes in Total Bleeding Scores by Type of Ward

Changes in Total Bleeding Scores		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	66	48	18
	Mean	3.95	4.01	3.79
	Median	4.00	4.00	3.45
Visit 2	N	64	47	17
	Mean	4.34	4.17	4.80
	Median	4.67	4.50	5.00
Visit 3	N	65	48	17
	Mean	4.37	4.24	4.76
	Median	4.84	4.62	5.00

Table 131 illustrates the changes in the total bleeding score from visit 1 to visit 3 when comparing the dementia wards (1.23) to the non-dementia wards (0.14) ($z=2.38$; $p=0.017$). The median of the Total bleeding score increased and was higher by the end of the 3rd clinical assessment in the dementia wards.

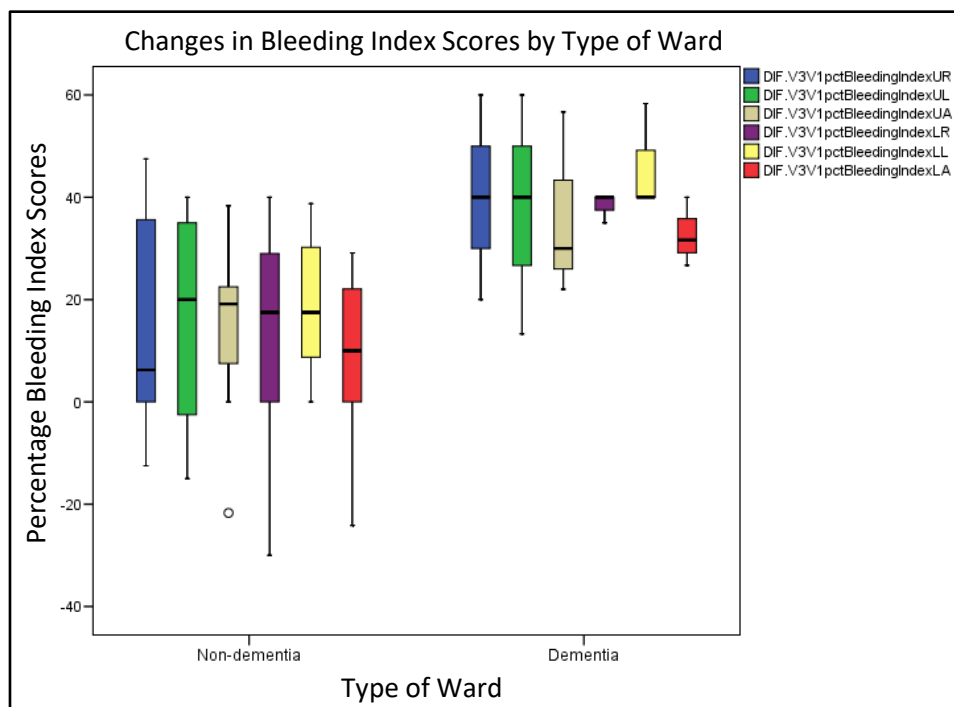


Figure 36 Changes in Percentage Bleeding Index Scores by Type of Ward

Figure 36 shows similar results are obtained from the bleeding index scores. Overall, the plot suggests that both non-dementia and dementia wards experienced increases in the Bleeding Index from Visit 1 to Visit 3. However, the scores for older adults in the dementia wards indicated that bleeding index scores were higher.

Table 132 Changes in Percentage Bleeding Index Upper Anterior Sextants by Type of Ward

Changes in Percentage Bleeding Index Upper Anterior		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	45	35	10
	Mean	76.05	78.51	67.42
	Median	80.00	80.00	61.00
Visit 2	N	45	34	11
	Mean	83.10	81.43	88.25
	Median	92.00	88.00	100.00
Visit 3	N	46	36	10
	Mean	86.40	83.22	97.87
	Median	100.00	98.00	100.00

Table 132 also shows the changes in the percentage bleeding index scores in upper anterior sextants when comparing dementia wards (35%) to non-dementia wards (2.0%) ($z=3.12$; $p= 0.002$). Percentage bleeding scores of older adults in the dementia wards were higher during the second and the third visit.

Table 133 Changes in Percentage Bleeding Index Lower Right Sextants by Type of Ward

Changes in Percentage Bleeding Index Lower Right Sextants		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	37	27	10
	Mean	73.10	73.78	71.25
	Median	80.00	80.00	70.00
Visit 2	N	37	26	11
	Mean	81.33	78.01	89.16
	Median	90.00	88.33	100.00
Visit 3	N	37	27	10
	Mean	86.41	81.84	98.75
	Median	100.00	90.00	100.00

Table 133 highlights the difference in the percentage bleeding index in the lower right sextants when compared between older adults in the dementia wards (27.50%) and those residing in non-dementia wards (10%) from visit 1 to visit 3 ($z=2.00$; $p=0.045$).

Table 134 Changes in Percentage Bleeding Index Lower Left Sextants by Type of Ward

Changes in Percentage Bleeding Index Lower Left Sextants		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	37	26	11
	Mean	71.60	74.24	65.38
	Median	75.00	78.75	60.00
Visit 2	N	36	25	11
	Mean	83.00	81.86	85.61
	Median	90.00	90.00	85.00
Visit 3	N	38	28	10
	Mean	84.59	79.81	98.00
	Median	92.71	80.00	100.00

Table 134 indicates the changes in the percentage index bleeding scores in the lower left sextants when comparing the dementia wards (40%) to the non-dementia wards (8.75%) from visit 1 to visit 3 ($z=3.43$; $p=0.001$). The results indicate that during the second visit the percentage index bleeding scores reduced however they increased again by the end of the 3rd visit. In the dementia wards the percentage index bleeding score in this sextant kept increasing.

Table 135 Changes in Percentage Bleeding Index Lower Anterior by Type of Ward

Changes in Percentage Bleeding Index Lower Anterior Sextants		TYPE OF WARD		
		Total	Non-dementia	Dementia
Visit 1	N	54	41	13
	Mean	75.55	75.89	74.48
	Median	80.00	80.00	70.00
Visit 2	N	51	37	14
	Mean	85.50	84.14	89.10
	Median	90.00	90.00	90.83
Visit 3	N	53	40	13
	Mean	83.83	80.64	93.64
	Median	93.30	88.75	100.00

Table 135 shows the changes in the percentage bleeding index scores in the lower anteriors when comparing the dementia wards (23.30%) to the non-dementia wards (3.75%) from visit 1 to visit 3 ($z=2.43$; $p=0.015$). The percentage bleeding index in the lower anterior sextant kept increasing and were higher in the dementia wards by the end of the 3rd clinical assessment.

5.7.3 Changes of Clinical Parameters from Visit 1 to Visit 3 by Ward Group [Study Group and Control Group]

Table 136 Changes in Mucosa Hygiene from Visit 1 to Visit 3 by Ward Group

Difference in Mucosa Hygiene			Ward Group		Total
			Control	Study	
Visit 1 to Visit 3	Worse	Count	4	15	19
		% within WARD GROUP	8.0%	29.4%	18.8%
	Stable	Count	43	36	79
		% within WARD GROUP	86.0%	70.6%	78.2%
	Better	Count	3	0	3
		% within WARD GROUP	6.0%	.0%	3.0%
Total		Count	50	51	101
		% within WARD GROUP	100.0%	100.0%	100.0%

Table 136 shows that 8% of the patients in the control wards showed a worsening of their mucosa hygiene against 29.4% in the test group ($z=3.09$; $p=0.002$). This indicates that the majority of older adults in the study group did not improve their oral hygiene in spite of interventions.

Table 137 Changes in Range of Worse Average PPDs in the Lower Anterior Sextants by Ward Group

Worse Periodontal Pocket Depth in Lower Anterior Sextant		WARD GROUP			
		Total	Control	Study	Dismantled
Visit 1	N	49	16	26	7
	Mean	3.22	3.56	3.23	2.43
	Median	2.00	2.00	3.00	2.00
Visit 2	N	49	15	27	7
	Mean	3.49	3.40	3.74	2.71
	Median	3.00	3.00	3.00	2.00
Visit 3	N	46	13	26	7
	Mean	3.67	3.08	4.15	3.00
	Median	3.00	3.00	4.00	3.00

Table 137 highlights a significant difference involving changes in the worst PPDs in the lower anterior sextant. It can be noted that the median of change from V3-V1 was 0mm in the control group but +1mm in the test group ($z=3.11$; $p=0.002$). This is another indication that in the study group there was no improvement in the PPDs in this sextant of older adults by the end of the 3rd clinical assessment.

Table 138 Changes in % Bleeding Index in Upper Anterior Sextants by Ward Group

Percentage Bleeding Index in Upper Anterior Sextant		WARD GROUP			
		Total	Control	Study	Dismantled
Visit 1	N	45	14	26	5
	Mean	76.05	83.66	70.10	85.66
	Median	80.00	85.00	67.65	80.00
Visit 2	N	45	15	25	5
	Mean	83.10	84.29	83.47	77.67
	Median	92.00	92.50	93.00	74.17
Visit 3	N	46	16	25	5
	Mean	86.40	89.35	87.05	73.74
	Median	100.00	100.00	100.00	70.00

Table 138 indicates changes at the bleeding index in the upper anterior sextant having a median was increased in both the control group and study group, however from the 1st visit to the 3rd visit the percentage bleeding index in this sextant increased by 32% when compared to the increase in percentage in the control group (15%)($z=2.15$; $p=0,032$).

Table 139 Changes in BPE 3 by Ward Group

Changes in BPE of Upper Left Sextant (Sextant 3)		WARD GROUP			
		Total	Control	Study	Dismantled
Visit 1	N	28	8	19	1
	Mean	2.04	2.00	2.11	1.00
	Median	2.00	2.00	2.00	1.00
Visit 2	N	23	5	17	1
	Mean	2.35	1.60	2.59	2.00
	Median	2.00	2.00	3.00	2.00
Visit 3	N	19	3	14	2
	Mean	2.53	2.00	2.64	2.50
	Median	3.00	2.00	3.00	2.50

Table 139 indicates a significant result in the changes of BPE in the Upper Left Sextants by ward group. This implies that the changes in BPE in this particular sextant within the control group, differed when compared to the study group ($z=2.42$; $p=0.016$). The median BPE code increased from 2 to 3 from the 1st visit up to the 3rd visit in the study group.

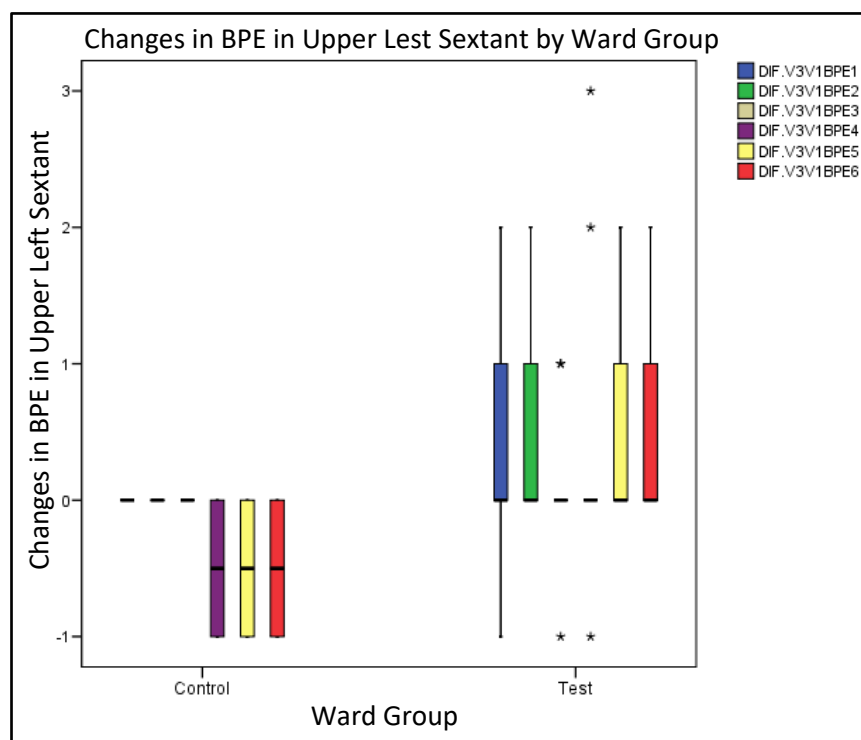


Figure 37 Changes in BPE in Upper Left Sextant by Ward Group

Figure 37 shows see a significant difference corresponding to BPE in the upper left sextant ($p=0.016$). The control group shows consistency and little change in BPE scores, whereas the test group displays variability with an inclination towards increased BPE scores.

This might suggest that the study group experienced worse periodontal outcomes or less effective periodontal management compared to the control group between Visit 1 and Visit 3.

5.7.4 Significant Results in Changes of Clinical Parameters from Visit 1 to Visit 3 by Dexterity

There were no significant differences.

5.7.5 Significant Results in Changes of Clinical Parameters from Visit 1 to Visit 3 by Ambulance

There were no significant differences.

5.7.6 Changes of Clinical Parameters from Visit 1 to Visit 3 by Cognitive Health

Table 140 Significant Results in Changes of Clinical Parameters from Visit 1 to Visit 3 by Cognitive Health

Clinical Parameters	p-value	Alert vs. Semi-Alert	Alert vs. Non-communicative	Semi-alert vs. Non-communicative
Average PPD LL	0,038* (Chi ² =6.55)	0,072	1,000	0,057

*p<0.05; **p<0.01; ***p<0.001

Kruskal-Wallis test

Chi²-statistic (df=2)

Mann-Whitney's test with Bonferroni's correction

z-statistics test

Table 140 shows that only one parameter showed a significantly different change depending on the level of cognitive health. This was manifested in the average PPDs of the lower left sextant (Chi² (df2; N=28) = 6.55; p=0.038).

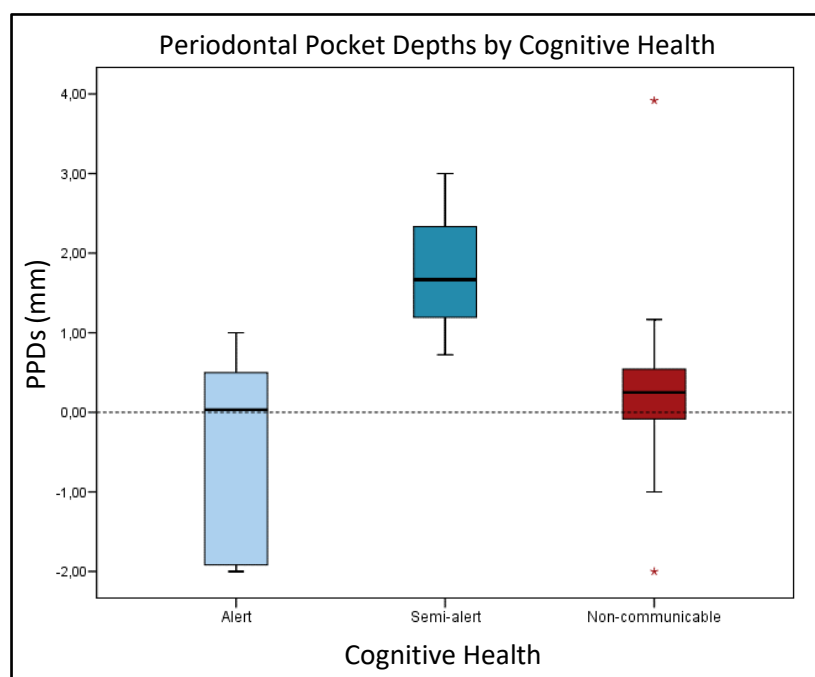


Figure 38 Changes in PPDs by Cognitive Health

Figure 38 shows that semi-alert patients showed the highest scores of PPDs at the lower left sextants.

5.7.7 Discussion and Conclusion

The primary objective of this chapter was to evaluate clinical parameters and their changes over a two-and-a-half-year period, utilizing oral hygiene and periodontal indices as primary metrics and therefore as key performance indicators.

As stated by Ahmed et al., (2017), Key Performance Indicators (KPIs) serve as instruments to oversee parameters and provide insights into the cohesion, nature, and functioning of healthcare teams within an organization across various levels. The KPIs used in this study, delineate multifaceted variables and factors which are vital for assessing the occurrence of teamwork. They also aim to enhance understanding and awareness to facilitate team interaction, consequently improving oral care and oral health outcomes amongst older adults.

This longitudinal clinical study, conducted between May 2019 and September 2021, involved data collection through clinical assessments in randomly selected wards. These were conducted at three intervals on both a study group receiving educational and clinical interventions and a control group without interventions. Adjustments were required due to patient reallocations and the impact of the Covid-19 pandemic.

Results revealed significant changes over time in several key performance indicators (KPIs). Over the course of the study, it became evident that there was a concerning trend of deteriorating oral health among the older adult population. One of the most notable findings was the increase in the number ($z=3.78$; $p<0.001$) and percentage ($z=3.78$; $p<0.001$) of missing teeth over time. Missing teeth increased from a mean of

25.1 to 25.6. This indicates a progressive loss of teeth, which can have significant implications for oral function, aesthetics, and overall quality of life. Despite advancements in dental care, the prevalence of missing teeth remained high, highlighting the persistent challenges in maintaining oral health and good quality of life amongst older adults. This result is particularly relevant when associated to the findings of Chatzopoulos, G., et.al. (2003), which identified links between various systemic conditions and increased rates of tooth loss and periodontitis. Conditions such as anemia, cardiovascular diseases, and substance abuse correlated with more missing teeth.

Furthermore, while there was an improvement in mucosa hygiene ($p=0.002$), particularly noteworthy given its impact on overall oral health and comfort, this improvement was not mirrored in denture hygiene. This suggests a potential gap in oral care practices among denture wearers, which may require targeted interventions and education to address.

Notably, PPDs, recession, CAL, bleeding scores, mobile teeth, debris scores, calculus scores, oral hygiene index scores, and Basic Periodontal Examinations (BPE) all demonstrated significant increases over time ($p<0.005$).

Bleeding scores and oral hygiene index scores which exhibited significant increases from the first visit up to the third visit ($p<0.005$), indicated a decline in oral hygiene practices among the study participants. These findings underscore the importance of regular dental hygiene routines and professional dental care in maintaining oral health, particularly among older adults who may be more susceptible to oral health issues due to age-related changes and comorbidities.

Additionally, the study identified a significant increase in the number of mobile teeth ($z=2.11$; $p=0.035$), indicating potential issues with tooth stability and periodontal support. This finding highlights the importance of early detection and management of periodontal disease to prevent further tooth mobility and loss. These findings suggest a progressive worsening of periodontal conditions among older adults, which can lead to increased risk of tooth loss, oral infections, and systemic health complications if left untreated.

These results also highlight an important aspect indicating that educational, clinical interventions and oral health promotion initiatives in the study group did not yield positive results in terms of oral hygiene and periodontal health indicators. Moreover, the control group showed significantly less deterioration in mucosa hygiene ($p=0.002$), PPDs in the lower anterior sextant ($p=0.002$), bleeding index in the upper anterior sextant ($p=0.032$), and changes in BPE in the upper left sextant ($p=0.016$) compared to the study group.

The investigation into the effect of ward gender on clinical changes from Visit 1 to Visit 3 revealed interesting findings. There were significant disparities in certain clinical parameters across different ward genders. Specifically, the average recession demonstrated a marked reduction in male older adult wards compared to female older adult and mixed wards ($p<0.005$). Additionally, disparities in changes in average CAL and debris index ($p<0.005$) were observed, with male wards exhibiting greater reductions compared to female and mixed wards.

Moving on to the effects of ward type, ward group, dexterity, and ambulation from Visit 1 to Visit 3, the analysis provided valuable insights into various aspects. Ward type,

distinguishing between dementia and non-dementia wards, yielded significant results across multiple clinical parameters. Notably, dementia wards exhibited greater increases in recession and CAL, as well as higher bleeding assessments ($p<0.005$), emphasizing the impact of cognitive health on periodontal health outcomes.

Significant differences were noted between the study group and control group, particularly regarding mucosa hygiene, PPDs, and bleeding index scores ($p<0.05$), highlighting the influence of group allocation on periodontal health progression.

Despite exploring dexterity and ambulation, no significant differences were found, indicating that these factors may not strongly impact periodontal health changes over time.

Interestingly, when considering cognitive health, only one parameter showed a significantly different change, emphasizing the importance of cognitive status, particularly in relation to PPDs.

Overall, these findings underscore the multifaceted nature of factors influencing periodontal health outcomes in older adults, ranging from ward gender and type to cognitive health status and group allocation. Understanding these factors is crucial for developing targeted interventions to improve periodontal health outcomes in the older adults' population. This chapter underscores the utility of oral hygiene and periodontal indices as effective performance metrics to be used as performance indicators, with findings suggesting a concerning trend of deteriorating periodontal health among older adults. Despite interventions, the study group did not exhibit improved outcomes, emphasizing the complexity of addressing oral health challenges in this demographic.

Conclusion

The research emphasizes the importance of identifying gaps in service delivery and assessing performance within long-term care facilities catering to older adults. The emphasis is on the necessity of implementing key performance indicators (KPIs) to effectively monitor healthcare environments and oral health promotion and awareness continuously and on a regular basis to reinforce daily oral care. Specifically, this study supports the notion of utilizing Oral Hygiene and Periodontal Indices as KPIs which can offer valuable insights into a facility's progress toward achieving its oral health objectives. These indicators play a crucial role in evaluating and improving the quality of oral health care provided to older adults in long-term care settings.

Chapter 6

Correlation of Staff Members and Older Adults' Attitudes,
Systemic Conditions and Quality of life

by

Ward vs Clinical KPIs

At SVPR Residence

6.1 Introduction

This chapter explores the significance of questionnaires and interview responses in understanding the oral health care awareness, perceptions, and quality of life among staff members and older adults in long-term care settings. The analysis examines the uniformity of responses across different deployment areas, highlighting the consistency in staff members' knowledge of personal oral care, oral health education, and their perceptions of older adults' oral health and dental care habits. Through the application of Mann-Whitney tests and Bonferroni's correction, the study reveals minimal disparities between deployment areas, suggesting a homogeneity in oral health care awareness and related measures among staff.

Moreover, the chapter delves into the correlations between changes in clinical parameters observed over time and staff members' awareness of their own oral health. Weak to moderate correlations were found between staff members' oral health awareness and the worsening of certain periodontal conditions in older adults. This correlation extends to older adults' self-perception of their oral health, where discrepancies between perceived and clinical realities were noted.

Additionally, the study investigates the complex relationship between older adults' clinical parameters, systemic diseases, and medication use. With a high prevalence of systemic conditions such as neurological, cardiovascular, and endocrine disorders, the analysis underscores the complex links between systemic health and oral hygiene. Gender disparities in disease prevalence, as well as the varying impact of ward types and medication on oral health, are explored in detail.

Ultimately, the chapter emphasizes the importance of considering both subjective and objective measures of oral health to improve clinical outcomes and enhance the quality of life for older adults. By integrating personal perceptions with clinical assessments, healthcare providers can better tailor interventions to meet the specific needs of this vulnerable population.

6.2 Aim

The aim of this chapter is to correlate staff members' and older adults' attitudes, systemic conditions and quality of life by Ward vs Clinical KPIs.

6.3 Correlations with Questions of Staff Members' Research Study (Chapter 3)

6.3.1 Method and Materials

For each section in the staff questionnaire a combined score was calculated. Five scores were calculated with the following interpretation:

- **Score Section A:** Awareness regarding Personal Oral Health
- **Score Section B:** Assessing Oral Health Education of health Professionals, particularly at SVPR
- **Score Section C:** Assessing staff members' perceptions regarding oral health of older adults and their priority to assist older adults in daily oral care
- **Score Section D:** Obtaining information from staff members whether older adults do ask for assistance to brush teeth/dentures and to visit the dental clinic

- **Score Section E:** Assessing whether staff members are aware of a dental clinic at SVPR and whether this can be easily accessed.

Each score was calculated as the weighted mean of scores attributable to categories of different key questions of the section. Weights were defined by the researcher (Section 6.2.3).

Moreover, OHIP-14 dimensions were also considered:

- OHIP-14 Functional
- OHIP-14 Psychosocial
- OHIP-14 Total

Provided that the number of staff members in some wards was remarkably low, medians of scores were described and used for comparisons.

6.3.2 Statistical Analysis

Statistical analysis consists of a general description for continuous variables (mean, standard deviation, range and median) and categorical variables (absolute and relative frequencies).

- Spearman's correlation coefficient was estimated to assess the non-linear association between ordinal or continuous parameters
- Mann-Whitney tests were used to compare distributions of ordinal through two independent groups of patients (by gender, by type of ward).

- Kruskal-Wallis tests were used to the same previous purpose when more than 2 groups were involved (by district).
- χ^2 independence and Fisher's exact tests were conducted to assess the association between categorical variables (by gender, by type of ward).
- Wilcoxon's test was conducted to assess changes at OHIP scores between both sessions.
- The Bonferroni Correction is a statistical adjustment used to counteract the problem of multiple comparisons.
- Z- statistical test used to determine if there are significant differences in data. There are three main types: the z-Test for a Single Mean checks if the mean of a sample significantly deviates from a known population mean; the z-Test for Two Means compares the means of two large, independent samples with known variances to see if they differ significantly; and the z-Test for Proportions examines if the proportion of a specific outcome in one group is different from a known proportion or from that in another group. These tests help researchers identify statistically significant differences in their data.

Significance level used in analysis was set at 5% ($\alpha=0.05$).

6.3.3 Weighted Key Questions for Correlation Purposes

6.3.3.1 Statistical Analysis – Combining scores of different questions of each section of the questionnaire for Staff Members.

Table 141 Section A - Awareness regarding Personal Oral Health (Staff Members)

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
1a	<u>Moderately Important 15%</u>	How would you describe the health of your teeth ?	1: <u>Excellent;</u> 2: <u>Very Good;</u> 3: <u>Good;</u> 4: <u>Average;</u> 5: <u>Poor;</u> 6: <u>Very Poor;</u> 7: <u>Don't Know</u>	10 8 6 5 1 0 2
1b	<u>Important 20%</u>	How would you describe the health of your gums ?	1: <u>Excellent;</u> 2: <u>Very Good;</u> 3: <u>Good;</u> 4: <u>Average;</u> 5: <u>Poor;</u> 6: <u>Very Poor;</u> 7: <u>Don't Know</u>	10 8 6 5 2 0 2
<u>6</u>	<u>Very Important 25%</u>	How often do you clean your teeth ?	1: <u>Never;</u> 2: <u>Less than once a day;</u> 3: <u>Once a day;</u> 4: <u>Two times a day;</u> 5: <u>More than two times a day</u>	0 2 5 8 10
<u>9</u>	<u>Least Important 5%</u>	<u>How do you brush your teeth</u>	1: <u>Back and forth (Horizontal Motion);</u> 2: <u>Up and down (Vertical Motion);</u> 3: <u>Circular Motion;</u> 4: <u>A mixture of the above</u>	0 7 10 4
<u>14</u>	<u>Most Important 35%</u>	<u>Do your gums bleed when you are brushing ?</u>	1: <u>Yes;</u> 2: <u>No;</u> 3: <u>Sometimes;</u> 4: <u>Never noticed</u>	10 0 7 2

Table 142 Section B - Assessing Oral Health Education of Staff Members at SVPR

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
16	<u>Most Important 60%</u>	Have you ever received oral health education ?	<u>1:Yes;</u> <u>2:No;</u> <u>3:Don't know</u>	10 0 2
20	<u>Very Important 40%</u>	Have you ever participated in dental talks held in wards ?	<u>1:Yes;</u> <u>2:No;</u> <u>3:Don't know/cannot remember</u>	10 0 2

Table 143 Section C - Assessing Staff members' priorities to assist older adults and their Perceptions regarding Oral Health of Older Adults

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
22	<u>Very Important 30%</u>	How important do you think oral health is to older adults ?	<u>1:Not much; 2:Important;</u> <u>3:Very Important; 4:Other</u>	0 7 10 2
23	<u>Important 15%</u>	Have you ever been asked to assist in routine oral care of the older adults ?	<u>1:Never;</u> <u>2:Sometimes;</u> <u>3:Frequently;</u> <u>4:Always;</u> <u>5:Other</u>	0 5 7 10 2
<u>28</u>	<u>Most Important 55%</u>	Do you follow the dental care plan for patients which is found in medical histories ?	<u>1:Never;</u> <u>2:Sometimes;</u> <u>3:Frequently;</u> <u>4:Always</u>	0 5 7 10

Table 144 Section D - Obtaining Information from Staff members whether Older Adults do ask for Assistance to Brush Teeth/Dentures and whether they do visit the Dental Clinic

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
31	<u>Most Important</u> <u>75%</u>	Do older adults ask for their teeth/dentures to be brushed ?	<u>1:Never;</u> <u>2:Sometimes;</u> <u>3:Frequently;</u> <u>4:Always;</u> <u>5:Other</u>	0 5 7 10 2
33	<u>Very Important</u> <u>25%</u>	Do residents ask to visit the dental clinic for treatment ?	<u>1:Never;</u> <u>2:Sometimes;</u> <u>3:Frequently;</u> <u>4:Always</u>	0 5 7 10

Table 145 Section E - Assessing whether Staff members are aware of a Dental Clinic at SVPR and whether this can be easily accessed

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
37	<u>Most Important</u> <u>100%</u>	Is the dental clinic within the faculty easily accessible for the residents ?	<u>1:Yes</u> <u>2:No</u>	10 0

OHIP-14 Sub Scores

Functional Sub-score is obtained by adding questions 1,2,3,4,7,8,14

Psychosocial Sub-score is obtained by adding questions 5, 6, 9, 10, 11, 12, 1

Table 146 Weighted Scores per Questionnaire Section of Staff Members by Ward

		SVPR Deployment Area															
		Total	Day Clinic	Dental Clinic	Doctor's Quarters	JP1	JP2	JP3	JP5	LOURDES	MT	RB1	RB3	SF3	SJ2	SJ4	SVPR
secA_score	N	199	8	4	4	10	4	8	4	11	14	13	14	9	12	15	69
	Median	6.00	4.85	5.55	5.55	6.92	6.53	5.94	5.85	5.00	5.73	5.95	6.35	6.75	6.19	6.19	6.00
secB_score	N	197	8	4	4	10	4	8	4	11	14	13	14	9	12	15	67
	Median	6.00	6.00	6.00	6.00	6.00	3.00	3.00	6.00	6.00	5.00	6.00	6.00	6.00	6.00	6.00	6.00
secC_score	N	196	7	4	4	10	4	8	4	11	14	13	14	9	12	15	67
	Median	6.50	6.50	9.28	3.00	7.03	6.88	8.88	5.83	6.50	6.23	7.45	6.20	4.85	7.13	5.75	5.60
secD_score	N	189	7	3	3	10	4	8	4	11	14	13	13	9	11	15	64
	Median	5.00	5.00	5.00	2.50	5.25	2.50	4.38	.63	5.00	3.75	5.00	5.00	3.75	5.00	1.25	3.75
secE_score	N	176	8	3	3	9	3	8	4	10	13	10	10	9	9	15	62
	Median	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Table 146 indicates that medians for Sections A, B and C were estimated at 6. This is interpreted as a 'good' level of awareness about personal oral health, oral health education and about perceptions in oral health of older adults. Median of Section D was slightly lower (=5), suggesting 'neutral' level about how staff members obtain information from older adults asking for dental assistance.

Finally, Table 173 illustrates that most of respondents are aware of an accessible dental clinic at SVPR, reaching a median of 10.

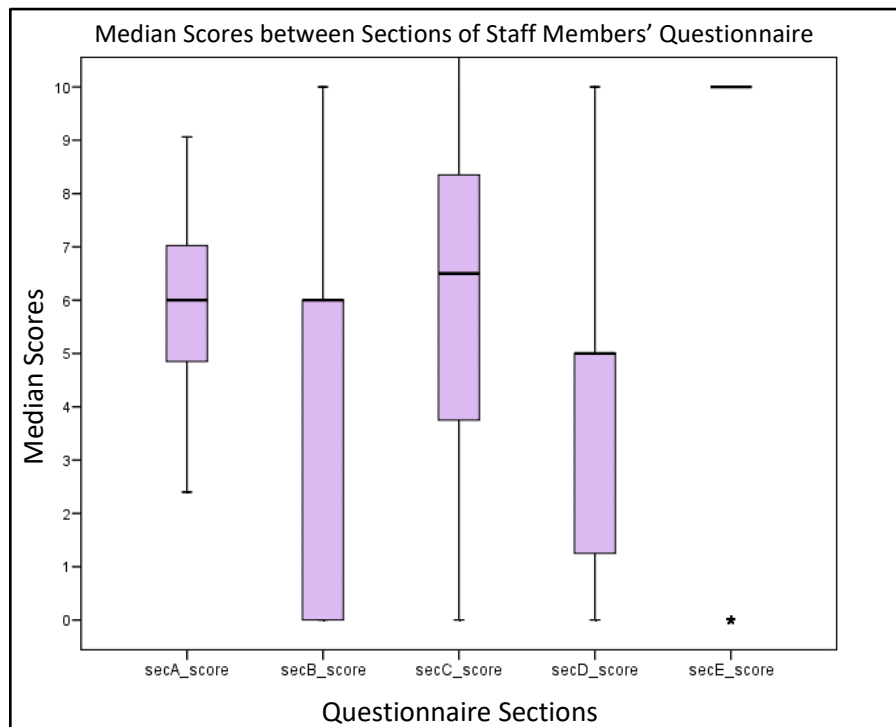


Figure 39 Median Scores between Sections of Staff Members' Questionnaire Responses

Figure 39 indicates that generally, scores in Section B and Section C score are higher, with Section B scores having the potential highest scores but also a wider spread indicating less consistency.

Section D score and Section E score appear to have more consistency in scores, but Section E score has a lower median and an extreme value as an outlier.

Section A score has scores that are moderately spread out but doesn't exhibit any extreme values or outliers.

This could suggest differing opinions or experiences among the participants.

Statistical tests were also conducted to explore possible significant differences which were difficult to obtain due to the following reasons:

- Sample size of most of SVRP areas are low or extremely low
- 105 pairwise comparisons per score were conducted. After applying Bonferroni correction, only p-values that were considered extremely low (indicating strong evidence against the null hypothesis) remained significant, while those that were not extremely low were within the margin of statistical error.
- Results indicated that there weren't too many significant differences amongst several factors, suggesting that there was a high homogeneity between wards and areas.

6.3.4 Results

6.3.4.1 Score Section A of Selected Questions in Questionnaire for Staff Members by SVPR area: Awareness About Personal Oral Health (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

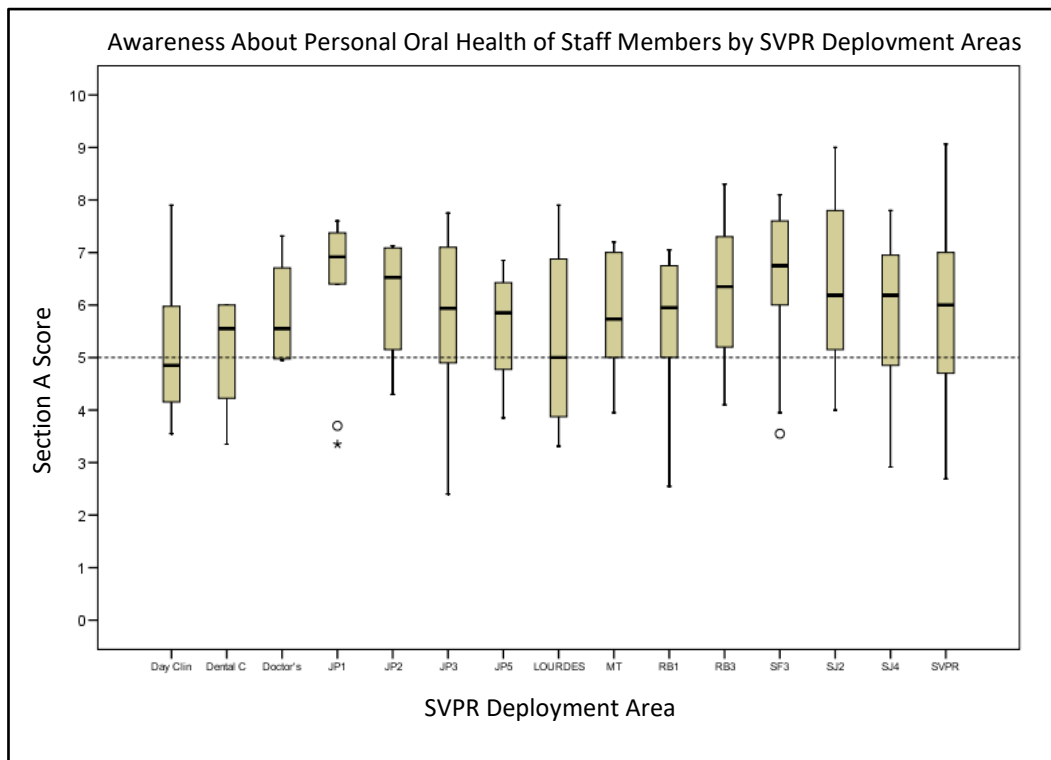


Figure 40 Awareness about Personal Oral Health of Staff Members by SVPR Deployment Areas

Figure 40 indicates that there are no significant differences when the combined questions regarding awareness of personal oral care by staff members were compared to the deployment areas. These results which were obtained using the Mann-Whitney tests in the third chapter, were corrected using the Bonferroni's correction for pairwise comparisons.

Table 147 Score of Section A Questions: Awareness about Personal Oral Health of Staff Members by Deployment Area

	DAY C.	DENT C.	DR. QUART.	JP1	JP2	JP3	JP5	LOUR	MT	RB1	RB3	SF3	SJ2	SJ4
DAY C.														
DENT.C.	1,000													
DR. Q.	1,000	1,000												
JP1	1,000	1,000	1,000											
JP2	1,000	1,000	1,000	1,000										
JP3	1,000	1,000	1,000	1,000	1,000									
JP5	1,000	1,000	1,000	1,000	1,000	1,000								
LOURDES	1,000	1,000	1,000	1,000	1,000	1,000	1,000							
MT	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000						
RB1	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000					
RB3	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000				
SF3	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000			
SJ2	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000		
SJ4	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
SVPR	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

*p<0,05; **p<0,01; ***p<0,001

Mann-Whitney's test with Bonferroni's correction for pairwise comparisons.

6.3.4.2 Score Section B of Selected Questions from Questionnaire of Staff Members by SVPR area: Oral Health Education (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

Similar to the previous results, there were no significant differences when the combined questions regarding oral health education were answered by staff members and compared to the deployment areas.

6.3.4.3 Score Section C of Selected Questions from the Questionnaire of Staff Members by SVPR area: Reflections of Staff members regarding Perceptions of Oral Health by Older Adults (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

There were no significant differences when the combined questions regarding reflections of staff members regarding perceptions of oral health by older adults were compared to the deployment areas.

6.3.4.4 Score Section D of Selected Questions of Questionnaires of Staff Members by SVPR area: Obtaining information from Staff Members whether Older Adults do ask for Assistance and visits to the Dental Clinic (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

There were no significant differences when the combined questions regarding staff members perceptions whether older adults do ask for assistance and visits to the dental clinic by deployment area.

6.3.4.5 Score Section E of Selected Questions from Questionnaires of Staff members by SVPR area: Assessing whether staff members are aware of a dental clinic at SVPR and whether this can be easily accessed (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

Similarly, there were no significant differences when the combined questions regarding whether staff members are aware of a dental clinic at SVPR and whether this can be easily accessed when compared to the deployment areas.

6.3.4.6 OHIP-14 Scores

6.3.4.6.1 OHIP-14 Functional Scores

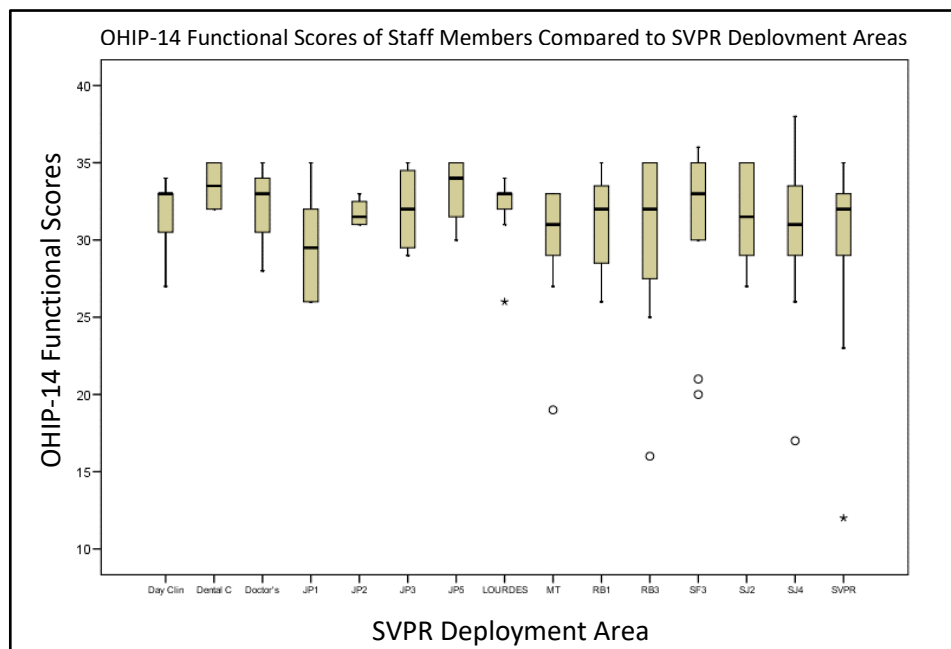


Figure 41 OHIP-14 Functional Scores of Staff Members compared to SVPR Deployment Areas

Figure 41 indicates that there were no significant differences when the OHIP-14 functional scores were compared to the deployment areas.

6.3.4.6.2 OHIP-14 Psychosocial Scores

There were no significant differences when the OHIP-14 Psychosocial scores were compared to the deployment areas.

6.3.4.6.3 OHIP-14 Total Scores

There are no significant differences when the OHIP-14 total scores were compared to the deployment areas.

6.3.5 Correlations of the differences between the Clinical Parameters of older adults and Medians of Results from Staff Members' questionnaire responses.

Aim: The aim of this section is to correlate the differences between the clinical parameters of older adults' and medians of results obtained by staff members' responses.

Method: The median scores of results were extracted from the responses obtained by staff members when answering to the questionnaire questions and matched to the older adults' clinical parameters from visit 1 to visit 3, according to the ward where they reside.

Table 148 Changes in Clinical parameters in the period V1-V3 by Medians of scores of sections A, B, C and D from the staff members in the correspondent ward

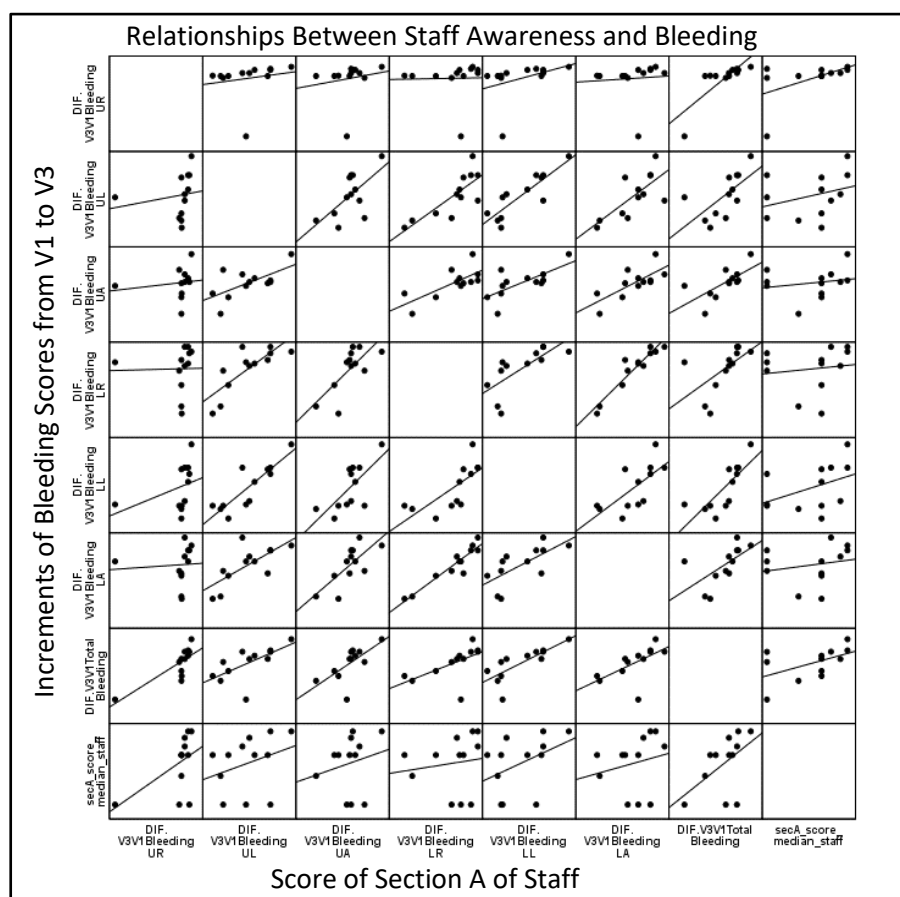
Questionnaire Questions	Section A		Section B		Section C		Section D	
	r(df)	p-value	r(df)	p-value	r(df)	p-value	r(df)	p-value
Mucosa hygiene	0.03	0.732	0.17	0.088	-0.27 (106)	0.005**	-0.14	0.142
Worst PPD UA	0.49(31)	0.003**	0.12	0.497	0.08	0.674	0.01	0.958
Average REC UA	0.40(28)	0.029*	-0.03	0.884	0.11	0.569	0.09	0.634
Average CAL LA	0.00	0.978	-0.36(37)	0.025*	-0.02	0.927	-0.36	0.026
Bleeding score UR	0.49(24)	0.012*	-0.15	0.466	0.04	0.835	0.02	0.910
Bleeding score UA	0.35(36)	0.029*	0.07	0.678	0.33 (36)	0.042*	0.24	0.154
Bleeding score LR	0.38(29)	0.036*	0.04	0.823	0.38 (29)	0.034*	0.26	0.165
Bleeding score LL	0.39(31)	0.026*	-0.13	0.474	0.35 (31)	0.048*	-0.03	0.850
Total bleeding score	0.36(56)	0.006**	-0.02	0.899	0.13	0.337	0.03	0.848
Bleeding index UR	0.44(23)	0.030*	-0.14	0.509	0.04	0.831	0.03	0.884
Bleeding index UA	0.33(35)	0.045*	-0.03	0.855	0.32	0.055	0.21	0.222
Bleeding index LR	0.38(29)	0.036*	0.04	0.823	0.38 (29)	0.034*	0.26	0.165
Bleeding index LL	0.37(30)	0.037*	-0.10	0.571	0.36	0.046	-0.02	0.928
Calculus index LL	0.25	0.202	-0.10	0.602	0.40 (25)	0.040*	0.14	0.483
Calculus index LA	0.08	0.630	-0.32(40)	0.037*	0.04	0.815	-0.19	0.231
Total Calculus index L	0.06	0.700	-0.21	0.159	0.41 (45)	0.004**	0.16	0.268

*p<0.05; **p<0.01; ***p<0.001

Spearman's correlation coefficient

6.3.5.1 Section A: Awareness about Personal Oral Hygiene of Staff Members

6.3.5.1.1 Changes of Older Adults' Clinical parameters in the period V1-V3 by Medians of Scores of Section A from Staff Members' Responses in the Correspondent Ward

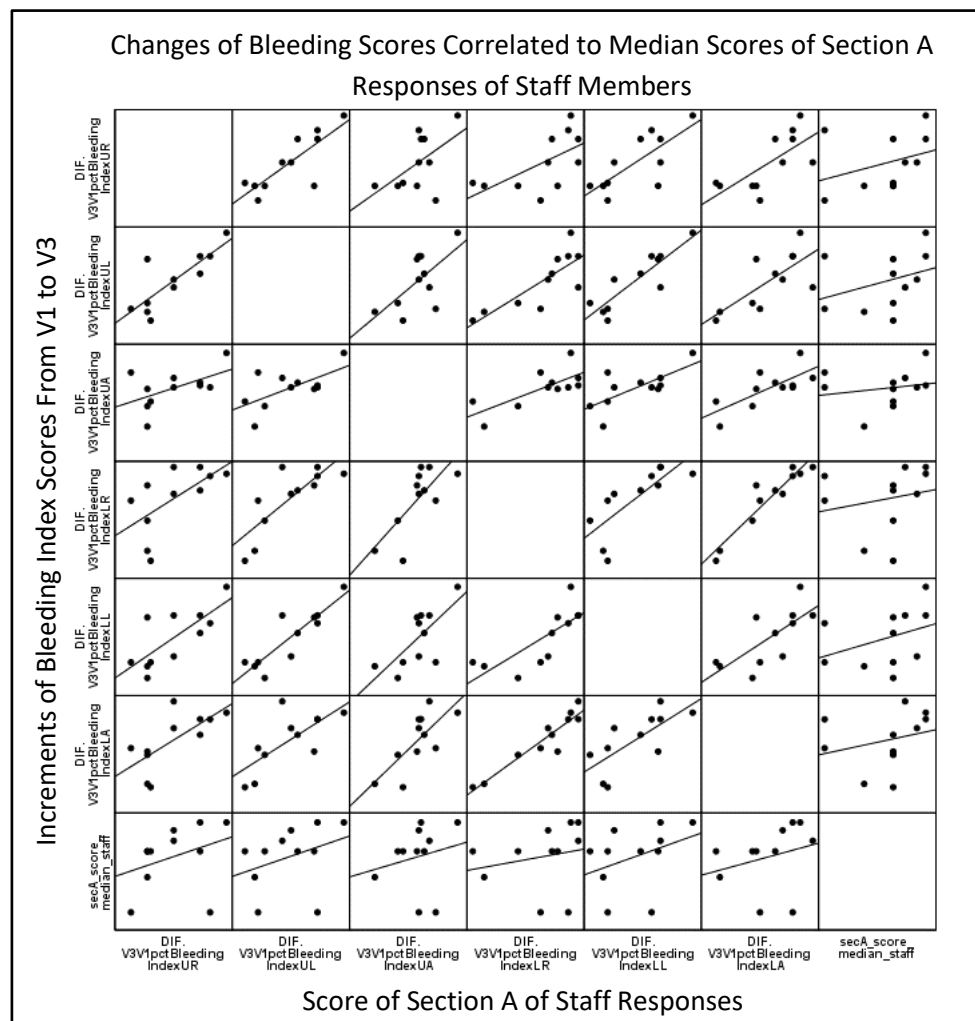


Spearman's Correlation Coefficient

Figure 42 Changes in Bleeding Scores correlated to Median Scores of Section A Responses of Staff Members Awareness about Personal Oral Health

Figure 42 shows the last row in this scatterplot matrix which corresponds to relationships between the score of section A of the staff members' responses and the increments of bleeding scores of older adults from visit 1 to visit 3 ($p < 0.005$). These questions and answers were related to the staff members' awareness of their personal oral health.

