Pharmacist-led Point-of-Care services

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Dedicated to my mum, Sharon — my best friend,

biggest supporter, and greatest blessing.

Abstract

Point-of-care testing (POCT) provides rapid diagnostic results outside traditional laboratory settings, offering the potential for early disease detection and management. The aim of this study was to identify available POCT services in community pharmacies and assess their potential, with a focus on guidelines, device utilisation, standardisation, demand, and pharmacoeconomic considerations. A questionnaire was developed, validated and distributed to community pharmacists via social media and personal delivery in community pharmacies. The pharmacist questionnaire assessed the range of POCT services provided, test frequency, device reliability, and pharmacoeconomic considerations. A separate patient questionnaire captured usage patterns, willingness to pay, and perceptions of service availability. A total of 119 (n= 92 females) pharmacist questionnaires were collected. The majority of participants fell within the 30–39-year age range (n=42). The results revealed that blood pressure monitoring was the most commonly offered test (n=111). Following closely behind were urinalysis (n=104) and blood glucose monitoring (n=88). Pharmacists reported positive perceptions of device reliability and accuracy but highlighted gaps in calibration and standardisation practices (n=53). Financially, the majority (n=85) claimed that fees covered expenses, and the pharmacist reflected that patients were willing to pay the fee requested (n=63). Patient responses (n=64) revealed that many had previously used POCT services in pharmacies, with urinalysis (n=17) being the most commonly used test, followed by blood pressure monitoring (n=15) and blood glucose testing (n=10). Payment expectations varied across tests. While some respondents expected blood pressure monitoring (n=17) and blood glucose testing (n=9) to be free, the majority were willing to pay a small fee of €1-€5. For urinalysis, payment expectations were more varied, with most patients willing to pay €1-€5 (n=27), though some expected it to be free (n=9) or were open to fees of €6 or higher

(n=28). Community pharmacy-based POCT is widely utilised and contributes to non-communicable disease screening and management. Challenges in calibration, training, and cost accessibility remain significant barriers. Addressing these gaps through standardisation efforts, improved pharmacist training, and better financial models is crucial in ensuring equitable access to POCT services and optimisation of patient care outcomes.

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BMI	Body Mass Index
CVD	Cardiovascular Disease
FREC	Faculty Research Ethics Committee
HbA1c	Glycated Haemoglobin
INR	International Normalised Ratio
NCD	Non-Communicable Diseases
POCT	Point-of-care Testing
UK	United Kingdom
U. S	United States of America
UTI	Urinary Tract Infections
WHO	World Health Organization

Chapter 1

Introduction

1.1 Introduction

“Point-of-care testing (POCT) is a pathology service involving performing a diagnostic test outside of a laboratory that yields a quick and accurate response, assisting in the diagnosis and management of chronic diseases and acute infections following standard operating procedures (Khan *et al*, 2024)”. The role of the pharmacist has significantly evolved over recent years, broadening beyond traditional dispensing to include patient-focused services, administrative responsibilities, and public health involvement. The integration of POCT into pharmacy practice strengthens pharmacists' contributions to public health by enabling more proactive and direct involvement in patient care (Saavedra-Mitjans *et al*, 2018).

POCT is widely recognised for being efficient, accurate, and non-invasive. Its implementation has demonstrated positive outcomes across various healthcare sectors. The faster and more efficient these tests are, the greater the likelihood of achieving a more positive patient experience (Luppa *et al*, 2011).

POCT in community pharmacies has become increasingly popular due to its potential benefits, such as improved patient access to healthcare services, reduced wait times for laboratory data, and increased efficiency in care delivery. Additionally, POCT in community pharmacies can provide a unique opportunity for pharmacists to offer more comprehensive health services, such as early disease detection and medication management (Hutchings & Shiamptanis, 2022).

Pharmacists represent one of the most accessible healthcare professionals and can ensure appropriate patient referrals, contribute to ongoing disease monitoring, support

medication adherence and patient compliance and limit the use of unnecessary or ineffective medications or lifestyle regimens. The quality of POCT can be influenced by several factors, such as human error or test equipment limitations, which can result in misinterpretation of results. Common POCT devices include glucose meters, blood pressure monitors, and urinalysis tests. (Goble & Rocafort, 2017).

A study carried out by Vella *et al* in 2015 aimed to determine the perception of consumers regarding the provision of extended professional services by community pharmacists in Malta, including POCT. The study provides an overview of how the role of community pharmacists has evolved to include more patient-oriented services, such as diagnostic testing and disease prevention, which are essential components of POCT. The study also emphasises the need for pharmacists to actively promote awareness of their role in delivering extended professional services, while highlighting the importance of assessing public perceptions of these offerings. It further reinforces the valuable contribution of community pharmacists in managing chronic conditions and providing access to diagnostic testing. Additionally, the study emphasises the need for private consultation areas, longer pharmacy opening hours, and keeping patient medication records, all of which are important factors to consider when implementing POCT services in community pharmacies.

The World Health Organization (WHO) states that POCT should follow the acronym 'ASSURED' which stands for “Affordable, sensitive, specific, user-friendly, rapid and robust, equipment-free and delivered” (Buss *et al*, 2019). This framework is widely recognised as the standard for ensuring tests are both clinically reliable and practical for community use.

A study carried out by Wirth *et al* in 2010 discusses the importance of consumer satisfaction and perception of patient-centred services in the quality of primary health care, and the role of community pharmacists in providing such services. The study also highlights the challenges faced by community pharmacists in balancing their professional and commercial roles and the importance of projecting a patient-centred service to support positive consumer perception and financial stability in the long term.

1.2 POCT in Disease Management

POCT has a beneficial effect on morbidity and mortality and allows for rapid decision-making based on diagnostic test results, which results in an intervention that improves the patient's condition and makes better utilisation of resources (Price, 2001). According to the WHO, types of deaths are classified into 3 groups: communicable, non-communicable and injuries[1]. Additionally, according to the Non-Communicable Diseases Prevention Framework in Malta published in 2024, in 2019, non-communicable diseases (NCD) were responsible for 90.9% of all deaths, with ischemic heart disease being the most common[2]. NCD prevention should not only start in adulthood but also in early childhood to prevent NCD such as type 1 diabetes, heart diseases, and respiratory diseases, including asthma (Budreviciute *et al*, 2020).

[1] World Health Organisation (WHO). The top 10 causes of death [Internet]. Geneva (Switzerland): WHO; 2022. [cited 2025 July 14] Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death

[2] Ministry for Health and Active aging. Non-Communicable Diseases Prevention Framework: Policy Framework for the Prevention of Non-Communicable Diseases and the Promotion of Wellbeing 2024 [Internet]. Valletta (Malta): Ministry for Health and Active aging; 2024 [cited 2025 Jul 14]. Available from: https://health.gov.mt/wp-content/uploads/2024/06/Non-CommunicableDiseases_Prevention_Framework_2024_Public_Consultation_Document.pdf

The development of NCDs is strongly linked to both modifiable and non-modifiable factors. Non-modifiable risk factors, such as age, sex, and family history, are intrinsic to an individual and cannot be altered. In contrast, modifiable risks are largely related to lifestyle and environmental influences. These include tobacco and alcohol use, unhealthy dietary patterns, insufficient physical activity, obesity, and exposure to air pollution. Individuals already affected by NCDs, or those living with such risk factors, are also at increased risk of complications and may experience worse outcomes when confronted with additional health challenges, such as infectious diseases (Bukelo *et al*, 2015; Madavanakadu *et al*, 2020). Beyond physiological risks, broader social determinants such as poverty, inadequate access to healthcare, low educational attainment, and occupational pressures further contribute to the burden of NCDs. The overall aim of NCD protection in Malta is to identify such risk factors and implement targeted initiatives through Primary Health services, with POCT in pharmacies potentially serving as a key strategy to support early detection, prevention, and management.[2]

A study by Zammit in 2021 highlights the role of pharmacists in managing and preventing NCDs through the implementation of pharmacist-led services that are easily accessible to patients. Additionally, the impact of COVID-19 on the provision of healthcare services and the disruption of health screening services is discussed, which further emphasises the importance of community-based testing and the need for a synergistic approach to address both COVID-19 and NCDs simultaneously.