Although the correlations were weak-moderate (r coefficients in the range 0,3-0,5), they were still positive. Therefore, the highest increments of bleeding took place in wards where staff scored highly at awareness regarding their personal oral health. This implies that the more aware the staff were regarding their personal oral health, the worse were the bleeding of the older adults.



Spearman's Correlation Coefficient

Figure 43 Changes of Bleeding Scores correlated to Median Scores of Section A Responses of Staff Members: Awareness about Personal Oral Health

Figure 43 shows a similar scatterplot matrix where the last row in this matrix corresponds to relationships between the score of section A of the staff members' responses and the increments of bleeding **index** scores of older adults from visit 1 to visit 3 ($p < 0.005$). These questions and answers were related to the staff members' awareness of their personal oral health.

The correlations were positive. Similarly, the highest increments of bleeding index took place in wards where staff scored highly at awareness regarding their personal oral health.

Other positive correlations involved worsening status of PPDs ($r(df) = 0.49(31)$; $p = 0.003$) and recession ($r(df) = 0.40(28)$; $p = 0.029$) in the upper anterior sextants. Therefore, the more staff members were aware of their personal oral health, the more PPDs and Recession were found in older adults.

6.3.5.2 Section B: Oral Health Education of Staff Members

6.3.5.2.1 Changes of Older Adults' Clinical parameters in the period V1-V3 by Medians of Scores of Section B from Staff Members' Responses in the Correspondent Ward

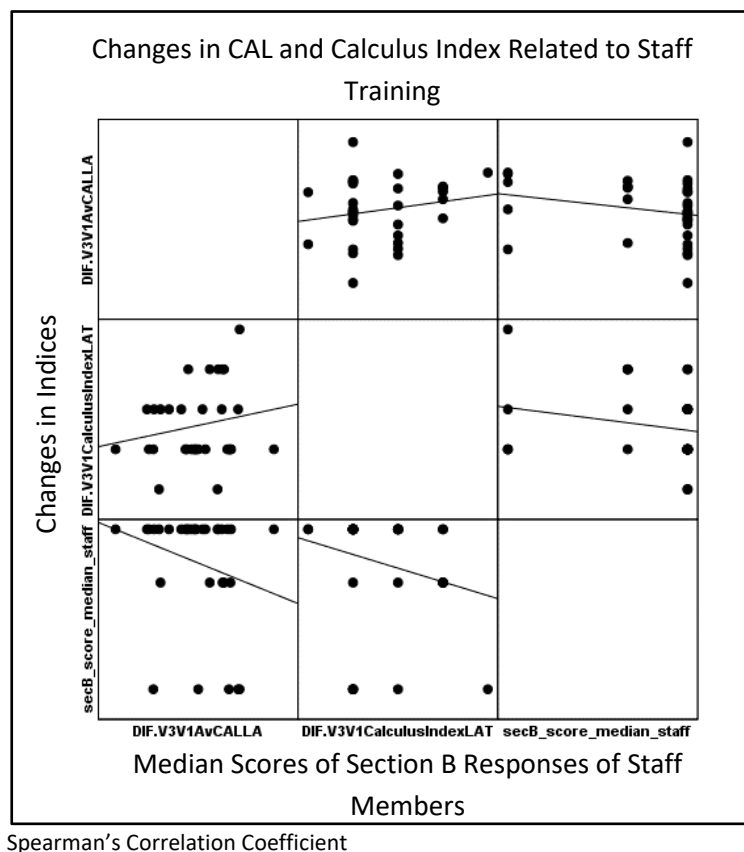


Figure 44 Changes in Average CAL and Calculus Index correlated to Median Scores of Section B Responses of Staff Members: Oral Health Education

Figure 44 illustrates the changes of average CAL ($r(df) = -0.36(37)$; $p = 0.025$) and calculus index ($r(df) = -0.32(40)$; $p = 0.037$) in lower anterior sextants. This result was significantly correlated with median score of the responses obtained by staff members in section B of the questionnaire related to Oral Health Education. Coefficients of CAL and Calculus Index were negative suggesting that reductions were stronger in wards where staff members were more trained in oral health education, indicating a positive outcome.

6.3.5.3 Section C: Staff Members' Perceptions regarding Oral Health of Older Adults

6.3.5.3.1 Changes of Older Adults' Clinical parameters in the period V1-V3 by Medians of Scores of Section C from Staff Members' Responses in the Correspondent Ward

Table 149 Difference in the Mean and Median Scores of Older Adults' Mucosa Hygiene V3 V1

		Difference in Mucosa Hygiene V3 V1		
	Total	Worse	Stable	Better
N	108	18	86	4
Mean	6.3	6.7	6.3	6.2
Median	6.5	6.5	6.5	6.2

Table 149 indicates that there is a significant correlation between changes in the mucosa hygiene and the median score of the combined questions in Section C of the questionnaire. The table shows how the mean score was higher in the group of patients whose mucosa got worse and the median score was higher in those older adults whose mucosa got worse or was stable ($r(df) = -0.27 (106); p=0.005$).

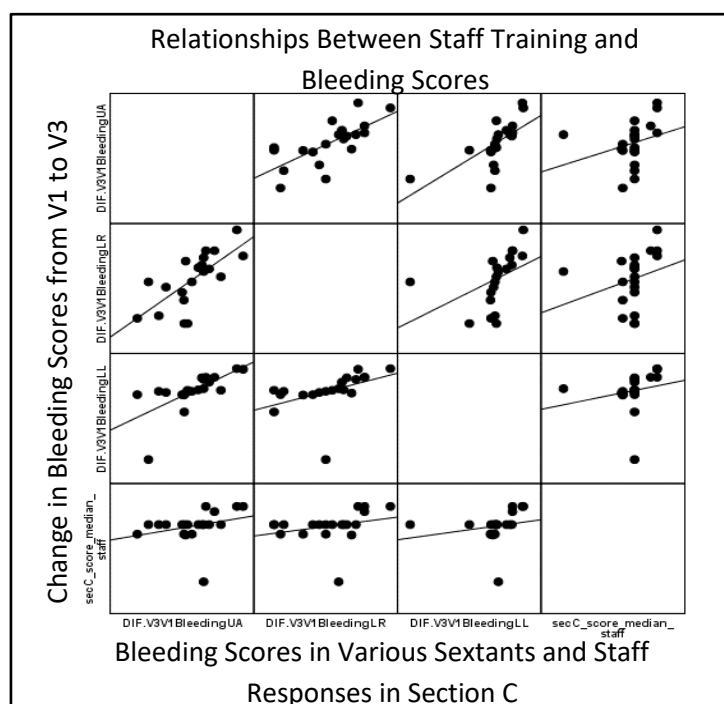


Figure 45 Changes in Bleeding Scores correlated to Median Scores of Question in Section C: Staff members' Perceptions regarding Oral Health of Older Adults

Figure 45 indicates that the bleeding scores in the upper anterior sextant ($r(df)=0.33(36)$; $p=0.042$), lower right sextant ($r(df)=0.38(29)$; $p=0.034$), and lower left sextant ($r(df)=0.35(31)$; $p=0.048$) increased over time as the median score for the questions in Section C increased, indicating that the score was higher for patients' whose bleeding and bleeding scores got worse.

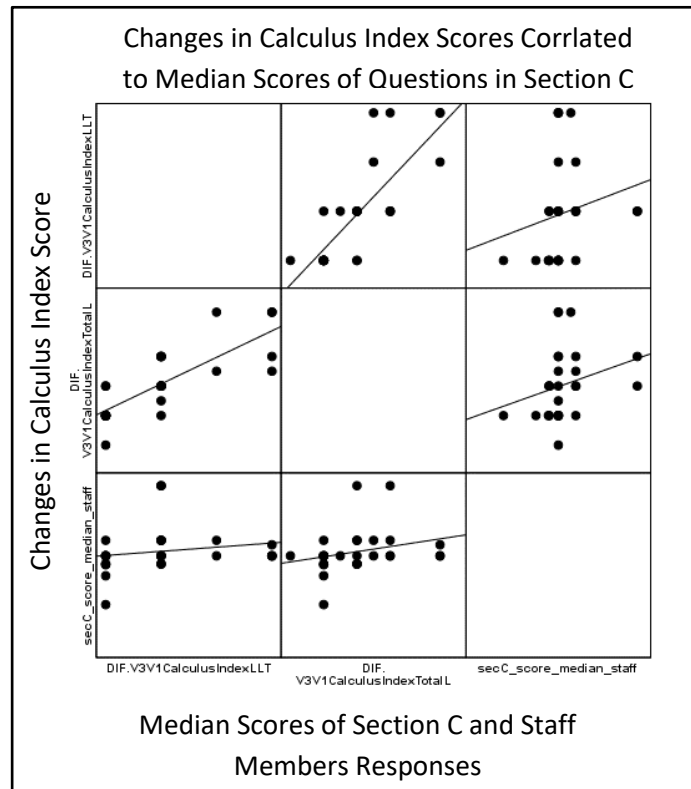


Figure 46 Changes in Calculus Scores correlated to Median Scores of Questions in Section C: Staff members' Perceptions regarding Oral Health of Older Adults

Figure 46 indicates that the calculus index scores ($r(df) = 0.40(25)$; $p = 0.040$) increased over time as the median score for the questions in Section C increased, indicating that the score was higher for patients' whose calculus index score got worse.

6.3.5.4 *Section D: Obtaining information from Staff Members whether Older Adults do ask for Assistance and visits to the Dental Clinic*

6.3.5.4.1 Changes of Clinical parameters in the period V1-V3 by Medians of Scores of Section D from Staff Members' Responses in the Correspondent Ward

No relevant correlations were found in this section.

6.3.5.5 *Section E: Awareness and Access of the Dental Clinic at SVPR by Staff Members*

6.3.5.5.1 Changes of Clinical parameters in the period V1-V3 by Medians of Scores of Section E from Staff Members' Responses in the Correspondent Ward

Estimations cannot be obtained because the only question of the section (Q37) was mostly responded as 'yes'. Therefore, median of score was 10 in all wards. Therefore, a constant cannot be correlated with other variables.

6.3.5.6 *OHIP – 14 Functional Scores of Staff Members*

6.3.5.6.1 Changes at Clinical parameters in the period V1-V3 by Medians of OHIP-14 functional scores from the staff members in the correspondent ward.

No correlations were found between OHIP-14 functional scores and the staff members' replies.

6.3.5.7 OHIP – 14 Psychosocial Scores of Staff Members

6.3.5.7.1 Changes at Clinical parameters in the period V1-V3 by Medians of OHIP-14 Psychosocial scores from the staff members in the correspondent ward.

No correlations were found between the OHIP-14 Psychosocial Scores and the responses of staff members.

6.3.5.8 OHIP – 14 Total Scores of Staff Members

6.3.5.8.1 Changes at Clinical parameters in the period V1-V3 by Medians of OHIP-14 total scores from the staff members in the correspondent ward.

No correlations were found between the OHIP-14 Total Scores and the responses of staff members.

6.4 Correlations with Questions of Older Adults' Research Study (Chapter 4)

6.4.1 Method and Materials

For each section in the older adults' questionnaire a combined score was calculated. Five scores were calculated with the following interpretation:

- **Score Section A:** Awareness regarding Personal Oral Health
- **Score Section B:** Assessing Oral Health Education of Older Adults residing at SVPR
- **Score Section C:** Assessing older adults' perceptions regarding oral health and their priority to be assisted in daily oral care
- **Score Section D:** Obtaining information from staff members whether older adults do ask for assistance to brush teeth/dentures and to visit the dental clinic
- **Score Section E:** Assessing whether older adults are aware of a dental clinic at SVPR and whether this can be easily accessed.

Each score was calculated as the weighted mean of scores attributable to categories of different key questions of the section. Weights were defined by the researcher.

OHIP-14 dimensions were also considered:

- OHIP-14 Functional at T1 and T2
- OHIP-14 Psychosocial at T1 and T2
- OHIP-14 Total at T1 and T2

6.4.1.1 Statistical Analysis – Combining scores of different questions of each section of the questionnaire for Older Adults.

Table 150 Section A – Awareness regarding Personal Oral Health (Older Adults)

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
1a	<u>Moderately Important</u> <u>15%</u>	How would you describe the health of your teeth ?	1: <u>Excellent;</u> 2: <u>Very Good;</u> 3: <u>Good;</u> 4: <u>Average;</u> 5: <u>Poor;</u> 6: <u>Very Poor;</u> 7: <u>Don't Know</u>	10 8 6 5 1 0 2
1b	<u>Important</u> <u>20%</u>	How would you describe the health of your gums ?	1: <u>Excellent;</u> 2: <u>Very Good;</u> 3: <u>Good;</u> 4: <u>Average;</u> 5: <u>Poor;</u> 6: <u>Very Poor;</u> 7: <u>Don't Know</u>	10 8 6 5 2 0 2
<u>6</u>	<u>Very Important</u> <u>25%</u>	How often do you clean your teeth ?	1: <u>Never;</u> 2: <u>Less than once a day;</u> 3: <u>Once a day;</u> 4: <u>Two times a day;</u> 5: <u>More than two times a day</u>	0 2 5 8 10
<u>9</u>	<u>Least Important</u> <u>5%</u>	<u>How do you brush your teeth</u>	1: <u>Back and forth (Horizontal Motion);</u> 2: <u>Up and down (Vertical Motion);</u> 3: <u>Circular Motion;</u> 4: <u>A mixture of the above</u>	0 7 10 4
<u>14</u>	<u>Most Important</u> <u>35%</u>	<u>Do your gums bleed when you are brushing ?</u>	1: <u>Yes;</u> 2: <u>No;</u> 3: <u>Sometimes;</u> 4: <u>Never noticed</u>	10 0 7 2

Table 151 Section B – Assessing Oral Health Education of Older Adults at SVPR

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
16	<u>Most Important 60%</u>	Have you ever received oral health education ?	<u>1:Yes;</u> <u>2:No;</u> <u>3:Don't know</u>	10 0 2
20	<u>Very Important 40%</u>	Have you ever participated in dental talks held in wards ?	<u>1:Yes;</u> <u>2:No;</u> <u>3:Don't know/cannot remember</u>	10 0 2

Table 152 Section C – Assessing Older Adults’ Perceptions regarding their Oral Health and their Priority to be assisted and to follow Oral Hygiene Instructions

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
22	<u>Very Important 30%</u>	How important is Oral Hygiene to you ?	<u>1:Not much;</u> <u>2:Important;</u> <u>3:Very Important;</u> <u>4:Other</u>	0 7 10 2
23	<u>Important 15%</u>	Have you ever asked to be assisted (in routine oral care)	<u>1:Never;</u> <u>2:Sometimes;</u> <u>3:Frequently;</u> <u>4:Always;</u> <u>5:Other</u>	0 5 7 10 2
<u>28</u>	<u>Most Important 55%</u>	Do you follow the oral hygiene instructions given to you during your visit at the dental clinic ?	<u>1:Never;</u> <u>2:Sometimes;</u> <u>3:Frequently;</u> <u>4:Always</u>	0 5 7 10

** Section D is not included since Section D for Older Adults is about Smoking and data was not recorded for this question (very few responses were gathered)

Table 153 Section E – Assessing whether Older Adults are aware of a dental clinic at SVPR and whether this can be easily accessed

<u>Number of Question</u>	<u>Weighting 100%</u>	<u>Question</u>	<u>Sub questions</u>	<u>Score 0-10</u>
39	<u>Most Important 100%</u>	Is the dental clinic within the faculty easily accessible for the residents ?	<u>1:Yes</u> <u>2:No</u> <u>3. Don't Know</u>	10 0 2

OHIP-14 Sub Scores

Functional Sub-score is obtained by adding questions 1,2,3,4,7,8,14

Psychosocial Sub-score is obtained by adding questions 5, 6, 9, 10, 11, 12, 13

Table 154 Weighted Scores of Older Adults' Interview Questions per Section by Ward

		WARD												
		Total	Mother Tereza 1	Lourdes	SJ2	SJ4	RB1	RB3	ST Frances 2	JP3	JP2	JP1	JP5	ST Frances 3
secA_score_older	N	99	12	12	10	8	5	12	10	10	0	0	8	12
	Median	2.80	2.96	2.10	4.63	2.45	2.45	2.71	2.73	2.45	.	.	3.38	3.50
secB_score_older	N	100	12	12	10	8	5	12	10	11	0	0	8	12
	Median	.00	.00	5.00	.60	.00	.00	.00	.00	.00	.	.	.00	5.00
secC_score_older	N	99	12	12	10	8	4	12	10	11	0	0	8	12
	Median	4.85	5.75	5.75	3.75	4.23	6.40	6.30	6.03	3.85	.	.	2.48	3.15
secE_score_older	N	63	11	10	7	5	2	8	5	3	0	0	5	7
	Median	10.00	10.00	10.00	10.00	10.00	5.00	10.00	10.00	10.00	.	.	.00	.00

Table 154 illustrates that the medians for Section A was estimated at 2.8. This is interpreted as a 'poor-average' level of awareness about personal oral health. Median for Section B was estimated at 0, indicating that oral health education was nil. Median for section C, the older adults' perceptions regarding their oral health and their priority to be assisted was estimated at 4.85 while oral health instructions were considered as moderate. Finally, most of respondents were aware of an accessible dental clinic at SVPR (median).

6.4.2 Results

6.4.2.1 Score Section A of Selected Questions of Older Adults' Interviews by SVPR area: Awareness About Personal Oral Health (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

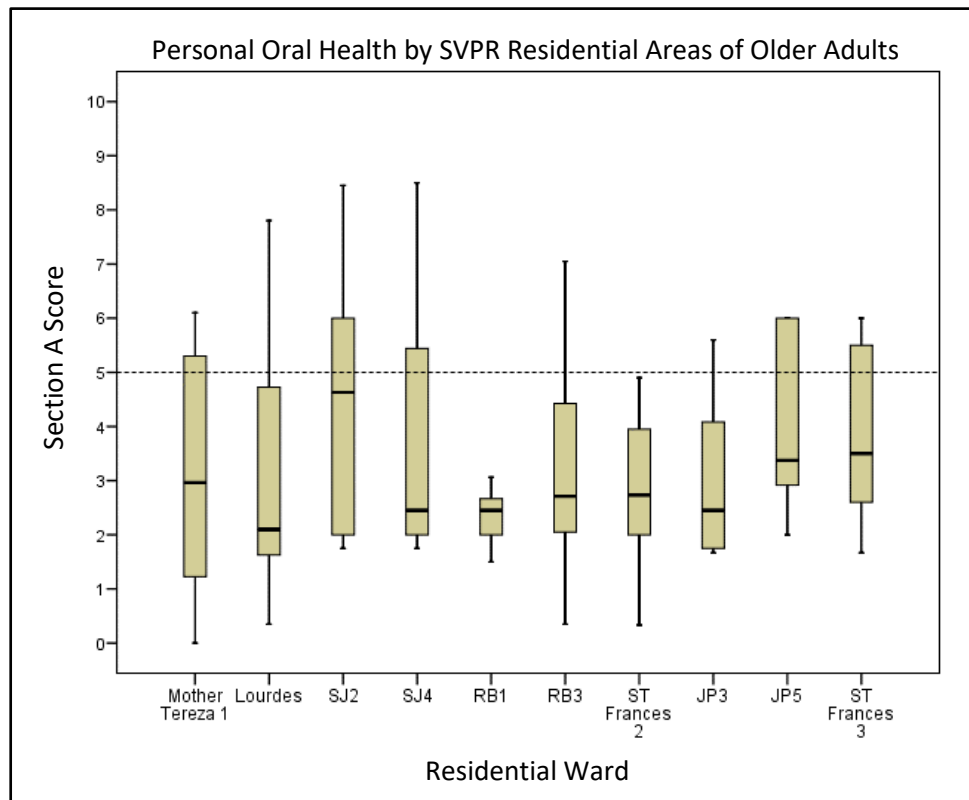


Figure 47 Awareness about Personal Oral Health by SVPR Residential Areas of Older Adults

Figure 47 and Table 160 indicate that there are no significant differences when the combined questions regarding awareness of personal oral care in Section A, of older adults response were compared to the residential areas.

Table 155 Score of Section A Interview Questions of Older Adults' by SVPR Residential Area: Awareness regarding Personal Oral Health

	M.THER	LOURDES	SJ2	SJ4	RB1	RB3	SF2	JP3	JP5	SF3
M.THER										
LOURDES	1,000									
SJ2	1,000	1,000								
SJ4	1,000	1,000	1,000							
RB1	1,000	1,000	1,000	1,000						
RB3	1,000	1,000	1,000	1,000	1,000					
SF2	1,000	1,000	1,000	1,000	1,000	1,000				
JP3	1,000	1,000	1,000	1,000	1,000	1,000	1,000			
JP5	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000		
SF3	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	

*p<0,05; **p<0,01; ***p<0,001

Mann-Whitney's test with Bonferroni's correction for pairwise comparisons

6.4.2.2 Score Section B of Selected Questions of Older Adults' Interviews by SVPR area: Assessing Oral Health Education of Older Adults residing at SVPR (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

Similarly, there were no significant differences when the combined questions regarding oral health education in Section B, answered by older adults when compared to the residential areas.

6.4.2.3 Score Section C of Selected Questions of Older Adults' Interviews by SVPR area: Assessing Older Adults' Perceptions regarding their Oral Health and their Priority to be assisted in Daily Oral Care (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

No significant differences were observed when the combined questions regarding older adults' perceptions regarding oral health and their priority to be assisted in daily oral care were compared to the residential areas.

6.4.2.4 Score Section E of Selected Questions of Older Adults' Interviews by SVPR area: Assessing Awareness of and Access of Older Adults' to the Dental Clinic, SVPR (Results of Mann-Whitney's test with Bonferroni's correction for pairwise comparisons).

No significant differences when the combined questions regarding whether older adults are aware of a dental clinic at SVPR and whether this can be easily accessed when compared to the deployment areas.

6.4.2.5 OHIP-14 Scores

6.4.2.5.1 OHIP- 14 Scores at T1

6.4.2.5.1.1 OHIP-14 Older Adults' Functional Scores at T1

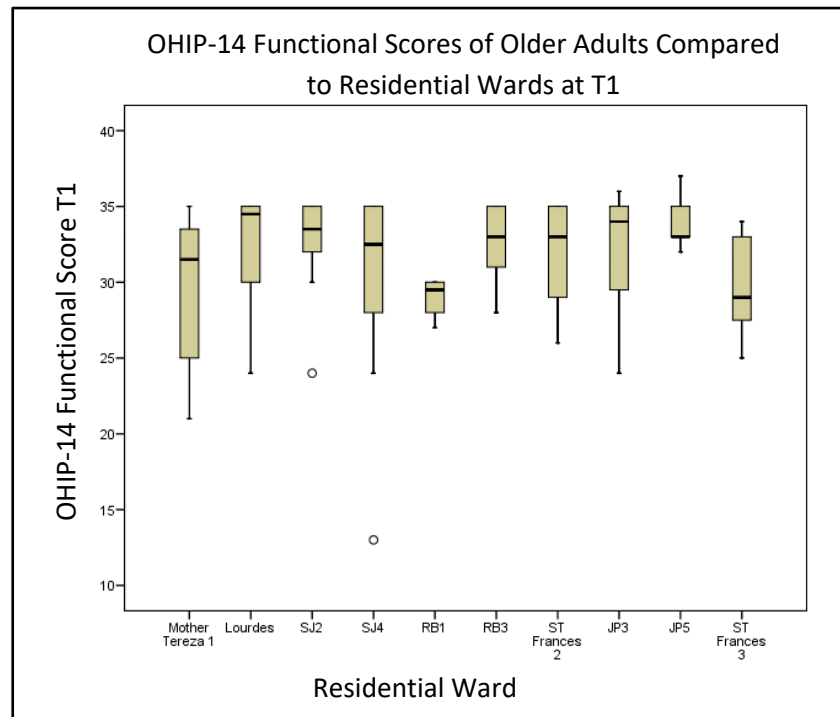


Figure 48 OHIP-14 Functional Scores of Older Adults Compared to Residential Wards

Figure 48 indicate that there are no significant differences when the OHIP-14 functional scores of older adults at T1 when compared to the residential areas.

6.4.2.5.1.2 OHIP-14 Older Adults' Psychosocial Scores at T1

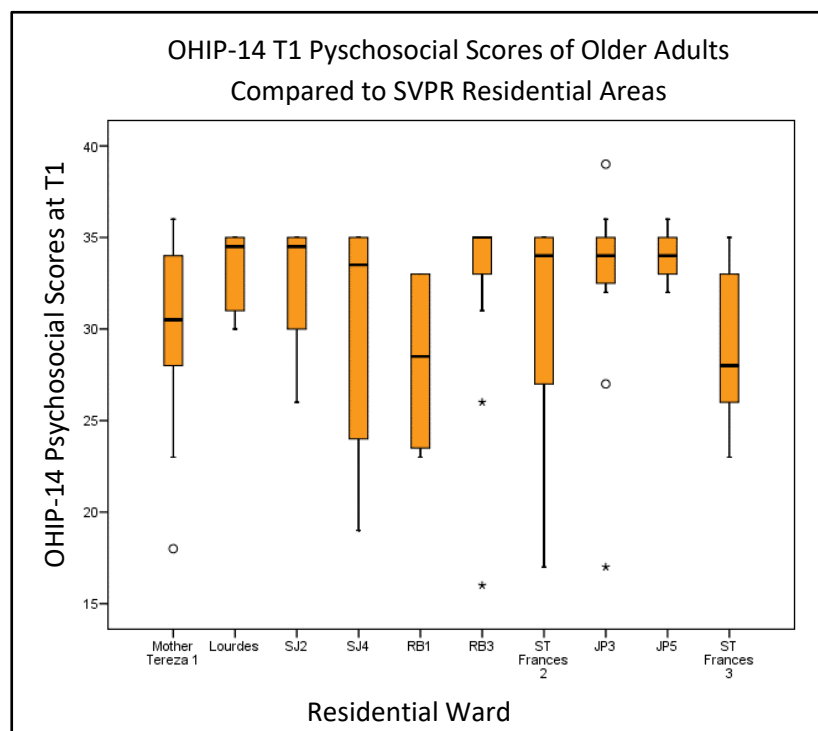


Figure 49 OHIP-14 T1 Psychosocial Scores of Older Adults Compared to SVPR Residential Areas

Figure 49 indicate that there are no significant differences when the OHIP-14 psychosocial scores at T1 were compared to the older adults' residential areas.

6.4.2.5.1.3 HIP-14 Older Adults' Total Scores at T1

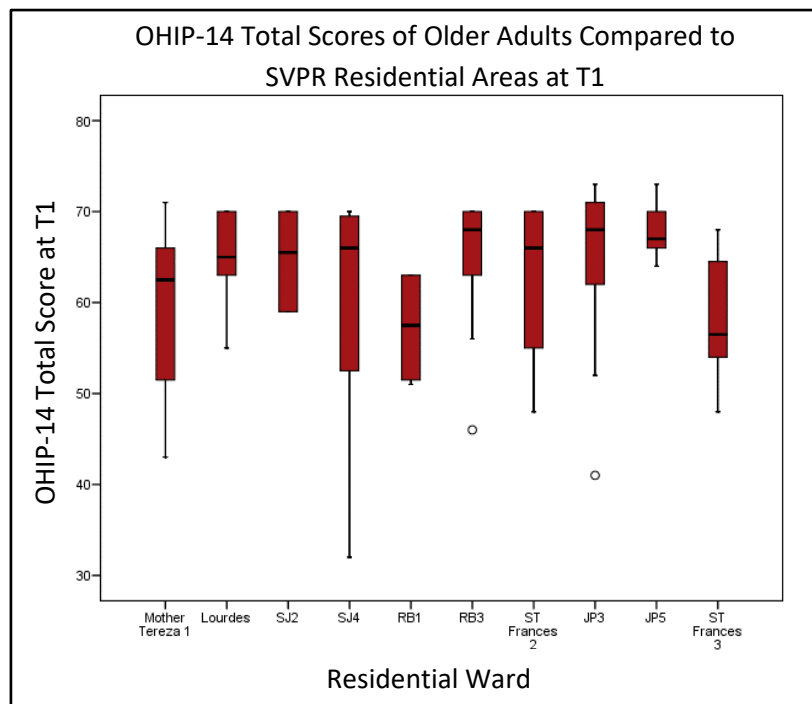


Figure 50 OHIP-14 T1 Total Scores of Older Adults Compared to SVPR Residential Areas

Figure 50 indicate that there are no significant differences when the OHIP-14 Total older adults' scores at T1 were compared to the older adults' residential areas.

6.4.2.5.2 OHIP- 14 Scores at T2

6.4.2.5.2.1 OHIP-14 Older Adults' Functional Scores at T2

There are no significant differences when the OHIP-14 functional older adults' scores at T2 were compared to the older adults' residential areas. These results which were obtained using the Mann-Whitney tests in the third chapter, were corrected using the Bonferroni's correction for pairwise comparison.

6.4.2.5.2.2 OHIP-14 Older Adults' Psychosocial Scores at T2

There are no significant differences when the OHIP-14 psychosocial older adults' scores at T2 were compared to the older adults' residential areas. These results which were obtained using the Mann-Whitney tests in the third chapter, were corrected using the Bonferroni's correction for pairwise comparison.

6.4.2.5.2.3 OHIP-14 Older Adults' Total Scores at T2

There are no significant differences when the OHIP-14 Total older adults' scores at T2 were compared to the older adults' residential areas. These results which were obtained using the Mann-Whitney tests in the third chapter, were corrected using the Bonferroni's correction for pairwise comparisons.

6.4.3 Correlations between Differences at Clinical Parameters and Medians of Older Adults' Responses.

Aim: The aim of this section is to correlate the differences between the clinical parameters of older adults' and medians of results obtained by the older adults' themselves when replying to the questions in the interview.

Method: The median scores of results were extracted from the responses obtained by older adults when answering to the questionnaire questions and matched to the older adults' clinical parameters from visit 1 to visit 3, according to the ward where they reside.

Provided that there was a score allocated to each patient, this score was matched to their clinical results (V3-V1) resulting into a paired design to estimate correlations.

Table 156 Changes at Clinical parameters in the period V1-V3 by Medians of scores of sections A, B, C and E from the Older Adults' interview questions in the correspondent ward

	Section A Awareness About Oral Health		Section B Awareness about Oral Health Education		Section C Perceptions about Oral Health and the Need to be Assisted		Section E Awareness and Access of Dental Clinic, SVPR	
	r(df)	p-value	r(df)	p-value	r(df)	p-value	r	p-value
Worst PPD LR	-0.75 (7)	0.021*	-0.79 (7)	0.011*	-0.45	0.220	.	.
Average CAL LR	-0.56	0.117	-0.81 (7)	0.008**	-0.33	0.389	.	.
Bleeding score UR	-0.72 (6)	0.042*	-0.02	0.962	-0.38	0.358	0.00	1.000
Bleeding score UL	0.20	0.700	0.66	0.156	0.84 (4)	0.036*	.	.
Total bleeding score	-0.43 (20)	0.048*	0.20	0.375	0.13	0.571	0.26	0.397
Bleeding index UL	0.20	0.700	0.66	0.156	0.84 (4)	0.036*	.	.
Calculus index UR	-0.68 (8)	0.032*	-0.10	0.791	-0.32	0.363	-0.50	0.667
Calculus index LL	-0.39	0.263	-0.49	0.147	-0.69 (8)	0.028*	.	.

*p<0.05; **p<0.01; ***p<0.001

Spearman's Correlation

Table 156 indicates the significant results obtained when the clinical parameters of older adults were correlated with the median scores allocated to questions of Sections A, B, C and E in the interview document.

6.4.3.1 Section A: Awareness about Personal Oral Hygiene of Older Adults

6.4.3.1.1 Changes of Older Adults' Clinical parameters in the period V1-V3 by Medians of Scores of Section A from Older Adults' Interview Responses in the Correspondent Ward

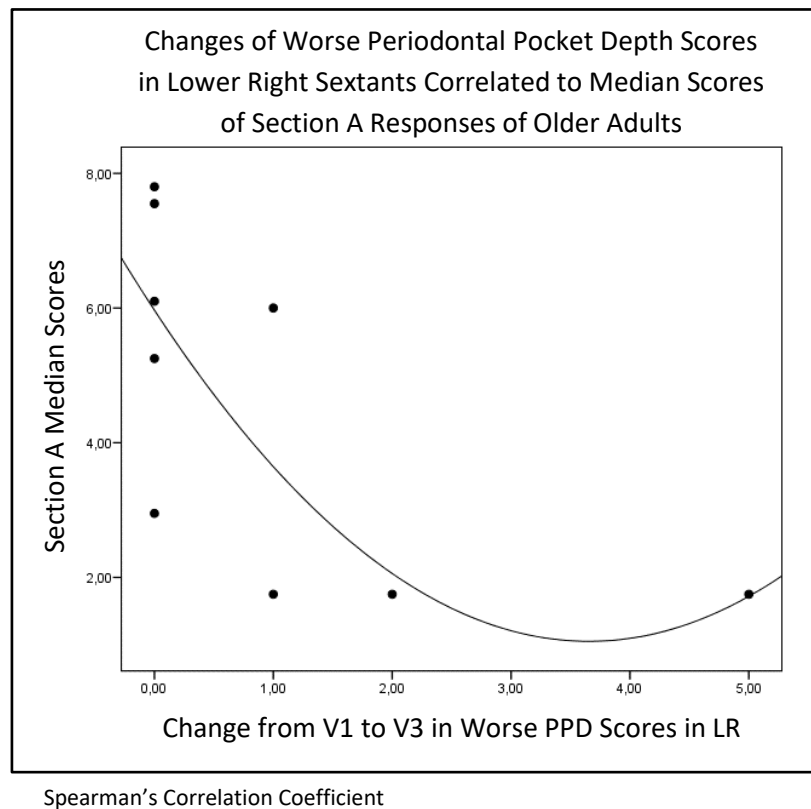


Figure 51 Changes of Worse PPD Scores in LR Sextants Correlated to Median Scores of Section A Responses of Older Adults: Awareness about Personal Oral Health

Figure 51 indicates that the highest scores of PPDs in the lower right sextants were found in older adults with a lower level of awareness regarding their personal oral health status: Spearman's Correlation Coefficient: ($r(df) = -0.75(7)$; $p=0.021$).

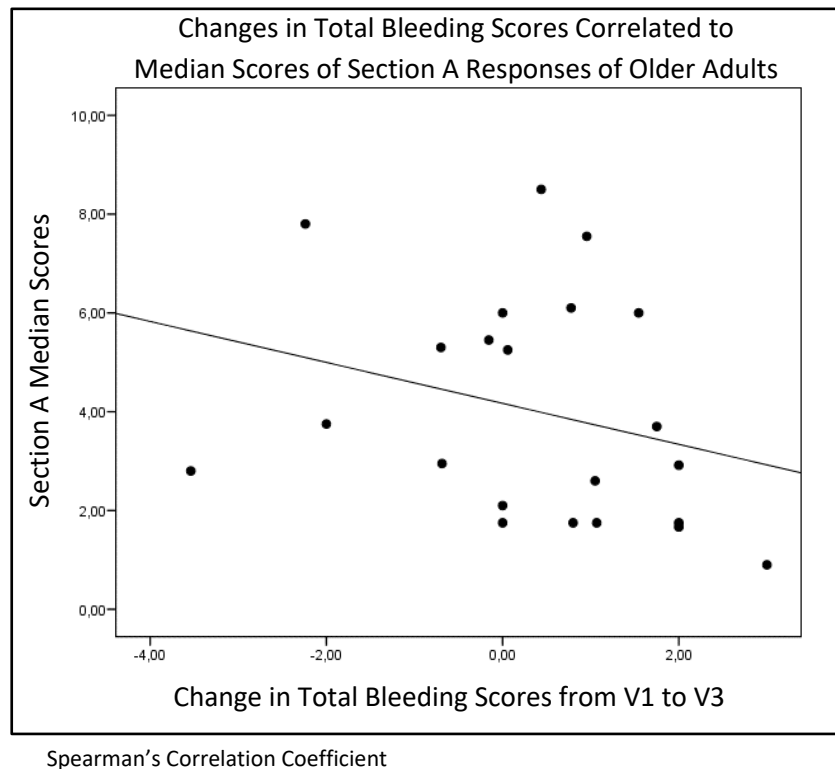


Figure 52 Changes in Total Bleeding Scores correlated to Median Scores of Section A responses of Older Adults: Awareness about Personal Oral Health

Table 52 indicates that older adults with a higher level of awareness of personal oral health, did have lower total bleeding scores: Spearman's Correlation Coefficient ($r(df) = -0.43(20)$; $p=0.048$).

Similarly, those adults with a higher level of awareness regarding their personal oral health, also showed reductions in the bleeding score in the upper right sextant: Spearman's Correlation Coefficient ($r(df) = -0.72(6)$; $p=0.042$); and reductions in calculus index scores in the upper right sextants: Spearman's Correlation Coefficient ($r(df) = -0.68(8)$; $p=0.032$).

6.4.3.2 Section B: Oral Health Education of Older Adults

6.4.3.2.1 Changes of Older Adults' Clinical parameters in the period V1-V3 by Medians of Scores of Section B from Older Adults' Responses in the Correspondent Ward

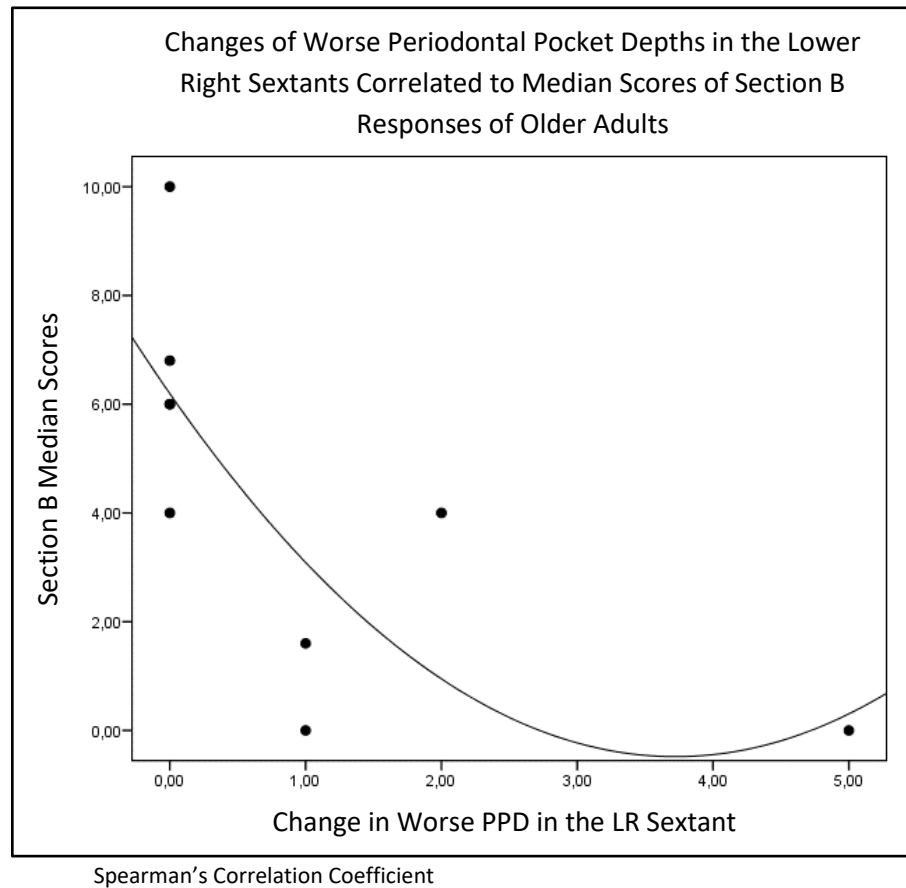


Figure 53 Changes of Worse PPD in the LR Sextant correlated to Median Scores of Section B Responses of Older Adults: Oral Health Education

Figure 53 shows that the highest scores of the worse PPD in the lower right sextant over time was observed in patients with a lower level of oral health education: Spearman's Correlation Coefficient ($r(df) = -0.79(7)$; $p=0.011$).

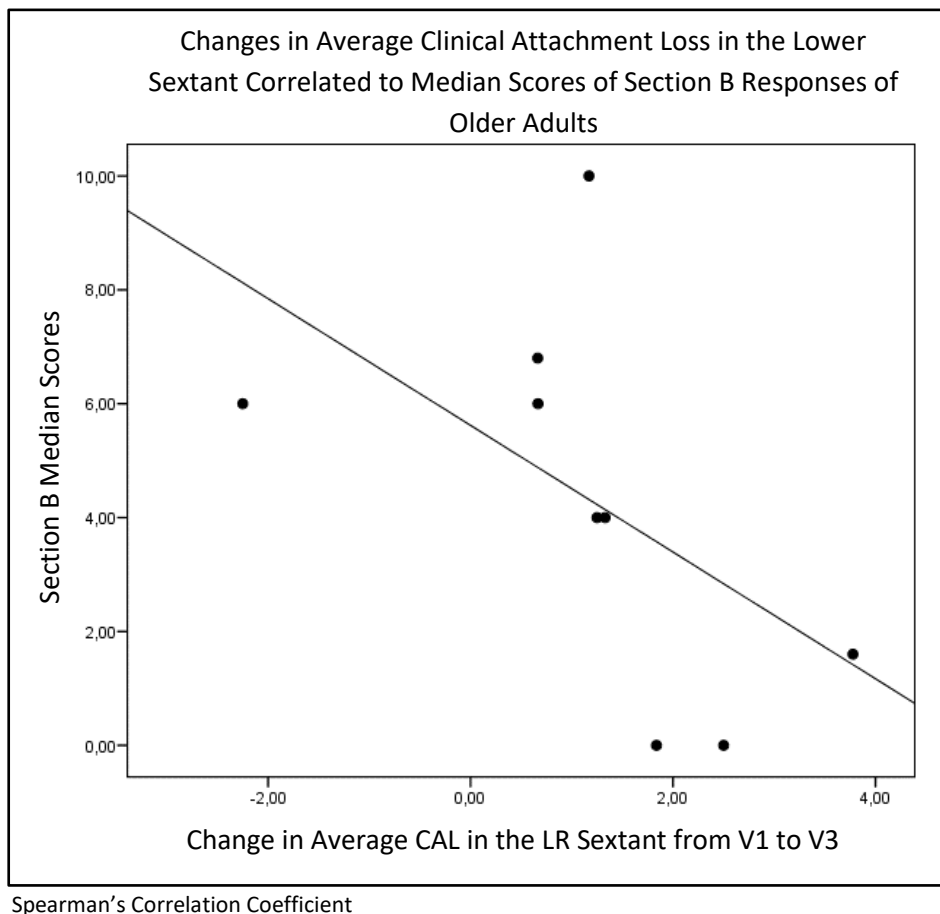


Figure 54 Changes in Average CAL in the LR Sextant correlated to Median Scores of Section B Responses of Older Adults: Oral Health Education

Table 54 shows a similar correlation where the highest scores of the average CAL in the lower right sextant over time was observed in patients with a lower level of oral health education: Spearman's Correlation Coefficient: ($r(df) = -0.81(7)$; $p=0.008$).