1.2.1 Obesity

Pharmacists, being among the most accessible healthcare providers, are uniquely positioned to address the obesity crisis by incorporating body mass index (BMI) assessment screening into routine point-of-care services. Research by Jordan and Harmon (2015) demonstrates that pharmacist-led initiatives, including BMI and waist circumference assessments alongside tailored counselling, can significantly improve weight-related health outcomes. By integrating BMI POCT, pharmacies can promote early intervention, focusing on prevention and lifestyle modifications before the need for pharmacological intervention becomes necessary.

1.2.2 Diabetes Mellitus

Diabetes Mellitus is an NCD that is caused when the body's response to insulin is reduced, due to decreased insulin sensitivity or production of insulin. Diabetes is classified into two types: type 1 diabetes, an autoimmune disease diagnosed at an early stage of life and type 2 diabetes, a more common adult-onset form associated with insulin resistance and insufficient insulin production (Kerner & Brückel, 2014). Globally, an estimated 830 million individuals are living with diabetes, and the prevalence is increasing faster than expected.[3] Diabetes is one of the main causes of mortality in Malta, according to a study carried out in 2018 by the Directorate for Health Information and Research, diabetes mellitus contributed to 209 deaths (5.6%), having increased in both genders compared to 2017[4].

[3] World Health Organization (WHO). Global Report on Diabetes [Internet]. Geneva (Switzerland): WHO; 2016 [cited 2025 Jul 15]. Available from: https://iris.who.int/bitstream/handle/10665/204871/9789241565257_eng.pdf

[4] Directorate for Health Information and Research. Annual mortality report 2018 [Internet]. Valletta (Malta): Ministry for Health; 2020 [cited 2025 Jul 15]. Available from: https://dhir.gov.mt/wp-content/uploads/2024/05/amr_twothousandandeighteen.pdf

Complications from diabetes range across different organ systems including neurological, renal, retinopathy, and cardiac. Impact on microvascular particular leads to peripheral vascular disorder and ophthalmic damage. (Deshpande *et al*, 2008).

POCT of blood glucose levels can help prevent diabetes-related complications and decrease the time between collection of the sample and analysis (Luppa *et al*, 2011). Frequent screening has been shown to identify at-risk persons, increase disease detection rates, lower disease risk factors, encourage healthier habits, improve medical care, and increase patient education and awareness regarding diabetes (Alzubaidi *et al*, 2019).

While capillary blood glucose testing is widely used for its convenience, it reflects glycaemic levels at a single point in time and is subject to fluctuations based on recent food intake or acute stress. Glycated haemoglobin (HbA1c), on the other hand, provides an indication of average blood glucose levels over the past eight to twelve weeks. Unlike capillary blood glucose testing, it can be performed at any time of the day and does not require any special preparation, such as fasting. These characteristics have established it the preferred test for assessing long-term glycaemic control in individuals with diabetes since chronic hyperglycaemia contributes to the development of cardiovascular complications. HbA1c also serves as a useful marker for cardiovascular risk. It is associated with both microvascular and macrovascular complications. Incorporating HbA1c testing into pharmacy-based screening programs could therefore enhance early identification of patients at risk of cardiovascular disease, particularly in those with undiagnosed diabetes or poor glycaemic control[5].

[5] World Health Organization. Use of glycated haemoglobin (HbA1c) in the diagnosis of diabetes mellitus: abbreviated report of a WHO consultation [Internet]. Geneva (Switzerland): WHO; 2011 [cited 2025 Jul 25]. Available from: https://www.who.int/publications/i/item/use-of-glycated-haemoglobin-(-hba1c)-in-diagnosis-of-diabetes-mellitus

A study by Santana *et al* (2024) in Brazil demonstrated the clinical value of pharmacist-led HbA1c testing in identifying undiagnosed cases of pre-diabetes and type 2 diabetes mellitus. A significant proportion of patients who presented with normal capillary glucose levels had elevated HbA1c values, highlighting the potential of this test to detect hidden glycaemic dysregulation. The accessibility of pharmacies, combined with the pharmacists' ability to interpret results and initiate referral or follow-up, reinforces the role of community-based HbA1c POCT as an essential tool in early diagnosis and disease management.

A study conducted by Jamshed *et al* (2018) in the United Arab Emirates demonstrated that pharmacist involvement in a diabetes care program improved patients' quality of life by enhancing blood glucose control without increasing healthcare costs. In this study, pharmacists also played a key role in educating patients about lifestyle modifications, including dietary changes and self-monitoring of blood glucose levels at home. Increased access to patient test results by pharmacists could support better collaborative care and ensure that regular testing is carried out to assess treatment success (Kharjul *et al*, 2018). However, in Malta, pharmacists currently do not have access to patients' test results through the myHealth portal, limiting their ability to monitor treatment progress and contribute to improved outcomes.

1.2.3 Cardiovascular disease

Cardiovascular disease (CVD) has the highest death rate globally when compared to other NCDS such as cancer and respiratory diseases. CVD cause around 19.8 million deaths

per year worldwide, mainly ischemic heart disease and stroke.[6] Risk factors of CVD include hypertension, dyslipidaemia, diabetes mellitus, smoking, physical inactivity and unhealthy diet habits. These risk factors influence cholesterol levels, blood pressure (BP) and arrhythmias (Mozaffarian *et al*, 2008**).** According to the FIP Cardiovascular Diseases Handbook, pharmacist-led interventions contribute significantly to improved CVD management through two key stages: primary prevention and secondary prevention.[7] Primary prevention is the delay in onset of CVD by reducing risk factors in individuals without established CVD, whilst secondary prevention is used following an attack of CVD and hinders the progression of the disease and complications in those already diagnosed (Peletidi *et al*, 2019).

The WHO refers to hypertension as "silent killer", uncontrolled blood pressure increases the risk of stroke, myocardial infarction, heart failure, and renal disease[8]. Hypertension is one of the most significant modifiable risk factors for cardiovascular disease and is responsible for a substantial proportion of morbidity and mortality worldwide (Memisoglu & Çelik, 2021). According to the European Society of Cardiology, hypertension is classified as blood pressure in the range of 120–139/70–89 mmHg, for which pharmacological treatment is recommended to reduce cardiovascular risk (McCarthy *et al*, 2025).

[6] World Health Organisation (WHO). Cardiovascular diseases [Internet]. Geneva (Switzerland): WHO; 2025 [cited 2025 Aug 1]. Available from: https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

[7] International Pharmaceutical Federation (FIP). Cardiovascular diseases: a handbook for pharmacists [Internet]. The Hague (Netherlands): FIP; 2022 [cited 2025 Jul 25]. Available from: https://www.knowledge-action-portal.com/sites/default/files/cvd_hb_fip.pdf

[8] World Health Organisation (WHO). A global brief on hypertension: silent killer, global public health crisis [Internet]. Geneva (Switzerland): WHO; 2013 [cited 2025 Jul 26]. Available from: https://www.who.int/publications/i/item/a-global-brief-on-hypertension-silent-killer-global-public-health-crisis-world-health-day-2013

Community pharmacists are well-positioned to support hypertension management due to their accessibility and regular interactions with patients. Pharmacy-based blood pressure monitoring can act as an effective frontline approach for the early identification of undiagnosed hypertension and for improving adherence to treatment. Evidence from a meta-analysis by Memisoglu and Çelik (2021) demonstrated that pharmacist-led interventions reduced systolic and diastolic blood pressure by −7.68 mmHg and −2.58 mmHg, respectively. Even greater reductions were observed when pharmacists worked in collaboration with physicians, with systolic and diastolic pressures decreasing by −8.22 mmHg and −3.55 mmHg. These findings highlight the clinical value of both independent and team-based pharmacist involvement in improving blood pressure control.

In addition to blood pressure measurement, pharmacists play a key role in educating patients on lifestyle modifications, promoting adherence to antihypertensive therapy, and referring individuals with elevated readings to general practitioners. Their interventions often include medication reviews and long-term monitoring, particularly when delivered through structured protocols. Pharmacist-led programmes have been shown to significantly contribute to both primary and secondary prevention of cardiovascular disease by improving clinical outcomes such as blood pressure, cholesterol levels, smoking cessation, and patient engagement in care (Omboni & Caserini, 2018).