6.4.3.3 Section C: Older Adults' Perceptions regarding their own oral health status and the need to be assisted in daily oral care

6.4.3.3.1 Changes of Older Adults' Clinical parameters in the period V1-V3 by Medians of Scores of Section C from Older Adults' Responses in the Correspondent Ward

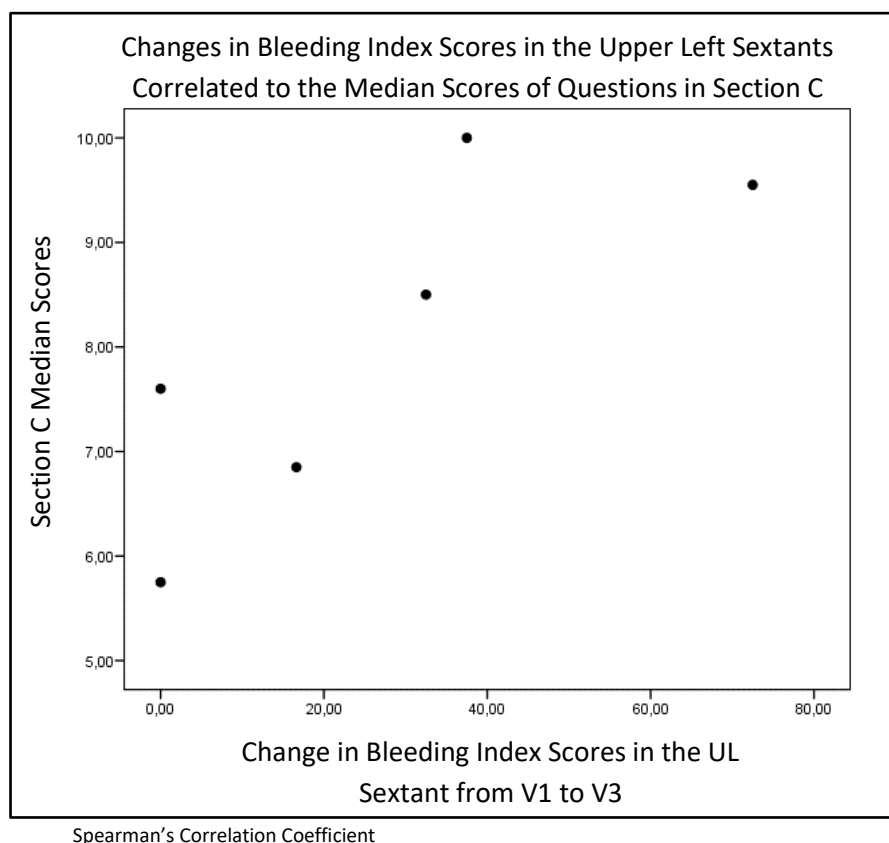


Figure 55 Changes in Bleeding Index Scores Correlated to the Median Scores of Questions in Section C: Older Adults' Perceptions regarding their Oral Health and the Need to be Assisted

Figure 55 shows that the percentage bleeding in the upper left sextant was higher in patients with a higher perception of good oral health but who requested to be assisted: Spearman's Correlation Coefficient: ($r(df) = 0.84(4)$; $p = 0.036$).

Similarly, the Bleeding Score in the upper left sextant (Spearman's Correlation Coefficient; ($r(df) = 0.84(4)$; $p = 0.036$) and the Calculus Index in the lower left sextant (Spearman's Correlation Coefficient; ($r(df) = -0.69(8)$; $p = 0.028$) showed the same

correlation. Both resulted to be higher in older adults who perceived their oral health as good.

6.4.3.4 Section E: Awareness and Access of the Dental Clinic at SVPR by Older Adults

6.4.3.4.1 Changes of Clinical parameters in the period V1-V3 by Medians of Scores of Section E from Older Adults' Responses.

There were no relevant correlations to be recorded in this section.

6.4.3.5 OHIP-14 Scores of Older Adults at T1

Table 157 OHIP-14 Scores of Older Adults at T1

OHIP-14 Scores of Older Adults	OHIP-14 Functional At T1		OHIP- Psychosocial at T1		OHIP-14 Total at T1	
	r(df)	p-value	r(df)	p-value	r(df)	p-value
Average PPD UR	0.37	0.321	0.69(7)	0.041*	0.49	0.177
Worst PPD LR	0.39	0.299	0.81(7)	0.008**	0.64	0.062
Calculus index LL	0.75(8)	0.012*	0.12	0.748	0.50	0.146
Total Calculus index L	0.58(13)	0.025*	0.14	0.610	0.35	0.202

*p<0.05; **p<0.01; ***p<0.001

Spearman's Correlation Coefficient

Table 157 indicates that there were significant results when the OHIP-14 functional score at T1 was correlated to the Calculus Index in the lower left sextant ($r(df)=0.75(8)$; $p=0.012$) and the Total Calculus Index in the left sextant ($r(df)=0.58(13)$; $p=0.025$).

Similarly, significant results were obtained when the OHIP-Psychosocial scores at T1 were correlated to the average PPD in the upper right sextant ($r(df)=0.69(7)$; $p=0.041$) and to the worse PPD in the lower right sextant ($r(df)=0.81(7)$; $p=0.008$).

No significant results were obtained when the Total OHIP-14 scores were correlated to the clinical parameters of older adults.

6.4.3.5.1 OHIP- 14 Scores at T1

6.4.3.5.1.1 OHIP-14 Older Adults' Functional Scores at T1

6.4.3.5.2 Changes of Older Adults' Clinical parameters in the period V1-V3 from Older Adults' Responses.

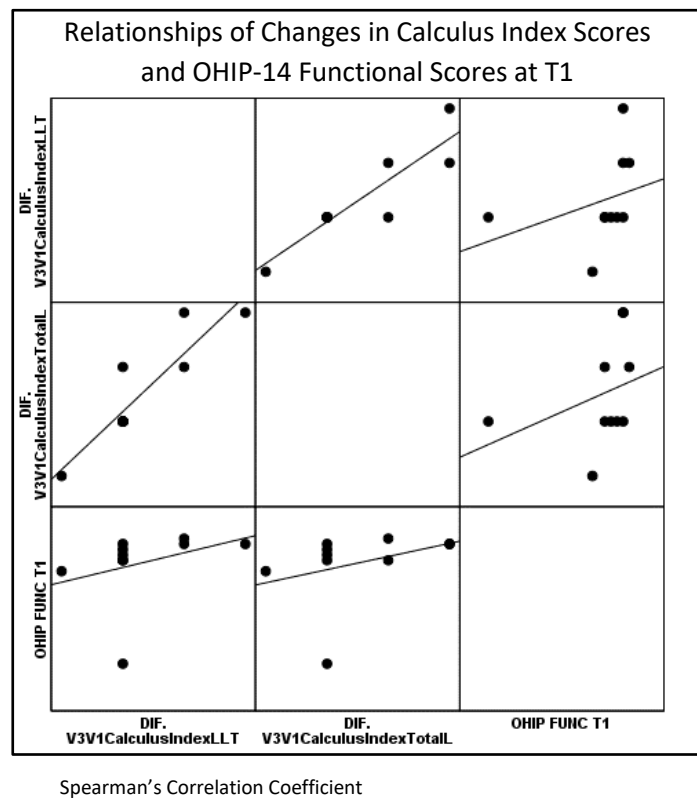


Figure 56 OHIP-14 Older Adults' Functional Scores from V1 to V3 at T1 correlated to the Total Calculus Index

Figure 56 shows a matrix of scatter plots which indicate that the calculus index score in the lower left sextant (Spearman's Correlation: $(r(df)=0.75(8); p=0.012)$ and the Total Calculus Index (Spearman's Correlation: $(r(df)=0.58(13); p=0.025)$, got worse in patients with a higher functional score.

6.4.3.5.3 OHIP-14 Older Adults' Psychosocial Scores at T1

6.4.3.5.4 Changes at Clinical parameters in the period V1-V3 of OHIP-14 Psychosocial scores from Older Adults' Responses.

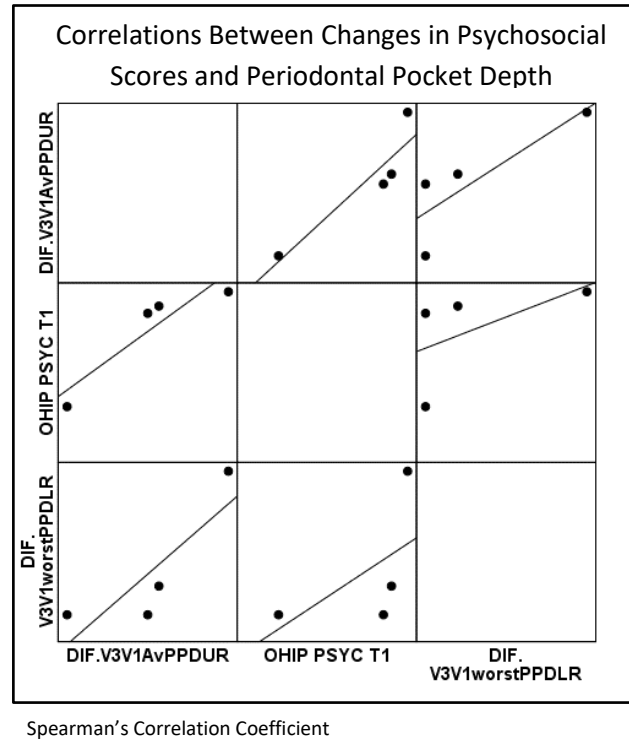


Figure 57 OHIP-14 Older Adults' Psychosocial Scores correlated to the Worse PPD in the Lower Right Sextant from V1 to V3

Figure 57 illustrates the correlations between the OHIP-14 psychosocial scores and the average PPD in the upper right sextant (Spearman's Correlation: $r(df)=0.69(7)$; $p=0.041$) and the worse PPDs in the lower right sextant over time (Spearman's Correlations: $r(df)=0.81(7)$; $p=0.008$). These results indicate that those patients who manifested higher scores in the Psychosocial OHIP-14 sub-scores, had also the worse PPDs.

6.4.3.5.5 OHIP-14 Older Adults' Total Scores at T1

6.4.3.5.6 Changes at Clinical parameters in the period V1-V3 of Older Adults' OHIP-14 Total Scores.

No relevant correlations were found.

6.4.3.6 OHIP-14 Scores of Older Adults at T2

Table 158 OHIP-14 Scores of Older Adults at T2

OHIP-14 Older Adults' Scores at T2	OHIP-14 Functional Scores at T2		OHIP-14 Psychosocial Scores at T2		OHIP-14 Total Scores at T2	
	r(df)	p-value	r	p-value	r(df)	p-value
Average PPD UA	0.76(6)	0.030*	0.24	0.563	0.59	0.121
Worst PPD UA	0.76(5)	0.048*	0.45	0.307	0.68	0.092
Bleeding score LL	0.83(7)	0.005**	0.60	0.085	0.84(7)	0.004**
Bleeding index LL	0.83(7)	0.005**	0.60	0.085	0.84(7)	0.004**
Bleeding index LA	0.71(8)	0.022*	0.57	0.083	0.73(8)	0.017**
Total Debris index L	0.38	0.202	0.46	0.115	0.58(11)	0.038*

*p<0.05; **p<0.01; ***p<0.001

Table 158 indicates that several significant results were obtained when the OHIP-14 Functional Scores at T2 were correlated with PPDs and Bleeding Scores. Likewise, OHIP-14 Total Scores at T2 yielded significant results when correlated to Bleeding Scores and the Total Debris Index.

When the OHIP-14 Psychosocial Scores at T2 were correlated to the clinical parameters of older adults, no significant results were obtained.

6.4.3.6.1.1 OHIP-14 Older Adults' Functional Scores at T2

6.4.3.6.2 Changes of Older Adults' Clinical parameters in the period V1-V3 from Older Adults' Responses.

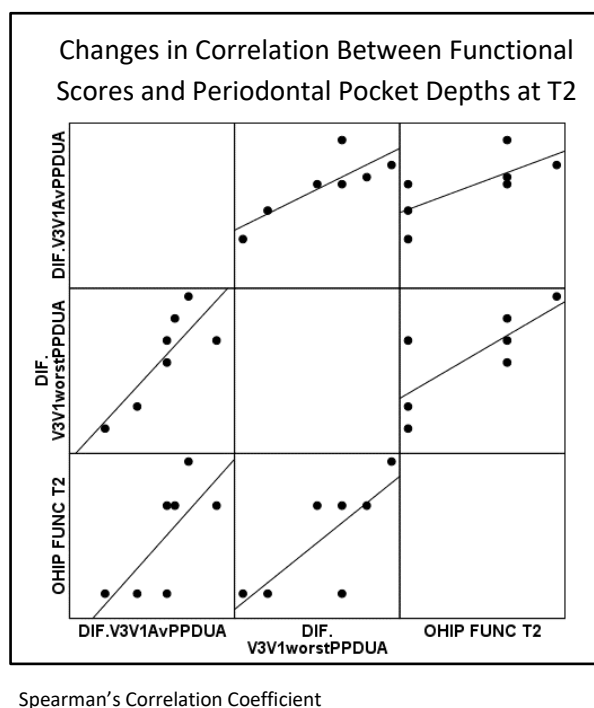


Figure 58 OHIP-14 Older Adults' T2 Functional Scores correlated to the Worse PPD in the Upper Anterior Region from V1 to V3

Figure 58 shows the correlation between the older adults' functional scores and the worse PPDs in the upper anterior region from V1 to V3 at T2. The average PPDs in the upper anterior sextants (Spearman's Correlation; $r(df) = 0.76(6)$, $p = 0.030$) and the worse PPDs in the upper anterior sextant (Spearman's Correlation: $r(df) = 0.76(5)$, $p = 0.048$) got worse in older adults who had a higher OHIP-14 functional score. Therefore, there may be a discrepancy between the clinical measurement of oral health and the self-perceived impact on quality of life. Older adults might underreport the impact or may not fully recognize the implications of their periodontal health on their overall well-being.

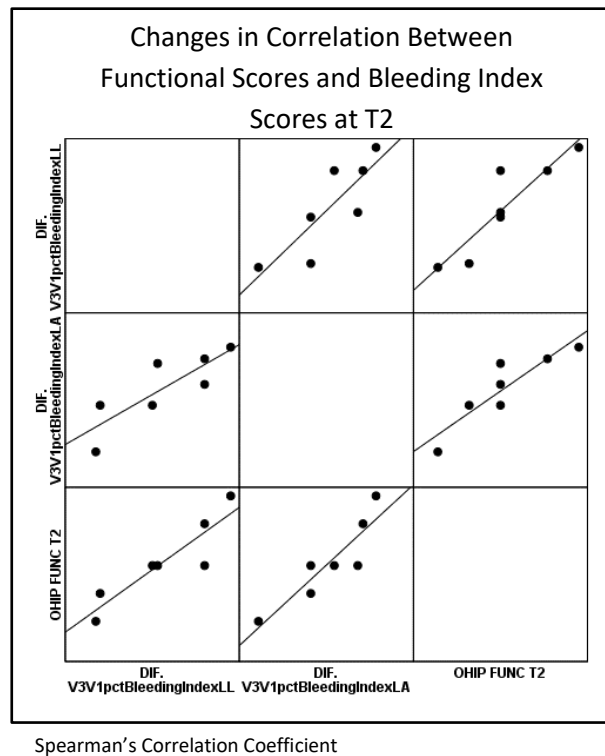


Figure 59 OHIP-14 Older Adults' T2 Functional Scores correlated to the Bleeding Index in the Lower Anterior Sextant from V1 to V3

Figure 59 shows a similar correlation between the older adults' functional scores and the bleeding score in the lower left sextant (Spearman's Correlation: $r(df)=0.83(7)$; $p=0.005$), the bleeding index in the lower left sextant (Spearman's Correlation: $r(df)=0.83(7)$; $p=0.005$) and the bleeding index in the lower anterior sextant (Spearman's Correlation: $r(df)=0.71(8)$, $p=0.022$) from V1 to V3 at T2. These scores got worse in older adults who had a higher OHIP-14 functional score and therefore who perceived their functional health as good.

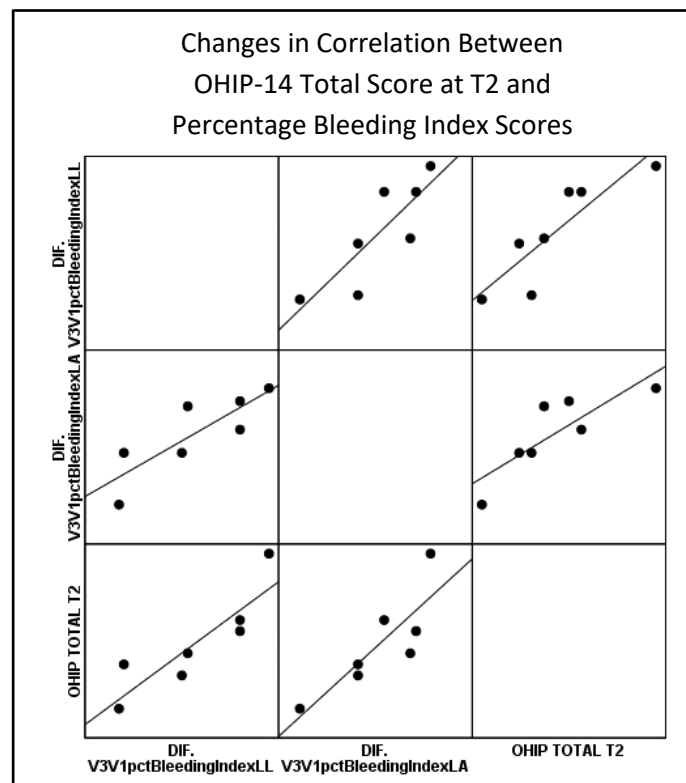
6.4.3.6.2.1 OHIP-14 Older Adults' Psychosocial Scores at T2

6.4.3.6.3 Changes of Older Adults' Clinical parameters in the period V1-V3 from Older Adults' Responses.

There were no correlations in this section.

6.4.3.6.3.1 OHIP-14 Older Adults' Total Scores at T2

6.4.3.6.4 Changes of Older Adults' Clinical parameters in the period V1-V3 from Older Adults' Responses.



Spearman's Correlation Coefficient

Figure 60 OHIP-14 Older Adults' T2 Total Scores correlated to the Bleeding Scores from V1 to V3

Figure 60 show correlations between the older adults' OHIP-14 total scores and the bleeding scores in the lower left sextant (Spearman's Correlation: $r(df)=0.84(7)$,

$p=0.004$), the bleeding index in the lower left sextant (Spearman's Correlation: $r(df)=0.84(7)$, $p=0.004$), the bleeding index in the lower anterior sextant (Spearman's Correlation: $r(df)=0.73(8)$, $p=0.017$). These scores got worse in older adults who had a higher OHIP-14 Total score.

Similarly, there was a correlation between the total debris index in the lower arch, where the score was high in older adults with a high OHIP-14 Total Score. This result indicates that there is a moderate, statistically significant positive correlation between the debris index in the left sextant and the OHIP-14 Total Score ($r(df)=0.58(11)$; $p=0.038$), suggesting that increased debris is associated with a more negative impact on oral health as measured by the OHIP-14.

6.4.4 Correlations between Older Adults' Clinical parameters, Systemic Diseases and Medications

Aim: The aim of this section is to determine whether there are any correlations differences between the clinical parameters of older adults' and the systemic conditions and medications of the older adults themselves.

Method: Data was extracted from the medical histories of older adults and matched to the older adults' clinical parameters from visit 1 to visit 3.

Provided that there was a score allocated to each patient, this score was matched to their clinical results (V3-V1) resulting into a paired design to estimate correlations.

6.4.4.1 Statistical Tests

Mann-Whitney tests were used to compare distributions of the difference of the parameter (V3-V1) through two independent groups of patients.

6.4.5 Medical Conditions of Older Adults

Table 159 Medical Conditions of Older Adults at SVPR

Medical Conditions		N	%
Cardiovascular	Total	275	100.0
	Yes	175	63.6
	No	100	36.4
Respiratory	Total	275	100.0
	Yes	93	33.8
	No	182	66.2
Endocrine	Total	273	100.0
	Yes	158	57.9
	No	115	42.1
Hepatic	Total	274	100.0
	Yes	28	10.2
	No	246	89.8
Renal	Total	274	100.0
	Yes	55	20.1
	No	219	79.9
Neurological	Total	275	100.0
	Yes	179	65.1
	No	96	34.9
Mental Conditions	Total	277	100.0
	Yes	56	20.2
	No	221	79.8
Haematological	Total	274	100.0
	Yes	32	11.7
	No	242	88.3
Gastrointestinal	Total	274	100.0
	Yes	67	24.5
	No	207	75.5
Musculoskeletal	Total	274	100.0
	Yes	84	30.7
	No	190	69.3
Dermatological	Total	274	100.0
	Yes	47	17.2
	No	227	82.8

Medical Conditions		N	%
Ophthalmic	Total	276	100.0
	Yes	12	4.3
	No	264	95.7
Infectious disease	Total	274	100.0
	Yes	3	1.1
	No	271	98.9
Cancer	Total	274	100.0
	Yes	11	4.0
	No	263	96.0

Table 159 shows that the majority of older adults suffer from neurological disorders (65.1%), amongst which are Alzheimer's conditions, Parkinson's Disease and Cerebrovascular Accidents. 63.6% of older adults have cardiovascular disease while 57.9% suffer from endocrine disorders, mainly diabetes. 33.8% of older adults suffer from respiratory conditions. These statistics also indicate that most older adults suffer from multiple conditions.

Table 160 Number, Mean and Median of Medical Conditions

	Medical Conditions	Medications	Xerostomic Medications
N	273	273	273
Mean	3.8	8.6	4
Median	4.0	9.0	4

Table 160 shows that the mean and median values of medical conditions exhibited by older adults, is four while the mean and median values of medications is nine and the mean and median values of xerostomic medications is four.

6.4.6 Prevalence of Disease by Gender, Ward Type and Ward Group

Table 161 Results and Correlations between Older Adults' Prevalence of Disease by Gender, Ward Type and Ward Group

	Ward Gender	Ward Type	Ward Group
	p-value (df=2)	p-value (df=1)	p-value (df=2)
Respiratory	0,081	<0,001*** (Chi ² =17,4)	0,084
Endocrine	0,113	0,132	0,006** (Chi ² =10,4)
Hepatic	0,087	0,685	0,004** (Chi ² =10,9)
Renal	0,018* (Chi ² =8,07)	0,099	0,018* (Chi ² =7,99)
Neurological	0,003** (Chi ² =11,5)	0,001** (Chi ² =11,6)	0,083
Mental	0,002** (Chi ² =12,6)	<0,001*** (Chi ² =32,8)	0,001** (Chi ² =14,5)
Haematological	0,951	0,031* (Chi ² =4,66)	0,111
Gastrointestinal	0,036* (Chi ² =6,60)	0,476	0,015* (Chi ² =8,44)
Musculoskeletal	0,033* (Chi ² =6,86)	0,262	0,001** (Chi ² =14,1)
Dermatological	0,037* (Chi ² =6,57)	0,001** (Chi ² =12,1)	<0,001*** (Chi ² =21,9)
Ophthalmic	0,027* (Chi ² =7,25)	0,704	0,202

*p<0.05; **p<0.01; ***p<0.001

Chi² test

Table 161 illustrates the significant results obtained when systemic diseases of older adults were correlated to Ward Gender, Ward Type and Ward Group.

6.4.6.1 Prevalence of Disease by Ward Gender

Table 162 Prevalence of Disease by Ward Gender

		Prevalence of Disease by WARD GENDER							
		Total		Male		Female		Mixed	
		N	%	N	%	N	%	N	%
Renal	Total	274	100.0	90	100.0	147	100.0	37	100.0
	Yes	55	20.1	20	22.2	34	23.1	1	2.7
	No	219	79.9	70	77.8	113	76.9	36	97.3
Neurological	Total	275	100.0	90	100.0	148	100.0	37	100.0
	Yes	179	65.1	47	52.2	109	73.6	23	62.2
	No	96	34.9	43	47.8	39	26.4	14	37.8
Mental	Total	277	100.0	90	100.0	150	100.0	37	100.0
	Yes	56	20.2	17	18.9	39	26.0	0	0.0
	No	221	79.8	73	81.1	111	74.0	37	100.0
Gastrointestinal	Total	274	100.0	90	100.0	147	100.0	37	100.0
	Yes	67	24.5	19	21.1	44	29.9	4	10.8
	No	207	75.5	71	78.9	103	70.1	33	89.2
Musculoskeletal	Total	274	100.0	90	100.0	147	100.0	37	100.0
	Yes	84	30.7	21	23.3	55	37.4	8	21.6
	No	190	69.3	69	76.7	92	62.6	29	78.4
Dermatological	Total	274	100.0	90	100.0	147	100.0	37	100.0
	Yes	47	17.2	11	12.2	33	22.4	3	8.1
	No	227	82.8	79	87.8	114	77.6	34	91.9
Ophthalmic	Total	276	100.0	90	100.0	149	100.0	37	100.0
	Yes	12	4.3	1	1.1	11	7.4	0	0.0
	No	264	95.7	89	98.9	138	92.6	37	100.0

Chi² test

Table 162 illustrates the significant results obtained of the prevalence of several diseases by gender. The statistical significance levels for various medical conditions were as follows: renal (Chi²(df2, N=274)=8.07; p=0.018); neurological (Chi² (df 2, N=275)=11.5; p=0.003); mental (Chi²(df2, N=277)=12.6; p=0.002); gastrointestinal, (Chi²(df2, N=274)=6.60; p=0.036); musculoskeletal (Chi²(df2, N=274)=6.86; p=0.033); dermatological (Chi²(df2, N=274)=6.57; p=0.037); and ophthalmic (Chi²(df2, N=276)=7.25; p=0.027). All these diseases are more prevalent in females.

6.4.6.2 Prevalence of Disease by Ward Type

Table 163 Significant Results of Prevalence of Disease by Ward Type

		TYPE OF WARD					
		Total		Non-dementia		Dementia	
		N	%	N	%	N	%
Respiratory	Total	275	100.0	218	100.0	57	100.0
	Yes	93	33.8	87	39.9	6	10.5
	No	182	66.2	131	60.1	51	89.5
Neurological	Total	275	100.0	218	100.0	57	100.0
	Yes	179	65.1	131	60.1	48	84.2
	No	96	34.9	87	39.9	9	15.8
Mental	Total	277	100.0	220	100.0	57	100.0
	Yes	56	20.2	29	13.2	27	47.4
	No	221	79.8	191	86.8	30	52.6
Haematological	Total	274	100.0	217	100.0	57	100.0
	Yes	32	11.7	30	13.8	2	3.5
	No	242	88.3	187	86.2	55	96.5
Dermatological	Total	274	100.0	217	100.0	57	100.0
	Yes	47	17.2	46	21.2	1	1.8
	No	227	82.8	171	78.8	56	98.2

Table 163 indicates that the statistical significance levels for the respective medical conditions were as follows: respiratory ($\chi^2(df1, N=275)=17.4$; $p<0.001$) which was more prevalent in the non-dementia wards; neurological ($\chi^2(df1, N=275)=11.6$; $p=0.001$) which was more prevalent in the dementia wards; mental ($\chi^2(df1, N=277)=32.8$; $p<0.001$) which was more prevalent in the dementia wards; haematological ($\chi^2(df1, N=274)=4.66$; $p=0.031$) which was more prevalent in the non-dementia wards, and dermatological ($\chi^2(df1, N=274)=12.1$; $p=0.001$) which was more prevalent in the non-dementia wards.

6.4.6.3 Prevalence of Disease by Ward Group

Table 164 Significant Results of Prevalence of Disease by Ward Group

		WARD GROUP							
		Total		Control		Test		Dismantled	
		N	%	N	%	N	%	N	%
Endocrine	Total	273	100.0	97	100.0	137	100.0	39	100.0
	Yes	158	57.9	44	45.4	91	66.4	23	59.0
	No	115	42.1	53	54.6	46	33.6	16	41.0
Hepatic	Total	274	100.0	97	100.0	137	100.0	40	100.0
	Yes	28	10.2	12	12.4	7	5.1	9	22.5
	No	246	89.8	85	87.6	130	94.9	31	77.5
Renal	Total	274	100.0	97	100.0	137	100.0	40	100.0
	Yes	55	20.1	11	11.3	32	23.4	12	30.0
	No	219	79.9	86	88.7	105	76.6	28	70.0
Mental	Total	277	100.0	97	100.0	137	100.0	43	100.0
	Yes	56	20.2	31	32.0	16	11.7	9	20.9
	No	221	79.8	66	68.0	121	88.3	34	79.1
Gastrointestinal	Total	274	100.0	97	100.0	136	100.0	41	100.0
	Yes	67	24.5	14	14.4	42	30.9	11	26.8
	No	207	75.5	83	85.6	94	69.1	30	73.2
Musculoskeletal	Total	274	100.0	97	100.0	136	100.0	41	100.0
	Yes	84	30.7	19	19.6	56	41.2	9	22.0
	No	190	69.3	78	80.4	80	58.8	32	78.0
Dermatological	Total	274	100.0	97	100.0	136	100.0	41	100.0
	Yes	47	17.2	3	3.1	36	26.5	8	19.5
	No	227	82.8	94	96.9	100	73.5	33	80.5

Chi² test

Table 164 illustrates that the significance levels for the medical conditions by ward group as follows: endocrine disorders (Chi² (df2, N273)=10.4; p=0.006) which were more prevalent in the study group, hepatic conditions (Chi² (df 2, N=274)=10.9; p=0.004) which were more prevalent in older adults who resided in wards which were eventually dismantled, renal conditions (Chi² (df2, N=274)=7.99; p=0.018) which were more prevalent in the study group, mental problems (Chi²(df2, N=277)=14.5; p=0.001) which were more prevalent in the control group, gastrointestinal disorders (Chi²(df2, N=274)=8.44; p=0.015) which were more prevalent in the study group, musculoskeletal

conditions ($\text{Chi}^2(\text{df}2, N=274)=14.1; p=0.001$) which were more prevalent in the study group, and dermatological conditions ($\text{Chi}^2(\text{df}2, N=274)=21.9; p<0.001$) which were more prevalent in the control group.

6.4.7 Correlations between Older Adults' Clinical Parameters and Systemic Conditions

Table 165 Results and Correlations between Older Adults' Clinical Parameters and Systemic Conditions

	Cardiovascular Disease	Respiratory Disease	Endocrine Disease	Hepatic Disease	Neurological Disease
	p-value	p-value	p-value	p-value	p-value
Average REC LL	0,022* (U=58; z=2,28)	0,494	0,396	0,457	0,896
Bleeding score UA	0,048* (U=143,5; z=1,98)	0,080	0,967	0,190	0,231
Bleeding index UA	0,067	0,033* (U=139; z=2,13)	0,686	0,157	0,170
Number of mobile teeth	0,512	0,517	0,253	0,366	0,041* (U=12; z=2,04)
Percentage of mobile teeth	0,858	0,791	0,365	0,131	0,017* (U=8; z=2,38)
Debris index UR	0,221	0,554	0,043* (U=74,5; z=2,03)	0,668	1,000
Debris index UL	0,105	0,021* (U=44; z=2,31)	0,021* (U=44; z=2,31)	0,966	0,894
Total Debris index U	0,185	0,165	0,018* (U=137; z=2,36)	0,831	0,134
Total Debris index	0,148	0,122	0,020* (U=287,5; z=2,33)	0,380	0,425
OH index	0,458	0,744	0,022* (U=286; z=2,29)	0,261	0,868
BPE Sextant 3	0,259	0,334	0,128	0,740	0,021* (U=9; z=2,31)
BPE Sextant 4	0,649	0,614	0,300	0,047* (U=4,5; z=1,98)	0,340

*p<0.05; **p<0.01; ***p<0.001

Mann-Whitney's test
z-statistic

Table 165 shows the statistical significant results when the clinical parameters of older adults were correlated with their systemic conditions.

6.4.7.1 *Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Cardiovascular disease*

Table 166 Median results obtained when Clinical Parameters over time were correlated with Cardiovascular Disease

	Older Adults with No Cardiovascular Disease	Older Adults with Cardiovascular Disease
	Median	Median
Recession Lower Left Sextant	-0.17	0.75
Bleeding Upper Anterior Sextant	0.96	0.00

Mann-Whitney 's test and z-statistic

Table 166 suggests that older adults experienced a worsening of risk factors in this particular population. Higher values of the risk factors such as high blood pressure and cholesterol levels, are typically associated with an increased risk of developing cardiovascular diseases. This indicates that there is a higher prevalence or incidence of these diseases within the population of older adults having recession in the lower left sextant (U=58; z=2.28; p=0.022).

On the other hand, if gingival bleeding is correlated with older adults who have a median of 0.96 and do not have cardiovascular disease, compared to older adults who have cardiovascular disease with a median of 0.00, it suggests an interesting association between gingival bleeding and cardiovascular health. A higher median score (0.96) among elders without cardiovascular disease implies a potentially higher prevalence or severity of gingival bleeding in this group compared to elders with cardiovascular disease (median of 0.00). This could also indicate a deterioration in cardiovascular health outcomes amongst older adults (U=143.5; z=1.98; 0.048).

6.4.7.2 *Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Respiratory Conditions*

Table 167 Median results obtained when Clinical Parameters over time were correlated with Cardiovascular Disease

	Older Adults with No Respiratory Conditions	Older Adults with Respiratory Conditions
	Median	Median
Debris Index Upper Left Sextant	-0.22	0.53
Bleeding Index Upper Anterior Sextant	0.75	0.00

Mann-Whitney's test and z-statistic

Table 167 indicates that there is an increase in median debris index among older adults with respiratory conditions. This implies a potentially poorer OH in this group compared to those without respiratory disease (U=44; z=2.31; p=0.021).

The decrease in median bleeding index among older adults with respiratory disease compared to those without suggests a potential protective effect of respiratory conditions on gingival health. This result may require further investigation (U=139; z=2.13; p=0.033).

6.4.7.3 Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Endocrine Disease (Diabetes).

Table 168 Median results obtained when Clinical Parameters over time were correlated with Endocrine Disease (Diabetes)

	Older Adults with No Endocrine Disease (Diabetes)	Older Adults with Endocrine Disease (Diabetes)
	Median	Median
Debris Index Upper Right Sextant	0.00	0.33
Debris Index Upper Left Sextant	0.00	0.46
Total Debris Upper Arch	-6.15	1.25
Total Debris Index	-1.02	0.31
Oral Hygiene Index	0.17	1.00

Mann-Whitney's test and z-statistic

Table 168 indicates that there is an increase in median debris index in the upper right (U=74.5; z=2.03; p=0.043) and left sextants (U=44, z=2.31; p=0.021) among older adults with endocrine conditions, namely diabetes. The total debris index in the upper arch (U=137; z=2.33; p=0.018) and the full mouth, therefore the total debris index (U=287.5; z=2.33; p=0.020) also increased over time. The oral hygiene index, therefore the sum of the debris index together with the calculus index also increased in the group of diabetic older adults (U=286; z=2.29; p=0.022). This shows that Oral Hygiene got poorer over time in the group with endocrine disease compared to those who do not suffer from this type of disease.

6.4.7.4 Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Neurological Conditions

Table 169 Mean results obtained when Mobile Teeth from V1 to V3 were correlated with Neurological Disorders

	Older Adults with No Neurological Disorders	Older Adults with Neurological Disorders
	Mean	Mean
No of Mobile Teeth	-0.25	0.67
% of Mobile Teeth	-4.76	9.81

Mann-Whitney's test and z-statistic

Table 169 shows that the mean value of the number of mobile teeth ($U=12$; $z=2.04$; $p=0.041$) and the percentage of mobile teeth ($U=8$; $z=2.38$; $p=0.017$), increased in older adults with neurological disorders when compared to older adults with no neurological disorder.

Table 170 Median results obtained when BPE in Sextant 3 from V1 to V3 was correlated with Neurological Disorders

	N	Median
V1 BPE Sextant 3	28	2.00
V2 BPE Sextant 3	23	2.00
V3 BPE Sextant 3	19	3.00

Table 170 shows another significant result was observed when the median of BPE in the third sextant (upper left) increased in older adults with neurological disorders from BPE 2 to BPE 3 from the first visit to the 3rd visit, when compared to older adults with no neurological disorder.

Table 171 Results and Correlations between Older Adults' Clinical Parameters and Systemic Conditions

	Haematological Diseases	Gastrointestinal Conditions	Dermatological Conditions
	p-value	p-value	p-value
Bleeding score UA	0,541	0,069	0,044* (U=88,5; z=2,02)
Bleeding score LL	0,207	0,170	0,014* (U=40; z=2,47)
Bleeding index LL	0,533	0,344	0,039* (U=40; z=2,06)
Debris index UR	0,667	0,872	0,035* (U=60; z=2,10)
Debris index UL	0,130	0,342	0,010* (U=19,5; z=2,58)
Debris index LR	0,151	0,096	0,011* (U=28,5; z=2,54)
Debris index LL	0,249	0,093	0,028* (U=56,5; z=2,20)
Total Calculus index U	0,180	0,047* (U=82,5; z=1,99)	0,202
Total Calculus index L	0,028* (U=120; z=2,13)	0,572	0,495

*p<0.05; **p<0.01; ***p<0.001

Mann-Whitney's test
z-statistic

Table 171 illustrates the significant results obtained when the clinical parameters of older adults were correlated to haematological, gastrointestinal and dermatological diseases.

6.4.7.5 Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Haematological Conditions

The significant results obtained for this section indicates that median of change of total calculus index in the lower arch was 0.50 in older adults with no haematological disease when compared to 2.0 in older adults with haematological disease (U=120; z=2.13; p=0.028).

6.4.7.5.1 Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Gastrointestinal Conditions

The significant results obtained for this section show that the median of change of total calculus index in the upper maxillary arch was 1.0 in older adults with no gastrointestinal conditions when compared to older adults with gastrointestinal disease who exhibited a median of 0.0 (U=82.5; z=1.99; p=0.047).

6.4.7.6 *Changes at Clinical parameters of Older Adults in the period V1-V3 correlated with Dermatological Conditions*

Table 172 Median results obtained when Clinical Parameters over time were correlated with Dermatological Conditions

	Older Adults with No Dermatological Conditions	Older Adults with Dermatological Conditions
	Median	Median
Bleeding Index Upper Anterior Sextant	0.71	0.00
Bleeding Index Lower Left Sextant	1.00	0.00
% Bleeding Index Lower Left Sextant	20	3.75

Mann-Whitney's test and z-statistic

On the contrary to the majority of previous results where clinical parameters of older adults suffering from disease, resulted into higher clinical parameter scores, Table 172 shows that older adults suffering from dermatological conditions exhibit low bleeding indices when compared to older adults who do have dermatological conditions; Bleeding Scores: Upper Anterior (U=88.5; z=2.02, p=0.044); Lower Left ((U=40; z=2.06; p=0.014); Percentage Bleeding Index Lower Left (U=40; z=2.06; p=0.039).

Table 173 Mean results obtained when Debris Index was correlated with Dermatological Conditions

	Older Adults with No Dermatological Conditions	Older Adults with Dermatological Conditions
	Mean	Mean
Debris Index Upper Right Sextant	0.31	-0.63
Debris Index Upper Left Sextant	0.48	-0.60
Debris Index Lower Right Sextant	0.56	-0.67
Debris Index Lower Left Sextant	0.70	0.13

Similarly, Table 173 also indicates that older adults having dermatological issues exhibit less debris, and thus plaque accumulation, when compared to older adults who do not have these conditions; Debris Index Upper Right ($U=60$; $z=2.10$; $p=0.035$); Debris Index Upper Left ($U=19.5$; $z=2.58$; $p=0.010$); Debris Index Lower Right ($U=28.5$; $z=2.54$; $p=0.011$); Debris Index Lower Left Sextant ($U=56.5$; $z=2.20$; $p=0.028$).

Table 174 Results and Correlations between Older Adults' Clinical Parameters and Medications

	Number of Medications		Number of Xerostomic Medications	
	r(df)	p-value	r(df)	p-value
Average PPD UR	-0,39(28)	0,035*	-0,36	0,054
Average PPD UA	-0,27	0,094	-0,43(37)	0,007**
Worst PPD UA	-0,10	0,539	-0,33(36)	0,040*
Bleeding score LL	0,37(34)	0,028*	-0,03	0,867
Bleeding index LL	0,34(33)	0,044*	-0,01	0,945
Number of mobile teeth	0,53(17)	0,019*	0,59(17)	0,008**
Debris index LR	0,37(29)	0,041*	0,36(29)	0,049*
BPE Sextant 2	-0,10	0,551	-0,40(33)	0,018*

*p<0.05; **p<0.01; ***p<0.001

Spearman's correlation coefficient

Table 174 indicates the significant results obtained when older adults' medications were correlated with their medications.

6.4.7.7 Changes at Clinical parameters of Older Adults in the period V1-V3 by Number of Medications

Results in this section (Table 174, pg. 345) indicated that the average PPD in the upper right sextant was inversely correlated with number of medications (Spearman's Correlation Coefficient: $r(df) = -0.39(28)$; $p=0.035$). This implies that the higher number of medications was, less PPDs were present.

Rest of the parameters were directly correlated with number of medications, therefore the higher the number of medications was, the higher was bleeding: Bleeding Score lower left sextant ($r(df) = 0.37(34)$; $p=0.028$); Bleeding Index lower left sextant ($r(df)=0.34(33)$; $p=0.044$), number of mobile teeth ($r(df)=0.53(17)$; $p=0.019$) and debris index in the lower right sextant ($r(df)=0.37(29)$; $p=0.041$).

6.4.7.8 Changes at Clinical parameters of Older Adults in the period V1-V3 by Number of Medications which cause Xerostomia

Similar results (Table 174,pg. 345) were obtained for correlations with medications which cause xerostomia. Results indicate that PPDs were inversely correlated with number of medications. Therefore, the higher number of medications which cause xerostomia was, less pocket depths were found: Average PPD in the upper anterior sextant ($r(df) = -0.43 (37)$; $p=0.007$) and worse PPD in the upper anterior sextant ($r(df) = -0.33 (36)$; $p=0.040$). The mean result for the BPE in the upper anterior sextant also reduced when correlated to the xerostomia medications ($r(df) = -0.40 (33)$; $p=0.018$).

Rest of parameters were directly correlated with number of medications which indicates that the higher the number of medications which cause xerostomia was, the higher the

clinical parameters were: Number of mobile teeth ($r(df)=0.59(17)$, $p=0.008$; Debris Index lower right sextant $r(df)=0.36(29)$; $p=0.049$).

6.4.8 Discussion and Conclusion

Significance of Questionnaires and Interview Responses by Section

The first section in the sixth chapter delved into an examination of several facets surrounding oral health care and perceptions among staff members employed across different deployment areas. Through analysis, it was found that there were no significant disparities observed in various domains included in the questionnaire sections.

Firstly, when assessing the awareness of personal oral care among staff members, the findings revealed no notable discrepancies when comparing responses across different deployment areas. Similarly, inquiries regarding oral health education yielded consistent results, indicating no significant differences in staff members' responses across deployment locations.

Furthermore, reflections on staff members' perceptions regarding the oral health of older adults exhibited uniformity across deployment areas, with no apparent variations noted. Likewise, staff members' perceptions regarding the tendency of older adults to seek assistance and visit dental clinics showed no significant discrepancies across different deployment zones.

Moreover, the study explored staff members' awareness of the existence of a dental clinic at SVPR and its accessibility, finding no noteworthy differences in responses between deployment areas. Additionally, the analysis of OHIP-14 functional, Psychosocial, and total scores yielded consistent results across deployment zones,

indicating a lack of significant variance in oral health-related quality of life measures among staff members.

These findings, derived through meticulous analysis employing Mann-Whitney tests and subsequently corrected using Bonferroni's correction for pairwise comparisons, collectively suggest a uniformity in various aspects of oral health care awareness, perceptions, and quality of life measures among staff members stationed across different deployment areas.

These results suggest that when comparing multiple factors (such as wards and areas), the differences observed which were not statistically significant might be due to high homogeneity between wards and areas. This implies that the wards and areas being studied were similar in terms of the factors being analyzed. There wasn't much variability or divergence among these factors across different locations.

So, when Bonferroni's correctional tests were applied, the significance threshold was adjusted to account for the multiple comparisons being made between wards and areas. After applying Bonferroni's correction, still not many significant differences were found among the factors studied. This reinforces the fact that the observed similarities between wards and areas were likely not due to chance, but rather indicative of a true homogeneity between them.

These findings, derived through meticulous analysis employing Mann-Whitney tests and subsequently corrected using Bonferroni's correction for pairwise comparisons, collectively suggest a uniformity in various aspects of oral health care awareness,

perceptions, and quality of life measures among staff members stationed across different deployment areas.

Correlations between Differences of Clinical Parameters from V1 to V3 and Staff Members' Responses.

The study found positive, though weak to moderate, correlations between staff members' awareness of their own oral health and increases in the bleeding index scores of older adults across three visits. Notably, the highest increases in bleeding occurred in wards where staff scored highly on personal oral health awareness. Additionally, there were similar positive correlations observed with worsening conditions of periodontal probing depths (PPDs) and recession in the upper anterior sextants, indicating a consistent trend. No significant OHIP-14 results were found in this section.

Correlations between Differences of Clinical Parameters from V1 to V3 and Older Adults' Responses.

This section explores the correlation between older adults' self-awareness of their oral health and clinical measurements. The study primarily used Spearman's Correlation Coefficient, revealing significant relationships. Key findings show that lower oral health awareness correlates with higher Probing Pocket Depths (PPDs), especially in the lower right sextant, while higher awareness links to better oral hygiene, indicated by lower bleeding and calculus scores. Lower educational levels in oral health also correlate with poorer periodontal conditions over time ($p < 0.05$).

Interestingly, some adults with a positive self-perception of their oral health exhibited higher bleeding and calculus scores in certain areas, suggesting a disconnect between

self-perception and clinical reality. Moreover, higher scores on the Oral Health Impact Profile-14 (OHIP-14), indicating no Psychosocial impact, were associated with worse periodontal conditions. These findings underline the importance of integrating both clinical assessments and personal perceptions to comprehensively manage oral health in older adults. This approach could enhance interventions, improving both the clinical outcomes and quality of life for this demographic. The research also underscores the strong links between subjective assessments of oral health via the OHIP-14 and objective clinical signs and symptoms, highlighting the importance of considering both perceived and clinical oral health parameters in dental studies ($p < 0.05$).

Correlations between Older Adults' Clinical parameters, Systemic Diseases and Medications

This detailed summary includes the significant correlations found between older adults' clinical parameters and thus key performance indicators, systemic diseases and medications. Predominantly, older adults exhibit a high prevalence of neurological disorders (65.1%), cardiovascular diseases (63.6%), and endocrine disorders, mainly diabetes (57.9%), with a significant portion suffering from multiple conditions. The study reveals significant gender disparities in disease prevalence, with females more affected by a variety of conditions including renal, neurological, mental, gastrointestinal, musculoskeletal, dermatological, and ophthalmic diseases.

The analysis further delves into disease prevalence by ward type ($p < 0.05$), uncovering that respiratory diseases are more common in non-dementia wards, whereas neurological and mental conditions predominate in dementia wards. Specific diseases such as endocrine disorders, hepatic conditions, renal conditions, mental problems,

gastrointestinal disorders, musculoskeletal conditions, and dermatological conditions show varied prevalence between study and control groups, indicating a distinctive relationship between residing conditions and health outcomes.

A noteworthy trend is the association between clinical parameters and systemic health. High blood pressure and cholesterol levels, indicative of cardiovascular risk, are prevalent, underscoring a connection between systemic health and oral hygiene. Specifically, gingival bleeding shows an inverse relationship with cardiovascular health, suggesting a potential biomarker for cardiovascular conditions. Oral hygiene, measured through the debris index and the calculus index, appears poorer among those with respiratory and endocrine conditions, hinting at a complex interconnection between systemic diseases and oral health ($p < 0.05$).

The study also highlights the impact of systemic diseases on oral health parameters. For instance, older adults with neurological disorders show an increase in the number of mobile teeth and a higher total calculus index in those with haematological diseases, suggesting a correlation between systemic diseases and oral health deterioration. Conversely, dermatological conditions are associated with lower bleeding and plaque indices, indicating a possible protective effect on oral health ($p < 0.05$).

Medication use, particularly those causing xerostomia, shows a direct correlation with worsened clinical parameters such as CAL, recession, debris, calculus, and overall OH. However, an inverse relationship is observed with PPDs, suggesting that medication use can both exacerbate and mitigate specific oral health challenges. All the above significant results were obtained through the p values, where $p < 0.05$.

Conclusion

The study illuminates the intricate connections between systemic diseases, medication use, and oral health in older adults. It underscores the need for integrated care approaches that address both systemic and oral health issues to improve overall well-being in this population. The gender-specific prevalence of diseases and the impact of residential conditions on health outcomes highlight the importance of tailored healthcare strategies to address the unique needs of older adults.

Chapter 7

Multivariate Analyses

7.1 Introduction

This study investigates the relationship between self-reported data, oral hygiene practices, and periodontal indices as critical performance indicators in a long-term care facility for older adults. In this chapter, the multivariate analysis aims to understand how these factors interact and contribute to the observed clinical outcomes. Table 175 provides a comprehensive summary of the results obtained from statistical tests conducted during the study. **Each dependent variable represents the change in clinical parameters over the evaluation period (V1-V3).**

The statistical analyses, previously presented were primarily univariate and bivariate, correlating each outcome with independent factors such as ward gender, ward type, and ward group. Several independent factors demonstrated significant correlations with the outcomes. These significant independent variables were subsequently incorporated into a multivariate regression model to evaluate their combined effects on the clinical parameters, providing an understanding of the interplay between these variables.

Therefore the independent variables contributed to a number of dependent variables showing that the latter can be used as KPIs.

Table 175 Comprehensive summary of the results obtained from statistical tests conducted during the study.

Changes V1-V3	WARD GENDER	WARD TYPE (Dementia /no)	WARD GROUP	COGN. HEALTH	STAFF			OLDER			OHIP- 14 Functi onal	DISEASES AND MEDICATION									
					Sec.A	Sec.B	Sec.C	Sec.A	Sec.C	CV		RESP	ENDOC	HEP	NEUR	HAEM	GAST	DERM	N MED	N XERO	
Mucosa hygiene			0,002** (U=948; z=3.09)				0.005**; r=-0.27														
Average PPD LL				0,038* (Chi²=6.55)																	
Worst PPD UA					0.003**; r=0.49															0,040* r=-0.33	
Worst PPD LA			0,002** (U=65.5; z=3.11)																		
Average REC UL	0,035* (Chi²=6.73)																				
Average REC LR		0,047* (U=48; z=1.98)																			
Average CAL UR	0,023* (Chi²=7.56)																				
Average CAL UL	0,018* (Chi²=8.09)																				
Average CAL UA	0,047* (Chi²=6.10)																				
Bleeding score UL								0.036*; r=0.84													
Bleeding score UA		0,002** (U=40.5; z=3.17)			0.029*; r=0.35		0.042*; r=0.33				0,048* (U=143,5; z=1,98)							0,044* (U=88,5; z=2,02)			
Bleeding index UR					0.030*; r=0.44																
Bleeding index UL								0.036*; r=0.84													
Bleeding index LL		0,001** (U=26.5; z=3.43)			0.037*; r=0.37													0,039* (U=40; z=2,06)	0,044*; r=0.34		
Bleeding index LA		0,015* (U=114,5; z=2.43)																			
Debris index UR													0,043* (U=74,5; z=2,03)				0,035* (U=60; z=2,10)				
Debris index UL												0,021* (U=44; z=2,31)	0,021* (U=44; z=2,31)				0,010* (U=19,5; z=2,58)				
Debris index LR																		0,011* (U=28,5; z=2,54)	0,041*; r=0.37	0,049* r=0.36	
Debris index LA	0,018* (Chi²=8.03)																				

Table 175 continued

[illegible]

*p<0.05; **p<0.01; ***p<0.001

Mann-Whitney's test and z statistic

Chi² test

Spearman's correlation coefficient

7.2 Change in Mucosa Hygiene from Visit 1 to Visit 3

Table 176 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in Mucosa Hygiene

		B	S.E.	Wald	df	Sig.	Exp(B)	95,0% C.I. for EXP(B)	
								Lower Bound	Upper Bound
Step 1(1)	WARDGROUP(1)	-1.627	0.639	6.474	1	0.011	0.197	0.056	0.688
	secC_score_median_staff	-0.612	0.365	2.822	1	0.093	0.542	0.265	1.107
	Constant	6.411	2.543	6.357	1	0.012	608.418		

1,00 Variable(s) entered on step 1: WARDGROUP, secC_score_median_staff.

In Table 176, one can observe the results obtained from the study when changes in mucosa hygiene over three visits were analysed, evaluating the likelihood of having stable or improved outcomes versus worse outcomes. This comparison was conducted using a logistic regression model. The findings revealed that patients in the study group, whose healthcare providers received oral health educational training, were less likely to achieve stable or better mucosa hygiene outcomes than patients in the control group, who did not receive any such interventions. This difference was statistically significant, with a p-value of 0.011.

Therefore, the educational interventions for staff appeared to be associated with a reduced likelihood of favourable outcomes in mucosa hygiene among patients, contrary to expectations.

7.3 Change in Basic Periodontal Examination Scores from Visit 1 to Visit 3

7.3.1 Change in BPE 2 from Visit 1 to Visit 3

Table 177 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in BPE 2

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.284	0.375		3.420	0.002	0.522	2.046
	Xerostomic meds	-0.170	0.073	-0.366	-2.328	0.026	-0.319	-0.022

1,00 Dependent Variable: DIF.V3V1BPE2

Table 177 suggests that as the number of medications a patient was taking increased, the reduction in the Basic Periodontal Examination (BPE) Score 2, became more pronounced. Therefore, patients on a higher number of medications experienced greater improvements (or smaller deteriorations) in BPE 2 scores over the study period ($p=0.026$).

7.3.2 Change in BPE 3 from Visit 1 to Visit 3

Table 178 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in BPE 3

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.551	0.621		2.498	0.026	0.220	2.883
	WARD GROUP	-0.299	0.414	-0.162	-0.723	0.482	-1.187	0.589
	Neurological	-0.913	0.372	-0.549	-2.455	0.028	-1.711	-0.116

1,00 Dependent Variable: DIF.V3V1BPE3

Table 178 indicates that patients with neurological diseases showed a smaller change in their Basic Periodontal Examination (BPE) Index 3 between the first visit (V1) and the third visit (V3) compared to other patients. This means that their periodontal health, as

measured by this specific parameter, exhibited less improvement or a less significant shift over the study period ($p=0.028$).

7.3.3 Change in BPE 4 from Visit 1 to Visit 3

Table 179 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in BPE 4

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	3.800	1.212		3.135	0.004	1,304	6.296
	Hepatic	-1.800	0.624	-0.500	-2.887	0.008	-3.084	-0.516

1,00 Dependent Variable: DIF.V3V1BPE4

Table 179 demonstrates that patients with hepatic (liver) diseases exhibited a smaller change in their Basic Periodontal Examination (BPE) category 4 scores between the first visit (V1) and the third visit (V3), with the finding being statistically significant ($p = 0.008$). This suggests that the progression or improvement in the most severe periodontal conditions (indicated by BPE category 4) was less pronounced in these patients.

7.4 Change in Calculus Index Scores from Visit 1 to Visit 3

7.4.1 Change in Calculus Index in Lower Anteriors from Visit 1 to Visit 3

Table 180 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in Calculus Index Lower Anteriors

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.965	0.692		2.841	0.007	0.567	3.363
	secB_score_median_staff	-0.271	0.126	-0.323	-2.158	0.037	-0.525	-0.017

1,00 Dependent Variable: DIF.V3V1CalculusIndexLA

Table 180 indicates that as the score for oral health education (Section B) among staff members increased, the change in the calculus index for patients' lower anterior teeth became smaller. The finding, with a statistical significance of $p = 0.037$, suggests that better oral health education among staff may be associated with more stable or maintained levels of calculus in this region, potentially reflecting improved preventive care or maintenance practices influenced by staff training.

7.4.2 Based on the above multivariate analysis model, several coefficient differences yielding significant results were obtained.

Patients with gastrointestinal diseases exhibited a significantly greater increase in their total calculus index in the upper arch between the first (V1) and third visit (V3) ($p = 0.022$). Additionally, higher scores among staff members reflecting their perceptions of oral health in older adults were strongly associated with a larger change in the OHIP (Oral Health Impact Profile) functional domain score at time point T1 ($p = 0.001$). This finding suggests that greater staff awareness and understanding of older adults' oral health perceptions may positively influence patients' functional oral health outcomes,

potentially through improved care strategies or communication. Similarly, higher scores reflecting older adults' emphasis on the importance of oral health were significantly correlated ($p = 0.001$) with a greater change in the calculus index in the lower left sextant from V1 to V3. This result highlights that individuals who value oral health more highly may experience more notable changes in calculus levels, possibly due to increased attention to oral hygiene or the effectiveness of oral health interventions.

7.5 Change in Debris Index from Visit 1 to Visit 3

Table 181 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in Debris Index

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	0.848	0.272		3.120	0.003	0.306	1.391
	WARDFEMALE	-0.500	0.189	-0.332	-2.643	0.010	-0.877	-0.122
	WARDMIXED	-0.267	0.259	-0.129	-1.030	0.306	-0.784	0.250
	Endocrine	-0.283	0.189	-0.172	-1.500	0.138	-0.660	0.094

1,00 Dependent Variable: DIF.V3V1DebrisIndex

Table 181 indicates that patients residing in female wards exhibited a smaller change in the debris index between visit 1 and visit 3 compared to those in male wards, with a statistically significant difference ($p = 0.010$). This suggests that factors associated with ward gender, such as care practices or behavioral differences, may influence the degree of maintenance in oral cleanliness over time.

7.5.1 Based on the above model, the following results were obtained using the multivariate regression analysis.

Patients in female and mixed wards exhibited a smaller change in the debris index in the lower anterior sextants and the lower arch from visit 1 to visit 3 compared to patients in male wards ($p = 0.028$). Similarly, patients with endocrine diseases showed a reduced difference in the debris index in the upper arch during the same period ($p = 0.005$). In contrast, patients with dermatological diseases experienced an increase in the debris index difference in multiple regions, including the upper left sextant ($p = 0.036$), the lower right sextant ($p = 0.034$), and overall debris index from visit 1 to visit 3 ($p = 0.042$). These findings highlight the potential impact of ward type and specific health conditions on changes in oral hygiene over time.

7.6 Changes in Percentage Bleeding Index from Visit 1 to Visit 3

7.6.1 Changes in Percentage Bleeding Index in the Lower Left Sextant from Visit 1 to Visit 3

Table 182 Multivariate Regression Analysis: Coefficients Difference Visit 1 - Visit 3 in Bleeding Index in the Lower Left Sextant from Visit 1 to Visit 3

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-16.375	38.053		-0.430	0.670	-94.455	61.704
	TYPE OF WARD	21.399	8.278	0.480	2.585	0.015	4.413	38.384
	secA_score_median_staff	3.180	6.976	0.090	0.456	0.652	-11.134	17.494
	Dermatological	-0.364	9.602	-0.007	-0.038	0.970	-20.067	19.338
	N medications	0.696	1.056	0.110	0.659	0.515	-1.470	2.863

1,00 Dependent Variable: DIF.V3V1pctBleedingIndexLL

Table 182 indicates that patients in the dementia ward exhibited a significantly greater increase in bleeding levels in the lower left sextants ($p = 0.015$). This indicates that dementia may be associated with challenges in maintaining oral health, potentially due to difficulties in self-care, reduced cooperation during oral hygiene routines, or other health-related factors impacting periodontal health. The result underscores the need for targeted oral health interventions in dementia care settings to address these unique challenges.

7.6.2 Based on the above coefficient model, the following results were obtained using the multivariate regression analysis.

Patients in wards where staff demonstrated high awareness of oral hygiene experienced the greatest increases in bleeding levels ($p = 0.043$). Additionally, patients in the "study" wards who had dermatological conditions showed a significantly higher increase in

bleeding specifically in the upper anterior sextant ($p = 0.029$). These findings suggest that while staff awareness may contribute to changes in bleeding outcomes, certain patient-specific factors, such as dermatological conditions, may also play a significant role in influencing periodontal health.

7.7 Changes in Average and Worse Periodontal Pocket Depths from Visit 1 to Visit 3

7.7.1 Change in Average Periodontal Pocket Depths in the Lower Left Sextants from Visit 1 to Visit 3

Table 183 Multivariate Regression Analysis: Coefficients Difference in Average Periodontal Pocket Depths in the Lower Left Sextant from Visit 1 to Visit 3

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	-0.344	0.401		-0.858	0.399	-1.170	0.481
CognitiveHealth Semi-alert	2.141	0.803	0.506	2.666	0.013	0.490	3.791
CognitiveHealth Noncommunicative	0.601	0.496	0.230	1.210	0.237	-0.420	1.621

1,00 Dependent Variable: DIF.V3V1AvPPDLL

Table 183 shows that patients with semi-alert conditions experienced a significantly greater increase in periodontal pocket depths between visit 1 and visit 3 compared to those who were fully alert, with an average difference of +2.14 mm ($p = 0.013$). This suggests that reduced alertness may impair the ability to maintain adequate oral hygiene, leading to worsening periodontal health as evidenced by deeper periodontal pockets over time.

Using the same analytical model, patients from wards where staff demonstrated high awareness of oral hygiene showed the most significant increases in the severity of periodontal pocket depths in the upper anterior sextants. This result suggests that, although staff awareness is typically associated with better oral health outcomes, additional underlying factors unique to these wards or patients may exacerbate periodontal conditions in this region ($p=0.005$). Furthermore, within the study group, there was a notably higher increase in the severity of periodontal pocket depths in the

lower anterior sextants ($p=0.003$), highlighting a distinct pattern of deterioration in this area.

7.8 Discussion and Conclusion

This chapter explores the application of multivariate analysis to identify key performance indicators (KPIs) that influence oral health outcomes in long-term care facilities for older adults. The findings provide an understanding of how self-reported data, oral hygiene practices, and periodontal indices interact to shape clinical outcomes. By employing multivariate models, this study unveils complex relationships between patient characteristics, ward types, and oral health metrics. This analysis shows that the independent variables are contributing to a number of dependent variables which can be used as KPIs, as follows:

- Neurological, hepatic, gastrointestinal, and dermatological conditions significantly influence periodontal indices, demonstrating the interaction between systemic and oral health. For instance, patients with neurological conditions exhibit **less improvement in their Basic Periodontal Examination (BPE) Index 3** ($p < 0.05$), a finding that aligns with studies by Kisely (2016) and Zenthofer et al. (2016), who emphasise the challenges of maintaining oral hygiene in older adults with dementia or severe mental illnesses. Similarly, hepatic diseases, correlate with smaller improvements in severe BPE category 4 scores ($p = 0.008$). This supports evidence suggesting that chronic periodontitis negatively impacts liver disease progression, with periodontal therapy improving systemic inflammation (Lauritano et al., 2019; Stajkovic, 2020).

Gastrointestinal diseases contribute to significant **increases in calculus index** in the upper arch ($p = 0.022$), underscoring the role of oral microbiome disruption in conditions like inflammatory bowel disease and colorectal cancer. Research by Gheorghe et al.,

(2022) and Lam et al., (2023) highlights shared pathogens and inflammatory mediators as mechanisms linking periodontal and gastrointestinal disorders. Dermatological conditions are associated with **increased debris index** differences (e.g., upper left: $p = 0.036$, lower right: $p = 0.034$) and **heightened bleeding** in the upper anterior sextants ($p = 0.029$). These findings align with Kiernan et al. (2023), who note higher periodontal disease rates in these patients, compounded by immune-modulatory therapies that exacerbate oral side effects.

For patients in the study wards with dermatological conditions, a significantly **higher increase in bleeding** was observed in the upper anterior sextant ($p = 0.029$). This finding underscores the interplay between systemic dermatological conditions and oral health, potentially linked to inflammation or altered immune responses that exacerbate periodontal vulnerability in this region.

The bidirectional link between periodontitis and systemic inflammation, as highlighted by Nascimento et al. (2019), further reinforces the need for integrative care. Advanced research methods (Gheorghe et al., 2022) are essential to explore these interactions, and clinicians must prioritise early oral health assessments (Kisely, 2016) and caregiver training (Van Der Putten et al., 2015; Persson et al., 2022). These strategies can significantly improve oral health outcomes and address systemic health challenges affecting periodontal indices.

- Systemic medications significantly influence periodontal health. Xerostomia, often associated with conditions like Sjogren's syndrome, diabetes, and radiation therapy, is exacerbated by drugs such as antidepressants, anticholinergics, and diuretics, impacting

oral health (Grusovin, 2019). Medications like phenytoin, cyclosporine, and calcium channel blockers are linked to gingival overgrowth, while oral lichenoid reactions may occur with beta-blockers, antidiabetic drugs, and NSAIDs (Mariotti & Hefti, 2015).

In contrast to existing literature highlighting these adverse effects, the study revealed a **positive correlation between higher medication counts and improvements in BPE Score 2** ($p < 0.05$). This finding suggests that increased medication use may reflect better healthcare access or heightened medical attention, highlighting an interaction between systemic treatment and periodontal outcomes.

- Gender differences in oral health outcomes are well-documented, with men generally experiencing poorer oral health, while women are more prone to tooth loss despite similar oral hygiene practices, likely due to inconsistent dental care attendance (Santucci & Attard, 2015a, 2015b; Janssens & Kossioni, 2020; Lipsky et al., 2021). In this study, multivariate analysis revealed that patients in female and mixed wards exhibited **smaller changes in debris indices** compared to male wards ($p = 0.028$), aligning with these broader trends.

Additionally, research suggests that periodontal health does not inevitably decline with age but is influenced more by individual health practices (Ship & Beck, 1996). The findings **in male wards, where greater debris index changes were observed**, may highlight differences in health practices and reinforce the importance of oral care strategies to address gender-related disparities in oral health.

- Managing oral health in cognitively impaired patients presents significant challenges, as evidenced by **increased bleeding** in the lower left sextants of dementia ward patients

($p = 0.015$) and **greater periodontal pocket depth increases** in semi-alert patients (+2.14 mm; $p = 0.013$). These findings align with Kisely et al. (2016), who recommend standard checklists to improve oral health assessment in such populations.

Baiju et al. (2019) emphasise the value of Clinical Attachment Level (CAL) and pocket depth measurements in diagnosing periodontitis severity, reinforcing the study's relevance in monitoring periodontal progression. Similarly, Lauritano et al. (2019) observed higher rates of gingival bleeding and periodontal disease in individuals with dementia, consistent with this study's findings, despite noting no overall oral health differences between those with and without dementia. These results highlight the need for tailored oral care strategies for vulnerable groups.

- In the study group, where educational interventions were held, the multivariate analysis highlighted the complex role of staff education and patient factors in periodontal outcomes. In the group with educational interventions, **a significant increase in periodontal pocket depths** was observed in the lower anterior sextants ($p = 0.003$), likely due to challenges in care access, patient cooperation, or gaps in staff training.

Higher staff awareness correlated with smaller changes in calculus indices for the lower anterior teeth ($p = 0.037$), suggesting improved preventive care. However, unexpectedly, higher staff awareness also led to **greater increases in periodontal pocket depths** in the upper anterior sextants ($p = 0.005$) and **overall bleeding** ($p = 0.043$), indicating that staff training alone may not address all contributing factors.

These findings align with Wulandari et al., (2022), who noted that the relationship between periodontitis severity and education level does not show a strong correlation. Additionally, Siukosaari et al., (2012) found that higher education levels were linked to better oral health and more frequent gingival treatments in older adults. Together, these findings suggest the importance of combining staff education with patient-specific strategies for improving oral health.

Conclusion

The findings from this chapter demonstrate that multivariate analysis is a powerful tool for identifying and understanding the complex interactions among KPIs in oral health management. Endocrine ($p = 0.070$), neurological ($p < 0.05$), hepatic ($p = 0.008$), and gastrointestinal ($p = 0.022$) conditions, as well as medication use ($p < 0.05$), significantly influenced oral hygiene and periodontal health outcomes. The role of staff education ($p = 0.037$) and ward-specific factors, including ward type and gender ($p = 0.028$), were also critical in shaping periodontal health over time.

Other findings, such as increased periodontal pocket depths and bleeding levels in wards with high staff awareness ($p = 0.005$ and $p = 0.043$, respectively), emphasise the complexity of oral health dynamics in long-term care settings. Localized challenges, such as deteriorations in the lower anterior sextants ($p = 0.003$), highlight the importance of region-specific strategies for periodontal management.

Future research should focus on interventions tailored to address the unique needs of patients with systemic diseases, cognitive impairments, or localized periodontal vulnerabilities. Integrating these findings into policy and practice could significantly

improve oral health outcomes and overall quality of life for residents in long-term care facilities.

Chapter 8

Discussion and Recommendations

8.1 Discussion

8.1.1 Introduction

In this chapter, the utility of Self-reported data, Oral Hygiene Indices (OHI), and Periodontal Indices (PI), as pivotal key performance indicators, within the long-term care facility for older adults at SVPR will be discussed. This discussion will focus on the null hypotheses statements (pg. 55), that proposed that these measures are not effective in their roles as key performance indicators of oral health. Therefore these indicators cannot be used as comprehensive measures for assessing and monitoring oral self-care daily and as instruments for evaluating management and manpower performance in daily oral health care provision. Additionally, the impact of oral health education on improving oral health metrics, as indicated by self-reported data, OHI, and PI will be discussed. Lastly, the ability of OHI and PI to capture the broader implications of poor oral hygiene on general health and quality of life will be looked into. Through a methodical exploration of these assertions, this discussion aims to shed light on the extent to which self-reported data, OHI, and PI can serve as reliable measures within a geriatric care context, thereby contributing to an understanding of oral health management in long-term care settings.

8.1.2 Self-Reported Data, Oral Hygiene and Periodontal Indices cannot be used as measuring tools to assess and monitor management and manpower performance as regards to the provision of oral health care on daily basis (Null Hypothesis 1).

The discussion focuses on a thorough analysis of the use of self-reported data, oral hygiene, and periodontal indices as oral health key performance indicators (KPIs) in a long-term care facility for older adults. The hypothetical statement (pg. 55), suggests that these measures alone cannot serve as reliable oral health KPIs due to their limitations in accurately capturing the daily oral self-care practices among managers and health professionals. This argument is broken down by exploring trends, predominant clinical parameters, manpower implications, and the correlation with questions from a staff members' research study, older adults' interviews and clinical parameters, ultimately addressing the acceptance or rejection of the null hypothesis.

8.1.2.1 Trends and Key Performance Indicators in Oral Health

Studies emphasize the complexity of oral health management in older adults, highlighting the need for multifaceted KPIs that encompass clinical measures, self-reported data, and objective oral hygiene assessments. This has been confirmed in the Oral Health Workforce Research Centre report (2016), where the authors stated that the changing methods of providing dental care services in long-term care settings highlight the importance of teams engaging in intricate, cooperative, and interprofessional approaches. This ensures that the workforce implements optimal practices when delivering dental care to residents in long-term care facilities. Furthermore, Booth T. et al., (1990) in their publication, 'Staff Attitudes and Caring

Practices in Homes for the Older adults', stated that 'institution officers may be more likely to paint glowing pictures of facility practices or are too far removed from caring practices to know what really happens on a daily basis, therefore they do not know the level of oral care or oral care procedures despite believing in the philosophical value of oral health and oral care'.

The above statement is reinforced in this research study, showing scientifically evidenced results in terms of oral hygiene and periodontal health or disease in individual older adults at the gender, ward type and various groups such as professional groups and older adults' analyses, providing a realistic facet to daily and long term oral care. The clinical parameters, including debris index, calculus index, oral hygiene index, PPDs, clinical attachment loss and recession together with predominant bleeding scores, emerge as vital indicators of poor oral health.

However, the reliance on self-reported data alone is challenged, suggesting that questionnaires and interviews might not fully encapsulate the intricacies of oral health status and maintenance in older populations. In health research, especially concerning age-related changes, a multidimensional approach is often necessary (Mariotti and Hefti 2015). Subjective measures, like questionnaires, provide insight into personal experiences, perceptions, attitudes, and self-reported health status. These measures are crucial because they offer a window into how individuals perceive their health and its impact on their quality of life. However, subjective measures can be influenced by various factors, including individual differences in perception, memory bias, and the social desirability bias, which can lead to variations in responses.

The significant results obtained from correlating subjective questionnaire data with objective oral clinical parameters among older adults can provide a fuller picture of their daily oral practices, oral hygiene and periodontal status. This is particularly relevant because oral health significantly impacts overall health and well-being, especially in older populations. For instance, poor oral health has been linked to a variety of systemic conditions, including cardiovascular disease, diabetes, and pneumonia (Kapila, 2021; Pirih et. al. 2021). By understanding the relationship between subjective experiences and objective health status, interventions can be more effectively designed and targeted to improve the oral and overall health of older adults.

Mariotti and Hefti (2015), stated that the way society views health and disease has evolved due to the ongoing development of scientific understanding. A person's perspective on health and disease is also influenced by their cultural background, social environment, and personal values. As a result, having a standardized definition of health offers a different perspective on signs and symptoms that fall outside what is considered normal. In this light, understanding periodontal health is more effectively done by examining its components and the factors that influence it.

8.1.2.2 Manpower and Clinical Implications

The effective monitoring of oral health in long-term care settings necessitates a comprehensive approach that extends beyond the use of current oral hygiene and periodontal indices, although it is imperative that these are taken into consideration. This approach requires significant manpower, including specialized training for care staff in oral health assessment and the integration of more dental professionals into the healthcare teams within these facilities. McNally M.E. et. al. (2011) concluded that the

engagement of government officials, policymakers, care facility leaders, educators, healthcare administrators, and a diverse range of health professionals is essential for achieving positive outcomes in delivering and improving oral care to older adults residing in long-term facilities.

Jurgensen, Petersen, Ogawa, & Matsumoto (2012), also commented that observed that although science and research have significantly advanced health outcomes, certain health systems continue to perform poorly. These deficiencies pose substantial obstacles to development. Consequently, research serves as a vital resource for a wide array of stakeholders including policy-makers, healthcare professionals, researchers, the general public, civil society, patients, and health system administrators and managers. It enables them to access vital information and leverage knowledge for making well-informed choices.

Thus the analysis of demographic profiles, gender disparities, and clinical parameters, alongside the evaluation of educational interventions, offers an in depth understanding of the challenges in managing oral health care for older adults in long-term care settings. The key performance indicators, reflecting the health status and outcomes of the older adult population, serve as a direct reflection of the effectiveness of management practices and the adequacy of manpower deployment in addressing oral health needs.

8.1.2.3 Clinical Parameters and Staff Members' Responses

The findings across different deployment areas, as revealed by the staff members' research study when correlated to the clinical parameters of older adults' over a period of time from the clinical assessment 1 to clinical assessment 3, which spanned over two

years four month, suggest that bleeding scores and the bleeding index of older adults were high in wards where the staff members deployed, were highly aware of their personal oral health. Also, an increase of the worse PPDs and recession was noted. From results obtained when staff members were asked whether they do think that older adults' oral health is important, the higher the perception was amongst staff members that oral health is important amongst older adults, the higher were the bleeding scores, the mucosa cleanliness and calculus scores. This could suggest that although the staff's awareness regarding oral health might influence the focus on or the outcomes of oral health practices in wards, in this research study it wasn't the case.

This uniformity points to a potential gap in the tailored education and training necessary for addressing the unique oral health care needs of older adults. The absence of significant differences, indicates a high homogeneity in staff perceptions and knowledge, which might not directly translate into effective oral health care practices in the residents under their care.

This finding corroborates the literature. Kullberg Erika et. al (2010) publication, 'Dental Hygiene Education for Nursing Staff in a Nursing Home for Older People', that it is necessary to tackle the attitudes and views regarding oral care among nursing staff. Dental hygiene education initiatives within the facility should focus on enhancing the oral health of older adults and mitigating the impact of inadequate oral care on systemic illnesses, ultimately aiming also to decrease healthcare expenses.

8.1.2.4 Clinical Parameters and Older Adults' Responses

The significant correlations between clinical parameters and older adults' responses underline the complex relationship between subjective perceptions of oral health and objective clinical indicators. Noteworthy is the correlation between awareness of personal oral health and periodontal disease indicators, emphasizing the critical role of education in oral health outcomes. In older adults who are less aware of their personal oral health, the periodontal scores increased over time from the 1st clinical assessment visit to the 3rd clinical assessment visit while amongst those older adults where the level of awareness regarding their personal oral health was high, significant results yielded lower total bleeding scores and reductions in bleeding scores and a decrease in the calculus index score.

However, in those older adults who had a higher perception of good oral health and the need to be assisted, the bleeding scores, including the percentage bleeding scores increased over time. This was similar for the calculus index. Overall, this means that beyond the self-perception of oral health for the carer and the resident directly, older adults' oral health is truly dependent on the self- and assisted- support available in the residence. Therefore, the contradiction between self-perceived oral health status and clinical assessments signals that there is a disconnection.

As Daniele Barone et. al. (2011) suggested in their publication, 'Reasoning with Key Performance Indicators, 'environments allow organisations to look out for opportunities and threats that may help/hinder the fulfilment of their objections'. Similarly, Pricewaterhousecoopers (2007) in their report 'Guide to Key Performance Indicators: Communicating the Measures That Matter, mentioned that key performance indicators,

are crucial for showing how well an organisation is doing in reaching its goals. Therefore, picking the right indicators requires knowing what really matters to the organization.

8.1.2.5 Acceptance or Rejection of the Null Hypothesis

Considering the complexity of factors influencing oral health outcomes and the evident disparities in staff members' and older adults' knowledge, practices, and older adults' clinical outcomes, across different demographic and professional groups, it is evident that the null hypothesis 'self-reported data, oral hygiene and periodontal indices cannot be used as measuring tools to assess and monitor management and manpower performance as regards to the provision of oral health care on daily basis', **has been rejected.**

Oral Hygiene and Periodontal Indices, as concluded in this research study, provide valuable insights into the oral health status and behaviours of both staff and older adults. The effectiveness of questionnaires and interviews as standalone tools in assessing and **monitoring the performance of oral health care provision** is of limited value, although the perspectives of individuals, especially in this case, of older adults regarding their oral health, oral hygiene and quality of life are of utmost importance. However perspectives, attitudes and insights must be complemented with continuous clinical assessments using clinical parameters which are the KPIs used in this research study. Bleeding scores, debris index, calculus index, oral hygiene index, PPDs, CAL and recession together with targeted educational interventions, gender-sensitive approaches, and **strategic manpower deployment** help address the identified gaps effectively.

8.1.3 Self-reported data, Oral Hygiene and Periodontal Indices cannot be used as measuring tools to assess and monitor oral self-care of older adults on daily basis (Null Hypothesis 2).

8.1.3.1 Introduction

The discussion analysis the integrating insights from demographic factors, self-reported data and clinical assessments, and the impact of these factors on the oral health and quality of life among older adults. Therefore it explores the relationship between demographic characteristics, oral health behaviours, and clinical outcomes over a specified period, amongst older adults, residing at SVPR and who participated in this research study.

8.1.3.2 Demographic and Clinical Profile Analysis

The demographic profile analysis helps to understand the attitudes towards daily oral care and its influence on the quality of life among older adults at St. Vincent de Paul. A cross-sectional approach involving 103 participants highlighted differences in oral health behaviours and experiences based on gender, ward type, educational level, and cognitive health status. The self-reported data gathered from the older adults' interviews facilitates for a deeper investigation into how these factors contribute to oral health outcomes and overall well-being.

8.1.3.3 Gender Differences in Oral Health Perceptions, Behaviours and Clinical Parameters as KPIs

Findings reveal distinct oral health behaviours between male and female older adults, with females reporting fewer toothaches and discomfort than males while males engaged more in dental care practices such as toothbrushing after lunch, participating

in ward dental talks, visited the dentist for oral debridement (Sc/Pol) while the majority responded that basic necessities for toothbrushing are not available since there isn't a designated person who orders them. This contradicts general perceptions and some literature suggesting men are less proactive about dental health (Wulandari, P. et al., 2022).

The clinical parameters of older adults who were assessed over time, produced significant results in average recession with males having reduction in recession scores. Males also exhibited a greater reduction in CAL scores. However the mean debris index in men increased over time indicating that more debris accumulated from the 1st clinical assessment to the 3rd clinical assessment confirming Lipsky et. al. (2021) comments that men tend to neglect their dental care and engage in poorer hygiene habits. Females had a slight decrease in the mean debris index and therefore there was a slight reduction in debris accumulation in females when compared to men, confirming once again that women might be more aware of their oral hygiene habits. This was further confirmed when a multivariate analysis was conducted and the following KPIs were identified: Patients in female and mixed wards exhibited smaller changes in debris compared to those in male wards from visit 1 to visit 3.

There may be other reasons behind the gender differences in debris accumulation. This could include differences not only in oral hygiene habits but also dexterity, ambulation, lack of basic necessities as reported by men themselves, general health, or access to dental care. Medication use, which can differ between genders, might also contribute to the observed differences in periodontal health changes.

As stated by Grusovin (2019) and Mariotti and Hefti (2015), systemic medications can

have several effects on the periodontium such as gingival overgrowth which can serve as a trap for more biofilm accumulation. The enlargement of the gingival tissue creates more surface area and false pockets that can harbour bacteria, plaque, and debris. False pockets may also be one of the reasons why there were some reductions in the CAL and recession of men. This environment is conducive to the growth of biofilm. These trapped substances can lead to further inflammation and potentially contribute to the progression of periodontal disease. Managing gingival overgrowth often involves addressing its underlying cause, improving oral hygiene practices, and, in some cases, surgical intervention to remove the excess tissue. Regular dental check-ups and cleanings are crucial for patients with gingival overgrowth to manage biofilm accumulation and prevent further dental complications.

On the other hand, Ship & Beck (1996) in their study 'Ten-year longitudinal study of periodontal attachment loss in healthy adults', concluded that despite extensive studies, linking gender directly to periodontal disease remains uncertain. This investigation followed 95 healthy individuals, aged 29 to 76, over ten years as part of the Baltimore Longitudinal Study of Aging, examining their periodontal health. Although his study was not focused on older adults only, the findings showed that attachment loss occurred regardless of gender and age, primarily due to gingival recession rather than changes in pocket depth. This suggests that periodontal deterioration is not inevitable according to gender and age and gender alone isn't a reliable indicator of periodontal disease risk.

One must note that this study was conducted on healthy adults, therefore if periodontal changes were observed in healthy adults, it is expected that in this research study more periodontal changes, even some which are not expected will result due to the fact that

older adults suffer from multiple health conditions and take several medications.

The results indicate that targeted interventions may be required for males to address the increasing debris accumulation, despite improvements in recession and attachment loss. For females, the slight reduction in debris accumulation is a positive outcome, especially since females also exhibited stable CAL over time, indicating that Ship and Beck's (1996) conclusion that attachment loss happen in people of all ages and genders, mainly because of recession rather than changes in pocket depth. This indicates that worsening of periodontal health is not guaranteed as one ages, and neither age nor gender by themselves are good predictors of the risk for periodontal disease.

However, it would be essential to maintain and further enhance plaque control strategies which include continuous educational campaigns on the importance of oral hygiene and regular dental check-ups which might need to be gender-tailored, taking into consideration the specific needs and trends observed in the older adult population.

Overall, while there are positive changes in certain clinical parameters for males, the increase in debris accumulation is a concern that needs to be addressed to ensure overall periodontal health. Conversely, the trend among females suggests a more consistent approach to managing plaque, highlighting the importance of maintaining good oral hygiene practices.

8.1.3.4 Impact of Ward Type and Cognitive Health

Significant differences were observed between older adults with and without dementia regarding oral hygiene practices and perceptions. Those without dementia demonstrated better adherence to oral hygiene routines, brushing their teeth after

lunch and before bedtime compared to cognitively impaired residents. Older adults who are cognitively healthy were aware of the use of fluoridated toothpaste. Patients in the dementia wards and in the non-dementia wards stated that they never attended dental talks in wards. This was confirmed by male older adults. The majority of the patients in the dementia ward stated that oral health is important to them when compared to those in the non-demented ward while they also stated that the basic necessities for toothbrushing were not available.

The significant results obtained from the clinical parameters in this research study found that the median average recession and the median CAL in the lower right sextant increased from visit 1 to visit 3, in the dementia wards while bleeding scores in the upper anterior, lower right, lower left sextants increased as well. The total bleeding scores increased in the older adults residing in the dementia wards. Bleeding Index scores increased together with the percentage bleeding index in the upper anterior, lower right, lower left and lower anterior sextants in patients who had cognitive impairment.

This section emphasizes the critical need for personalized oral health interventions and improved access to dental care and education within dementia care settings.

The multivariate analysis indicated that in dementia wards, the patients experienced a significant increase in bleeding levels, underscoring the challenges associated with managing oral hygiene for patients with cognitive impairments. Patients with semi-alert conditions exhibited significantly greater increases in periodontal pocket depths compared to fully alert patients, with an average increase of +2.14mm.

These results align with the observations of Andreas Zenthofer et. al. (2016), and Lauritano et. al. (2019). These authors identified poor oral hygiene and increased

gingival issues among older adults with dementia. Stajkovic, A. (2020) highlighted that oral health significantly affects the quality of life in individuals with dementia, who are more susceptible to oral health problems as dementia progresses, leading to challenges in communication and potential behavioural issues. Caregivers are vital in maintaining oral hygiene but face hurdles such as time constraints, insufficient support, and lack of resources. In Malta, specific facilities like SVPR showed higher Debris Index and Bleeding Scores, suggesting a targeted need for enhanced oral care.

Additionally, Mohammadi, Franks, & Hines (2015) emphasized the importance of dental hygienists in creating tailored oral health care plans and preventive programs, especially for long-term care residents with dementia. They advocate for dental hygienists to perform examinations, design treatment plans, and ensure referrals, underscoring the necessity for care models that improve dental service access for the older adults in such facilities, viewing dental hygienists' involvement as crucial.

8.1.3.5 Impact of Ward Group on Oral Health

In this research study, wards were divided into a Study Group (wards where interventions were conducted) and a Control Group (wards where no interventions were conducted). Some significant results which were obtained were unexpected. In spite of the study group receiving educational interventions and oral health awareness, the older adults had worse oral mucosa hygiene. Older adults in the control group, not only had better mucosa cleanliness but this improved from the 1st visit to the 3rd visit. Worse PPDs in the were also found in older adults in the study group.

The observed results in the study, where older adults in the control group displayed better mucosa cleanliness and improved oral health over time without interventions, while those in the study group showed worse periodontal probing depths (PPDs) despite receiving several educational and oral health awareness interventions, may initially appear perplexing. However, several practical reasons could explain these outcomes.

In the study group, a significant worsening of periodontal pocket depths in the lower anterior sextants was observed. This localised pattern of deterioration highlights specific challenges in maintaining effective oral hygiene or responding adequately to treatments in this area. Factors that may contribute include limited accessibility during care, variations in patient cooperation, and potential gaps in staff training regarding localised periodontal management.

Furthermore, within the study group, patients with dermatological conditions experienced a significantly greater increase in bleeding in the upper anterior sextant. This finding underscores the intricate connection between systemic dermatological disorders and oral health. It suggests that underlying inflammatory or immune responses associated with these conditions may exacerbate periodontal vulnerabilities, necessitating more tailored preventive and therapeutic strategies in these cases.

Firstly, the effectiveness of the intervention itself could be questioned. It's possible that the educational content, the way it was delivered, or its duration was not adequately suited to the older adults in the study group. If the intervention did not effectively engage this demographic, it would not lead to the expected improvements in oral health.

Secondly, another factor to consider is the personal motivation and engagement not only of the participants but also of the staff members. Those in the control group, without any intervention, might have had a higher level of self-motivation to maintain or improve their oral hygiene than those in the study group. This self-driven initiative could stem from personal experiences or previous encounters with dental ailments. In contrast, participants receiving the educational interventions might have depended too heavily on these sessions to drive changes, which could be less effective if the interventions were not impactful.

The timing of assessments also plays a critical role. If the initial measurements were taken before the educational interventions had an opportunity to effect change, and subsequent assessments were made during or after the interventions, this could create a misleading appearance of no improvement or deterioration in oral health. Moreover, genuine improvements in oral health often require time to become evident.

The control group, aware of their participation in a study but not receiving any direct intervention, might have improved their oral hygiene simply because they were being observed. This psychological response to being studied can often lead to temporary changes in behaviour.

Lastly, there could have been baseline differences between the two groups that were not adequately controlled for, such as variations in socioeconomic status, health literacy, or unwillingness to access dental care. These factors could significantly influence the outcomes of any health interventions.

8.1.3.6 Acceptance or Rejection of the Null Hypothesis

In conclusion, this thesis integrates demographic, behavioural, and clinical insights to offer a comprehensive analysis of factors affecting periodontal health on daily basis, among older adults. From the results obtained, it is evident that KPIs are required to assess, monitor and improve oral health outcomes. Building on these insights, the discussion shifts to evaluating clinical parameters and their changes over time, using oral hygiene and periodontal indices as key performance indicators.

Given the evidence presented, the null hypothesis stating "Self-reported data, Oral Hygiene, and Periodontal Indices cannot be used as measuring tools to assess and monitor oral self-care of older adults on a daily basis" **has been rejected**. The research highlights the use of questionnaires and periodontal indices. These are definitely not required on a daily basis to assess and monitor self-care of older adults, however they serve as useful information to obtain data regarding daily oral hygiene practices of participants. In this research study, **oral hygiene and bleeding score metrics** produced significant results, indicating the presence of high debris index scores and high bleeding and bleeding index scores in various sextants which are a result of poor oral hygiene practices, which can be observed on daily basis. This doesn't mean that there isn't the need for a broader, more holistic approach to assessing and improving daily oral care among older adults. The integration of additional measures and tools such as facilitating more effective monitoring and intervention strategies in wards, should be included to address the complexities of daily oral care and the diverse needs of the older adult population at SVPR.

By recognizing the critical connections between older adults' attitudes towards daily oral care, age, gender, level of education and cognitive and health impairments, health professionals can use KPIs and therefore clinical parameters. On daily basis, there should be a focus on debris, calculus and bleeding indications, to customize oral hygiene interventions in order to meet the unique requirements of each person, leading to more effective and individualized daily oral care strategies.

8.1.4 Self-reported data, Oral Hygiene and Periodontal Indices do not necessary measure the effects poor oral health has on general health and quality of life of older adults (Null Hypothesis 3).

8.1.4.1 Introduction

Based on the null hypothesis "Self-reported data, oral hygiene, and periodontal indices do not necessarily measure the effects poor oral hygiene has on general health and quality of life of older adults," the discussion aims to explore this relationship through the significant results obtained in this research study, utilizing the trends and key performance indicators (KPIs) and therefore the predominant clinical parameters. The overarching goal is to differentiate whether the null hypothesis, stating there is no significant correlation between oral health measures, quality of life and general health impacts in older adults, has been accepted or rejected based on empirical evidence.

8.1.4.2 Trends and Key Findings: OHIP-14 and Oral Hygiene/Periodontal Health and KPIs

The analysis into quality of life dimensions of older adults residing at SVPR revealed that older adults who perceived a good functional quality of life during the first OHIP-14 interview, had decreased calculus index scores and total calculus index in the lower left sextant however they also had an increase in PPDs in the upper right sextant, and worse PPDs in the lower right sextant.

Those older adults who scored high in the Psychosocial OHIP-14 scores and therefore perceived that their quality of life was good, also had worse PPDs. From the 2nd OHIP-14 interview, older adults who had a high functional OHIP-14 score and therefore perceived good functional quality of life, had low average PPDs and worse PPDs. Bleeding score

and bleeding index scores were also high in older adults with a high functional score who perceived that their quality of life was good or satisfactory or are not aware of any oral health issues which are affecting their quality of life. The total debris index in the lower mandibular arch increased over time in older adults who had an increased total OHIP-14 score.

These findings highlight how older adults perceive their quality of life irrespective of poor oral hygiene and its impact on periodontal health. Therefore, if older adults lack awareness of their daily oral hygiene duties and the status of their periodontal health, it becomes crucial to highlight the significance of regular monitoring of their oral health, prompt dental treatment, and interventions. Such measures are essential to prevent the further decline of gingival and periodontal tissues.

This has been stated by (Santucci & Attard, 2015), that Older adults living in institutions in Malta generally suffer from poor oral health. This study indicates that while overall oral health-related quality of life (OHQoL) is relatively favourable, those with a lower quality of life experience significant correlations between their quality of life and poor oral health. This relationship suggests that inadequate oral health directly impacts the OHQoL among these Maltese state-institutionalized seniors. The impact, however, differs according to the individual's perception of what constitutes good health. It is essential not to underestimate oral health issues, as they can degrade the quality of life, thereby depriving these older adults of the chance to lead a healthy lifestyle.

Although the results obtained in this study indicated that the majority of older adults do not perceive their quality of life as poor and that oral issues do not impact their quality

of life irrespective of their OH and periodontal disease, the results are still consistent with the findings of the authors Van de Rijt, Liza et al., (2020) who stated that they found the research linking periodontal health to Oral Health-Related Quality of Life (OHQoL) widely varied, with no clear consensus emerging from the existing literature. Their systematic review uncovered mixed results, indicating while some studies show periodontal diseases negatively affect adults' quality of life, the impact level might depend on the disease's severity. Periodontal disease, often asymptomatic and thus labelled a "silent" condition, might explain the inconsistent findings across research efforts. This perspective urges dental professionals and researchers to focus more on individuals who might not prioritize their periodontal health in daily life.