Pharmacists in the United Kingdom (UK) offer three main services in community pharmacies, which are dispensing medications, supporting medicines optimisation, and delivering enhanced services such as lifestyle advice on smoking cessation and diet, as well as routine health checks including blood pressure measurement, triglyceride testing, and BMI. In contrast, Greek pharmacists are only involved in the dispensing of

medication, thus all other POCT are carried out by a general practitioner or a specialist (Peletidi *et al*, 2019). Pharmacists in Malta have several duties which include dispensing of medications, preparing Pharmacy of your choice medications, offering lifestyle advice and performing POCTs. When comparing pharmacists' input with regard to CVD in Malta with other countries such as the UK and Greece. Malta and the UK offer similar services but have no access to patients' test results. Community pharmacists can aid in the management as they are the most reachable profession without the need for appointments, being able to reach high-risk patients quicker by dispensing non-prescription medication and offering advice (Haggerty & Tran, 2017).

A systematic review by Alshehri *et al* (2020) confirmed that pharmacist-led interventions can significantly reduce total cholesterol (−20.24 mg/dL), LDL-C (−15.19 mg/dL), and triglyceride levels (−37.90 mg/dL). These findings, derived from randomised controlled trials in general practice, support the potential role of pharmacists in the early identification and management of dyslipidaemia. Cholesterol testing is essential for the early detection and management of lipid disorders, ultimately contributing to improved cardiovascular outcomes. Pharmacists have a crucial role in screening for lipid abnormalities and ongoing monitoring through point-of-care testing (Haggerty & Tran, 2017).

Pharmacist-led POCT for international normalised ratio (INR) has been shown to significantly enhance anticoagulation management in patients with cardiovascular conditions such as atrial fibrillation. Maintaining INR within the therapeutic range is vital to prevent thromboembolic events and reduce bleeding risk. A study by Rossiter *et al* (2013) reported that introducing a pharmacist-led INR POCT clinic within a Canadian

family health team increased patients' time in therapeutic range (TTR) from 64.4% to 77.1%. Immediate access to INR results enabled pharmacists to make real-time adjustments to warfarin dosing and offer direct patient counselling during appointments. In Malta, pharmacist involvement with warfarin has traditionally been limited to dispensing and medication use reviews. A study in six community pharmacies found that pharmacist-led medication reviews supported by POCT INR testing led to an improvement in TTR from 68.7% to 79.8%, with 84% of pharmacist recommendations accepted by prescribers. Despite the absence of a formal national INR monitoring pathway, structured pharmacist-led services have demonstrated clinical benefit and high acceptability among patients (Mifsud *et al*, 2019).

1.2.4 Urinalysis

Urinalysis is among the most widely utilised point-of-care diagnostic tools, offering a rapid, non-invasive, and low-cost method for detecting a variety of clinical conditions. Typically performed via dipstick tests, it allows pharmacists to screen for markers such as leukocyte esterase, nitrites, protein, glucose, ketones, blood, and bilirubin within one to two minutes of dipping the strip into a urine sample. These parameters assist in identifying conditions, including urinary tract infections (UTIs), diabetes mellitus, kidney dysfunction, and liver abnormalities (Hwang *et al*, 2022).

A test-and-treat pilot service for UTIs conducted in community pharmacies across the UK demonstrated the feasibility and effectiveness of pharmacist-led urinalysis. The service, implemented in 38 pharmacies, involved the use of dipstick urinalysis and a smartphone-based interpretation app to guide treatment decisions for women aged 16–64 presenting with symptoms of uncomplicated UTIs. Of the 496 women who purchased the

test, 75% received a positive result for a likely UTI, and 96.8% of these were supplied antibiotics directly by the pharmacist under a patient group direction. Notably, the majority of women accessed the full service on the same day, and 71.4% indicated they would have otherwise visited a GP, highlighting the service's potential to reduce pressure on primary care.