Although it might not always directly diminish OHQoL, the progression of periodontal disease can lead to tooth loss, significantly impacting quality of life, particularly among older adults. Therefore, the broader implications of periodontal health on individuals' well-being, including its indirect effects, are critical to acknowledge and understand, highlighting the complex relationship between periodontal disease and oral health's role in overall life quality.

Mariotti and Hefti (2015) also confirmed the above since they stated that society's understanding of health and disease is ever-evolving with new scientific insights, yet personal beliefs about health are also shaped by culture, social norms, and individual values. Thus, defining health requires considering these varied perspectives, especially for conditions like periodontal health and should be assessed based on its characteristics and impacts.

Nordenfelt (2007), on the other hand, proposes that health should be judged by an individual's ability to achieve their essential daily goals within their cultural context. For example, someone with controlled gingival recession who can eat without pain and is not troubled by their appearance may be deemed periodontally healthy, having a good quality of life. This perspective is similar to what the older adults stated when responding to the OHIP-14 questions as evidenced in the significant results obtained in this research study.

Nisten & McKenna (2020) also argued that quality of life is subjectively evaluated by individuals based on their social and cultural context, aspirations, and concerns, and is linked to well-being. This assessment is influenced by a mix of physical and mental health, personal beliefs, social relationships, and environmental conditions, necessitating a tailored approach for accurate measurement. This approach highlights how personal experiences and expectations can affect perceptions of life quality among people with similar health conditions.

Incorporating oral health, the Oral Health-Related Quality of Life (OHRQoL) framework has shifted dental focus from merely clinical outcomes to a broader, patient-centred perspective over the past two decades. This perspective recognizes that optimal oral health affects more than just the absence of dental issues—it also includes functional, psychosocial, and social aspects, crucial for evaluating its overall impact on an individual's life.

8.1.4.2.1 Negative Correlation with Awareness

Therefore, in this research study, results showed there was a lower level of oral health awareness which was correlated with higher debris scores, bleeding scores and worse PPDs, although there was a decrease in calculus accumulation overtime. This suggests that individuals' subjective perceptions of their oral health can often misalign with their clinical reality.

8.1.4.2.2 Psychosocial Well-being

An interesting correlation emerged between higher Psychosocial OHIP-14 scores, as measured by the Oral Health Impact Profile-14 (OHIP-14), and poorer periodontal outcomes. This highlights the Psychosocial dimension of oral health, suggesting that mental well-being is closely linked to oral health status.

8.1.4.2.3 Predominant Clinical Parameters

The study identified PPDs, bleeding scores, and calculus index scores as predominant KPIs for assessing the oral health of older adults. These indicators not only reflect the immediate condition of oral health but are also predictive of potential future systemic health issues.

8.1.4.3 Acceptance or Rejection of the Null Hypothesis: OHIP-14 and Oral Hygiene/Periodontal Health

Based on the comprehensive analysis presented, it is evident that the initial null hypothesis, that self-reported data, oral hygiene, and periodontal indices do not

necessarily reflect the impact of poor oral hygiene on the quality of life of older adults, **can be accepted.**

The null hypothesis **can be accepted** because although the self-reported data collected from OHIP-14 questionnaires is definitely an important tool to obtain the perceptions of older adults regarding their quality of life, the research identified a negative correlation between oral health awareness and clinical oral health outcomes, suggesting a misalignment between individuals' perceptions and their actual oral health status. The findings reveal a complex interaction between perceived quality of life and oral health status, with significant results showing that older adults may perceive their quality of life as unaffected by oral health issues, despite clinical indicators suggesting otherwise.

Therefore, arguments which have been brought forward by Mariotti and Hefti (2015), Nordenfelt (2007) and Nisten & McKenna (2020) further enrich our understanding of oral health's role in overall well-being, advocating for a broad definition that includes functional, psychosocial, and social aspects. The significant results of this study, alongside the perspectives of Nisten & McKenna (2020), advocate for an Oral Health-Related Quality of Life (OHRQoL) paradigm that emphasizes the substantial effect of oral health on an individual's life, urging dental professionals to adopt a patient-centric model that exceeds mere clinical assessments.

In light of the authors' statements, there is a need for a multidimensional approach to oral health care that recognizes the complex relationship between oral health and quality of life, advocating for interventions that are mindful of the broader functional, psychosocial, and social impacts of oral health conditions.

8.1.4.4 Trends and Key Findings: Oral Hygiene, Periodontal Health, Medications and KPIs

In the exploration of the relationship between medication intake, periodontal health, and the effects of poor oral hygiene, this study delved into the relationships that emerge at the connection of pharmacological impacts and oral health parameters. Central to this study was the null hypothesis stating that self-reported data, oral hygiene, and periodontal indices might not accurately reflect the influence of poor oral hygiene on the effects of medication. The data findings from the research offer insightful revelations and a basis for concluding on this hypothesis.

8.1.4.4.1 Clinical Parameters and Medications

On average, participants have 3.8 medical conditions each, with a median of 4. This suggests a relatively even distribution of the number of conditions per individual, indicating that most participants have around 3 to 4 medical conditions.

The average number of medications taken by participants is 8.6, with a median of 9. This higher median compared to the mean suggests a slightly right-skewed distribution, indicating that a larger number of participants might be taking a higher number of medications, but there is still a substantial proportion of the population taking fewer medications.

Both the average and median number of dry mouth-inducing medications taken by participants are 4. This uniformity in the mean and median indicates a symmetric distribution, suggesting that most participants are taking around 4 medications that could potentially cause xerostomia.

The significant results obtained when medications were correlated with clinical

parameters, demonstrated a unique inverse correlation between the number of medications taken and PPD in the upper right sextant, suggesting that an increase in medication usage could potentially lead to shallower periodontal pockets. This outcome deviates from the anticipated direct correlation observed across other oral health parameters such as bleeding, CAL, recession, debris, calculus, and overall OH.

These latter parameters displayed a direct correlation with the number of medications, particularly those inducing xerostomia, thus indicating a worsening of oral health conditions with an increase in medication intake. The study highlighted the dual role of medication in oral health, with some medications exacerbating conditions like xerostomia, which in turn worsened clinical parameters.

Conversely, certain medications appeared to mitigate specific oral health challenges, highlighting the important impact of pharmacotherapy on oral health. When a multivariate analysis was conducted, the following KPIs were identified. Medication use was associated with higher medication counts correlating with greater improvements in BPE Score 2.

One of the reasons that periodontal depth scores reduced over time, might be the result of gingival overgrowth which could give false pocket depths when these were being measured. Another reason might be that certain medications for systemic diseases taken by older

adults, as suggested by Ryan, M.E. (2005), might act as host modulatory treatments aiming at reducing tissue damage by inhibiting the harmful aspects of the host's response to the bacterial infection. By modulating these responses, the treatments can help manage periodontal disease and potentially reduce its impact on systemic health conditions, given the established links between periodontal disease and systemic

diseases such as cardiovascular disease, diabetes, and osteoporosis (Grusovin 2019; Mariotti and Hefti 2015; Ryan, M.E., 2005). These approaches are considered adjunctive to conventional periodontal treatments, such as scaling and root surface debridement, and aim to enhance treatment outcomes by addressing the underlying pathophysiology of the disease at the systemic level.

As stated by Grosovin (2019), xerostomia, or dry mouth syndrome, despite being subjectively reported, has been closely linked to an increased risk of dental caries, especially among older adults due to existing periodontal pockets which expose root surfaces. The medication-induced xerostomia heightens the susceptibility to root caries, complicating the oral health landscape for individuals on multiple medications. This condition, often a side effect of a wide array of drugs including antidepressants, anticholinergics, and antihistamines, underlines the relationship between medication use and oral health outcomes.

Mariotti and Hefti (2015) , also claimed that beyond xerostomia, the study also sheds light on other medication-related oral health impacts such as gingival overgrowth and oral lichenoid reactions, with specific medications identified as common contributors to these conditions. The comprehensive examination of these effects reveals the multifaceted nature of medication impacts on the periodontium, emphasizing the importance of holistic dental care that considers the systemic medication profiles of patients.

8.1.4.5 Acceptance or Rejection of the Null Hypothesis: Medications and KPIs

In conclusion, the evidence gathered from this study challenges the initial null hypothesis, demonstrating that self-reported data, or rather in this case, data gathered

from medical histories of older adults regarding their medications and medical conditions and oral hygiene, and periodontal indices, do indeed reflect the effects of poor oral hygiene on the outcomes of medication use. The direct and inverse correlations observed among the study parameters provide empirical **support for rejecting the null hypothesis.**

This research underscores the critical need for dental professionals to adopt an integrated approach to patient care, one that acknowledges and addresses the complex dynamics between medication intake, periodontal health, and the broader implications of oral hygiene practices. The findings advocate for a heightened awareness and proactive management of the oral health impacts of systemic medications, ensuring that dental care strategies are responsive to the diverse needs of patients navigating the interrelated spheres of medication use and oral health.

8.1.4.6 Trends and Key Findings: Oral Hygiene, Periodontal Health and Systemic Disease and KPIs

The link between oral hygiene and overall health in older adults has been widely studied, highlighting how oral health can affect general health. According to Lim, Glendale et al. (2020), bacteria from focal infections can spread within the body, leading to research on the relationship between dental sepsis and endocarditis. Scannapieco (2013) noted that systemic health and periodontal health are intricately connected through factors like inflammation and immune responses, which can disrupt periodontal health. Conditions such as diabetes, immunosuppression, and genetic disorders are linked to poor periodontal health, affecting both hard and soft dental structures.

Older adults face complex health issues, including neurological, cardiovascular, and endocrine disorders, complicating their health management. This discussion examines the relationship between oral hygiene, periodontal health, and overall health in older adults, challenging the null hypothesis that self-reported oral hygiene data and periodontal indices do not reflect general health impacts. Statistical data and trends in older adults with various medical conditions are analyzed to explore these potential links.

Older adults often suffer from multiple health conditions, with a mean and median of four systemic diseases. Kapila (2021) and Pirih et al. (2021) provided substantial evidence of the connection between periodontal health and overall health, particularly noting the association between periodontitis and systemic conditions like metabolic syndrome.

8.1.4.6.1.1 Gender and Ward-Specific Observations

Significant results related to the prevalence of diseases by gender and the type of ward feature the importance of related factors in the health outcomes of the older adults participating in this research study. Respiratory and neurological disorders show varying prevalence based on the ward type, suggesting the influence of environmental and care-related factors on health status.

8.1.4.6.1.2 Gender and Disease Prevalence

Difference by Gender: The analysis revealed notable findings in the prevalence of several diseases based on gender. Specific conditions showed statistically significant results ($p < 0.005$): renal, neurological, mental, gastrointestinal, musculoskeletal, dermatological, and ophthalmic conditions, which are all more common in females. When a multivariate analysis was carried out, patients in female and mixed wards exhibited smaller changes in debris indices compared to those in male wards.

8.1.4.6.1.3 Ward Type and Ward Group Impact on Disease Prevalence

Difference by Ward Type: Disease prevalence also varied significantly with the type of ward ($p < 0.005$). Respiratory conditions were notably higher in non-dementia wards, while neurological and mental diseases were more prevalent in dementia wards. Hematological and dermatological conditions also showed a higher occurrence in non-dementia wards.

Differences by Ward Group: The prevalence of specific medical conditions ($p < 0.005$) varied between ward groups. Endocrine disorders and renal conditions were more prevalent in the study group, whereas hepatic conditions were more common in older

adults from wards that were eventually dismantled. Mental problems and dermatological conditions showed a higher prevalence in the control group.

8.1.4.6.1.4 Cardiovascular Disease Correlations and KPIs

Older adults experienced a worsening of risk factors in this particular population. Higher values of the risk factors such as high blood pressure and cholesterol levels, are typically associated with an increased risk of developing cardiovascular diseases. This indicates that there is a higher prevalence or incidence of these diseases within the population of older adults having increased recession in the lower left sextant.

The median gingival bleeding score of 0.96 in older adults without cardiovascular disease, compared to 0.00 in those with cardiovascular disease, suggests an interesting association. This indicates a potentially higher prevalence or severity of gingival bleeding in older adults without cardiovascular disease.

The finding that older adults without cardiovascular disease have higher median scores for gingival bleeding (0.96) compared to those with the disease (median of 0.00) contrasts with established research. According to Cesar de Oliveira et al., (2010), markers of low-grade inflammation, like those seen in periodontal disease, increase cardiovascular risk. This is supported by Slade, GD et al., (2003) and Loos, BG et al., (2000), who noted that periodontal disease elevates inflammatory biomarkers such as C-reactive protein, typically linked to higher cardiovascular risk.

Another potential explanation, as explained in paragraph 7.1.5.3.1, might be that the evaluation of Ryan, M.E. (2005), that medications for systemic diseases commonly prescribed to older adults could serve as host modulatory treatments, is valid. These

treatments work by mitigating tissue damage through the suppression of detrimental responses to bacterial infections. By modulating these reactions, such medications could help control periodontal disease and diminish its influence on systemic health issues, including cardiovascular diseases, given the known connections between periodontal and systemic diseases.

Medications that can modulate the inflammatory processes or the bacterial environment in periodontal disease could potentially reduce the disease's severity or progression. By doing so, they might also lessen the impact on systemic health issues, which could be particularly beneficial given the inflammation and bacteria associated with periodontal disease have been implicated in exacerbating systemic conditions like cardiovascular disease.

This is a valuable area of research because controlling periodontal disease not only improves oral health but could also be a crucial step in managing or preventing associated systemic conditions.

8.1.4.6.1.5 Respiratory Disease and KPIs

There is an increase in median debris index among older adults with respiratory conditions. This implies a potentially poorer OH in this group compared to those without respiratory disease. Scannapieco and Mylotte (1996) describe that there is a link between periodontal disease and the development of bacterial pneumonia, suggesting that oral hygiene impacts bacterial colonization of the oropharynx. A. Ishikawa, et. al. (2008) showed that weekly professional oral care by health professionals in long-term residences for older adults significantly reduced or eliminated oropharyngeal

microorganisms. This care included brushing teeth and dentures, cleaning the tongue, and oral mucous membranes. They emphasized that regular professional oral cleaning is crucial for preventing aspiration pneumonia in dependent older adults.

The decrease in median bleeding index among older adults with respiratory disease compared to those without suggests a potential protective effect of respiratory conditions due to medications, as explained for cardiovascular diseases, on gingival health.

8.1.4.6.1.6 Endocrine Conditions

There is an increase in median debris index, therefore in plaques scores, in the upper right and left sextants among older adults with endocrine conditions, namely diabetes. The oral hygiene index, therefore the sum of the debris index together with the calculus index also increased in the group of diabetic older adults. This shows that there is poorer OH in the group with disease compared to those who do not suffer from diabetes. Comisso et al., (2011) assert that gram-negative bacteria in the biofilm found in the subgingival areas interact with the host's immune system. This interaction leads to the release of various inflammatory cytokines, chemokines, and other intermediaries, ultimately resulting in the degradation of the dental supporting tissues. The situation is exacerbated by additional factors like diabetes. The multivariate analysis indicated that patients with endocrine diseases exhibited smaller improvements in their oral hygiene index scores from the first visit to the third visit, suggesting that the systemic conditions may limit oral health progress despite interventions.

8.1.4.6.1.7 Neurological Disorders

The mean value of the number of mobile teeth and the percentage of mobile teeth, together with the median of BPE in the third sextant increased in older adults with neurological disorders when compared to older adults with no neurological disorder. Nascimento et al., (2019) identify periodontitis as an oral inflammatory condition that may lead to systemic low-grade inflammation, potentially affecting neuroinflammation. This has prompted numerous epidemiological investigations into the possible connection between periodontitis, neurological disorders such as migraines (Mohammed et al., 2023) and other cognitive disorders like dementia. The evidence currently points to a correlation between periodontitis and cognitive decline (Lauritano et al., 2019; Kisely, S., 2016). Addressing chronic periodontitis is vital for minimizing bacterial sources that increase proinflammatory cytokine levels and which can potentially lead to loss of periodontium, loss of teeth and poor quality of life.

8.1.4.6.1.8 Haematological Diseases

The median of change of total calculus index in the lower arch was 0.50 in older adults with no haematological disease when compared to 2.0 in older adults with haematological disease. This indicates that older adults with haematological disease tend to have more calculus accumulation in the lower mandibular arch. Sudhakar, U. et.al. (2020), discuss how periodontitis triggers not only local inflammation but also mirrors systemic conditions like diabetes and hypertension, which could lead to total loss of teeth and their supporting structures. They note that less common haematological disorders also significantly affect periodontal health, altering treatment effectiveness due to impacts on wound healing and infection susceptibility. Key drivers

of periodontitis include dental plaque, calculus and bacterial colonization, leading to progression from gingivitis if untreated (Sudhakar, U. et. al. 2020). Therefore, it is important that oral debridement to remove calculus which is a plaque retentive factor is imperative to avoid haematological complications and to reduce loss of periodontal structures.

8.1.4.6.1.9 Gastrointestinal Conditions

The median of change of total calculus index in the upper maxillary arch was 1.0 in older adults with no gastrointestinal conditions when compared to older adults with gastrointestinal disease who exhibited a median of 0.0. Therefore this result indicates that older adults with no gastrointestinal disease potentially do not accumulate calculus on teeth in the maxillary arch.

Gheorghe et. al. (2022) and Lam et. al. (2023) note that periodontal disease is now a well-recognized oral condition. This disease causes chronic inflammation damaging gums, bones, and ligaments around teeth, potentially leading to tooth loss and systemic inflammation if untreated. The links between periodontal and liver diseases might involve shared inflammatory mediators, while connections with gastrointestinal cancers such as gastric tract cancers could be due to bacterial factors.

Periodontal disease also associates with gastrointestinal conditions like inflammatory bowel disease (IBD) and colorectal cancer, although the precise mechanisms are not fully understood. Recent studies suggest a complex, possibly non-linear interaction between the oral microbiome and other body microbiomes, involving many unknown immune factors (Gheorghe et. al. (2022) and Lam et. al. (2023). Therefore, as in previous systemic situations, oral hygiene and periodontal health are imperative to avoid these

systemic complications. The multivariate analysis showed that gastrointestinal diseases were associated with a significant increase in the calculus index in the upper arch, underscoring the role of systemic health in shaping oral outcomes.

8.1.4.6.1.10 Dermatological conditions

On the contrary to the majority of previous results where clinical parameters of older adults suffering from disease, resulted into higher clinical parameter scores, older adults suffering from dermatological conditions exhibit low bleeding indices when compared to older adults who do have dermatological conditions. Older adults having dermatological issues exhibit less debris, and thus plaque accumulation, when compared to older adults who do not have these conditions.

The multivariate analysis indicated that patients with dermatological conditions experienced debris index differences across multiple sextants and increased bleeding in the upper anterior sextants.

These findings contrast well with what Kiernan, O'Connor, Ryan, & Murphy (2023) state that poor oral hygiene is a significant risk factor for systemic diseases and decreased quality of life. People with inflammatory skin and joint conditions often suffer from more oral discomfort, dry mouth, and gum disease than those without such conditions. The World Health Organization defines oral health as the absence of oral pain, cancers, infections, gum diseases, tooth decay, and other issues that affect one's ability to bite, chew, smile, speak, and maintain social well-being.

Oral health is crucial for overall well-being, and its degradation can significantly affect one's quality of life. Patients with conditions like psoriasis, rheumatoid arthritis, and systemic lupus erythematosus frequently face oral health issues that adversely affect their life quality. Adverse effects such as ulcers and mucositis from immunomodulatory treatments further underscore the need for regular oral health checks. Clinicians must

be vigilant about the oral health risks in these patients and engage dental professionals early in managing severe inflammatory diseases (Kiernan, O'Connor, Ryan, & Murphy, 2023)(Kiernan, O'Connor, Ryan, & Murphy, 2023)(Kiernan, O'Connor, Ryan, & Murphy, 2023).

8.1.4.7 Acceptance or Rejection of the Null Hypothesis: Systemic Diseases and KPIs

The data and trends discussed challenge the null hypothesis by demonstrating that oral hygiene and periodontal indices can, in fact, serve as meaningful reflections of the general health status of older adults patients. Therefore, the null hypothesis 'Self-reported data, oral hygiene and periodontal indices do not necessary measure the effects poor oral hygiene has on general health of older adults patients,' **has been accepted**. The statistical significance and observed correlations across various medical conditions and oral health indicators suggest a relationship that **warrants further investigation**. Although some results obtained, were not as predicted, this does not mean that daily oral care to remove plaque and plaque retentive factors is not necessary to avoid periodontal destruction and systemic complications.

The findings reinforce the necessity for integrated care approaches that consider oral health as a critical component of general health management for the older adults. Utilising KPIs and addressing oral health, not only involves direct dental care, but also understanding its potential impact on managing and preventing systemic health issues.

8.1.5 Oral health education does not improve oral health as measures by oral hygiene indices (Null Hypothesis 4).

The discussion derived from the null hypothetical statement "Oral health education does not improve oral health as measured by oral hygiene and periodontal indices," necessitates a complex exploration, including demographic trends, clinical parameters (KPIs), and manpower dynamics within a research setting, such as SVPR. Through a thorough analysis of survey results among staff and older adults, this discourse aims to ascertain the validity of the null hypothesis in question.

8.1.5.1 Trends and Key Findings: Education, Interventions and KPIs

The demographic analysis reveals a diverse workforce involved in the care of older adults, with a significant representation from administrators, health carers, and nurses. The predominance of non-oral health professionals underscores a potential gap in specialized oral health knowledge and points out the importance of targeted educational programs for all caregiving staff on a continuous basis. The age and gender distribution among the staff, suggest varied exposure and attitudes toward oral health practices, which may influence the effectiveness of oral health education initiatives.

8.1.5.1.1 Gender Disparities in Oral Health Practices

Gender-based analysis uncovers significant disparities in oral hygiene practices and perceptions between male and female staff members. Men reported better dental health and less frequent brushing habits compared to women, echoing findings from literature that suggest gender differences in oral health behaviors (Newton & Asimakopoulou, 2017; Lipsky et al., 2021). This discrepancy highlights the need for

gender-sensitive approaches in oral health education to address specific behaviors and attitudes.

8.1.5.1.2 Ward-Specific Oral Health Trends

Investigation by ward type reveals differences in oral hygiene practices, with dementia wards exhibiting particular challenges. Staff in dementia wards reported a higher emphasis on pre-breakfast brushing, potentially due to structured routines within the wards for both staff members and older adults. However, the overall higher prevalence of gingival bleeding and a notable demand for oral health education among non-dementia ward staff suggest varying levels of oral health awareness and practices across ward types. This indicates a need for ward-specific oral health education programs that account for the unique challenges and routines encountered in different care settings.

8.1.5.1.3 Professional Group Analysis

Differences in oral health practices and attitudes were also evident across professional groups, with Allied Health Professionals reporting fewer mouth-related problems and a greater adherence to preventive dental visits compared to their counterparts in nursing and medical fields. This suggests that oral health education and practices may benefit from an interdisciplinary approach, leveraging the knowledge and behaviors of different professional groups to foster a comprehensive oral health culture within care settings as recommended by Parveen, S., et al., (2023) that even medical practitioners' understanding and practices linking oral to systemic health, especially concerning periodontal disease, ranged from low to moderate. The research emphasized that webinars are effective in improving their knowledge and practices in this field.

8.1.5.1.4 Influence of Professional Roles on Oral Health Education

Further exploration into Professional Group I (comprising administrators, nurses, and carers) revealed significant variances in toothbrushing frequency, technique, and sources of oral hygiene information. This suggests that professional roles may influence oral health practices and the receptiveness to oral health education, underscoring the importance of role-specific oral health education strategies that cater to the distinct needs and influences of each professional group.

8.1.5.2 Education Interventions within the Research Studies

Despite educational interventions, the oral hygiene and periodontal health of older adults still showed deterioration over a period of two and a half years. This highlights that a single educational moment is insufficient and that continuous and ongoing oral health education and promotion are necessary to maybe bring about a behavioural change.

The demographic analysis of the workforce caring for older adults shows a diverse group including administrators, health carers, and nurses. The prevalence of non-oral health professionals in this workforce emphasizes a potential lack in specialised oral health knowledge and stresses the need for targeted, ongoing educational programmes for all caregiving staff.

Gender-based analysis reveals notable differences in oral hygiene practices and perceptions between male and female staff members. Men reported better dental health but less frequent brushing than women, reflecting the gender differences in oral health behaviors identified in previous studies. This disparity underlines the importance

of gender-sensitive approaches in oral health education to address specific behaviors and attitudes.

Investigations into ward-specific oral hygiene practices show that dementia wards face unique challenges, with staff emphasizing pre-breakfast brushing due to structured routines. However, the higher incidence of gingival bleeding and the demand for oral health education in non-dementia wards indicate a variability in oral health awareness and practices across different ward types. This calls for ward-specific oral health education programmes tailored to the unique challenges and routines of each care setting.

Further analysis across professional groups shows that Allied Health Professionals report fewer oral health problems and a higher adherence to preventive dental care than their nursing and medical peers. This suggests that oral health education and practices could benefit from an interdisciplinary approach, using the diverse knowledge and behaviours of different professional groups to create a comprehensive oral health culture within care settings.

Exploring Professional Group I, which includes administrators, nurses, and carers, revealed significant differences in toothbrushing frequency, technique, and sources of oral hygiene information. This variation suggests that professional roles significantly influence oral health practices and openness to oral health education, highlighting the need for role-specific oral health education strategies that address the unique needs and influences of each professional group.

Wulandari. P. et al., (2022) observe that in their research they found no significant link between education level and the severity of periodontitis in their study group. Meanwhile, Batchelor P. (2014) emphasizes the importance of using instruments that can measure the impacts of the disease and monitor changes over time. He points out that dental health education, a common intervention, must be repeated and reinforced annually to ensure its effectiveness.

Despite the lack of a direct correlation between education level, educational interventions and periodontitis severity, the need for ongoing education in dental health highlights its role in potentially mitigating the impact of such diseases, suggesting that continuous educational efforts are crucial in promoting better oral health outcomes.

8.1.5.3 Acceptance or Rejection of the Null Hypothesis: Oral Health Education and KPIs

Despite the noted disparities in oral health practices and education across gender, ward types, and professional groups, the findings in this research study **does accept the null hypothesis** that oral health education does not improve oral health as measured by self-reported data, oral hygiene and periodontal indices. Although education is critical, its effectiveness may be contingent upon addressing the needs of different demographics, professional roles, and care settings and also upon **continuous and regular effective oral health education** provided for staff members and older adults. Tailored, comprehensive oral health education programmes aimed at these diverse factors, are imperative for improving oral health outcomes among both caregivers and older adults in care settings like SVPR.

In conclusion, this analysis sheds a light on the diverse nature of oral health education and its potential impact. It emphasises the importance of a tailored long term, regular and reinforcing approach to oral health education that including demographic trends, professional dynamics, and the specific needs of care environments to effectively improve oral health, daily oral care and gingival and periodontal health outcomes.

8.1.6 Self-reported data, Oral Hygiene and Periodontal Indices cannot be used as key performance indicators in a long term facility for older adults (Null Hypothesis 5).

Demographic Profile Analysis

This discussion incorporates all prior discussions about whether clinical parameters tested for potential use as key performance indicators (KPIs) can actually be utilized effectively. This discussion also reflects the objective of this research study. Specifically, it explores the assertion that "Self-reported data, Oral Hygiene, and Periodontal Indices cannot be used as KPIs in long-term facilities for older adults."

Drawing on insights from this longitudinal research study which was conducted at St. Vincent de Paul, which included an analysis of demographic profiles, gender-based results, differentiation by ward type, educational level comparison, three clinical assessments over a period of two and a half years, an examination of oral health quality of life, and oral health education and promotion interventions including the participation of the Clinical Director at SVPR, the discussion provides a comprehensive evaluation of these metrics' effectiveness as KPIs for assessing oral health among older adults.

The demographic analysis highlighted the importance of considering various factors such as gender, education level, and cognitive health when evaluating poor oral hygiene and periodontal disease and their impact on the quality of life. The findings reveal a diverse participant profile, with a majority having limited education and retaining their natural teeth. The use of the OHIP-14 questionnaire at two different times provided

valuable longitudinal data on oral health's impact on life quality, revealing how perceptions can change over time.

Clinical parameters as Key Performance Indicators (KPIs)

The study's findings challenge the initial null hypothetical statement, 'Self-reported data, Oral Hygiene, and Periodontal Indices cannot be used as KPIs in long-term facilities for older adults', by demonstrating the utility of oral hygiene and periodontal indices as effective KPIs. Significant changes in various clinical parameters, including missing teeth, mucosa and denture hygiene, plaque, calculus and oral hygiene index scores, PPDs, recession and CAL and bleeding scores, highlight the deteriorating periodontal health trend among the older adult population.

Leroy et al., (2010) discuss the significant obstacles faced in periodontal studies due to inconsistent definitions and methods used across different research projects. This inconsistency hinders the ability to effectively compare findings and determine risk factors. The authors found that a majority of the studies lack precise definitions and methods for measuring periodontitis. They argue for the need to develop standardized criteria for defining and measuring periodontitis in studies, which should include sensitivity to different clinical indicators like pocket depth, attachment loss, and bleeding upon probing. These clinical parameters were included in this research study and significant results were obtained.

They also highlight the necessity for rigorous training, calibration and standardization of examiners and measurement instruments to enhance data reliability and comparability.

Calibration of clinical examiners was held prior to the research study, as highlighted in the methodology chapter 2.

Accurate data collection in epidemiology is crucial for managing periodontal health and diseases, pinpointing at-risk groups, assessing treatment efficacy, and planning healthcare resources. Such data also facilitate understanding of how risk factors for periodontitis interact, the relationship between periodontal and systemic health, and the impact of periodontal conditions on quality of life. These parameters in this research study have also been considered and included.

Page and Eke (2007) identified CAL and probing pocket depth as key markers for periodontal disease epidemiology. CAL indicates historical disease presence, while probing depth more accurately reflects current disease status. Other signs like bleeding on probing are also important for a comprehensive assessment. These specific clinical parameters have been used to identify periodontal disease and be used as key performance indicators.

Atassi et al., (1992), Keagle et al., (1989), and Larsen et al., (2009) pointed out several limitations in using periodontal probes for measuring probing depth and attachment loss, such as variability in penetration due to inflammation, probe tip characteristics, and probing force. These factors can introduce significant inconsistencies in data, complicating the achievement of uniform and reliable research outcomes. These aspects can be considered as study limitations.

Leroy, Eaton, & Savage (2010) criticized the Community Periodontal Index of Treatment Needs (CPITN) for its limitation to only a few teeth per examination, which may not

accurately reflect the full extent of periodontal health or disease in the mouth. In this research study, the Basic Periodontal Examination index did not yield very significant results.

The reason for this might be due to the fact that, as stated by the same authors, The CPITN index, designed to rank the stages of periodontitis, assumes that more severe conditions like deeper pockets should coexist with symptoms like calculus and bleeding. However, this assumption has been contested by multiple studies. Research in Norway showed that 30% of teeth with calculus did not bleed, and 25% of those with both deep pockets and bleeding had no calculus. In Japan, about half of the cases scored for calculus showed no bleeding. Similarly, findings from Hong Kong also demonstrated cases of calculus without bleeding or pockets, challenging the CPITN's accuracy in linking these conditions. Furthermore, the CPITN fails to consider tooth mobility or attachment loss, highlighting further limitations of this index.

Savage et al., (2009) suggested that an ideal periodontal index should be simple, objective, and have clearly defined categories to ensure effective categorization of conditions. The index should be both valid, with high sensitivity and specificity, and reliable, able to consistently produce accurate results and detect changes in the condition. It should also be comfortable for patients and efficient in terms of the time required for assessments. This is the reason why Greene and Vermillion (1964) was considered to measure the debris, calculus and oral hygiene index score.

Periodontal health was further examined through the Basic Periodontal Examination and the Community Index of Periodontal Treatment Needs Probe (CPITN), both

endorsed by the British Society of Periodontology. However, a more detailed assessment was performed for all participants, irrespective of the BPE score, using the 6-point Periodontal Chart with a University of North Carolina (UNC-15) Periodontal Probe, which measures PPDs, recession, and CAL. Bleeding on probing was recorded using the Sulcus Bleeding Index Score, employing a CPITN probe with a 0.5mm diameter tip, as pioneered by Muhlemann & Son in 1971. Tooth mobility was assessed with the metallic handles of two mouth mirrors, based on the method by Grace and Smales in 1989, and furcation involvement was checked using Naber's Furcation Probe following Glickman's guidelines from 1979, with results charted on the 6-point pocket chart.

These clinical parameters and therefore KPIs were instrumental in identifying the need for targeted interventions and evaluating the effectiveness of oral health promotion initiatives. Despite the study group not showing improved outcomes, the use of these indices facilitated a detailed assessment of periodontal health and the factors influencing it, such as ward type, cognitive health, and intervention effectiveness.

8.1.6.1 Acceptance or Rejection of the Null Hypothesis: Oral Health Education and KPIs

The research conducted at St. Vincent de Paul provides **compelling evidence supporting the use of oral hygiene, and periodontal indices as valuable KPIs in long-term care facilities for older adults.** These indicators not only reflect the multifaceted nature of oral health challenges faced by this demographic but also offer insights into improving care delivery and outcomes.

Despite the complexity of addressing oral health challenges in older adults, the study underscores the necessity of implementing KPIs to effectively monitor and enhance the

quality of oral health care in long-term settings. Therefore, the null hypothesis, **‘Oral Hygiene, and Periodontal Indices’** cannot be used as KPIs in long-term facilities for older adults’ **was rejected**. By recognizing and addressing the gaps in service delivery, facilities can make significant strides toward achieving their oral health objectives, ultimately improving oral hygiene, periodontal health and the quality of life for older adults under their care, by using clinical parameters utilized in this study as Key Performance Indicators. However in this study there is **no evidence on self-reported data** which is supported by the research findings.

8.2 Recommendations

The objective of this research was to determine if self-reported data, oral hygiene, and periodontal indices can serve as key performance indicators in long-term care facilities for older adults. Based on the study's findings, discussions and conclusions, the following recommendations have been developed.

8.2.1 Pivotal Role of Daily Oral Care in Long-Term Care Facilities

Addressing daily oral care and promoting oral health in long-term care facilities is pivotal for maintaining the well-being of residents. It is essential to focus on regular oral hygiene routines to ensure the long-term health of individuals in these facilities. Implementing consistent and thorough oral care practices can contribute significantly to the overall health and quality of life of residents residing in long-term care settings.

8.2.2 Strategic Implementation of Oral Care Programs in Long-Term Care Settings

It is also imperative to instill daily oral care practices in long-term care facilities, establish comprehensive strategies for both staff and older adults. Develop policies requiring organizational support to encourage active participation in oral care. Integrate oral care into Standard Operating Procedures and use consistent reminders through memos to emphasize its importance and consequences of neglect. Initiate educational campaigns and training programs to engage staff and older adults in maintaining daily oral hygiene.

8.2.3 Enhancing Geriatric Oral Health Care Integration

Authorities at SVPR should advocate for policies that focus on evaluating and improving the oral health of older adults, making it a core component of universal health coverage and aging policies. This holistic approach will ensure that oral health care is not only accessible but also tailored to meet the specific needs of the aging population. This should be done in conformity with the policy statement of the FDI World Dental Federation, 'Oral Health for Healthy Ageing', in support of the United Nations Decade of Healthy Ageing 2021-2030.

8.2.4 Bridging Research and Practice in Oral Health for the Older adults

Oral health research should be translated into practice. This is essential for addressing periodontal disease in older adults. Bridging the gap between research findings and implementation enhances clinical practice and overall health in long-term care facilities. A comprehensive approach combining oral hygiene and periodontal indices with continuous clinical assessments, such as bleeding, debris index, calculus scores and oral hygiene index, PPDs, CAL, and recession measures, should be utilized as key performance indicators in oral health care research.

8.2.5 Integrating An interdisciplinary Approach to Holistic Health Management

Promote the integration of oral health within overall health management at SVPR through in-depth research on the impact of oral hygiene and periodontal disease on systemic health in older adults. Adopt an interdisciplinary approach involving experts in medicine, dentistry, and geriatric care to develop holistic healthcare strategies.

Emphasize policy and practice changes to make oral health a core component of health care planning and management for older adults.

8.2.6 Integrating A Holistic Approach to Oral Health and Quality of Life

Implement a multidimensional approach in dental care, blending subjective insights from self-reporting tools like the OHIP-14 questionnaire with objective clinical data. This holistic strategy recognizes oral health's broad spectrum, incorporating its functional, Psychosocial, and social aspects as crucial to understanding Oral Health-Related Quality of Life (OHRQoL). It aims to bridge the gap between individuals' perceived oral health and clinical status, promoting interventions that reflect the comprehensive influence of oral health. Highlighting a patient-centric approach, this recommendation advocates for dental care that prioritises a holistic perspective on health and well-being.

8.2.7 Integrating Medication Management into Dental Care: A Holistic Approach to Oral Health

Adopt a comprehensive patient care approach that considers the relationship between medication use, periodontal health, and oral hygiene. Increase awareness and proactive management of how systemic medications affect oral health. Tailor oral health policies to meet patients' varied needs, considering medication intake and oral health outcomes. Further research may be needed to understand and implement these strategies effectively.

8.2.8 Advancing Periodontal Health through Clinical Governance in Older adults Care

Applying oral health research to improve periodontal health in older adults is crucial. Implement a strong clinical governance framework within long-term care facilities such as SVPR. Reinforce health promotion, integrate disease prevention, and educate all stakeholders, including policymakers, administrators, health professionals, caregivers, older adults, and their families. These efforts aim to create health-promoting environments, reduce disease risk factors, and enhance the quality of life in long-term care settings.

8.2.9 Enhancing Oral Health Services with Dental Hygienists in Elder Care

According to this research study, the number of dental clinicians who participated in this study was four. This is a true reflection of how many dental professionals are employed at SVPR within the public service. There is a need for more members in the dental team. Dental hygienists should be deployed to conduct dental examinations and screenings for newly admitted residents, create preventive and periodontal treatment plans, and make appropriate referrals to dentists and other health professionals. There is a pressing need to establish care models that enhance access to dental services for older adults in long term care facilities for older adults, with the involvement of dental hygienists being particularly promising.

8.2.10 Innovative Access for Oral Health Services

Improving access to oral health services is another critical recommendation. This has been experienced by the researcher while conducting the research study. One of the

interventions had to be transporting the older adults to the dental clinic, SVPR for non-surgical periodontal therapy. However this failed to be achieved due to logistic problems. This can be solved through exploring innovative solutions such as mobile dental units to provide on-site care for frail residents in long-term care facilities.

8.2.11 Strengthening Communication and Training for Improved Oral Health Care

Enhancing communication and collaboration among stakeholders is crucial. Establish clear channels between dentists, dental hygienists, and long-term care facility managers for effective care coordination. Promote interdisciplinary education and training programs to improve collaboration among healthcare professionals. Develop specialized training in geriatric dentistry and provide ongoing education for nurses and care assistants on oral care techniques and the importance of oral health in overall well-being.

8.2.12 The Train-the-Trainer Approach to Oral Hygiene Education in Healthcare Settings

Implement an oral hygiene educational strategy using the train-the-trainer approach in healthcare settings, especially wards. A nurse, trained by a dental hygienist as the ward oral health care organizer, will teach ward assistants to serve as oral hygiene aides. This cascading method ensures widespread oral hygiene knowledge. Regular follow-up visits by the dental hygienist every six weeks reinforce training and address challenges, ensuring ongoing support. Published studies show this approach significantly improves dental and denture plaque scores within six months. Adopting this strategy is recommended to enhance oral hygiene practices and dental health outcomes.

8.2.13 Empowering Families and Caregivers in Oral Health Care Practices

Empowering family members and caregivers is another important aspect of improving oral care for frail residents. Educating LTCF staff on the importance of involving family or caregivers in oral health care routines and providing resources and support to enable them to assist with daily oral care effectively can help enhance preventative measures and overall oral health outcomes.

8.2.14 Facilitating Cross-Sector Collaboration for Comprehensive Oral Health Solutions

Finally, administrative burdens in long-term care facilities such as SVPR, should be addressed. Processes should be streamlined within dental practices and care facilities. There should be increased funding to purchase oral hygiene aides, alleviating time constraints and improving patient care. Facilitate cross-sector collaboration by advocating for policy changes that incentivize cooperation and establishing local coordinating bodies. These steps will help address oral health disparities and improve outcomes for older adults in long-term care facilities.

8.2.15 Future Directions for Enhancing Oral Health Assessment and Education in Long-Term Care Settings

An area for further research could focus on exploring the underlying factors contributing to the observed misalignment between self-reported oral health perceptions and clinical oral health outcomes. Future studies could investigate how psychological, social, and educational factors influence older adults' perceptions of their oral health, as well as the potential role of interventions aimed at improving oral health awareness and its impact on both perceived and actual health outcomes.

An area for further research could focus on exploring the discrepancies between self-reported oral health data and clinical findings in long-term care settings. Future studies could investigate the reliability and validity of self-reported data in assessing oral health outcomes, and examine whether integrating clinical parameters with self-reported measures can provide a more comprehensive understanding of oral health and quality of life in older adults.

An area for further research could involve investigating the specific mechanisms through which poor oral hygiene and periodontal indices impact the general health of older adult patients. Future studies could focus on longitudinal analysis to better understand the causal relationships between oral health and various medical conditions, as well as explore the potential benefits of integrating oral health assessments into broader health evaluations for older adults.

An area for further research could focus on evaluating the impact of tailored oral health education programs that address the specific needs of different demographics, professional roles, and care settings. Future studies could explore the long-term effects of continuous and targeted education on both caregivers and older adults, as well as investigate the most effective methods and delivery strategies to enhance oral health outcomes in diverse populations within care environments like SVPR.

8.3 Study Limitations

8.3.1 Communication Challenges with SVPR Administrators

One significant hurdle was the lack of efficient communication and timely responses from the clinical administrators at SVPR. This limitation likely hindered the smooth execution of research activities, such as obtaining critical information in a timely manner. Delays and miscommunications could have led to setbacks in research timelines and possibly affected the quality of the data collected.

8.3.2 Incorporation of Memos and Daily Oral Care in SOPs

The failure of clinical managerial authorities to incorporate memos and integrate daily oral care practices into the SOPs at SVPR presented a considerable barrier. This inaction may have affected the standardization and effectiveness of oral care practices within the facility, potentially impacting the study's intended outcomes related to improving oral care procedures over the period of study.

8.3.3 Incomplete Participant Responses

Another limitation was participants' inconsistent responses to questionnaires and interviews. Not all questions were answered by participants, which might lead to gaps in the data, potentially skewing the research findings. This incomplete data collection could limit the ability to draw comprehensive conclusions from the participant responses.

8.3.4 Challenges in Delivering Dental Health Education to Older Adults in LTCF SVPR

The attempt to conduct oral health talks for older adults at the Long-Term Care Facility SVPR faced significant obstacles. These included logistical issues stemming from the facility's extensive wards and the presence of residents who were either bedridden, dependent on wheelchairs, engaged in personal hobbies, or experiencing dementia. Additionally, a scarcity of staff members available to assist in organizing the residents added to these challenges. To mitigate these difficulties, efforts were made to provide individualized oral hygiene instructions to residents whenever possible.

8.3.5 Employee Union Concerns Over COVID-19 Resources

Complaints from employees' unions regarding insufficient access to COVID-19 swabbing centers within the facility for clinical assessments and treatment highlight a significant limitation in providing necessary health resources. This issue may reflect broader systemic challenges within the facility, affecting staff morale and possibly impacting the study's implementation within such an environment. This also hindered the clinical assessments of staff members which was planned to be included in this research project.

8.3.6 Logistical Constraints on Clinic Hours, Access and Clinical Assessments at LTCF SVPR dental Clinic

The completion of clinical assessments for staff members at the Long-Term Care Facility SVPR encountered additional logistical constraints due to the dental clinic's operating hours, which were strictly between 8:00 AM and 1:00 PM. This scheduling made it impractical to offer services beyond these times, primarily because the necessary resources and support for conducting such assessments were unavailable after hours. Consequently, the rigid clinic schedule, difficult access to transport bedridden older adults, coupled with directives from the facility's CEO against interrupting staff during

their shifts, and the staff's practical challenges in attending the clinic outside their working hours, significantly limited the study's capacity to include staff assessments within its scope.

8.3.7 Lack of Cooperation from Dental Clinic Staff

The reluctance or lack of cooperation from staff members employed at the Dental Clinic, SVPR, in coordinating appointments for older adults to access dental care services posed a critical challenge. This lack of cooperation likely complicated the logistics of ensuring that participants could attend their appointments, which could influence the study's findings related to access to dental care and conclusions regarding the impact of clinical interventions.

8.3.8 Time Constraints and COVID-19 Related Disruptions

The study faced significant time constraints due to various commitments, alongside disruptions caused by the COVID-19 pandemic, such as postponements of assessments and the dismantling of wards. The dispersion of older adult participants across different wards, not initially selected for the study, disrupted the planned study methodology. These factors collectively introduced substantial logistical challenges.

8.3.9 Challenges in Periodontal Probing: Assessing Older Adults with Clinical Limitations

Clinical assessment of periodontal health in older adults using periodontal probes presents several limitations that can affect accuracy and reliability.

- Variations in the markings on the probe tines, even within the same production batch, can differ by more than 0.5 mm, potentially leading to measurement errors.

- Inflammation at the base of periodontal pockets can decrease resistance, allowing probes to penetrate deeper than the actual pocket depth, especially when variable probing forces are applied.
- The angulation of the probe relative to the pocket wall can be challenging to maintain accurately, particularly in older patients who may be bedridden or wheelchair-bound, complicating the ergonomic requirements for precise measurement.
- The presence of dental restorations like overhangs can obstruct proper probe placement and depth measurement.
- Comparative studies have noted that even probes with identical tip shapes and diameters can differ by up to 1 mm in depth readings in minimally inflamed pockets, underscoring the inconsistencies in this assessment tool.

Chapter 9

Conclusion

9.1 Utilising Oral Hygiene and Periodontal Indices as Key Performance Indicators in Health Care Management in a Long Term Residence for Older Adults

This research study, titled ‘Self-reported Data, Oral Hygiene, and Periodontal Indices as Key Performance Indicators in a Long-Term Care Facility for Older Adults,’ investigates the factors affecting oral hygiene and periodontal outcomes at St. Vincent de Paul Residence, which housed 1,200 older adults at the time when this study was conducted. It highlights the noticeable gaps in knowledge and practices among older adults and health professionals. The findings suggest that utilising self-reported data, along with oral hygiene and periodontal indices as Key Performance Indicators, is adequate for managing oral health care in a long-term care setting for older adults.

Continuous clinical assessments can serve as Key Performance Indicators which have been thoroughly studied in this research project. The findings indicate that oral hygiene and periodontal indices offer valuable insights into the oral health status while self-reported data offer significant perspectives into the behaviours of staff and older adults. However, the effectiveness of questionnaires and interviews as standalone tools is limited, suggesting the necessity for more comprehensive clinical assessments to be included.

The research further highlights the necessity for a multidimensional approach to oral health care that recognises the complex interactions between oral health and quality of life. It suggests that while self-reported data and clinical indices offer valuable insights, they should be complemented by targeted educational interventions, gender-sensitive

strategies, attention to ward types and patient groups, and strategic manpower allocation to effectively bridge gaps in oral health care.

The multivariate analysis underscores the intricate relationship between systemic health conditions, ward-specific factors, and staff education in influencing oral health outcomes. Systemic diseases and medication use, significantly shaped periodontal indices, ward type, gender, and staff education also played critical roles. This analysis showed that the independent variables contributed to a number of dependent variables while the findings highlighted the complexity of oral health care and the need for tailored, region-specific interventions to address both systemic and localised challenges effectively.

In conclusion, the evidence obtained from this research study emphasises the need for integrating Key Performance Indicators, customised interventions, with policies and legislations. This would ensure that oral care is tailored to meet the diverse needs of the older adult population, guaranteeing accountability, regularity, and high standards of care, thus enhancing the effectiveness of oral health strategies in long-term care settings.

The recommendations in this thesis include various guidelines that can be utilised to improve oral health care. These guidelines encompass best practices, policy frameworks, and strategic approaches to ensure comprehensive and effective oral health management in long-term care facilities. By implementing these recommendations, facilities can better address the specific needs of their populations and promote optimal oral health outcomes.

Building upon this foundation, the thesis culminates by advocating for the re-evaluation and broader application of Oral Hygiene and Periodontal Indices, coupled with self-reported feedback from health professionals and the older adults themselves, as KPIs for assessing and monitoring the management and manpower performance in oral health care provision among older adults in long-term residential care facilities. The insights from demographic investigates, gender disparities, professional group dynamics, ward-specific variations, and the interactions of systemic diseases and medications provide a holistic view of the challenges and complexities in managing oral health care in such settings.

To address these challenges effectively, this research highlights the critical importance of integrating a robust ethical clinical governance framework. This framework will guide best practices and ensure the protection and promotion of oral health among this vulnerable population. The key performance indicators used in this research study suggest a deficiency in daily oral hygiene among older adults at SVPR, either due to their inability, lack of motivation, lack of assistance or lack of delegation of oral hygiene duties. The absence of regular oral care contributes to the build up of biofilms and calculus, which can accumulate plaque and eventually lead to bleeding as a result of an inflammatory process, periodontal disease and tooth loss. This deterioration in oral health significantly impacts the quality of life for older adults. It indicates that the environment at SVPR does not adequately promote the consistent oral care necessary to prevent periodontal disease and improve life quality.

Using Key Performance Indicators to track managerial and staff performance related to the oral health of older adults, monitor their daily self-care to prevent periodontal and

related systemic diseases, and implement continuous oral health education will help prioritise ethical considerations vital for promoting transparency, accountability, and ongoing improvement. At SVPR, the incorporation of self-reported data, oral hygiene, and periodontal indices aims to enhance the quality of oral care for older adults in this long-term residential care facility. This approach is imperative for ensuring that all aspects of oral health service provision adhere to the highest standards, thereby guaranteeing the best possible oral health services for this vulnerable population.

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APPENDICES

Appendix 1- Request for Approval to Conduct Research – Dean, Faculty of Dental Surgery

10/24/2018

University of Malta Mail - Request to conduct doctoral research under the auspices of the Faculty of Dental Surgery



L-Università
ta' Malta

Carmen Caruana <carmen.d.caruana@um.edu.mt>

Request to conduct doctoral research under the auspices of the Faculty of Dental Surgery

2 messages

Carmen Caruana <carmen.d.caruana@um.edu.mt>
To: "Prof. Nikolai Attard" <nikolai.attard@um.edu.mt>

17 October 2018 at 12:27

Dear Professor Attard,

Dean, Faculty of Dental Surgery
Head, Department of Oral Rehabilitation and Community Care
Acting Head, Department of Restorative Dentistry

I would like to carry out a doctoral research project at St. Vincent de Paul, Residence for older adults to determine whether oral hygiene indices can be used as key performance indicators to improve the oral hygiene status of this specific population. (Research proposal attached).

It is therefore the aim of this study to:

- Determine whether oral hygiene indices indicate that the older adults are managing oral self-care effectively and on a daily basis.
- Establish whether oral hygiene indices can be used as measuring tools to assess and monitor manpower performance.
- Determine whether oral health education does affect the results obtained from clinical assessments when using oral hygiene indices as key performance indicators.
- Evaluate whether oral hygiene indices indicate that periodontal disease has been minimised or eliminated, therefore whether the incidence of acute episodes of systemic diseases which are correlated to periodontal disease and poor oral hygiene, are lowered.

Both older adults and staff members will benefit from this study since researchers will provide oral health education programmes, clinical dental check-ups and oral hygiene/periodontal assessments and clinical treatment if necessary.

This anonymous study will not link the individual's personal data to the rest of the research findings. All data will be kept confidential and copies of the project, will only be provided to you as Dean, Faculty of Dental Surgery, University of Malta, to Dr. Josianne Cutajar, Chief Executive Officer, SVPR and to Dr. Ronald Fiorentino, Medical Director, SVPR.

I would like to ask your permission and approval to conduct this study under the auspices of the Faculty of Dental Surgery, University of Malta before submitting the proposal to the Faculty Research Ethics Committee, the University Research Ethics Committee, the Faculty Doctoral Committee and Senate Doctoral Committee.

Yours truly,

Carmen Caruana RDH, PgDip Gerontology and Geriatrics, MA Bioethics

C. Caruana RDH, PgDip Geriatrics, MA Bioethics
Assistant Lecturer
Dental Hygiene Course Co-ordinator

Department of Oral Rehabilitation and Community Care
Faculty of Dental Surgery
Medical School
Mater Dei Hospital

Office Tel No: 23401828

Nikolai J. Attard <nikolai.attard@um.edu.mt>

18 October 2018 at 08:40

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Appendix 2 - Approval from the Faculty Research Ethics Committee

From: **Simon Camilleri** <simon.camilleri@um.edu.mt>

Date: Thu, 21 Mar 2019 at 14:04

Subject: Fwd: UREC documents submission UREC-DP1901004DSG - Carmen Caruana

To: UNIVERSITY RESEARCH ETHICS COMMITTEE <research-ethics.committee@um.edu.mt>

Dear Sirs

I am submitting these documents on behalf of Ms Carmen Caruana.
FREC has vetted the documents and has no outstanding issues.

Regards

--

Simon Camilleri PhD MOrth FDS
Senior Lecturer
Department of Child Dental Health and Orthodontics
Faculty of Dental Surgery
University of Malta
Msida, Malta MSD2090

--

regards,

University Research Ethics Committee

Appendix 3 – Approval from University Research Ethics Committee

04/08/2022, 15:29

Gmail – Fwd: UREC-DP1901004DSG - Carmen Caruana

From: **University Research Ethics Committee** <research-ethics.committee@um.edu.mt>
Date: Fri, 5 Apr 2019, 18:03
Subject: Re: UREC-DP1901004DSG - Carmen Caruana
To: Sharlene Cachia <sharlene.cachia@um.edu.mt>, Nikolai J Attard <nikolai.attard@um.edu.mt>

Dear FREC Chair, FREC Secretary,

Thank you for submitting Carmen Caruana's (UREC-DP1901004DSG) revised research materials.

UREC-DP is satisfied that all the required clarifications and amendments have been carried out. Approval is therefore granted and the student may proceed with her research, on condition that the FREC ensures that she has obtained all the necessary approvals to do so.

Kind regards,

UREC-DP

<https://mail.google.com/mail/u/0/?ik=6f264a78ad&view=pt&search=all&permthid=thread-f%3A1740215996335701473&simpl=msg-f%3A1740215...> 1/2

Appendix 4 - Approval to conduct research – Dean, Faculty of Dental Surgery

10/24/2018

University of Malta Mail - Request to conduct doctoral research under the auspices of the Faculty of Dental Surgery

To: Carmen Caruana <carmen.d.caruana@um.edu.mt>

Dear Ms Caruana

You have my permission and full support to conduct your research within the university facilities.

Wishing you success in your studies.

Regards,

Prof Attard

Professor Nikolai Attard BChD. MSc. PhD
Dean, Faculty of Dental Surgery
Head, Department of Oral Rehabilitation and Community Care
Acting Head, Department of Restorative Dentistry

University of Malta Medical School
Mater Dei Hospital
Block A, Level O
B'Kara Bypass
Msida MSD2090

Tel- 00356 23401876
email: nikolai.attard@um.edu.mt
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Appendix 5 - Request for approval to conduct research – Chief Executive Officer, SVPR

10/24/2018

University of Malta Mail - Doctoral Research Project at SVPR - Carmen Caruana



Carmen Caruana <carmen.d.caruana@um.edu.mt>

Doctoral Research Project at SVPR - Carmen Caruana

Carmen Caruana <carmen.d.caruana@um.edu.mt>

11 October 2018 at 20:30

To: Cutajar Josianne at MFSS-Elderly <josianne.cutajar@gov.mt>

Cc: "Prof. Nikolai Attard" <nikolai.attard@um.edu.mt>, ronald.fiorentino@gov.mt

Dear Dr. Josianne Cutajar

Chief Executive Officer
St. Vincent de Paul Residence for Older Adults
Luqa.

I would like to carry out a doctoral research project at St. Vincent de Paul, Residence for older adults to determine whether oral hygiene indices can be used as key performance indicators to improve the oral hygiene status of this specific population. (Research proposal attached).
It is therefore the aim of this study to:

- Determine whether oral hygiene indices indicate that the older adults are managing oral self-care effectively and on a daily basis.
- Establish whether oral hygiene indices can be used as measuring tools to assess and monitor manpower performance.
- Determine whether oral health education does affect the results obtained from clinical assessments when using oral hygiene indices as key performance indicators.
- Evaluate whether oral hygiene indices indicate that periodontal disease has been minimised or eliminated, therefore whether the incidence of acute episodes of systemic diseases which are correlated to periodontal disease and poor oral hygiene, are lowered.

Both older adults and staff members will benefit from this study since researchers will provide oral health education programmes, clinical dental check-ups and oral hygiene/periodontal assessments and clinical treatment if necessary.

This anonymous study will not link the individual's personal data to the rest of the research findings. All data will be kept confidential and copies of the project, will only be provided to the Dean, Faculty of Dental Surgery, University of Malta, to you as Chief Executive Officer, SVPR and to Dr. Ronald Fiorentino, Medical Director, SVPR.

I would like to ask your permission and approval to conduct this study before submitting the proposal to the Faculty Research Ethics Committee, the University Research Ethics Committee, the Faculty Doctoral Committee and Senate Doctoral Committee.

Yours truly,

Carmen Caruana RDH, PgDip Gerontology and Geriatrics, MA Bioethics

C. Caruana RDH, PgDip Geriatrics, MA Bioethics
Assistant Lecturer
Dental Hygiene Course Co-ordinator

Department of Oral Rehabilitation and Community Care
Faculty of Dental Surgery
Medical School
Mater Dei Hospital

Office Tel No: 23401828



Oral Hygiene Indices as Key Performance Indicators 11102018.docx
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Appendix 6 - Approval to conduct research – Chief Executive Officer, SVPR

10/24/2018

University of Malta Mail - Doctoral Research Project at SVPR - Carmen Caruana



L-Università
ta' Malta

Carmen Caruana <carmen.d.caruana@um.edu.mt>

Doctoral Research Project at SVPR - Carmen Caruana

Cutajar Josianne at MFCS-SVPR <josianne.cutajar@gov.mt>

11 October 2018 at 21:25

To: Carmen Caruana <carmen.d.caruana@um.edu.mt>

Cc: "Prof. Nikolai Attard" <nikolai.attard@um.edu.mt>, Fiorentino Ronald at MFCS-SVPR <ronald.fiorentino@gov.mt>

Dear Carmen

Thank you for focusing your research on SVP. From your brief below we understand that this is an interesting and well designed study and we are happy to support it. You have my approval subject to the Data Protection Officer in our entity. Dr Fiorentino will guide you accordingly.

We will then await the outcome of your research eagerly.

Jos

Josianne Cutajar

Sent from my iPhone

[Quoted text hidden]

> <Oral Hygiene Indices as Key Performance Indicators 11102018.docx>

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Appendix 7 - Request for approval to conduct research – Medical Director, SVPR

10/24/2018

University of Malta Mail - Carmen Caruana - Doctoral Research Project



L-Università
ta' Malta

Carmen Caruana <carmen.d.caruana@um.edu.mt>

Carmen Caruana - Doctoral Research Project

Carmen Caruana <carmen.d.caruana@um.edu.mt>

11 October 2018 at 20:10

To: ronald.fiorentino@gov.mt

Cc: "Prof. Nikolai Attard" <nikolai.attard@um.edu.mt>, Cutajar Josianne at MFSS-Elderly <josianne.cutajar@gov.mt>

Dear Dr. Ronald Fiorentino

Medical Director
St. Vincent de Paul Residence for Older Adults
Luqa.

I would like to carry out a doctoral research project at St. Vincent de Paul, Residence for older adults to determine whether oral hygiene indices can be used as key performance indicators to improve the oral hygiene status of this specific population. (Research proposal attached).

It is therefore the aim of this study to:

- Determine whether oral hygiene indices indicate that the older adults are managing oral self-care effectively and on a daily basis.
- Establish whether oral hygiene indices can be used as measuring tools to assess and monitor manpower performance.
- Determine whether oral health education does affect the results obtained from clinical assessments when using oral hygiene indices as key performance indicators.
- Evaluate whether oral hygiene indices indicate that periodontal disease has been minimised or eliminated, therefore whether the incidence of acute episodes of systemic diseases which are correlated to periodontal disease and poor oral hygiene, are lowered.

Both older adults and staff members will benefit from this study since researchers will provide oral health education programmes, clinical dental check-ups and oral hygiene/periodontal assessments and clinical treatment if necessary.

This anonymous study will not link the individual's personal data to the rest of the research findings. All data will be kept confidential and copies of the project, will only be provided to the Dean, Faculty of Dental Surgery, University of Malta, to you as Medical Director, SVPR and to Dr. Josianne Cutajar, Chief Executive Officer, SVPR.

I would like to ask your permission and approval to conduct this study before submitting the proposal to the Faculty Research Ethics Committee, the University Research Ethics Committee, the Faculty Doctoral Committee and Senate Doctoral Committee.

Yours truly,

Carmen Caruana RDH, PgDip Gerontology and Geriatrics, MA Bioethics

C. Caruana RDH, PgDip Geriatrics, MA Bioethics
Assistant Lecturer
Dental Hygiene Course Co-ordinator

Department of Oral Rehabilitation and Community Care
Faculty of Dental Surgery
Medical School
Mater Dei Hospital

Office Tel No: 23401828

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Appendix 8 - Approval to conduct research – Medical Director, SVPR

10/24/2018

University of Malta Mail - Carmen Caruana - Doctoral Research Project



L-Università
ta' Malta

Carmen Caruana <carmen.d.caruana@um.edu.mt>

Carmen Caruana - Doctoral Research Project

Fiorentino Ronald at MFCS-SVPR <ronald.fiorentino@gov.mt>

16 October 2018 at 11:15

To: Carmen Caruana <carmen.d.caruana@um.edu.mt>

Cc: "Prof. Nikolai Attard" <nikolai.attard@um.edu.mt>, Cutajar Josianne at MFCS-SVPR <josianne.cutajar@gov.mt>

Ms Caruana,

Definitely no objection from my end, pending CEO approval. I am sure that this research would prove beneficial in our endeavour to provide quality dental services to older persons in residential care and also in the community.

Best wishes

Ronald

From: Carmen Caruana [mailto:carmen.d.caruana@um.edu.mt]

Sent: Thursday, 11 October 2018 20:10

To: Fiorentino Ronald at MFCS-SVPR

Cc: Prof. Nikolai Attard; Cutajar Josianne at MFCS-SVPR

Subject: Carmen Caruana - Doctoral Research Project

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Appendix 9 - Request for approval to conduct research – Data Protection Officer SVPR

10/25/2018

University of Malta Mail - Request for approval to conduct research project at SVPR (Data Protection Office)



L-Università
ta' Malta

Carmen Caruana <carmen.d.caruana@um.edu.mt>

Request for approval to conduct research project at SVPR (Data Protection Office)

1 message

Carmen Caruana <carmen.d.caruana@um.edu.mt>

25 October 2018 at 08:53

To: valerie.briffa@gov.mt

Cc: Cutajar Josianne at MFSS-Elderly <josianne.cutajar@gov.mt>, Fiorentino Ronald at MFCS-SVPR <ronald.fiorentino@gov.mt>, "Prof. Nikolai Attard" <nikolai.attard@um.edu.mt>

Ms. Valerie Briffa,
Data Protection Officer
St Vincent de Paul Residence for Older Adults

Dear Ms. Briffa,

I would like to carry out a doctoral research project at St. Vincent de Paul, Residence for older adults to determine whether oral hygiene indices can be used as key performance indicators to improve the oral hygiene status of this specific population. (Research proposal attached including approvals, information documents to participants and legal guardians and consent forms).

It is therefore the aim of this study to:

- Determine whether oral hygiene indices indicate that the older adults are managing oral self-care effectively and on a daily basis.
- Establish whether oral hygiene indices can be used as measuring tools to assess and monitor manpower performance.
- Determine whether oral health education does affect the results obtained from clinical assessments when using oral hygiene indices as key performance indicators.
- Evaluate whether oral hygiene indices indicate that periodontal disease has been minimised or eliminated, therefore whether the incidence of acute episodes of systemic diseases which are correlated to periodontal disease and poor oral hygiene, are lowered.

Both older adults and staff members will benefit from this study since researchers will provide oral health education programmes, clinical dental check-ups and oral hygiene/periodontal assessments and clinical treatment if necessary.

This anonymous study will not link the individual's personal data to the rest of the research findings. All data will be kept confidential and copies of the project, will only be provided to the Dean, Faculty of Dental Surgery, University of Malta, to Dr. Josianne Cutajar, Chief Executive Officer, SVPR and to Dr. Ronald Fiorentino, Medical Director, SVPR.

I would like to ask your permission and approval to conduct this study before submitting the proposal to the Faculty Research Ethics Committee, the University Research Ethics Committee, the Faculty Doctoral Committee and Senate Doctoral Committee.

Professor Nikolai Attard, Dean, Faculty of Dental Surgery, Dr. Josianne Cutajar, Chief Executive Officer, SVPR and Dr. Ronald Fiorentino, Medical Director, SVPR have approved my requests to conduct the research programme subject to the data protection officer's approval.

Yours truly,

Carmen Caruana

C Caruana RDH, PgDip Geriatrics, MA Bioethics

Assistant Lecturer
Dental Hygiene Course Co-ordinator

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Appendix 10 - Approval letter from Data Protection Officer, SVPR

11/8/2018

University of Malta Mail - Request for approval to conduct research project at SVPR (Data Protection Office)



L-Università
ta' Malta

Carmen Caruana <carmen.d.caruana@um.edu.mt>

Request for approval to conduct research project at SVPR (Data Protection Office)

Briffa Valerie at MFCS-SVPR <valerie.briffa@gov.mt>
To: Carmen Caruana <carmen.d.caruana@um.edu.mt>

7 November 2018 at 13:46

Dear Carmen

Kindly be informed that your request to conduct your study within SVP has been approved.

Attached please the scanned copy of the approval letter from the CEO.

I have also attached the scanned data protection form for you to fill and send back to me.

You can collect the original copy of the letter from my office as from tomorrow.

Good luck with your studies.

Regards

Valerie

From: Carmen Caruana [mailto:carmen.d.caruana@um.edu.mt]
Sent: Wednesday, 07 November 2018 11:19
To: Briffa Valerie at MFCS-SVPR
Subject: Re: Request for approval to conduct research project at SVPR (Data Protection Office)

[Quoted text hidden]

2 attachments

 **premission to conduct study General Data Protection Regulation.docx**
40K

 **Carmen Caruana.pdf**
990K

Appendix 11 - Data Protection Clearance to proceed with research study – CEO, SVPR



Saint Vincent
De Paul
caregivers have the duty

Ms Carmen Caruana
Department of Oral Rehabilitation and Community Care
Faculty of Dental Surgery
Medical School
Mater Dei Hospital

6th November 2018

Dear Ms Caruana

Reference is made to your request to conduct your research study with the title "Oral Hygiene Indices as Key Performance Indicators in a long Term Residential Care Facility for Older Adults", within St Vincent de Paul Long Term Care Facility.

I would like to inform you that after review of the study protocol presented and as per the General Data Protection Regulations you have been cleared to proceed with your research study, provided you obtain the necessary approvals from the CEO of the Residence and the University of Malta Research Ethics Committee.

Kindly contact Ms Valerie Briffa, Data Protection Officer, on telephone number 22912286 or send an e-mail to dpo-svo@gov.mt to present a copy of all your approval letters and to fill in the appropriate Data Protection Form. All medical data is to be viewed from the Records Department at SVP.

Kindly be reminded that confidentially, privacy of data and ethical considerations are to be maintained at all times and that once the research study is finalised the data gathered is to be adequately destroyed.

You are also cordially requested to submit a copy of your findings to the CEO Office at SVP at the end of your study.

Wishing you all the best in your studies.

Sincerely

Dr Josianna Cutajar
CEO
St Vincent de Paul Long Term Care Facility

Appendix 12 - General Data Protection Regulation; Declaration on Access to Resident Data, SVPR



Saint Vincent
De Paul

General Data Protection Regulation

Permission to conduct research studies within St Vincent de Paul Long Term Care Facility

All resident data at SVP is "personal data" or "special category personal data" in terms of the General Data Protection Regulation (GDPR) and Data Protection Act (DPA). Therefore access to resident data is subject to compliance with the provisions of the GDPR as well as other relevant legislation and regulations published from time to time.

The Data protection Officer may be contacted at St Vincent de Paul Long-Term Care Facility, Luqa or on telephone 22912286 or e-mail dpo-svp@gov.mt

Declaration on Access to Resident Data

I hereby declare that:

- I will respect the confidentiality and privacy of any personal data or information that I will come across during my research study at SVP and will in no circumstance disclose any such information to third parties not directly involved in my research study;
- Documentation collected will be explicitly used for the purpose of this research study and any material which would be superfluous will be adequately destroyed;
- Written consent will be obtained from the residents or their legal guardians prior to enrolling the residents in the research or for any filming, recordings, and photographs taken.
- Respect, dignity and privacy of the residents will be suitably preserved at all times;
- The integrity and privacy of the SVP Residence will be safeguarded;
- I am aware of the provisions of the General Data Protection Regulations and will abide by all SVP residence regulations.

Name of Research Study Oral Hygiene Indices as Key Performance Indicators in a Long Facility Care for Older Adults.
Signature: [Signature]
Full Name CARMEN CARUANA
ID / Passport Number 37767 (u)

Data Protection Statement: The personal data supplied on this form will be processed in accordance with the provisions of the General Data Protection Regulations

**Appendix 13 - Recruitment Letter /Information Sheet
(English and Maltese)**



**L-Università
ta' Malta**

**Oral Hygiene Indices as Key Performance Indicators
In a Long Term Residential Care facility for Older Adults**

Dear Dr/Sir/Madam,

I am conducting a doctoral research project titled, 'Oral Hygiene Indices as Key Performance Indicators in a Long Term Residential Care Facility for Older Adults.'

You are invited to take part in this research study. Before you decide, it is important that you understand why the research is being conducted and what it entails. Please take your time to read the following information carefully and discuss it with others if need be. If there is anything which is unclear, please do not hesitate to ask for more information.

1. What is the purpose of this study?

The purpose of the study is to determine whether oral hygiene indices:

- indicate that older adults are managing oral self-care effectively and on a daily basis.
- establish whether oral hygiene indices can be used as measuring tools to assess and monitor manpower performance.
- determine whether oral health education does affect the results obtained from clinical assessments when using oral hygiene indices as key performance indicators.
- evaluate whether oral hygiene indices indicate that periodontal disease has been minimised or eliminated, therefore whether the incidence of acute episodes of systemic diseases which are correlated to periodontal disease and poor oral hygiene, are lowered.

2. What if I don't want to take part in this study or if I want to withdraw later?

Participation in this study is voluntary. You are free to decide whether you would like to participate or not. This will, in no way, hinder treatment which you might seek in the future or affect your relationship with those involved in the research study or with any other member of staff within the facility. If you wish to withdraw from the study once it has started, you can do so at any time without having to give a reason. The information will be destroyed as soon as you withdraw from the study.

3. What rights do I have?

Under the General Data Protection Regulation Act (2018) and according to the national legislation, you have the right to access, rectify and where applicable erase the data concerning you.

4. What does this study involve?

If you agree to participate in this study, you will be asked to sign the Participant Consent Form. The study will involve a questionnaire which takes about ten minutes to complete and if consent is given to the researcher, oral examination/oral hygiene treatment will be conducted. Treatment sessions usually take about twenty minutes. In the case of legal guardians, the legal guardian needs to sign a consent form permitting the older adult to participate. Treatment will be administered with the assent (the wish to participate) of the older adult whenever appropriate.

5. Will I be exposed to any risks and will I benefit from the study?

You will not be exposed to any risks. The interventions in this study are educational and the clinical assessments and non-surgical periodontal therapy provided if required are common dental practices which are offered on daily basis at dental clinics to improve periodontal health. You will benefit from this study since researchers will provide oral health education programmes, clinical dental check-ups and oral hygiene/periodontal assessments and clinical treatment if necessary to improve your oral health.

6. Will taking part in this study cost me anything?

Participation in this study is free of charge.

7. What happens with the results?

If you give us your permission by signing the consent document, we plan to discuss/publish the results. In any publication, information will be provided in such a way that you cannot be identified. Strict confidentiality will be maintained on all information and the study is strictly pseudonymous, therefore the information cannot be traced back to identify the participant. The personal data will be stored separately from the research data collected and these files will be encrypted and kept on a passworded computer in a locked office, which can be accessed by Professor Nikolai Attard, who is the project supervisor and also the Dean, Faculty of Dental Surgery and by the researcher, Carmen Caruana. If you wish, results of the study will be provided to you. The data will be stored securely by Professor Nikolai Attard, Dean, Faculty of Dental Surgery, for five years and then it will be destroyed.

8. What should I do if I want to discuss this study further?

Carmen Caruana, the researcher, will discuss all the necessary information pertaining to the study with you and you may ask and discuss any queries you may have. If you would like to know more at any stage, please do not hesitate to contact her on 22912437/23401828.

Thank you for taking the time to consider your participation in this study.

If you wish to participate, please sign the attached consent form.

This information sheet is for you to keep.

Carmen Caruana RDH, PgDip Ger, MA Bioethics
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Medical School, MDH Office – 23401828
carmen.d.caruana@um.edu.mt

Professor Nikolai Attard B.Ch.D., MSc., PhD.
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Medical School, MDH Office – 23401876
nikolai.attard@um.edu.mt



Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Care facility for Older Adults

Ghaziz Tabib/Sinjur/Sinjura,

Qed tiġi mistieden/a biex tiegħu sehem f'riċerka li qiegħda nagħmel fir-residenza f'San Vincenz de Paul, bl-isem 'Oral Hygiene Indices as Key Performance Indicators in a Long Term Residential Care Facility for Older Adults'. L-iskop ta' din ir-riċerka huwa biex nistabilixxu jekk il-partiċipazzjoni u l-impenn ta' l-istaff fil-manigment u ta' l-impjegati ġewwa San Vincenz de Paul, fil-kura dentali li tingħata lill-residenti, hix effettiva fis-saħħa orali u dik ġenerali ta' l-anzjani li jgħixu f'din ir-residenza. Dan inkunu qed nagħmluh billi nużaw indiċi xjentifiċi li jintużaw fid-dentistrija.

Qabel ma tiddeċidi jekk tixtieqx tipparteċipa f'dan l-istudju jew le, huwa importanti li tifhem għaliex qed issir din ir-riċerka u x'ser tinvolvi. Jekk jogħġbok hu l-ħin tiegħek biex taqra l-informazzjoni u għandek kull dritt li tiddiskuti dak li taqra ma' xi hadd ieħor jekk tixtieq.

1. X'inhu l-iskop ta' dan l-istudju?

L-iskop tal-istudju huwa biex niddeterminaw jekk l-indiċi xjentifiċi li jintużaw fid-dentistrija:

- Jirriflettux kemm l-anzjan qed jieħu ħsieb it-tindif u s-saħħa ta' ħalqu ta' kuljum.
- Jistgħux fil-verita', jintużaw biex isir assessjar tal-ħidma u l-partiċipazzjoni tal-manigment u tal-ħaddiema involuti fil-kura ta' l-individwu.
- Jindikawx li hemm xi rabtiet bejn l-edukazzjoni u l-għarfien dwar is-saħħa orali li tingħata ġewwa San Vincenz de Paul u bejn dak li jirriżulta mill-assessjar kliniku li jindika li l-anzjani għandhom ħalqhom aktar nadif u b'saħħtu.
- Jurux titjib fil-mard tal-ħanek u fl-għadam u strutturi oħra tal-madwar u għalhekk b'riżultat ta' dan, nipprevenu episodji ta' attakki akuti ta' mard ieħor li hu ġenerali.

2. X'nagħmel jekk ma nixtieqx nieħu sehem fl-istudju jew nixtieq nieqaf nipparteċipa iżjed tard?

Il-parteċipazzjoni tiegħek hija waħda volontarja. Hija d-deċiżjoni tiegħek tixtieqx tieħu sehem jew le. Id-deċiżjoni li ma tipparteċipax mhux ser twaqfek milli tirċievi trattament jekk ikollok bżonn u mhux ser taffetwa r-relazzjonijiet tiegħek ma' membri ta l-staff jew ma dawk li huma nvoluti fil-proġett. Tista tieqaf milli tieħu sehem fil-proġett meta trid u mingħajr ma jkollok għalfejn tagħti raġuni. L-informazzjoni li tkun leħqet ingabret tiġl meqruda.

3. X'drittijiet għandi?

Skont il-General Data Protection Regulation Act (2018) u skont il-liġi nazzjonali, għandek id-dritt li taċċessa, tirranġa u fejn applikabbli tħassar ir-riċerka li tikkonċernak.

4. X'jinvolvi l-istudju?

Jekk taċċetta li tipparteċipa f'dan l-istudju, se tintalab biex tiffirma dokument ta' kunsens. L-istudju se jinvolvi kwestjonarju, li jieħu madwar għaxar minuti biex jimtela', 'check-ups' u trattament ta' tindif/trattament ta' snien li jieħdu madwar għoxrin minuta. Fil-każ li jkun hemm bżonn ta' prokuratur/gwardjan legali biex jieħu deċiżjoni għall-anzjan, dan/din ikollu/ha j/tiffirma/ dokument ta' kunsens biex l-anzjan/a j/tipparteċipa. Madankollu, l-anzjan xorta waħda j/tingħata l-opportunita li j/tagħti l-kunsens (assent – j/turi x-xewqa biex j/tipparteċipa) tiegħu/tagħha.

5. Jista dan l-istudju jkun ta' riskju għalija u x'se nieħu mill-istudju?

Il-parteċipazzjoni tiegħek f'dan l-istudju ma jista qatt ikun ta' riskju għalik. L-interventi ser ikunu edukattivi u anki kliniċi fejn isir valutazzjoni tas-saħħa ta' ħalqek u jekk ikun hemm bżonn tindif tas-snien. Dawn l-interventi jsiru kuljum fil-kliniċi dentali b'iskop li jitfejjaq l-mard tal-ħanek. Bil-parteċipazzjoni tiegħek f'dan l-istudju ser ikollok aktar għarfien dwar is-saħħa tal-ħalq u kif tista tieħu ħsieb il-kura ta' ħalqek aħjar. Fl-istess ħin ha tiġi offrut/a 'check-ups' u trattament b'xejn, jekk ikun hemm bżonn.

6. Irrid inħallas xi ħaġa biex nieħu sehem fl-istudju?

Ma trid tħallas xejn biex tipparteċipa.

7. X'isir mir-riżultati?

Jekk ikollna l-permess tiegħek u l-firma tiegħek fuq id-dokument tal-kunsens, niddiskutu u nipublikaw ir-riżultati b'għan li ntejbu s-servizz dentali ġewwa San Vincenz de Paul. Meta jiġu ppublikati r-riżultati, l-informazzjoni dwar individwi ma jkunux jidhru. Dawn id-dettalji jkunu kunfidenzjali w r-riċerka tkun waħda psewdonima bir-riżultati miġbura jkunu merfugħa separatament mill-informazzjoni personali b'hekk ma jkunx hemm l-ebda traċċa ta' informazzjoni li tista tikkax l-identita tal-partecipant. L-informazzjoni ser tinżamm fuq sistema kompjuterizzata msakkra f'uffiċju, mill-Professor Nikolai Attard li hu s-superviżur ta' dan l-istudju u hu wkoll id-Dekan tal-Fakulta tad-Dentistrija. L-aċċess għall-bażi tad-dejta jsir permezz ta' identifikazzjoni personali (User.Id)/Password mill-Professor Attard u r-riċerkatur Carmen Caruana bl-informazzjoni tkun kriptata u miżmuma bl-aktar mod sigur.

Jekk tkun tixtieq taf x'hareġ minn dan l-istudju, nkunu nistgħu nuruk ir-riżultati u d-diskussjoni. Ir-riċerka tkun merfugħa b'mod sigur mill-Professor Nikolai Attard, Dekan, Fakulta tad-Dentistrija għall-perjodu ta' hames snin, imbagħad tintrema.

8. X'irrid nagħmel jekk nixtieq niddiskuti l-istudju iżjed fil-dettall?

Meta taqra l-informazzjoni kollha, Carmen Caruana, r-riċerkatriċi, tiddiskuti miegħek xi mistoqsijiet jew hsibijiet li jista' jkollok. Jekk tixtieq tkun taf iżjed f'dan l-istudju, tista' oċempel fuq in-numru 23401828.

Grazzi tal-ħin li ħadt biex tikkunsidra li tiehu sehem f'dan l-istudju.

Jekk tixtieq tipparteċipa, jekk jogħġbok, iffirma d-dokument tal-kunsens.

Tista' żżomm din l-informazzjoni bħala referenza.

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Appendix 14 - Covering Letter (English and Maltese)



L-Università
ta' Malta

Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Care facility for Older Adults

Dear Participant,

I am Carmen Caruana and I am a PhD student, studying at the Faculty of Dental Surgery, University of Malta. For my project, I am evaluating the development of a strategic programme to measure management and manpower performance whilst monitoring oral care maintenance efficiency parameters. This is done by using oral health indices to determine an improvement or a decline in the oral health care of the older adults in relation to the older adults' life conditions.

Since you are a health professional and contributor towards the general health of the older adults at St. Vincent de Paul Residence for the Elderly, I am inviting you to participate in this research study by completing the attached questionnaires. You are also invited to attend for a dental check-up at the Dental Teaching Clinic, on the same premises.

In order to ensure anonymity, please do not include your name on the questionnaire. Copies of the project, will be provided to the Dean, Faculty of Dental Surgery, University of Malta and to the Chief Executive Officer and Medical Superintendent, SVPR. If you choose to participate in this project, please answer the questions as honestly as possible and return the completed questionnaires at the Dental Teaching Clinic, SVPR by not later than _____. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to participate in this project.

Completion and return of the questionnaires will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me.

Sincerely,

Carmen Caruana RDH, PgDip Gerontology and Geriatrics, MA Bioethics
Dental Teaching Clinic, SVPR – 22912437
Medical School, MDH Officer – 23401828
carmen.d.caruana@um.edu.mt



L-Università
ta' Malta

Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Care facility for Older Adults

Għażiż/a Partecipant/a,

Jiena Carmen Caruana, studenta fil-Fakulta tad-Dentistrija, l-Università ta' Malta.

Għad-dottorat tiegħi, jiena qieghda nagħmel riċerka biex nohloq programm strateġiku dwar is-saħħa orali ta' l-anzjani li huma residenti għewwa r-residenza San Vincenz De Paul. Dan il-proġett huwa mmirrat sabiex nistabilixxi jekk il-participazzjoni tal-'management' u ta' l-impjegati fis-sistema li tinghata tal-kura dentali għewwa din ir-residenza, hix effettiva fis-saħħa orali u dik ġenerali ta' l-anzjani li jgħixu f'din ir-residenza. Dan inkun qed nagħmlu billi nuża parametri u indiċi xjentifiċi li jintużaw fid-dentistrija.

Għalhekk qed nistiednek biex tipparteċipa f'dan l-istudju u tagħti l-kontribut tiegħek billi timla dan il-kwestjonarju. Inti wkoll mistieden/mistiedna tattendi għall-vista ta' ħalqek b'xejn fil-klinika dentali għewwa San Vincenz De Paul.

Jekk jogħġbok tiktibx ismek fuq il-kwestjonarju biex inkun nista inżomm l-identita' tiegħek anonima. Kull mistoqsija hija relata mal-proġett u ser tintuża biss għall-iskopijiet tar-riċerka. Kull informazzjoni ser tibqa kunfidenzjali. Kopja tal-proġett tinghata lid-Dekan tal-Fakulta tad-Dentistrija u liċ-Chief Executive Officer u lis-Superintendent Mediku tar-Residenza għall-Anzjani San Vincenz de Paul.

Jekk tipparteċipa f'dan il-proġett, jekk jogħġbok għati t-tweġibiet tiegħek b'mod sinċier u rritorna l-kwestjonarju fid-Dental Teaching Clinic SVPR sa mhux aktar tard _____. Il-participazzjoni tiegħek hija wahda volontarja. Jekk hemm bżonn ta' xi verifikazzjonijiet, tista tikkuntatjani.

Dejjem tiegħek,

Carmen Caruana RDH, PgDip Gerontology and Geriatrics, MA Bioethics
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Medical School, MDH Officer – 23401828
carmen.d.caruana@um.edu.mt

Appendix 15 - Consent Form (for consenting adults)

Consent Form (for consenting adults)



**L-Università
ta' Malta**

Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Care facility for Older Adults

I, (name and surname): _____,

declare that the aims of the research project 'Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Facility for Older Adults at St Vincent De Paul', has been explained to me by Ms. Carmen Caruana, the researcher who is conducting her doctoral studies at the Faculty of Dental Surgery, University of Malta.

I am willing to participate in this study, fill in the questionnaire and attend any dental appointments given to me at the Dental Teaching Clinic, St. Vincent de Paul Residence for the Elderly. I am aware that the duration of this study is two (2) years and therefore if I decide to participate I will be involved in the project for two (2) years unless I do not decide to withdraw from the study for personal reasons.

I have been informed that questions are directly related to the research being conducted and used solely for the purpose of the study. I have also been informed that strict confidentiality will be maintained on all information, that the study is strictly pseudonymous therefore the results obtained from the research are going to be stored separately from my personal details. The research files will be encrypted and kept on a passworded computer (User ID/Password) in a locked office, and can be accessed only by Professor Nikolai Attard who is the project supervisor and also Dean, Faculty of Dental Surgery and by the researcher, Ms. Carmen Caruana. Therefore the information can never be traced back to identify me. A copy of the project will be submitted to the Dean, Faculty of Dental Surgery (who is also the sole supervisor of this project), to the Chief Executive Officer and the Medical Superintendent of St. Vincent de Paul Residence of the Elderly.

I have also been informed that I will not be exposed to any risks and that I will benefit from this study since I will receive oral health education, clinical dental check-ups and assessments and non-surgical periodontal treatment if required.

Results will be discussed and published only if I give my permission and if I sign this consent document. As stated above, in any publication, the information will be provided in such a way that I cannot be identified. I have been informed that I am allowed to access and view results if I would want to and that the data will be stored securely by Professor Nikolai Attard, Dean Faculty of Dental Surgery and then destroyed after five years.

Participant's Signature

Date

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**L-Università
ta' Malta**

**Oral Hygiene Indices as Key Performance Indicators
In a Long Term Residential Care Facility for Older Adults**

Jiena (isem u kunjom): _____,

niddikjara li r-riċerka intitolata 'Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Care Facility for Older Adults', giet spjegata lili minn Ms. Carmen Caruana, li qiegħda tagħmel riċerka għad dottorat tagħha fil-Fakulta tad-Dentistrija fl-Università ta' Malta.

Naċċetta li nimla l-kwestjonarju u li nattendu għall-appuntament li jingħata lili fil-klinika dentali ġewwa San Vincenz De Paul. Jiena konxju li dan l-istudju ser jiehru sentejn biex jidwettuq, allura s-sehem tiegħi f'dan l-istudju hu jkun ta' sentejn sakemm ma nkunx nixtieq li nieqaf għal raġunijiet personali.

Niddikjara li ġejt infurmat/a li kull mistoqsija hija relatata mal-proġett u se tintuża biss biex issir riċerka li tagħmel parti minn proġett li hu imħejji minn Carmen Caruana. Niddikjara wkoll li ġejt infurmat/a li kull informazzjoni tibqa' kunfidenzjali. Ir-riċerka hu tkun waħda psewdonima u r-riżultati miġbura mill-istudju ser jiġu merfugħa separatament mill-informazzjoni personali b'hekk ma jkunx hemm l-ebda traċċa ta' informazzjoni li tista' tikkaxxi l-identità tiegħi. L-informazzjoni ser tinżamm fuq Sistema kompjuterizzata u msakkra f'uffiċju mill-Professor Nikolai Attard li hu s-superviżur ta' dan l-istudju u hu wkoll id-Dekan tal-Fakulta tad-Dentistrija. L-aċċess għall-bażi tad-dejta jsir permezz ta' identifikazzjoni personali (User ID/Password) mill-Professor Attard u r-riċerkatur Carmen Caruana bl-informazzjoni tkun kriptata u miżmuma bl-aktar mod sigur.

Kopja tal-proġett finali tingħata lid-Dekan tal-Fakulta tad-Dentistrija (li hu wkoll is-superviżur ta' dan il-proġett), liċ-Chief Executive Officer u lis-Superintendent Klinikulari ta' San Vincenz de Paul.

Jien ġejt informat/a li l-parteċipazzjoni tiegħi f'dan l-istudju ma tista qatt tkun ta' riskju għalija. L-interventi ser ikunu edukattivi u anki kliniċi fejn isir valutazzjoni tas-saħħa ta' ħalqi u jekk ikun hemm bżonn niġi offrut tindif tas-snien. Dawn l-interventi jsiru kuljum fil-kliniċi dentali b'iskop li jitfejjaq l-mard tal-ħanek. Bil-parteċipazzjoni tiegħi f'dan l-istudju ser ikolli aktar għarfien dwar is-saħħa tal-ħalq u kif nista nieħu ħsieb il-kura ta' ħalqi aħjar. Fl-istess ħin ħa niġi offrut/a 'check-ups' u trattament b'xejn, jekk ikun hemm bżonn.

Ir-riżultati jistgħu jiġu diskussi u ppublikati biss bil-permess u l-firma tiegħi fuq dan id-dokument tal-kunsens. Kif tiġa ġie msemmi hawn fuq, meta jiġu ppublikati r-riżultati, l-informazzjoni dwari ma tkunx tidher u ma tkunx tista tiġa assoċjata miegħi. Dawn id-dettalji jkunu kunfidenzjali, imma jekk inkun nixtieq naf x'ħareġ minn dan l-istudju, nkun nista nara ir-riżultati u d-diskussjoni. Ir-riċerka tkun merfugħa mill-Professur Nikolai Attard, Dekan, Fakultà tad-Dentistrija għall-perjodu ta' ħames snin,, imbagħad tintrema.

Firma tal-parteċipant

Data

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Medical School, MDH Office – 23401876
nikolai.attard@um.edu.mt

Appendix 16 - Consent Form/Next of Kin

Consent Form/Guardian



**L-Università
ta' Malta**

Oral Hygiene Indices as Key Performance Indicators
In a Long Term Residential Care facility for Older Adults

I, (name and surname), _____ guardian of _____ declare that the aims of the research project 'Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Facility for Older Adults at St Vincent De Paul', has been explained to me by Ms. Carmen Caruana, the researcher who is conducting her doctoral studies at the Faculty of Dental Surgery, University of Malta.

I am willing to give my consent to the researcher so that Mr./Ms. _____ participates in this study and attends any dental appointments given to him/her at the Dental Teaching Clinic, St. Vincent de Paul Residence for the Elderly. I am aware that the researcher will seek the assent (wish to participate) from Mr./Ms. _____. I am also aware that the duration of this study is two (2) years, therefore Mr./Ms. _____ will be involved in the project for two (2) years unless he/she withdraws from the study for any reason.

I have been informed that questions are directly related to the research being conducted and used solely for the purpose of the study. I have also been informed that strict confidentiality will be maintained on all information and that the study is strictly pseudonymous therefore the information cannot be traced back to identify Mr/Ms. _____. The research files will be encrypted and kept on a passworded computer (User Id/Password) in a locked office, and can be accessed only by Professor Nikolai Attard, who is the project supervisor and Dean, Faculty of Dental Surgery and by the researcher, Ms. Carmen Caruana.

A copy of the project will be submitted to the Dean, Faculty of Dental Surgery (who is also the sole supervisor of this project), to the Chief Executive Officer and the Medical Superintendent of St. Vincent de Paul Residence of the Elderly.

I have also been informed that Mr./Ms. _____ will not be exposed to any risks but will benefit from clinical check-ups, oral assessments and non-surgical periodontal treatment (debridement) if required.

Results will be published only if I, in the name of Mr./Ms. _____, give permission and sign this consent document. As stated above, in any publication, the information will be provided in such a way that Mr./Ms. _____ cannot be identified. The information will be kept and stored securely by Professor Nikolai Attard, Dean, Faculty of Dental Surgery and will be destroyed after five years.

Participant's Signature

Date

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Formola ta' Kunsens (Gwardjan Legali)



**L-Università
ta' Malta**

Oral Hygiene Indices as Key Performance Indicators
In a Long Term Residential Care Facility for Older Adults

Jiena (isem u kunjom): _____, bħala prokuratur/gwardjan legali tas-Sur/Sinjura _____ u f'ismu/isimha, niddikjara li r-riċerka intitolata 'Oral Hygiene Indices as Key Performance Indicators In a Long Term Residential Care Facility for Older Adults', giet spjegata lili minn Ms. Carmen Caruana, li qiegħda tagħmel riċerka għad dottorat tagħha fil-Fakulta tad-Dentistrija fl-Università ta' Malta.

Naċċetta li s-Sur/Sinjura _____ j/tattendi għall-appuntament li jingħata lilu/ha fil-klinika dentali ġewwa San Vincenz De Paul. Jien konxju/a li l-ewwel ir-riċerkatur ħa jsaqsi għall-assent(kunsens) tas-Sinjur/a _____. Jiena konxju li dan l-istudju ser jieħu sentejn biex jitwettagħ, allura s-sehem tas-Sur/Sinjura _____ f'dan l-istudju ħa jkun ta' sentejn sakemm ma jkunx hem raġunit kun xi tkun li S-Sur/Sinjura _____ jieqaf/tieqaf tipparteċipa.