The high uptake, patient satisfaction, and responsible antibiotic supply observed in the study support the role of community pharmacies as accessible providers of point-of-care urinalysis for minor infections. The integration of urinalysis into pharmacy-based screening services empowers pharmacists to contribute to early disease detection and timely referral to other healthcare professionals (Thornley *et al*, 2020).

1.2.5 COVID-19 Test

Pharmacist-led POCT for COVID-19, including both rapid antigen testing and RT-PCR sample collection, emerged globally as a practical and accessible public health measure during the pandemic. Numerous studies evaluated its impact on service delivery and patient satisfaction across community pharmacy settings (Visacri *et al*, 2021). A cross-sectional survey conducted in Croatia between November 2021 and January 2022 assessed patient satisfaction with pharmacist-led COVID-19 testing in community pharmacies. The study included 211 participants and found that 95.2 % of respondents considered the testing service convenient, 92.3 % trusted the pharmacists' competence, and nearly 95 % would use the service again. These high satisfaction rates highlight the acceptability and trust in pharmacy-based COVID-19 testing services (Fehir Šola *et al*, 2025).

1.3 Performance, Accuracy, Calibration, and Support for POCT Devices

The effectiveness of POCT in community pharmacy practice is closely linked to the performance and reliability of the diagnostic devices used. Research has shown that high quality POCT devices can provide results that are both clinically accurate and consistent with laboratory standards. A prospective study by Yonel *et al* (2022) assessed three capillary-based POCT devices for HbA1c, creatinine, and vitamin D, finding that over 95% of results fell within two standard deviations of reference laboratory assays, indicating strong concordance. Among these, the Nova StatSensor device showed 98.8% sensitivity and 100% specificity for creatinine detection, outperforming the other devices tested, while the Siemens DCA Vantage for HbA1c also demonstrated acceptable performance, with 87.5% sensitivity and 84.4% specificity. These results confirm that modern POCT devices, when used under proper protocols, modern POCT systems can achieve laboratory grade precision for key biochemical parameters.

Despite the overall positive performance profile, the accuracy of POCT devices may be influenced by various factors, including operator error, environmental conditions, device maintenance, and patient-specific variables such as hydration status or recent food intake. Luppa *et al* (2011) noted that although POCT is generally regarded as accurate and robust, maintaining its reliability requires strict compliance with established protocols. Key measures include routine device calibration, controlled testing conditions, and thorough staff training to ensure consistent and accurate results.

Calibration and quality control measures are critical to maintaining analytical accuracy in POCT devices. A systematic review by Buss *et al* (2019) concluded that POCT conducted in community pharmacies generally achieved satisfactory analytical quality,

attributing this to appropriate staff training and internal and external quality controls. Yonel *et al* (2022) similarly emphasised the importance of daily quality control procedures to ensure accuracy and reliability of POCT devices. Furthermore, structured training has been shown to enhance the confidence and appropriate use of POCT among pharmacists, with 74% of pharmacists reporting that the service was acceptable for their practice following standardised training (Pope *et al*, 2021). Further supporting this, a narrative review by Chan *et al* (2023) emphasised that structured training with post-training certification covering procedures such as test administration, result interpretation, and waste disposal was essential for the successful implementation of POCT in private pharmacy and drug retail settings. Providers who underwent such training were better equipped to perform tests correctly.

1.4 Pharmacoenomics

The economic considerations of pharmacist-led POCT are a critical determinant of their feasibility and sustainability within healthcare systems. Pharmacoeconomics in this context extends beyond the direct costs of purchasing devices, consumables, and pharmacist time, but also to include the broader implications on health system expenditure, patient outcomes, and long-term economic sustainability.

A key aspect of pharmacoeconomic evaluation is understanding patient willingness to pay, since this reflects both the perceived value of services and their potential sustainability in practice. Several studies have explored how much patients are prepared to contribute financially to pharmacy-based services, offering useful insights for the context of POCT. Painter *et al* (2018) conducted an updated systematic review of contingent valuation studies and found that across 31 publications, consumers

consistently expressed willingness to pay for pharmacy services, including medication therapy management, disease education, and health screening. Despite variability in study design and geographic setting, the overall trend indicates that patients value these services. This indicates that pharmacist-led POCT, particularly when combined with counselling or follow-up, is likely to be economically acceptable to patients.