Niddikjara li ġejt infurmat/a li kull mistoqsija hija relatata mal-proġett u se tintuża biss biex issir riċerka bħala parti minn proġett imħejji minn Carmen Caruana. Niddikjara wkoll li ġejt infurmat/a li kull informazzjoni tibqa' kunfidenzjali. Ir-riċerka ħa tkun waħda psewdonima u r-riżultati miġbura mill-istudju jiġu merfugħa separatament mill-informazzjoni personali b'hekk ma jkunx hem l-ebda traċċa ta' informazzjoni li tista tikxef l-identita' tas-Sur/Sinjura _____. L-informazzjoni ser tinżamm fuq sistema kompjuterizzata u msakkra f'uffiċju mill-Professur Nikolai Attard li hu s-superviżur ta' dan l-istudju u hu wkoll id-Dekan tal-Fakulta tad-Dentistrija. L-aċċess għall-bażi tad-dejta jsir permezz ta' identifikazzjoni personali (User ID/Password)

mill-Professor Attard u r-riċerkatur Carmen Caruana bl-informazzjoni tkun kriptata u miżmuma bl-aktar mod sigur.

Kopja tal-proġett finali tingħata lid-Dekan tal-Fakulta tad-Dentistrija (li hu wkoll is-superviżur ta' dan il-proġett), liċ-Chief Executive Officer u lis-Superintendent Klinik tar-Residenza ta San Vincenz de Paul. Jien ġejt informat/a li l-parteċipazzjoni tas-Sur/Sinjura _____ f'dan l-istudju ma tista qatt tkun ta' riskju għalih/a. L-interventi ser ikunu wieħed klinik fejn isir valutazzjoni tas-saħħa ta' ħalq s-Sur/Sinjura _____ u jekk ikun hemm bżonn j/tiġi offrut/a tindif tas-snien. Dawn l-interventi jsiru kuljum fil-kliniċi dentali b'iskop li jiffejjaq l-mard tal-ħanek.

Ir-riżultati jistgħu jiġu diskussi u ppublikati biss bil-permess u l-firma tiegħi f'isem is-Sur/Sinjura _____ fuq dan id-dokument tal-kunsens. Kif tiġa ġie msemmi hawn fuq, meta jiġu ppublikati r-riżultati, l-informazzjoni dwar s-Sur/Sinjura _____ ma tkunx tidher u ma tkunx tista tiġa assoċjata miegħu/magħha. Ir-riċerka tkun merfugħa b'mod sigur għand il-Professor Nikolai Attard, Dekan, Fakultà tad-Dentistrija u wara perjodu ta' ħames snin, tintrema.

Firma tal-parteċipant

Data

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APPENDIX 17 – Questionnaires for Staff Members

English and Maltese Version

Questionnaire Adults

Identification No:

UNIVERSITY OF MALTA
Msida – Malta
MEDICAL SCHOOL



Dental  Public Health Unit
Superintendence of Public Health
Tel: 2595 3330/3314, www.ehealth.gov.mt

QUESTIONNAIRE: MOUTH HEALTH IN ADULTS

The following pages contain questions about the health of your mouth.

Please fill in the details requested on this front page and then answer the rest of the questions by ticking the correct answer or by placing a V in the right box. If you make a mistake put a cross in that box and place your V next to your correct answer.

Example of how to mark the questionnaire

YES	NO
✓	

DATE ____/____/____

Sex Male ____ Female ____

AGE _____

Locality of Residence _____

DATE OF BIRTH ____/____/____

**WHAT IS YOUR
LEVEL OF EDUCATION?
(TICK ONE BOX ONLY)**

1. NO SCHOOLING
2. PRIMARY SCHOOL
3. SECONDARY SCHOOL
4. POST SECONDARY SCHOOL/UPPER SECONDARY/HIGHER TECHNICAL/VOCATIONAL LEVEL
5. DIPLOMA
6. GRADUATE
7. POST-GRADUATE
8. DOCTORATE

**WHAT IS YOUR
CURRENT JOB?
(TICK ONE BOX ONLY)**

1. Chief Executive Officer; 2. Medical Director; 3. Consultant Geriatrician; 4. Medical Doctor; 5. Foundation Doctor; 6. Physiotherapist;
7. Speech Language Pathologist; 8. Occupational Therapist; 9. Dental Professional/State:
10. Podiatrist; 11. Day Care Nurse; 12. Chief Nurse;
13. Charge Nurse; 14. State Registered Nurse
15. State Enrolled Nurse; 16. Carer; 17. Nursing Aid
18. Administrator; 19. Volunteer/Unemployed

SECTION A

1. HOW WOULD YOU DESCRIBE THE HEALTH OF YOUR TEETH AND GUMS? TICK ONE BOX IN EACH ROW

	a. EXCELLENT	b. VERY GOOD	c. GOOD	d. AVERAGE	e. POOR	f. VERY POOR	g. DON'T KNOW
TEETH							
GUMS							

2. HOW OFTEN DID YOU HAVE TOOTHACHE OR DISCOMFORT IN YOUR MOUTH DURING THE PAST 12 MONTHS? TICK ONE BOX ONLY

a. OFTEN	b. OCCASIONALLY	c. RARELY	d. NEVER	e. DON'T KNOW

3. WHICH TYPE OF DENTAL SERVICE DO YOU USE? TICK ONE BOX ONLY

a. PRIVATE DENTIST	b. HOSPITAL SERVICE	c. MIXTURE OF BOTH	d. DON'T REMEMBER	e. HAVE NEVER BEEN

4. HOW OFTEN DID YOU GO TO THE DENTIST DURING THE LAST 12 MONTHS? TICK ONE BOX ONLY

- a. NEVER BEEN TO A DENTIST
- b. NOT IN THE LAST 12 MONTHS
- c. ONCE
- d. TWICE
- e. THREE OR MORE TIMES
- f. I DON'T KNOW/DON'T REMEMBER

5. WHAT WAS THE REASON FOR YOUR LAST VISIT TO THE DENTIST?**TICK ONE BOX ONLY**

- a. PAIN /TROUBLE WITH TEETH, GUMS OR MOUTH
- b. TREATMENT/FOLLOW-UP TREATMENT
- c. ROUTINE CHECK-UP OF TEETH/TREATMENT
- d. I DON'T KNOW/DON'T REMEMBER
- e. I HAVE NEVER BEEN

6. HOW OFTEN DO YOU CLEAN YOUR TEETH?**TICK ONE BOX ONLY**

- a. NEVER
- b. LESS THAN ONCE A DAY
- c. ONCE A DAY
- d. TWO TIMES A DAY
- e. MORE THAN TWO TIMES A DAY

7. WHEN DO YOU BRUSH YOUR TEETH?**TICK ANY BOX/BOXES**

- a. BEFORE BREAKFAST
- b. AFTER BREAKFAST
- c. AFTER LUNCH
- d. BEFORE GOING TO BED
- e. AT OTHER TIMES

8. WHICH TOOTHBRUSH DO YOU USE TO CLEAN YOUR TEETH? TICK ONE BOX ONLY

a. DON'T BRUSH	b. DON'T KNOW	c. MANUAL BRUSH SOFT	d. MANUAL BRUSH MEDIUM	e. MANUAL BRUSH HARD	f. ELECTRIC BRUSH

9. HOW DO YOU BRUSH YOUR TEETH?**TICK ONE BOX ONLY**

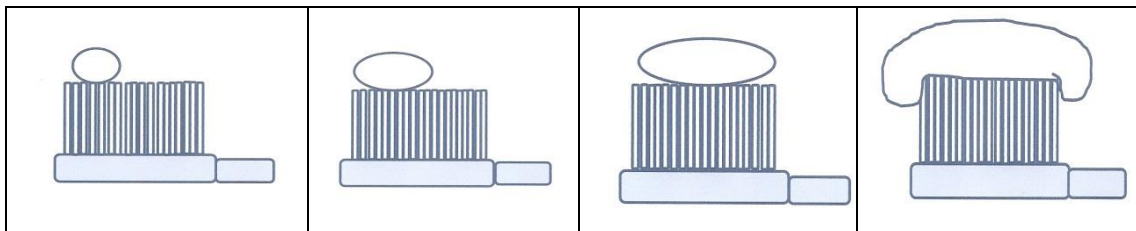
- a. BACK AND FORTH (HORIZONTAL MOTION)
- b. UP AND DOWN (VERTICAL MOTION)
- c. CIRCULAR MOTION
- d. A MIXTURE OF THE ABOVE

10. WHAT DO YOU USE TO CLEAN YOUR TEETH?

- a. TOOTHPASTE WITH FLUORIDE
- b. TOOTHPASTE WITHOUT FLUORIDE
- c. WHITENING TOOTHPASTE
- d. MEDICATED TOOTHPASTE
- e. MOUTHWASH?

YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW

11. CIRCLE THE PICTURE WHICH BEST SHOWS THE AMOUNT OF TOOTHPASTE YOU PLACE ON THE TOOTHBRUSH.



12. DO YOU RINSE YOUR MOUTH AFTER BRUSHING?

YES	NO

13. DO YOU USE ANY OF THE FOLLOWING TO CLEAN YOUR TEETH AND GUMS? TICK ANY ANSWER

- a) Wooden Toothpicks _____
- b) Plastic Toothpicks _____
- c) Dental Floss/Tape _____
- d) Interdental Brushes _____
- e) Other _____

14. DO YOUR GUMS BLEED WHEN YOU ARE BRUSHING YOUR GUMS? TICK ONE BOX ONLY

YES	
NO	
SOMETIMES	
NEVER NOTICED	

15. IF YES OR SOMETIMES FROM WHERE DO YOU BLEED? TICK ONE BOX ONLY

FROM CERTAIN AREAS IN MY MOUTH	
EVERYWHERE IN MY MOUTH	
NEVER NOTICED	

SECTION B

AN INTERDISCIPLINARY APPROACH TOWARDS ORAL MAINTENANCE CARE AT ST. VINCENT DE PAUL RESIDENCE FOR OLDER ADULTS

16. HAVE YOU EVER RECEIVED ORAL HEALTH EDUCATION? TICK ONE BOX ONLY

YES	NO	DON'T KNOW

**17. IF YES, FROM WHERE HAVE YOU RECEIVED YOUR EDUCATION/INFORMATION REGARDING ORAL
HEALTH CARE ? YOU MAY TICK MORE THAN ONE BOX**

SCHOOL	
CURRICULAR STUDIES	
MEDIA (television/radio/social media)	
AT THE PLACE OF WORK	
RESIDENCE FOR OLDER ADULTS (talks/training course)	

**18. HOW MANY TIMES DID YOU HAVE THE OPPORTUNITY TO LEARN ABOUT ORAL HEALTH CARE ?
TICK ONE BOX ONLY**

ONCE	
MORE THAN ONCE	
FREQUENTLY	

**19. HOW FREQUENTLY WOULD YOU LIKE TO RECEIVE EDUCATION/INFORMATION REGARDING ORAL HEALTH CARE
AT YOUR PLACE OF WORK (SVPR) ? TICK ONE BOX ONLY**

NEVER	
EVERY 6 MONTHS	
EVERY YEAR	
OTHER COMMENT	

20. HAVE YOU EVER PARTICIPATED IN DENTAL TALKS HELD IN WARDS ? TICK ONE BOX ONLY

YES	
NO	
DON'T KNOW/CANNOT REMEMBER	

21. IF YOUR ANSWER TO THE ABOVE QUESTION IS NO, WHAT IS THE REASON ? TICK ONE BOX ONLY

NEVER HELD	
NOT AWARE OF ANY TALKS HELD	
NOBODY INFORMED ME	

SECTION C

22. HOW IMPORTANT DO YOU THINK ORAL HEALTH IS TO OLDER ADULTS ? TICK ONE BOX ONLY

NOT MUCH	
IMPORTANT	
VERY IMPORTANT	
OTHER....	

**23. HAVE YOU EVER BEEN ASKED TO ASSIST IN ROUTINE ORAL CARE OF THE OLDER ADULTS ?
TICK ONE BOX ONLY**

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	
OTHER	

24. IF YES, BY WHOM HAVE YOU BEEN ASKED ? YOU MAY TICK MORE THAN ONE BOX

DENTIST/DENTAL HYGIENIST	
NURSE	
PHYSIOTHERAPIST/OCCUPATIONAL THERAPIST	
DOCTOR	
RESIDENTS	

25. IF YES, IN WHAT WAY DO YOU ASSIST THE OLDER ADULTS IN HIS/HER DAILY ORAL NEEDS ?
YOU MAY TICK MORE THAN ONE BOX

RINSING AND BRUSHING OF DENTURES	
BRUSHING OF TEETH	
REMOVAL OF DENTURES BEFORE BEDTIME	

26. DO YOU EVER RECOMMEND FACILITATING AIDS TO HELP OLDER ADULTS BRUSH THEIR TEETH ?
EG. FOAM TUBING ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
ALWAYS	
NEVER HEARD OF FACILITATING AIDS	

27. DO YOU EVER ENCOURAGE INDEPENDENT OLDER ADULTS TO BRUSH THEIR TEETH/DENTURES ?
TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

28. DO YOU FOLLOW THE DENTAL CARE PLAN FOR PATIENTS FOUND IN MEDICAL HISTORIES ?
TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

29. IF YOUR ANSWER TO THE PREVIOUS QUESTION IS NO, WHAT IS THE REASON ? TICK ONE BOX ONLY

DENTAL CARE PLANS ARE NOT AVAILABLE	
NOT AWARE OF DENTAL CARE PLANS IN MEDICAL HISTORIES	
OTHER	

30. DO YOU EVER REFER RESIDENTS FOR ADVICE/TREATMENT ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

SECTION D

31. DO OLDER ADULTS ASK FOR THEIR TEETH/DENTURES TO BE BRUSHED ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

32. IF YES, HOW MANY OF THE OLDER ADULTS ASK FOR THEIR TEETH/DENTURES TO BE BRUSHED ? TICK ONE BOX ONLY

NO ONE	
FEW	
MOST	
ALL OF THEM	

33. DO RESIDENTS ASK TO VISIT THE DENTAL CLINIC FOR TREATMENT ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

SECTION E

34. WHAT FACILITIES ARE AVAILABLE IN WARDS ?

ACCESSIBLE BASINS IN ROOMS	Yes ☐	No ☐
WATER SUPPLY IN ROOMS	Yes ☐	No ☐
ACCESSIBLE BATHROOMS	Yes ☐	No ☐

35. ARE THE BASIC NECESSITIES FOR TOOTHBRUSHING AVAILABLE ?

KIDNEY DISHES	Yes ☐	No ☐
TOOTHBRUSHES	Yes ☐	No ☐
TOOTHPASTES	Yes ☐	No ☐
DENTURE CLEANSING TABLETS	Yes ☐	No ☐
MOUThWASHES	Yes ☐	No ☐
Mouthtrays	Yes ☐	No ☐
Denture containers	Yes ☐	No ☐

36. IF THESE ARE NOT AVAILABLE, WHAT IS THE REASON ? TICK ONE BOX ONLY

DON'T KNOW	
NO ONE ORDERS/BUYS THEM	
INSUFFICIENT FUNDS	
OTHER	

37. IS THE DENTAL CLINIC WITHIN THIS FACILITY EASILY ACCESSIBLE FOR THE RESIDENTS ?

Yes ☐ No ☐

38. IF THE ANSWER TO THE PREVIOUS QUESTION IS NO, WHAT IS THE REASON ?

YOU MAY TICK MORE THAN ONE BOX

DISTANCE	
BUILDING STRUCTURE NEEDS ALTERATIONS EG RAMPS	
TRANSPORT	
SHORTAGE OF STAFF	
OTHER	

The Oral Health Impact Profile – 14

1. Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

2. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

3. Have you had painful aches in your mouth?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

4. Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

5. Have you been self-conscious because of your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

6. Have you felt tense because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

7. Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

8. Have you ever had to interrupt meals because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

9. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

10. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

11. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

12. Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

13. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

14. Have you been totally unable to function because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly ever	Never	Don't know

Thank you

Questions compiled from various questionnaires used; tested and scientifically validated in other research programmes: Section A: Faculty of Dental Surgery, University of Malta, Dental Public Health Unit; Sections B, C, D, E from research conducted at SVPR 'An interdisciplinary Approach towards Oral Maintenance Care in an Institution for Older adults in Malta' (1999). Translations from English to Maltese versions had been translated in previous years by Maltese linguists.

KWESTJONARJU: SAHHA TAL-HALQ



KWESTJONARJU: IS-SAHHA TAL-HALQ FL-ADULTI

Hawn se ssib mistoqsijiet dwar is-saħħa ta' halqek.

Jekk jogħġbok imla d-dettalji mitluba fuq din il-paġna u wara rrispondi l-mistoqsijiet billi timmarka t-twegiba korretta jew billi tpogġi ✓ fil-kaxxa t-tajba. Jekk tieħu żball agħmel salib f'dik il-kaxxa u poggj ✓ hdejn ir-risposta korretta.

Eżempju ta' kif timmarka l-kwestjonarju.

IVA	LE
✓	

DATA ____/____/____

Sess: Ragel ____ Mara ____

ETÀ ____

Lokalita fejn toqgħod ____

DATA TAT-TWELID ____/____/____

IL-LIVELL TÀ EDUKAZZJONI TIEGHEK?
(IMMARKA KAXXA WAHDA BISS)

1. MA MORTX SKOLA
2. SKOLA PRIMARJA
3. SKOLA SEKONDARJA
4. SKOLA POST-SEKONDARJA
5. DIPLOMA
6. GRADWAT/A
7. POST-GRADWAZZJONI
8. DOTTORAT

X'INHU L-IMPJIEG TIEGHEK BHALISSA?
(IMMARKA KAXXA WAHDA BISS)

1.Chief Executive Officer; 2. Medical Director; 3. Consultant Geriatrician; 4. Medical Doctor; 5. Foundation Doctor
6.Physiotherapist; 7.Speech Language Pathologist; 8.Occupational Therapist; 9. Dental Professional/State
10.Podiatrist; 11. Day Care Nurse; 12. Chief Nurse;
13. Charge Nurse; 14. State Registered Nurse;
15. State Enrolled Nurse; 16. Carer; 17. Nursing Aid
18. Administrators; 19. Volunteer/Ma Naħdimx

SEZZJONI A

1. X' TISTA TGHID FUQ IS-SAĦĦA TAS-SNIEN U L-ĦANEK TIEGĦEK? IMMARKA KAXXA WAĦDA F'KULL RINGIELA

	a. EĊĊELLENTI	b. TAJBA ĦAFNA	ċ. TAJBA	d. HEKK U HEKK	e. ĦAŽINA	f. ĦAŽINA ĦAFNA	g. MA NAFX
SNIEN							
ĦANEK							

2. FL-AĦĦAR 12-IL XAHAR, KEMM IL-DARBA KELLEK UĠIGH FIS-SNIEN JEW SKUMDITA' F'ĦALQEK? IMMARKA KAXXA WAĦDA BISS

a. SPISS	b. XI DRABI	ċ. DARBA FIL	d. QATT	e. MA NAFX

3. X'TIP TÀ SERVIZZ TAS-SNIEN TUŻA? IMMARKA KAXXA WAĦDA BISS

a. DENTIST PRIVAT	b. SERVIZZ TÀ L-ISPTAR	ċ. DAQQA WIEĦED U DAQQA L-IEĦOR	d. MA NIFTAKARX	e. QATT MA MORT

4. FL-AĦĦAR 12-IL XAHAR, KEMM IL-DARBA MORT GĦAND ID-DENTIST? IMMARKA KAXXA WAĦDA BISS

- a) QATT MA MORT GĦAND ID-DENTIST
- b) QATT FL-AĦĦAR 12-IL XAHAR
- c) DARBA
- d) DARBTEJN

5. X'KIENT IR-RAĠUNI TÀ L-AĦĦAR ŻJARA GĦAND ID-DENTIST TIEGĦEK?

IMMARKA WAĦDA BISS

- a) UĠIĠĦ/PROBLEMI FIS-SNIEN, HANEK JEW IL-ĦALQ _____
- b) TRATTAMENT/VISTA WARA T-TRATTAMENT _____
- c) EŻAMI NORMALI TAS-SNIEN _____
- d) MA NAFX/ MA NIFTAKARX _____
- e) QATT MA MORT GĦAND ID-DENTIST _____

6. KEMM IL-DARBA TAĦSEL SNIENEK? IMMARKA WAĦDA BISS

- a) QATT _____
- b) ANQAS MINN DARBA KULJUM _____
- c) DARBA KULJUM _____
- d) DARBTEJN KULJUM _____
- e) AKTAR MINN DARBTEJN KULJUM _____

7. META TNADDAF SNIENEK? IMMARKA KAXXEX KEMM HEMM BZONN

- a) QABEL L-EWWEL IKLA TÀ FILGĦODU/BREAKFAST _____
- b) WARA L-EWWEL IKLA TÀ FILGĦODU/BREAKFAST _____
- c) WARA L-IKLA TÀ NOFSINHAR _____
- d) QABEL L-IRQAD _____
- e) XI ĦINIJIET OĦRA _____

8. LIEMA XKUPILJA (TOOTHBRUSH) TUŻÀ BIEX TNADDAF SNIENEK?

IMMARKA KAXXA WAĦDA BISS

9.

a. MA NNADDAFX	b. MA NAFX	ċ. XKUPILJA RATBA	d. XKUPILJA TAN- NOFS (MEDIUM)	e. XKUPILJA IEBSA	f. XKUPILJA TA L- ELETTRIKU

9. KIF TAĦSEL SNIENEK?

IMMARKA KAXXA WAĦDA BISS

- a) IL-WARA U L-QUDDIEM (MOVIMENT ORIŻŻONTALI)
- b) IL-FUQ U L-ISFEL (MOVIMENT VERTIKALI)
- c) GĦAT-TOND (F'ĊIRKU)
- d) TAĦLITA TÀ KOLLOX

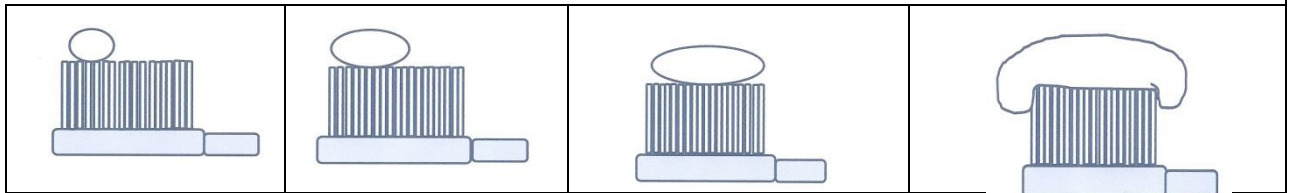
10. X' TUŻA BIEK TNADDAF SNIENEK?

IMMARKA KAXXA WAĦDA BISS

- e. 'TOOTHPASTE' BIL-'FLUORIDE'
- f. 'TOOTHPASTE' MINGĦAJR 'FLUORIDE'
- g. 'TOOTHPASTE' LI JBAJJAD IS-SNIEN
- h. 'TOOTHPASTE' IMMEDIKAT
- i. MOUTHWASH

IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX

11. AGĦMEL ĊIRKU MAL-ISTAMPA LI TURI KEMM TUŻA 'TOOTHPASTE' FUQ L-IXKUPLIJA TAS-SNIEN TIEGĦEK.



12. TLAĦLAĦ SNIENEK WARA LI TNADDAFHOM?

IVA ☐ LE ☐

13. TUŻA XI HAĠA MINN DAWN BIEK TNADDAF SNIENEK JEW IL-ĦANEK?

IMMARKA KAXXEX KEMM HEMM BŻONN

'TOOTHPICK' TAL-INJAM	'TOOTHPICK' TAL-PLASTIK	ĦAJT (DENTAL FLOSS)	XKUPILJI ŻĠĦAR TÀ BEJN IS-SNIEN	OĦRAJN : _____

14. JOĦROĠLOK DEMM META TAĦSEL SNIENEK? IMMARKA KAXXA WAĦDA BISS

IVA	LE	MA NAFX

15. JEKK IVA, MINN FEJN JOĦROĠ ID-DEMM ? IMMARKA KAXXA WAĦDA BISS

F'XI BNADI	ĦALQ KOLLU	MA NAFX

SEZZJONI B

ĦARSA LEJN L-ATTITUDINI INTERDIXXIPLINARJI DWAR IS-SAĦĦA ORALI TA' L-ANZJANI ĠEWWA R-RESIDENZA TA' SAN VINCENZ DE PAUL.

16. QATT IRĊEVEJT TAĦRIĠ DWAR IS-SAĦĦA TAS-SNIEN ? IMMARKA KAXXA WAĦDA BISS

IVA	LE	MA NAFX

17. JEKK IVA, FEJN HADT IT-TAĦRIĠ ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAĦDA

I-ISKOLA	
KORSIJET PARTI MIT-TAĦRIĠ GĦALL-PROFESSIONI TIEGĦI	
MEDIA (television, radio)	
FUQ IL-POST TAX-XOGĦOL	
RESIDENZA TA' L-ANZJANI (IN-TRAINING COURSE JEW TAĦDITIET GĦALL-ANZJANI)	

18. JEKK ĠIELI RĊEVEJT TAĦRIĠ JEW INFORMAZZJONI DWAR IS-SAĦĦA U L-KURA TAL-ĦALQ, KEMM IL-DARBA KELLEK DIN L-OPPORTUNITA'? IMMARKA KAXXA WAĦDA BISS

DARBA	
AKTAR MINN DARBA	
SPISS	

19. JEKK TIXTIEQ LI JKUN HEMM AKTAR TAGĦRIF DWAR IS-SAĦĦA U L-KURA TAS-SNIEN FIR-RESIDENZA FEJN TAĦDEM JEW FEJN TOQGĦOD, KEMM IL-DARBA TIXTIEQ LI DAN ISIR ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULL 6 XHUR	
KULL SENA	
XI HAĠA OĦRA....	

20. QATT IPPARTEĊIPAJT F'TAĦDITIET RIGWARD IL-KURA TAS-SNIEN FIS-SWALI ? IMMARKA KAXXA WAĦDA BISS

IVA	
LE	
MA NAFX/MA NIFTAKARX	

21. JEKK LE, GĦALIEX ? IMMARKA KAXXA WAĦDA BISS

MA JSIRUX	
MA NAFX BIHOM	
ĦADD MA JINFURMANI DWARHOM	

SEZZJONI Ċ

22. KEMM TAĦSEB LI S-SAĦĦA TAS-SNIEN HIJA MPORTANTI GĦALL-ANZJAN ? IMMARKA KAXXA WAĦDA BISS

MHUX WISQ	
IMPORTANTI	
IMPORTANTI ĦAFNA	
XI HAĠA OĦRA	

23. QATT ĠEJT MITLUB/A TGHIN FIL-ĦASIL TAS-SNIEN TA' L-ANZJANI ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	
XI HAĠA OĦRA	

24. JEKK IVA, MIN TALBEK ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAHDA

DENTIST / DENTAL HYGIENIST	
INFERMIERA	
PHYSIOTHERAPISTS / OCCUPATIONAL THERAPISTS	
TABIB	
RESIDENTI STESS	

25. JEKK IVA, B'LIEMA MOD TAJT L-GHAJNUNA TIEGHEK ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAHDA

TINDIF TA' DENTATURI	
TINDIF TAS-SNIEN	
TNEHHIJA TA' DENTATURI GHAL BIL-LEJL	

26. QATT TISSUGĠERIXXI MEZZI TA' GHAJNUNA BIEX L-ANZJANI JNADDFU SNIENHOM JEW IDENTATURI B'MOD KOMDU, EZEMPJU B'UZU TA' FOAM TUBINGS ? IMMARKA KAXXA WAHDA BISS

QATT	
KULTANT	
DEJJEM	
MA NAFX DWARHOM	

27. TINKURAĠĠIXXI ANZJANI INDIPENDENTI BIEX JNADDFU SNIENHOM/DENTATURI ? IMMARKA KAXXA WAHDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	

28. FIS-SWALI, TOSSERVA L-ISTRUZZJONIJIET MOGHTIJA MID-DENTIST/DENTAL HYGIENIST, DWAR IL-KURA TAS-SNIEN FL-ISTORJA MEDIKA ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	

29. JEKK LE, GĦALIEX ? IMMARKA KAXXA WAĦDA BISS

MA JKUNX HEMM ISTRUZZJONIJIET	
MA NAFX BIHOM	
RAĠUNI OĦRA	

30. QATT TIRREFERI RESIDENTI GĦALL-PARIR DWAR IL-KURA TAS-SNIEN ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	

SEZZJONI D

31. I-anzjani qatt isaqsu biex is-snien/dentaturi tagħhom jiġu maħsula ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	

32. JEKK IVA, KEMM MILL-ANZJANI JSAQSU BIEK SNIENHOM /DENTATURI JIĠU MAĦSULA ? IMMARKA KAXXA WAĦDA BISS

HADD	
FTIT MINNHOM	
HAFNA MINNHOM	
KOLLHA	

33. L-ANZJANI JSAQSU BIEX IMORRU L-KLINIKA DENTATLI LI TINSAB ĠEWWA R-RESIDENZA ? IMMARKA KAXXA WAHDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	

SEZZJONI E

34. IL-FACILITAJIET FIS SWALI TAR-RESIDENZA MSEMMIJA HAWN TAHT, HUMA MILHUQA TAJJEB MIR-RESIDENTI ?

SINKS FIL-KMAMAT **IVA** ☐ **LE** ☐

ILMA MILL-VIT FIL-KMAMAR **IVA** ☐ **LE** ☐

KMAMAR TAL-BANJU AĊĊESSIBLI **IVA** ☐ **LE** ☐

35. WIEĦED ISIB DAWN IL-BZONNIJET GHALL-HASIL TAS-SNIEN ?

KIDNEY DISHES **IVA** ☐ **LE** ☐

TOOTHBRUSHES **IVA** ☐ **LE** ☐

TOOTHPASTES **IVA** ☐ **LE** ☐

DENTURE CLEANSING TABLETS **IVA** ☐ **LE** ☐

MOUHWASHES **IVA** ☐ **LE** ☐

DENTURE CONTAINERS **IVA** ☐ **LE** ☐

36. JEKK LE, GĦALIEX ? IMMARKA KAXXA WAĦDA BISS

MA NAFX	
M'HEMMX MIN JIXTRIHOM	
M'HEMMX FONDI BIZZEJJED	
RAĠUNI OĦRA....	

37. IL-KLINIKA DENTALI F'DIN IR-RESIDENZA HIJA MILĦUQA FAĊILMENT MILL-ANZJAN ?

IVA ☐ LE ☐

38. JEKK TAĦSEB LI LE, GĦALIEX ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAĦDA

DISTANZA	
BIDLA FIL-KOSTRUZZJONI TAL-POST EZ. RAMPI	
TRASPORT	
NUQQAS TA STAFF	
RAĠUNI OĦRA ...	

Oral Health Impact Profile – 14 (Maltese Version)

1. Ġieli kellek xi diffikultà biex tgħid xi kliem, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

2. Ġieli ħassejt li ma stajt ittiegħem sew, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

3. Ġieli kellek ugiġh qawwi f'ħalqek?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

4. Ġieli ħassejtek skomdu/a tiekol xi ikel, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

5. Ġieli ħassejtek konxju bi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

6. Ġieli kont anzjuż minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

7.Thoss li l-ikel ta' kuljum mhux jgħoġbok biżżejjed minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

8.Ġieli kellek tieqaf f'nofs ikla, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

9.Ġieli sibtha diffiċli biex tirrilassa, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

10.Ġieli ħassejtek imbarazzat/a, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

11.Ġieli kont urtat b'ħaddieħor, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

12.Ġieli sibtha aktar diffiċli biex tkompli bix-xogħol tiegħek, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

13. Ġieli hassejt li l-ħajja ma kinitx sodisfaċenti biżżejjed, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

14. Ġieli hassejt li ma stajtx tkampa xejn mal-ħajja ta' kuljum minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS ĦAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

GRAZZI

Mistoqsijiet miġbura minn kwestjonarji li ġew wżati, ppruvati u li huma xjentifikament validi fi studji oħra: mill-Fakulta tad-Dentistrija, Università' ta' Malta, mill-Unit tas-Saħħa Dentali Publika u minn studju li sar ġewwa SVPR, 'An Interdisciplinary Approach towards Oral Maintenance Care in an Institution for the Older adults in Malta' (1999)

APPENDIX 18 – Interview Questions with Older Adults

English and Maltese Version

Interview Questions for Older Adults

UNIVERSITY OF MALTA



Interview for Residents : MOUTH HEALTH IN OLDER ADULTS

Example of how to mark QUESTIONS

YES	NO
√	

DATE ____/____/____

AGE ____

Sex: Male ____ Female ____

DATE OF BIRTH ____

LOCALITY OF RESIDENCE _____

**WHAT IS YOUR
LEVEL OF EDUCATION?
(TICK ONE BOX ONLY)**

1. NO SCHOOLING
2. PRIMARY SCHOOL
3. SECONDARY SCHOOL
4. POST SECONDARY SCHOOL/UPPER SECONDARY/HIGHER TECHNICAL/VOCATIONAL LEVEL
5. DIPLOMA
6. GRADUATE
7. POST-GRADUATE
8. DOCTORATE

**PROFESSION PRIOR TO
RETIREMENT**

1. PROFESSIONAL, COMPANY DIRECTOR, MANAGER, HIGHER GOVERNMENT/ARMY OFFICIAL, SMALL BUSINESS OWNER
2. CLERK, SUPERVISOR, TECHNICIAN
3. KITCHEN ASSISTANT, HAIRDRESSER, POSTMAN, WARDEN
4. FOREMAN, MANUAL LABOURER, MESSENGER, WAITER
5. UNEMPLOYED

General Assessment

Cognitive Health

Alert ☐

Semi-Alert ☐

Non-Communicable ☐

Mobility

Ambulatory ☐

Non-Ambulatory ☐

Dexterity

Good ☐

Poor ☐

Dentition

Own dentition ☐

Dentures ☐

Both ☐

Section A

- 1. HOW WOULD YOU DESCRIBE THE HEALTH OF YOUR TEETH AND GUMS? TICK ONE BOX IN EACH ROW**

	a. EXCELLENT	b. VERY GOOD	c. GOOD	d. AVERAGE	e. POOR	f. VERY POOR	g. DON'T KNOW
TEETH							
GUMS							

- 2. HOW OFTEN DID YOU HAVE TOOTHACHE OR DISCOMFORT IN YOUR MOUTH DURING THE PAST 12 MONTHS? TICK ONE BOX ONLY**

a. OFTEN	b. OCCASIONALLY	c. RARELY	d. NEVER	e. DON'T KNOW

- 3. WHICH TYPE OF DENTAL SERVICE DO YOU USE ? TICK ONE BOX ONLY**

a. PRIVATE DENTIST	b. HOSPITAL SERVICE	c. MIXTURE OF BOTH	d. DON'T REMEMBER	e. HAVE NEVER BEEN

- 4. HOW OFTEN DID YOU GO TO THE DENTIST DURING THE LAST 12 MONTHS? TICK ONE BOX ONLY**

- a. NEVER BEEN TO A DENTIST
- b. NOT IN THE LAST 12 MONTHS
- c. ONCE
- d. TWICE
- e. THREE OR MORE TIMES
- f. I DON'T KNOW/DON'T REMEMBER

5. WHAT WAS THE REASON FOR YOUR LAST VISIT TO THE DENTIST ?

- a. PAIN/TROUBLE WITH TEETH, GUMS OR MOUTH _____
- b. TREATMENT/FOLLOW-UP TREATMENT _____
- c. ROUTINE CHECK-UP OF TEETH/TREATMENT _____
- d. I DON'T KNOW/DON'T REMEMBER _____
- e. I HAVE NEVER BEEN _____

6. HOW OFTEN DO YOU CLEAN YOUR TEETH ?

- a. NEVER _____
- b. LESS THAN ONCE A DAY _____
- c. ONCE A DAY _____
- d. TWO TIMES A DAY _____
- e. MORE THAN TWO TIMES A DAY _____

7. WHEN DO YOU BRUSH YOUR TEETH ?

- a. BEFORE BREAKFAST _____
- b. AFTER BREAKFAST _____
- c. AFTER LUNCH _____
- d. BEFORE GOING TO BED _____
- e. AT OTHER TIMES _____

8. WHICH TOOTHBRUSH DO YOU USE TO BRUSH YOUR TEETH ? TICK ONE BOX ONLY.

a. DON'T BRUSH	b. DON'T KNOW	c. MANUAL BRUSH SOFT	d. MANUAL BRUSH MEDIUM	e. MANUAL BRUSH HARD	f. ELECTRIC TOOTHBRUSH

9. HOW DO YOU BRUSH YOUR TEETH ? TICK ONE ANSWER ONLY

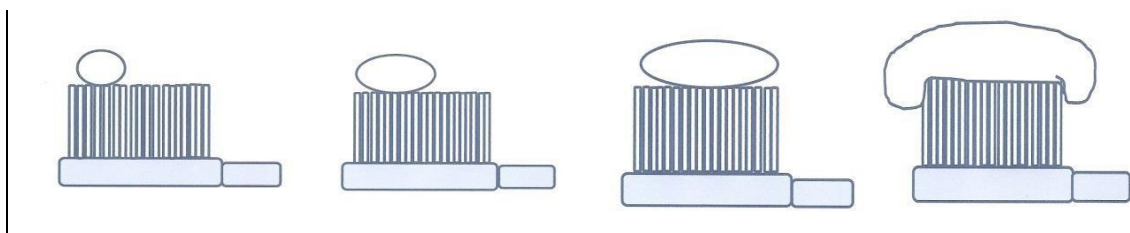
- a. BACK AND FORTH (HORIZONTAL MOTION) _____
- b. UP AND DOWN (VERTICAL MOTION) _____
- c. CIRCULAR MOTION _____
- d. A MIXTURE OF THE ABOVE _____

10. WHAT DO YOU USE TO CLEAN YOUR TEETH?

- a. TOOTHPASTE WITH FLUORIDE
- b. TOOTHPASTE WITHOUT FLUORIDE
- c. WHITENING TOOTHPASTE
- d. MEDICATED TOOTHPASTE
- e. MOUTHWASH?

YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW
YES	NO	SOMETIMES	DON'T KNOW

11. CIRCLE THE PICTURE WHICH BEST SHOWS THE AMOUNT OF TOOTHPASTE YOU PLACE ON THE TOOTHBRUSH.



12. DO YOU RINSE YOUR MOUTH AFTER BRUSHING ? YES ____ NO ____

13. DO YOU ALSO USE ANY OF THE FOLLOWING TO CLEAN YOUR TEETH OR GUMS? TICK ANY BOX/BOXES

a. WOODEN TOOTHPICKS	b. PLASTIC TOOTHPICKS	c. DENTAL FLOSS/TAPE (THREAD)	d. INTERDENTAL BRUSHES	e. OTHER: _____

14. DO YOUR GUMS BLEED WHEN YOU ARE BRUSHING YOUR TEETH ? TICK ONE BOX ONLY

YES	
NO	
SOMETIMES	
NEVER NOTICED	

15. IF YES OR SOMETIMES, FROM WHERE DO YOU BLEED ? TICK ONE BOX ONLY

FROM CERTAIN AREAS IN MY MOUTH	
EVERYWHERE IN MY MOUTH	
NEVER NOTICED	

SECTION B

AN INTERDISCIPLINARY APPROACH TOWARDS ORAL MAINTENANCE CARE AT ST. VINCENT DE PAUL RESIDENCE FOR OLDER ADULTS

16. HAVE YOU EVER RECEIVED ORAL HEALTH EDUCATION ? TICK ONE BOX ONLY

YES	NO	DON'T KNOW

**17. IF YES, FROM WHERE HAVE YOU RECEIVED YOUR EDUCATION/INFORMATION
REGARDING ORAL HEALTHCARE ? YOU MAY TICK MORE THAN ONE BOX**

SCHOOL	
CURRICULAR STUDIES	
MEDIA (television/radio/social media)	
AT THE PLACE OF WORK	
RESIDENCE FOR OLDER ADULTS (talks/training course)	

**18. HOW MANY TIMES DID YOU HAVE THE OPPORTUNITY TO LEARN
ABOUT ORAL HEALTH CARE ?TICK ONE BOX ONLY**

ONCE	
MORE THAN ONCE	
FREQUENTLY	

19. HOW FREQUENTLY WOULD YOU LIKE TO RECEIVE EDUCATION/INFORMATION REGARDING ORAL HEALTHCARE AT THE PLACE WHERE YOU RESIDE ? TICK ONE BOX ONLY

NEVER	
EVERY 6 MONTHS	
EVERY YEAR	
OTHER COMMENT	

20. HAVE YOU EVER PARTICIPATED IN DENTAL TALKS HELD IN WARDS ? TICK ONE BOX ONLY

YES	
NO	
DON'T KNOW/CANNOT REMEMBER	

21. IF YOUR ANSWER TO THE ABOVE QUESTION IS NO, WHAT IS THE REASON ? TICK ONE BOX ONLY

NEVER HELD	
NOT AWARE OF TALKS BEING HELD	
NOBODY HAS INFORMED ME	

SECTION C

22. HOW IMPORTANT IS ORAL HYGIENE TO YOU ? TICK ONE BOX ONLY

NOT MUCH	
IMPORTANT	
VERY IMPORTANT	
OTHER....	

23. HAVE YOU EVER ASKED TO BE ASSISTED ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	
OTHER	

**24. IF YOU HAVE BEEN ASSISTED IN DAILY ORAL CARE, BY WHOM
HAVE YOU BEEN ASSISTED ?YOU MAY TICK MORE THAN ONE BOX**

DENTIST/DENTAL HYGIENIST	
NURSE	
PHYSIOTHERAPIST/OCCUPATIONAL THERAPIST	
DOCTOR	
OTHER RESIDENTS	
RELATIVES	
OTHER	

25. IF YES, IN WHAT WAY HAVE YOU BEEN ASSISTED ? YOU MAY TICK MORE THAN ONE BOX

RINSING AND BRUSHING OF DENTURES	
BRUSHING OF TEETH	
REMOVAL OF DENTURES BEFORE BEDTIME	

26. DO YOU EVER USE FACILITATING AIDS TO ENABLE YOU BRUSH YOUR TEETH/DENTURES BETTER ? EG.FOAM TUBING ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
ALWAYS	
NEVER HEARD OF FACILITATING AIDS	

27. HAVE YOU EVER BEEN ENCOURAGED TO BRUSH TEETH/DENTURES ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

28. DO YOU FOLLOW THE ORAL HYGIENE INSTRUCTIONS GIVEN TO YOU DURING YOUR VISIT AT THE DENTALCLINIC ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

29. IF YOUR ANSWER TO THE PREVIOUS QUESTION IS NO, WHAT IS THE REASON ? TICK ONE BOX ONLY

I DO NOT BRUSH MY TEETH/DENTURES	
IFORGET ALL ABOUT THE INSTRUCTIONS GIVEN	
OTHER	

30. HAVE YOU EVER BEEN REFERRED FOR DENTAL ADVICE/TREATMENT ? TICK ONE BOX ONLY

NEVER	
SOMETIMES	
FREQUENTLY	
ALWAYS	

31. HAVE YOU EVER VISITED THE DENTAL CLINIC AT SVPR FOR A CHECK-UP/TREATMENT ?

Yes ☐ No ☐

32. IF THE ANSWER TO THE PREVIOUS QUESTION IS NO, WHAT IS THE REASON ?TICK ONE BOX ONLY

DON'T KNOW ABOUT IT	
VISIT PRIVATE DENTIST	
NEVER HAD A DENTAL PROBLEM	
OTHER	

33. IF THE ANSWER TO QUESTION 30 IS YES, FOR WAHT REASON DID YOU VISIT THE DENTAL CLINIC ? YOU MAY TICK MORE THAN ONE BOX

CHECK-UP	
SCALING/POLISHING	
FILLINGS	
EXTRACTIONS	
DENTURES	
OTHER...	

Section D

34. DO YOU SMOKE Yes ☐ No ☐

35. IF YES, HOW MANY CIGARETTES PER DAY ?

1-5 CIGARETTES/DAY	
6-10 CIGARETTES/DAY	
11-20 CIGARETTES/DAY	
MORE....	

Section E

36. WHAT FACILITIES ARE AVAILABLE IN WARDS ?

- a. ACCESSIBLE BASINS IN ROOMS YES____ NO____
- b. WATER SUPPLY IN ROOMS YES____ NO____
- c. ACCESSIBLE BATHROOMS YES____ NO____

37. ARE THE BASIC NECESSITIES FOR TOOTHBRUSHING AVAILABLE ?

KIDNEY DISHES YES____ NO ____

TOOTHBRUSHES YES____ NO ____

TOOTHPASTES YES____ NO ____

DENTURE DISINFECTANT TABLETS YES____ NO____

MOUThWASHES YES____ NO____

MOUThTRAYS YES____NO____

DENTURE CONTAINER YES____ NO____

38. IF THESE ARE NOT AVAILABLE, WHAT IS THE REASON ? TICK ONE BOX ONLY

DON'T KNOW	
NO ONE ORDERS/BUYS THEM	
INSUFFICIENT FUNDS	
OTHER	

**39. IS THE DENTAL CLINIC WITHIN THE FACILITY EASILY ACCESSIBLE
TO THE RESIDENTS ? Yes ____ No ____**

**40. IF THE ANSWER TO THE PREVIOUS QUESTION IS NO, WHAT IS THE
REASON ? YOU MAY TICKMORE THAN ONE BOX**

DISTANCE	
BUILDING STRUCTURE NEEDS ALTERATION EGRAMPS	
TRANSPORT	
SHORTAGE OF STAFF	
OTHER	

Oral Health Impact Profile-14

1. Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

2. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

3. Have you had painful aches in your mouth?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

4. Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

5. Have you been self-conscious because of your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

6. Have you felt tense because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

7. Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

8. Have you ever had to interrupt meals because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

9. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

10. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

11. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

12. Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?

☐	☐	☐	☐	☐	☐
Very Often	Fairly Often	Occasionally	Hardly Ever	Never	Don't know

13. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?

☐ ☐ ☐ ☐ ☐ ☐

Very Often Fairly Often Occasionally Hardly ever Never Don't know

14. Have you been totally unable to function because of problems with your teeth, mouth or dentures?

☐ ☐ ☐ ☐ ☐ ☐

Very Often Fairly Often Occasionally Hardly ever Never Don't know

Thank you

Questions compiled from various questionnaires used; tested and scientifically validated in other research programmes: Faculty of Dental Surgery, University of Malta, Dental Public Health Unit and from research conducted at SVPR 'An interdisciplinary Approach towards Oral Maintenance Care in an Institution for Older adults in Malta' (1999). Translations from English to Maltese versions had been translated in previous years by Maltese linguists.

Intervista mar-Residenti : SAHHA TAL-HALQ



L-Università
ta' Malta

Dental



Public Health Unit
Superintendence of Public Health
Tel: 2595 3330/3314, www.ehealth.gov.mt

DATA _____/_____/____

ETA _____

DATA TATWELID _____/_____/_____

SESS RAĠEL _____ MARA _____

LOKALITÀ FEJN TOQGHOD _____

IL-LIVELL TÀ EDUKAZZJONI
TIEGHEK?(IMMARKA KAXXA
WAHDA BISS)

1. MA MORTX SKOLA
2. SKOLA PRIMARJA
3. SKOLA SEKONDARJA
4. SKOLA POST-SEKONDARJA
5. DIPLOMA
6. GRADWAT/A
7. POST-GRADWAZZJONI
8. DOTTORAT

Impjieg qabel l-Irtitar

1. PROFESSJONIST/A, DIRETTUR/DIRETTRIČI TA' KUMPAJIA, MANAĠER, UFFIČJAL TAL-GVERN/ARMATA, SID TA' NEGOZJU ŻĠHIR
2. SKRIVAN/A, SUPERVAJŻER, TEKNIXIN
3. ASSISTENT FIL-KĊINA, BARBIER, PUSTIER/A, WARDEN
4. FOREMAN, HADDIEM TAL-ID, MESSAĠĠIER, WEJTER
5. QIEGĦED/QIEGĦDA

Assessjar ta' Saħħa Ġenerali

General Assessment

Saħħa Konjittiva

Komunikkabli ☐

Semi-Komunikkabli ☐

Mhux Komunikkabli ☐

Mobilita

Mobbli ☐

Mhux Mobbli ☐

Flessibilita

Flessibli ☐

Mhux Flessibli ☐

Snien

Naturali ☐

Dentaturi ☐

It-Tnejn ☐

SEZZJONI A

1. X' TISTA TGHID FUQ IS-SAĦĦA TAS-SNIEN U L-ĦANEK TIEGĦEK? IMMARKA KAXXA WAĦDA F'KULL RINGIELA

	a. EĊĊELLENTI	b. TAJBA ĦAFNA	ċ. TAJBA	d. HEKK U HEKK	e. ĦAŻINA	f. ĦAŻINA ĦAFNA	g. MA NAFX
SNIEN							
ĦANEK							

2. FL-AĦĦAR 12-IL XAHAR, KEMM IL-DARBA KELLEK UĠIĦ FIS-SNIEN JEW SKUMDITA' F'ĦALQEK? IMMARKA KAXXA WAĦDA BISS

a. SPISS	b. XI DRABI	ċ. DARBA FIL	d. QATT	e. MA NAFX

3. X'TIP TÀ SERVIZZ TAS-SNIEN TUŻA? IMMARKA KAXXA WAĦDA BISS

a. DENTIST PRIVAT	b. SERVIZZ TÀ L- ISPTAR	ċ. DAQQA WIEĦED U DAQQA L- IEĦOR	d. MA NIFTAKARX	e. QATT MA MORT

4. FL-AĦĦAR 12-IL XAHAR, KEMM IL-DARBA MORT GĦAND ID-DENTIST? IMMARKA KAXXA WAĦDA BISS

- a. QATT MA MORT GĦAND ID-DENTIST ____
- b. QATT FL-AĦĦAR 12-IL XAHAR ____
- c. DARBA ____
- d. DARBTEJN ____
- e. TLIET DARBIET JEW AKTAR ____
- f. MA NAFX/MA NIFTAKAR ____

**5. X'KIENET IR-RAGUNI TA L-AĦĦAR ŻJARA GĦAND ID-DENTIST TIEGĦEK ?
IMMARKA KAXXA WAĦDA BISS.**

- a. UĠIGH/PROBLEMI FIS-SNIEN, HANEK JEW IL-ĦALQ _____
- b. TRATTAMENT/VISTA WAR A T-TRATTAMENT _____
- c. EŻAMI NORMALI TAS-SNIEN _____
- d. MA NAFX/MA NIFTAKARX _____
- e. QATT MA MORT GĦAND ID-DENTIST _____

6. KEMM IL-DARBA TAĦSEL SNIENEK ? IMMARKA KAXXA WAĦDA BISS.

- a. QATT _____
- b. ANQAS MINN DARBA KULJUM _____
- c. DARBA KULJUM _____
- d. DARBTEJN KULJUM _____
- e. AKTAR MINN DARBTEJN KULJUM _____

7. META TNADDAF SNIENEK ? IMMARKA KAXXEX KEMM BŻONN

- a. QABEL L-EWWEL IKLA TA FILGĦODU/BREAKFAST _____
- b. WAR A L-EWWEL IKLA TA FILGĦODU/BREAKFAST _____
- c. WAR A L-IKLA TA' NOFSINHAR _____
- d. QABEL L-IRQAD _____
- e. XI ĦINIJIET OĦRA _____

8. LIEMA XKUPILJA TUŻA (Toothbrush) BIEK TNADDAF SNIENEK ?

- a. MA NNAFDDAFX _____
- b. MA NAFX _____
- c. XKUPILJA RATBA _____
- d. XKUPILJA TAN-NOFS (Medium) _____
- e. XKUPILJA IEBSA _____
- f. XKUPILJA TA L-ELETTRIKU _____

9. KIF TAĦSEL SNIENEK ? IMMARKA KAXXA WAĦDA BISS

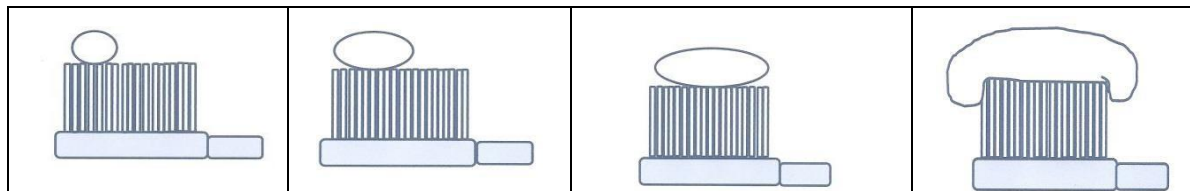
- a. IL-WARA U L-QUDDIEM (MOVIMENT ORIŻŻONTALI) _____
- b. IL-FUQ U L-ISFEL (MOVIMENT VERTIKALI) _____
- c. GĦAT-TOND (F'ĊIRKU) _____
- d. TAĦLITA TÀ KOLLOX _____

10. X' TUŻA BIEX TNADDAF SNIENEK? IMMARKA KAXXA WAĦDA BISS

- a. 'TOOTHPASTE' BIL-'FLUORIDE'
- b. 'TOOTHPASTE' MINGĦAJR 'FLUORIDE'
- c. 'TOOTHPASTE' LI JBAJJAD IS-SNIEN
- d. 'TOOTHPASTE' IMMEDIKAT
- e. MOUTHWASH

IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX
IVA	LE	XI KULTANT	MA NAFX

11. AGĦMEL ĊIRKU MAL-ISTAMPA LI TURI KEMM TUŻA 'TOOTHPASTE' FUQ L-IXKUPLIJA TAS-SNIENTIEGĦEK.



12. TLAĦLAĦ SNIENEK WARA LI TNADDAFHOM?

Iva ☐ Le ☐

13. TUŻA XI HAĠA MINN DAWN BIEX TNADDAF SNIENEK JEW IL-ĦANEK? IMMARKA KAXXEX KEMM HEMMBŻONN

'TOOTHPICK' TAL-INJAM	'TOOTHPICK' TAL-PLASTIK	ĦAJT (DENTAL FLOSS)	XKUPILJI ŻĠĦARTÀ BEJN IS-SNIEN	OHRAJN : _____

14. JOĦROĠLOK DEMM META TAĦSEL SNIENEK? IMMARKA KAXXA WAĦDA BISS

IVA	LE	MA NAFX

15. JEKK IVA, MINN FEJN JOĦROĠ ID-DEMM ? IMMARKA KAXXA WAĦDA BISS

F'XI BNADI	ĦALQ KOLLU	MA NAFX

**ĦARSA LEJN L-ATTITUDINI
INTERDIXXIPLINARJIDWAR IS-SAĦĦA
ORALI TA' L-ANZJANI ĠEWWA R-
RESIDENZA TA' SAN VINCENZ DE PAUL.**

SEZZJONI B

16. QATT IRĊEVEJT TAĦRIĠ DWAR IS-SAĦĦA TAS-SNIEN ? IMMARKA KAXXA WAĦDA BISS

IVA	LE	MA NAFX

17. JEKK IVA, FEJN HADT IT-TAĦRIĠ ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAĦDA

I-ISKOLA	
KORSIJET PARTI MIT-TAĦRIĠ GĦALL-PROFESSIONI TIEGĦI	
MEDIA (television, radio)	
FUQ IL-POST TAX-XOGĦOL	
RESIDENZA TA' L-ANZJANI (IN-TRAINING COURSE JEW TAĦDITIET GĦALL-ANZJANI)	

**18. JEKK ĠIELI RĊEVEJT TAĦRIĠ JEW INFORMAZZJONI DWAR IS-SAĦĦA U L-KURA TAL-ĦALQ,
KEMM IL-DARBA KELLEK DIN L-OPPORTUNITA'? IMMARKA KAXXA WAĦDA BISS**

DARBA	
AKTAR MINN DARBA	
SPISS	

19. JEKK TIXTIEQ LI JKUN HEMM AKTAR TAGHRIF DWAR IS-SAĦĦA U L-KURA TAS-SNIEN FIR-RESIDENZA FEJN TOQGHOD, KEMM IL-DARBA TIXTIEQ LI DAN ISIR ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULL 6 XHUR	
KULL SENA	
XI HAĠA OĦRA....	

20. QATT IPPARTEĊIPAJT F'TAĦDITIET RIGWARD IL-KURA TAS-SNIEN FIS-SWALI ? IMMARKA KAXXAWAĦDA BISS

IVA	
LE	
MA NAFX/MA NIFTAKARX	

21. JEKK LE, GĦALIEX ? IMMARKA KAXXA WAĦDA BISS

MA JSIRUX	
MA NAFX BIHOM	
ĦADD MA JINFURMANI DWARHOM	

SEZZJONI Ċ

22. KEMM TAĦSEB LI S-SAĦĦA TAS-SNIEN HIJA MPORTANTI GĦALIK ? IMMARKA KAXXA WAĦDABISS

MHUX WISQ	
IMPORTANTI	
IMPORTANTI ĦAFNA	
XI HAĠA OĦRA	

23. QATT SAQSEJT BIEX TIĠI MEJĠHUN/A FIL-ĦASIL TAS-SNIEN ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	
XI HAĠA OHRA	

24. JEKK IVA, LIL MIN TLABT BIEX JĠHINEK FIL-ĦASIL TAS-SNIEN ? TISTA TIMMARKA AKTAR MINNRISPOSTA WAĦDA

DENTIST / DENTAL HYGIENIST	
INFERMIERA	
PHYSIOTHERAPISTS / OCCUPATIONAL THERAPISTS	
TABIB	
RESIDENTI STESS	

25. JEKK IVA, B'LIEMA MOD ĠHINUK ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAĦDA

TINDIF TA' DENTATURI	
TINDIF TAS-SNIEN	
TNEHHIJA TA' DENTATURI GĦAL BIL-LEJL	

26. QATT UZAJT MEZZI TA' GĦAJNUNA BIEX TNADDAF SNIENEK JEW ID-DENTATURI B'MODKOMDU, EZEMPJU B'UZU TA' FOAM TUBINGS ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
DEJJEM	
MA NAFX DWARHOM	

27. ĠIELI ĠEJT INKURAGĠUT/A BIEX TAĦSEL SNIENEK/DENTATURI ? IMMARKA KAXXA WAĦDABISS

QATT	
KULTANT	
SPISS	
DEJJEM	

28. TOSSERVA L-ISTRUZZJONIJIET MOGHTIJA MID-DENTIST/DENTAL HYGIENIST, DWAR IL-KURATAS-SNIEN ? IMMARKA KAXXA WAĦDA BISS

QATT	
KULTANT	
SPISS	
DEJJEM	

29. JEKK LE, GĦALIEX ? IMMARKA KAXXA WAĦDA BISS

MA NAĦSILX SNIENI	
NINSA	
RAĠUNI OĦRA	

30. QATT ĠEJT RIFERUT/AI GĦALL-PARIR DWAR IL-KURA TAS-SNIEN ? IMMARKA KAXXA WAĦDABISS

QATT	
KULTANT	
SPISS	
DEJJEM	

31. ĠIELI MORT IL-KLINIKA DENTALI ĠEWWA SAN VINCENZ DE PAUL ? IVA ____ LE ____

32. JEKK IT-TWEĠIBA TA' QABEL KIENET LE, X'INHI R-RAĠUNI ? IMMARKA KAXXA WAĦDA BISS

MA NAFX LI HAWN KLINIKA DENTALI	
MMUR GĦAND ID-DENTIST TIEGHI	
QATT MA KELLI PROBLEMI F'ĦALQI	
RAĠUNI OĦRA...	

33. JEKK IT-TWEĠIBA TAL-MISTOQSIJA 31 HIJA 'IVA', GĦALFEJN MORT IL-KLINIKA DENTALI ?TISTA TIMMARKA AKTAR MINN RISPOSTA WAĦDA

CHEKCK-UP	
TINDIF TAS-SNIEN	
MILI	
QLUGH	
DENTATURI	
RAĠUNI OĦRA	

Sezzjoni D

34. TPEJJEP ? IVA ____ LE ____

35. JEKK TPEJJEP, KEMM SIGARETTI TPEJJEM KULJUM ?

1-5 SIGARETTI /ĠURNATA	
6-10 SIGARETTI /ĠURNATA	
11-20 SIGARETTI /ĠURNATA	
AKTAR	

SEZZJONI E

36. IL-FAĊILITAJIET FIS SWALI TAR-RESIDENZA MSEMMIJA HAWN TAHT, HUMA MILĦUQA TAJJEBMINNEK ?

- a. SINKS FIL-KMAMAT IVA____ LE____
- b. ILMA MILL-VIT FIL-KMAMAR IVA____ LE____
- c. KMAMAR TAL-BANJU AĊĊESSIBLI IVA____ LE____

37. ISIB DAWN IL-BŻONNIJET GHALL-ĦASIL TAS-SNIEN ?

- a. KIDNEY DISHES IVA____ LE____
- b. TOOTHBRUSHES IVA____ LE____
- c. TOOTHPASTES IVA____ LE____
- d. DENTURE CLEANSING TABLETS IVA____ LE____
- e. MOUTHWASHES IVA____ LE____
- f. DENTURE CONTAINERS IVA____ LE____

38. JEKK LE, GĦALIEX TAĦSEB ? IMMARKA KAXXA WAĦDA BISS

- a. MA NAFX ____
- b. M'HEMMX MIN JIXTRIHOM ____
- c. M'HEMMX FONDI BIŻŻEJJED ____
- d. RAĠUNI OĦRA ____

39. IL-KLINIKA DENTALI F'DIN IR-RESIDENZA, HI MILĦUQA FAĊILMENTMINNEK ?

IVA____ LE____

40. JEKK TAĦSEB LI LE, GĦALIEX ? TISTA TIMMARKA AKTAR MINN RISPOSTA WAĦDA.

- a. DISTANZA _____
 - b. BIDLA FIL-KOSTRUZZJONI TAL-POST EŻ. RAMPI _____
 - c. TRANSPORT _____
 - d. NUQQAS TA STAFF _____
 - e. RAĠUNI OHRA _____
-

Oral Health Impact Profile-14 (Maltese Version)

1. Ġieli kellek xi diffikultà biex tgħid xi kliem, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

2. Ġieli hassejt li ma stajtx ittiegħem sew, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

3. Ġieli kellek ugiġh qawwi f'ħalqek?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

4. Ġieli hassejtek skomdu/a tiekol xi ikel, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

5. Ġieli hassejtek konxju bi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

6. Ġieli kont anzjuż minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

7. Thoss li l-ikel ta' kuljum mhux jgħoġbok bizżejjed minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

8. Ġieli kellek tieqaf f'nofs ikla, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

9. Ġieli sibtha diffiċli biex tirrilassa, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

10. Ġieli ħassejtek imbarazzat/a, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

11. Ġieli kont urtat b'ħaddieħor, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

12. Ġieli sibtha aktar diffiċli biex tkompli bix-xogħol tiegħek, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

13. Ġieli hassejt li l-ħajja ma kinitx sodisfaċenti biżżejjed, minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

14. Ġieli hassejt li ma stajtx tkampa xejn mal-ħajja ta' kuljum minħabba problemi fi snienek, ħalqek jew bid-dentatura?

☐	☐	☐	☐	☐	☐
SPISS HAFNA	SPISS	KULTANT	RARI	QATT	MA NAFX

GRAZZI

Mistoqsijiet miġbura minn kwestjonarji li ġew wżati, ppruvati u li huma xjentifikament validi fi studji oħra: mill-Fakulta tad-Dentistrija, Università ta' Malta, mill-Unit tas-Saħħa Dentali Publika u minn studju li sar ġewwa SVPR, 'An Interdisciplinary Approach towards Oral Maintenance Care in an Institution for the Older adults in Malta' (1999)

APPENDIX 19 – CLINICAL DOCUMENTATION

OHI – S 1964 and Plaque Scoring Levels

Basic Periodontal Examination Scoring

6 – Point Pocket Chart

Measurement of Periodontal Pocket, Recession and CAL

Sulcus Bleeding Score Chart

Dental Hygiene Assessment Document

Oral Hygiene and Periodontal Indices used in this research project.

Oral Hygiene and Periodontal Indices as Key Performance Indicators

Oral Hygiene Index - Debris (plaque index) - Calculus Index	Greene and Vermillion Oral Hygiene Index (1964)
Basic Periodontal Examination	British Society of Periodontology
6 point Periodontal Chart	- PPDs - Recession - CAL - Mobility - Furcation
Bleeding on Probing – Sulcus Bleeding Index Score	Muhlemann & Son 1971
Mobility	Grace and Smales 1989
Furcation	Glickman, I 1979

Hyposalivation, Denture and Mucosa Hygiene as Key Performance Indicators

Denture Hygiene	Clean	Not Clean
Mucosa Hygiene	Clean	Not Clean
Hyposalivation	Present	Not present

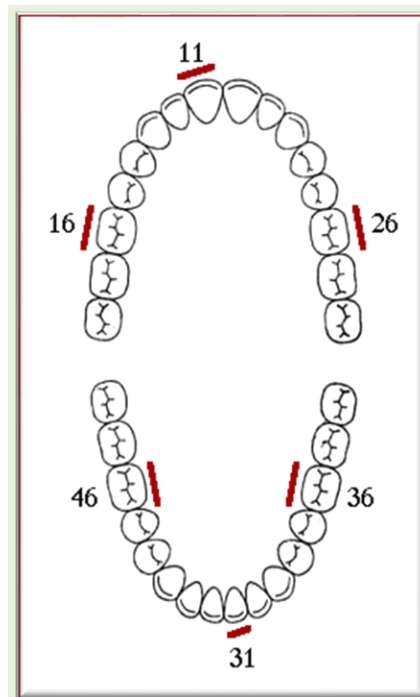
Dental charting is the representation of the patients' condition of his/her teeth graphically on a particular date. The clinical assessments are recorded together with any symptoms reported by the patient. There has to be continuity, sequencing and ongoing documentation to observe successive findings and interpretations (Darby & Walsh, 2014). The numbering system which will be used in this study is the International Numbering system (Federation Dentaire International).

Oral Hygiene Indices

The WHO manual “Oral Health Surveys – Basic Methods (2013)”, provides WHO recommended standardized oral hygiene and periodontal reporting systems when conducting national oral health surveys. This allows comparisons of oral health status between countries and also within countries.

Plaque and Calculus Scores – Oral Hygiene Index Score

Simplified Oral Hygiene Index



The Simplified Oral Hygiene Index (OHI-S) (Greene and Vermillion, 1964) was used in this study. This index measures the presence of both debris (plaque, food particles and stains) and calculus (supra and sub gingival calculus).

The Simplified Oral Hygiene Index (OHI-S) is different from the OHI (The Oral Hygiene Index). The number of the tooth surfaces scored are 6 and not 12. The OHI-S index is also different when selecting the surfaces to be scored, and the scores, which can be obtained. However the criteria used for allocating scores to the tooth surfaces are the same as those used for the OHI (The Oral Hygiene Index).

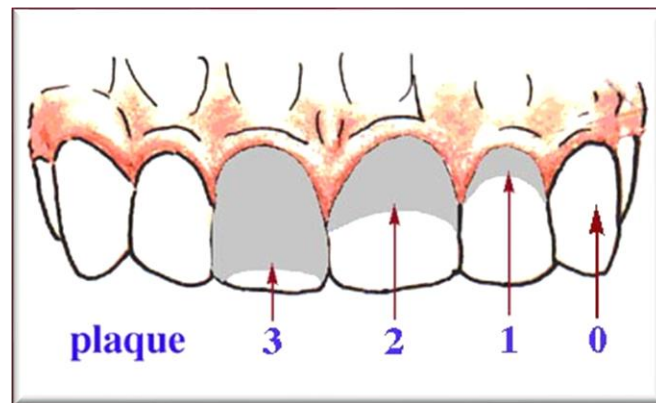
The OHI-S is an adequately sensitive tool for evaluating the oral hygiene of population groups and can be used reliably. Despite its potential shortcomings in possibly underestimating or overestimating debris or calculus, its quick application time in field studies—less than one minute per person—greatly outweighs these limitations. For cases that demand more detailed information on oral cleanliness than the OHI-S offers, either the original OHI or the all surfaces method may be utilized (Greene and Vermillion, 1964).

The OHI-S, like the OHI, is divided into the Debris Index and the Calculus Index. Each of these indices, are based on numerical determinations representing the amount of debris or calculus found on the pre-selected tooth surfaces.

The six surfaces examined for the OHI-S are selected from four posterior and two anterior teeth.

- In the posterior area of the dentition, the first fully erupted tooth distal to the second bicuspid (15), usually the first molar (16) but sometimes the second (17) or third molar (18), is examined. The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars are inspected.

- In the anterior portion of the mouth, the labial surfaces of the upper right (11) and the lower left central incisors (31) are scored. In the absence of either of these anterior teeth, the central incisor (21 or 41 respectively) on the opposite side of the midline is substituted (Greene and Vermillion, 1964).



- Criteria for classifying debris

Debris Index Criteria (Greene and Vermillion, 1964)

Debris Score	Debris Index Criteria
0	No debris or stain present
1	Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered
2	Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.
3	Soft debris covering more than two thirds of the exposed tooth surface.

- Criteria for classifying calculus

Calculus Index Criteria (Greene and Vermillion, 1964)

Calculus Score	Calculus Index Criteria
0	No calculus present
1	Supragingival calculus covering not more than third of the exposed tooth surface.
2	Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both.
3	Supragingival calculus covering more than two third of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth or both.

- Calculation example

After the scores for debris and calculus are recorded, the Index values are calculated. For each individual, the debris scores are totalled and divided by the number of surfaces scored. At least two of the six possible surfaces must have been examined for an individual score to be calculated. After a score for a group or an individual is obtained by computing the average of the individual scores. The average individual or group score is known as the Simplified Debris Index (DI-S) (Greene and Vermillion, 1964).

The same methods are used to obtain the calculus scores or the Simplified Calculus Index Score (CI-S).

The average individual or group debris and calculus scores are combined to obtain the Simplified Oral Hygiene Index.

The CI-S and DI-S values may range from 0 to 3; the OHI-S values from 0 to 6. These values are just half the score magnitude possible with the OHI (Oral Hygiene Index).

The following example shows how to calculate the index. The scores for debris and calculus should be tabulated separately and index for each calculated independently, but in the same manner.

Debris Index = (The buccal-scores) + (The lingual-scores) / (Total number of examined buccal and lingual surfaces).

Calculus Index = (The buccal-scores) + (The lingual-scores) / (Total number of examined buccal and lingual surfaces).

The average individual or group debris and calculus scores are combined to obtain simplified Oral Hygiene Index, as follows.

Oral Hygiene Index = Debris Index + Calculus Index (Greene and Vermillion, 1964).

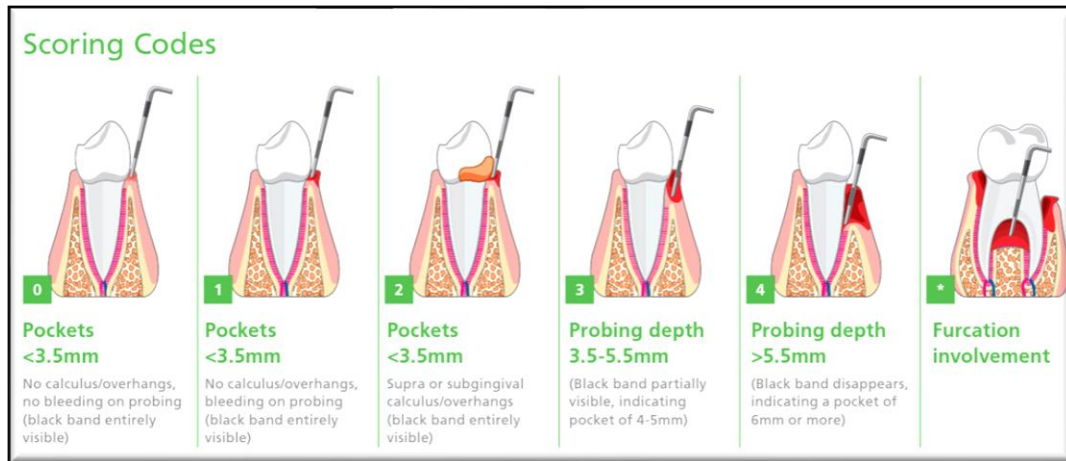
- Interpretation of Oral Hygiene Index Scores

Oral Hygiene Index Score and Interpretation (Darby & Walsh, 2014; Greene & Vermillion 1964; WHO, 2013)

0 – 1.2	Good
1.3 – 3.0	Fair
3.1 – 6.00	Poor

Periodontal Indices

Basic Periodontal Examination



The Basic Periodontal Examination indices are used to provide guidelines and determine treatment plans. These guidelines provide initial basic periodontal assessment. BPE is used for screening only and should not be used for diagnosis (Council of the British Society of Periodontology, Jan 2019).

The Basic Periodontal Examination is carried out using the periodontal probe which is recommended by the World Health Organisation, known as the Community Index of Periodontal Treatment Needs probe. The dentition is divided into six sextants. All the teeth within that sextant are examined. The third molars are not included in the examination, unless the first and second molars are absent. If less than two teeth are present in the sextant, then that sextant is not considered for examination purposes. The clinician should examine every tooth and thus walk around each tooth with the probe to obtain the highest periodontal pocket score in each sextant. Furcations should not be missed especially if a Code 4 is observed within a sextant.

The BPE will eventually indicate whether patients having Code 3 will require initial therapy, which includes oral hygiene instructions and therefore the need for improved self-care, control of any risk factors and a 6 point pocket chart in that sextant only.

If a Code 4 is identified, then a 6-point pocket chart is to be recorded throughout the whole dentition.

This type of examination cannot be useful to monitor changes in periodontal health after therapy since the examination does not give enough information about changes in different sites of the sextants. Therefore to obtain this information, a 6-point periodontal chart is required (Council of the British Society of Periodontology, Jan 2019).

BPE Score Grid

3	4*	3
2	-	4*

The number and the asterisk are important indices which indicate the score for a sextant and the furcation involvement respectively. Therefore if the score is 4, then this indicates that the probing depth is of 6.0mm and more. If an asterisk is recorded that means that furcation is present and therefore there is extensive horizontal bone loss.

6-Point Pocket Charting

Patient		Date														
ID Card		Stage of Treatment														
Clinical attachment																
Mobility																
Furcation																
Recession																
Probing depth																
buccal																
lingual																
right	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
lingual																
buccal																
Probing depth																
Recession																
Furcation																
Mobility																
Clinical attachment																

Plaque Score

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

Bleeding Score

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8

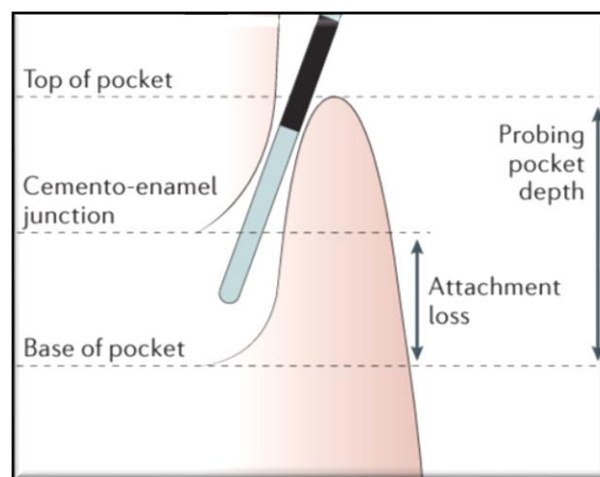
For patients with BPE codes of 3 or 4, more detailed periodontal charting is required.

The probe is again “walked around” each tooth. 6 points are measured and recorded around each tooth, this allows reassurance that no pockets are missed and that deeper pockets may need further treatment to obtain periodontal stability.

A 6PPC is carried out according to the periodontal status of the patient so that areas within the oral cavity are monitored to determine whether they are improving or may need further attention.

- *PPDs*

A periodontal pocket is a pathologically deepened sulcus. This sulcus is caused by bacterial infection. (the coronal end of the junctional epithelium separates from the tooth when it comes in contact with oral plaque. The apical end of the junctional epithelium migrates apically, thus a periodontal pocket forms when the sulcus deepens. The same inflammatory response triggers alveolar bone resorption which happens gradually. This reduces the level of bone which supports the tooth). Pocket depth is measured from the gingival margin to the base of the sulcus or pocket, as measured by the periodontal bone which has been lost.



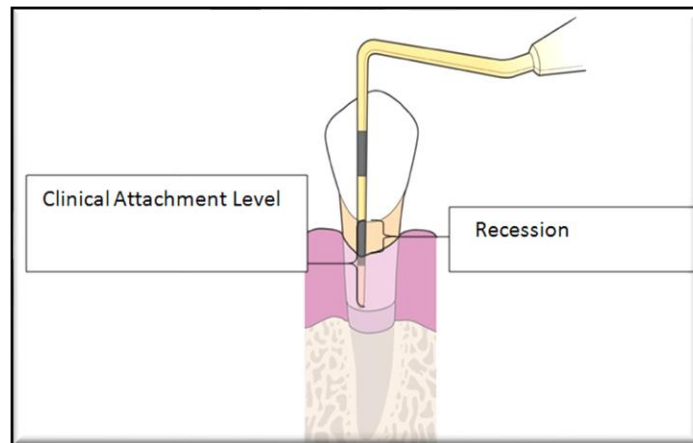
Measurement of Pocket Depths and Attachment Loss (Lippincott, Williams, Wilkins, 2013)

- *Clinical Attachment Levels*

Clinical attachment level is the point where there are attached tissues at the base of the pocket. It is measured from the distance from the cementoenamel junction to the base of the sulcus or pocket.

- *Recession*

Gingival recession is a reduction of the height of the marginal gingiva to a location apical to the cement-enamel junction. Recession indicates attachment loss. Gingival recession is the visual measurement from the cement-enamel junction to the gingival margin.

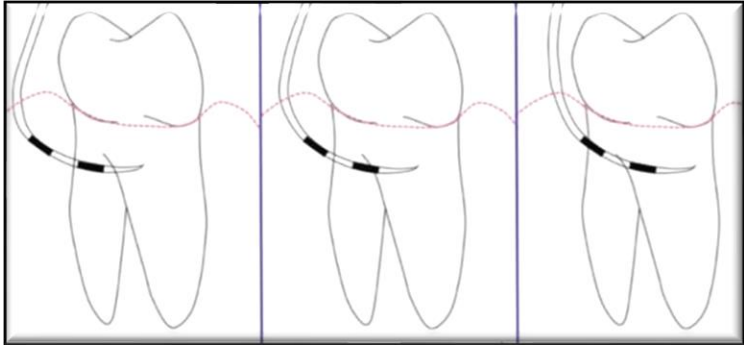


Clinical Attachment Loss and Recession (Lippincott, Williams, Wilkins, 2013)

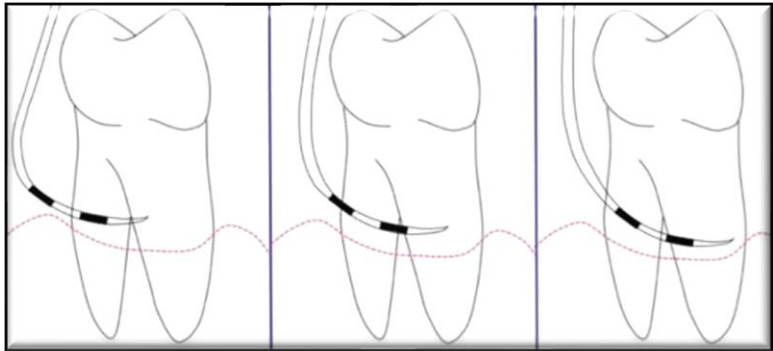
- *Furcation*

A furcation is the area on a multirooted tooth where the root trunk divides into separate roots. The furcation area is the space under the root trunk between two or more roots. Most furcation involvement is hidden from view by the gingival tissues and must be located with a furcation probe used to evaluate the bone support in the furcation areas

of multirooted teeth. The index to score furcation used in this study is the Glickman (1979) Furcation Index.



Furcation Stages (Not Clinically Exposed) (Pillioni and Rojas, 2018)



Furcation Stages (Clinically Exposed) (Pillioni and Rojas, 2018)

Furcation Index (Glickman & Carranza, 1979)

Glickman and Carranza (1979)	Grade I: Incipient lesion. Horizontal Attachment loss of 2mm or less
	Grade II: Horizontal attachment loss of 3 mm or more
	Grade III: Total Horizontal Attachment loss (through and through)
	Grade IV: Through and through lesion with gingival recession, leading to a clearly visible furcation area.

Bleeding on Probing

The signs of inflammation and periodontal disease can easily be observed when there is bleeding from the gingiva. Several bleeding indices can be found in literature; some assess bleeding as simply present or absent from particular areas around the gingiva while others use grading to assess severity of bleeding. In clinical practice, sites that are at risk are better assessed by the use of a graded bleeding index to determine whether any destructive activity is going on.

Assessing the tendency for gingival bleeding is crucial for a thorough oral examination. In clinical settings, employing a detailed bleeding index can better pinpoint areas susceptible to further damage. To track a patient's progress after initial treatment and throughout ongoing care, it is advised to use a Sulcus Bleeding Index with three levels of bleeding scores rather than a simple yes-or-no bleeding assessment. (Newbrun, 1996; Panagakos & Davies, 2011).

Sulcus Bleeding Index Score: Scoring Criteria

Sulcus Bleeding Score (Muhlemann & Son 1971)

Score 0	Healthy looking papillary and marginal gingiva, no bleeding on probing
Score 1	Healthy looking gingiva, bleeding on probing
Score 2	Bleeding on probing, change in colour, no oedema
Score 3	Bleeding on probing, change in colour, slight oedema
Score 4	Bleeding on probing, change in colour, obvious oedema
Score 5	Spontaneous bleeding, change in colour, marked oedema

Bleeding Scores

[illegible]

Sulcus Bleeding Index Score: Scoring Criteria

Score 0: healthy looking papillary and marginal gingiva, no bleeding on probing.

Score 1: healthy looking gingiva, bleeding on probing.

Score 2: bleeding on probing, change in colour, no oedema.

Score 3: bleeding on probing, change in colour, slight oedema.

Score 4: bleeding on probing, change in colour, obvious oedema.

Score 5: spontaneous bleeding, change in colour, marked oedema.

Four gingival units are scored systematically for each tooth: the labial and the lingual marginal-gingival units (M units), and the mesial and distal papillary gingival units (P units). Scores for these units are added and divided by four, giving the sulcus bleeding index.

Mobility

Tooth mobility is assessed using the Grace and Smales mobility index. According to Grace and Smales, 1989, the classification is as follows: 'Class 0 (No apparent mobility); Class I (Tooth can be moved less than 1mm in the buccolingual); Class II (Tooth can be moved 1mm or more in the buccolingual direction, with no mobility in the occlusoapical direction (vertical mobility)) and Class III (Tooth can be moved 2mm or more in the buccolingual or mesiodistal direction, with mobility in the occlusoapical direction which is also present).' (Shubhangi M., 2019).

Mobility Index Score (Grace and Smales 1989)

Grade	Mobility Index (This index can be useful to track the amount of mobility in teeth over a period of time)
0	No apparent mobility
1	Tooth mobility is perceptible, but less than 1mm buccolingually
2	Mobility is between 1mm and 2mm
3	Mobility exceeds 2mm buccolingually

Dental Hygiene Therapy Assessment and Care Plan Document



University of Malta

Department of Oral Rehabilitation and Community Care
Dental Hygiene Therapy Assessment and Care Plan

PATIENT DETAILS

ID Card

Name

DOB

Gender

Address

Telephone

ASSESSMENT DETAILS

Date of Assessment

Student

Demonstrator

Referred by

MDH Record Availability

Previous Treatment

MEDICAL HISTORY

System / Condition	Y	N	Details
Cardiovascular			
Respiratory			
Endocrine			
Hepatic / Renal			
Neurological			
Haematological			
Gastrointestinal			
Musculoskeletal			
Dermatological			
Pregnancy (or probability)			
Infectious disease (or probability)			
Cancer treatment			
Hospitalization			
Adverse reaction to GA or LA			
Smoking			Cigarettes/Roll-ups/Cigar/Pipe <i>(delete as necessary)</i>
<i>If yes, enter number of years:</i>			Cessation attempts
Alcohol			
Medications			
Allergies			

CARIES RISK PROFILE - SUGAR CONSUMPTION FREQUENCY

Sugar-containing drinks

Sugar-containing foods and hidden sugars

HISTORY

Presenting Complaint

History of presenting complaint

Past Dental History

Oral Hygiene Methods

Family History

Attendance Pattern

Social History
*including smoking history***EXTRAORAL EXAMINATION**

General appearance

Smile Line

*Symmetry**High/Medium/Low*

Facial Appearance

TMJs

Speech

Maximal opening

Normal/Reduced

Lip Competence

Lymph nodes

INTRAORAL EXAMINATION

Soft tissues

Salivary Flow

Mucosae

Dentition

Gingival Tissues

Prostheses

*Crowns, bridges, implants, dentures**Location, technical condition, hygiene***BPE**

OHI-S**DI+CI scores****ORAL DEBRIS INDEX**

	1	2	3
Buccal			
Palatal			
	6	5	4
Lingual			
Buccal			
Total score			
Divide by sextants	DI score →		

CALCULUS INDEX

	1	2	3
Buccal			
Palatal			
	6	5	4
Lingual			
Buccal			
Total score			
Divide by sextants	CI Score →		

Appendix 20 – Draft Memo Oral Hygiene Instructions

To: Charge Nurses

From: Dr Ronald Fiorentino MD – Medical Superintendent

Cc: Dr. Josianne Cutajar – Chief Executive Officer
Ms. Mary Grace Dalli – Chief Nursing Manager

Date: 9st February 2021

Subject: Daily Oral Care for Older Adults

CARERS INFORMATION SHEET 1 TOOTHBRUSHING INSTRUCTIONS

Good oral hygiene has an impact on general health and improves well being. It also reduces the risk of chest infections. Toothbrushing removes harmful dental plaque from the teeth and gums. Therefore toothbrushing and oral care should be done twice daily, or once daily as a minimum standard.

- Prepare Equipment;
 - Small toothbrush and toothpaste with Fluoride
 - Waste receiver e.g. disposable kidney dish
 - Mirror if available
 - Use of light e.g. pen torch can help to observe better when cleaning the mouth
- Wash and dry hands before and after carrying out any mouth care and wear appropriate personal protective equipment – gloves, apron, and eye protection.
- Explain the procedure to the patient and ensure he/she is in a comfortable position, preferably with some head support.
- Remove any dentures.
- Apply pea-sized amount of toothpaste onto toothbrush.
- Use the toothbrush and toothpaste to remove 'plaque' (soft debris) from the teeth and gums. It takes at least two minutes to ensure all areas are cleaned thoroughly.

Toothbrushing Technique

- Place toothbrush at 45 degree angle to gum margin i.e. where tooth and gum meet.
- Start with upper teeth; remove plaque by cleaning all teeth; front and back. First brush the outside surfaces of the upper teeth, then all inside surfaces, finishing with a gentle scrub action on the chewing surfaces of the back teeth. Repeat the same procedure on the lower teeth.
- It is important to brush gums even if they bleed. If there is no improvement after two weeks seek dental advice.
- Finally, gently brush the tongue and clean the palate and inner cheeks with a swab. This is especially important for residents with no remaining natural teeth who do not wear dentures.
- Allow and assist the patient to rinse and rest as required.
- Follow denture cleaning procedure before returning any dentures to the mouth.
- After use toothbrushes should be rinsed in water, excess shaken off and stored to 'air dry'.
- Dispose of all equipment used, appropriately.
- Wash and dry hands at end of procedure.
- Replace toothbrush every three months or sooner if bristles become worn.
- *Pink foam sticks should be used Very Carefully when cleaning teeth as the foam head may become damaged or detached whilst in the mouth and cause choking. If the patient's condition changes i.e. changes according to the consistency of their food, or their swallow deteriorates necessitating Percutaneous Endoscopic Gastronomy feeding tube (PEG) or the patient has a nasogastric feeding tube, a dentist should reassess the resident's oral health.

CARERS INFORMATION SHEET 2 INSTRUCTIONS FOR DENTURE CARE

It is important to treat dentures like natural teeth as harmful dental plaque (a film of soft debris, and bacteria) continuously builds up on the surfaces of the denture, in the same way as it does on natural teeth. Plaque can cause inflamed gums, bad breath, bacterial and/or fungal infections (e.g. Candida), or where there are remaining teeth, dental decay and gum disease. Some people also build up calculus (tartar) on their dentures just as they would on their natural teeth making the denture uncomfortable and unsightly.

For all of these reasons it is important to clean dentures at least once daily.

Denture Cleaning Technique

- Wash and dry hands before and after carrying out any mouth care and wear

appropriate personal protective equipment - gloves, apron and eye protection.

- All mouth care equipment (toothbrush, denture brush, denture cleaning paste, denture container) should be identified with the resident's name.
- Clean the denture thoroughly at least once a day (preferably before going to bed) and rinse under water after meals. Dry denture well.
- All dentures, both partial and complete, should be removed from the mouth for cleaning.

- Dentures are very delicate and can break easily if dropped. When handling dentures, always hold them over a towel or basin of water.
- Rinse dentures thoroughly to remove loose food particles and brush immersed in warm water to prevent splatter – AVOID hot water since it can warp dentures.
- Use water, denture cleaning paste or liquid soap on a toothbrush or denture brush. Avoid very stiff bristles as these may damage the denture. Toothpaste is NOT recommended as this can be abrasive and damage the denture.

- Rinse dentures well to remove all traces of cleaning paste or soap before putting them back in the mouth. Dry dentures well.
- Brush all surfaces of the denture thoroughly paying particular attention to the surfaces that fit directly onto the roof of the mouth, or the lower jaw, and to any metal clasps on the denture.
- Brush gums, tongue and palate with a medium-bristled regular toothbrush to remove plaque and stimulate circulation.

- **Dentures should be removed overnight** but when this is not possible then they should be removed for a short period during the day. This will allow the mouth to rest from the pressure of the dentures.
- When out of the mouth (either at night or during the day) dentures should **NOT** be stored in water. Keep dentures dry.
- Loose or ill-fitting dentures can cause problems such as ulceration, therefore a dental assessment may be appropriate.
- Dentures should be clearly labelled with the individual's name.
- Bleaching products, should NEVER be used to clean or soak dentures.
- Where the mouth looks very red or sore, or where there is 'thrush' (usually white and speckled) Dental advice should be sought.

Signatures:

Reference:

GAIN. (2012). *Guidelines for the Oral Healthcare of Older People living in Nursing and Residential Homes in Northern Ireland*. Belfast: Gain Office. Retrieved from <https://rqia.org.uk/RQIA/files/12/12a65998-23a4-4610-a1f6-afe6ce2fa059.pdf>

Appendix 21 - Approval of Draft of Memo by Clinical Chairperson

From: **Fiorentino Ronald at MSCA-SVP** <ronald.fiorentino@gov.mt>
Date: Tue, 23 Mar 2021 at 10:02
Subject: RE: [EXTERNAL] - Oral Hygiene Indices as Key Performance Indicators Research Study at SVPR
To: Carmen Caruana <carmen.d.caruana@um.edu.mt>, Cutajar Josianne at MSCA-SVP <josianne.cutajar@gov.mt>
Cc: Prof. Nikolai Attard <nikolai.attard@um.edu.mt>

Hi Carmen,

Thanks for your constant support and for the interesting material submitted as a result of your research which is definitely an eye-opener.

We will be making good use of the info submitted as SOPs and Memo. We also need to train staff as somehow, health care professionals and workers seem averse to oral health especially when it comes to dentures. Also a common encounter is that clients are given solid food quickly without intervals of fluid intake in between leading to difficulties in swallowing as well as poor oral hygiene.

Hopefully we will continue to improve as your motivation to our employees is contagious.

Hope to meet again soon.

Ronald

Dr Ronald Fiorentino MD

Director Svpr
Med. Supt. Office
SVPR Long Term Care Facility

Appendix 22 – Oral Hygiene Poster



L-Università ta' Malta
Faculty of Dental Surgery



**Saint Vincent
De Paul**
Societas Christiana

Hasil tas-Snien



1

Uża xkupilja tas-snien
żghira u mhux iebša.
Ghamel fit 'toothpaste'
fuq l-xkupilja.
L-ammont tat-toothpaste
lrid ilun daqs piżella.



2

Poġġi l-xkupilja
angolata max-xifer
tal-ħanek u
fuq is-snien.



3

Aħsel minn barra
u minn ġewwa
tas-snien billi tagħmel
dricki żgħir fuq kull sinna,
imxi minn tarf sa tarf.



4

Aħsel l-uċuh tas-snien
(fejn tpoġġi jew
toghmod l-ikel).
Billi tagħmel
moviment
ħfief li-quddiem
u lura fuq l-uċuh.



5

Jekk għandek dentatura
li tmiss ma xi snien,
kun ċert/a li taħsel
sewwa madwar is-snien
li jmissu mad-dentatura.
Qis li l-ewwel tneħhi
d-dentatura qabel ma
taħsel is-snien.

Hasil tad-Dentatura



1

Aħsel id-dentatura
bi-xkupilja
tas-snien
li tkun
ratba jew
bi-xkupilja
tal-ħasil
tad-dentaturi.



2

Id-dentatura
aħsilha bi-lima
u sapun newtrali
(li ma ikollux fwieħa).
Poġġi xugaman
żgħir fir-sink,
jew inkella
imla s-sink bi-lima,
biew jekk taqalek
ma tinkisirx.



3

Aħsel l-uċuh
kollha tad-dentatura
biew tneħhi
l-idallijiet ta' l-ikel
u l-ġega ta'
mikrobi
li tiffirma fuq
id-dentatura.



4

Aħsel sew madwar
xi gancijiet
tad-dentatura
li jaqdbu
mas-snien
meta titpoġġa
fil-ħalq.



5

Wara li taħsel
id-dentatura,
poġġiha f'kontenitur.
Żid pillola ta'
dizinfizzjoni
mal-lima, u
halliha fi-lima
skond il-ħin fuq
l-istruzzjonijiet.



6

Nehhi d-dentatura
għal bilej,
lahlaħha sewwa,
xxottaha u poġġiha
go recipient xott
u bla ilma.

Designed by Antonia Gatt