Park & Yuen (2022) explored patients' willingness to pay for pharmacist-led clinical services, reporting willingness to pay of CAD $40–$50 for initial assessments and CAD $15–$50 for follow-ups. While POCT was not the primary focus, the findings highlight that patients are open to paying for expanded pharmacist services in primary care, suggesting a potential economic role for POCT within such models.

Hohmeier *et al* (2018) conducted a survey using self-explicated conjoint analysis to assess consumer preferences and willingness to pay for POCT services in community pharmacy settings. The study involved 188 participants representative of the United States of America (U.S) population and examined several service features, including the type of test, service location, sample collection method, and result delivery. A subgroup of respondents, primarily aged 20 to 34 years, expressed a preference for pharmacy-based POCT and were generally willing to pay $50 or more for the service. In contrast, the majority of the overall sample indicated a preference for lower price points. Participants who preferred pharmacy-based POCT valued attributes such as proximity, provider endorsement, and integration with healthcare services (e.g. sending results to a physician). Tests for acute or screening conditions, such as influenza and streptococcal infections, were more frequently preferred than tests for chronic disease monitoring.

These findings suggest that certain population groups are more likely to pay for POCT services when convenience and clinical relevance are evident.

While Hohmeier *et al* (2018) explored consumer willingness to pay for various POCT services in U.S. community pharmacies, Vinh Nguyen *et al* (2024) conducted a mixed-methods study focusing on C-reactive protein POCT for respiratory infections in Vietnamese pharmacies. The Vietnamese study revealed significantly lower payment acceptance, $2.40, compared to U.S. findings, yet both reported strong consumer approval, with 96.5% in Vietnam. Each study recognised common facilitating factors such as convenience, confidence in pharmacists, and the need for quick outcomes, while also revealing unique location specific challenges. Vinh Nguyen *et al* (2024) noted structural limitations such as a lack of regulation and pharmacist training, whereas Hohmeier *et al* (2018) emphasised the importance of service features and demographic targeting. These findings suggest that while economic feasibility may vary across settings, consumer support for pharmacy-based POCT services is robust, and implementation strategies must be tailored to local capacities and expectations.

Papastergiou *et al* (2018) examined the implementation of a pharmacist-led POCT service for group A streptococcus across over 200 community pharmacies in Canada. Patients were charged a fixed fee of CAD $20 for the test, and the majority (82%) expressed willingness to use the service again. The study demonstrated that POCT can be integrated successfully into routine pharmacy practice with high patient satisfaction, particularly in Alberta, where pharmacists have prescribing privileges. Contrastingly to Vinh Nguyen *et al* (2024) findings in Vietnam, which reported a lower average willingness to pay of $2.40, the Canadian experience highlights the viability of modest co-payment models in

high-income countries. Both studies, alongside Hohmeier *et al* (2018), underscore the role of convenience, rapid access to testing, and trust in pharmacists as key determinants of willingness to pay. The observed payment threshold variations (from $2.40 to $50) reflect fundamental differences in healthcare systems and national economies. This evidence confirms that appropriately scaled POCT models can achieve financial sustainability across income settings when customised to local practice environments, economic realities, and patient needs.

Evidence from Australia also supports the role of community pharmacies in providing POCT as part of broader professional services. A qualitative study exploring patient preferences found that consumers regarded pharmacist-led screening services, including blood pressure, blood glucose, and cholesterol testing, as highly acceptable, particularly when endorsed by general practitioners and supported by public funding (Karia *et al*, 2025).

Similar issues are likely to be relevant in Malta, where patients are accustomed to receiving free primary care. The literature shows that willingness-to-pay for pharmacist-led POCT is not fixed but shaped by the structure of the healthcare system and the wider economic setting. In Canada, modest co-payments supported the success of streptococcal testing services (Papastergiou *et al*, 2018), while in Vietnam, willingness-to-pay was much lower, reflecting different economic realities (Vinh Nguyen *et al*, 2024). Across these diverse contexts, certain themes appear consistently, such as patients' value POCT for its convenience, the accessibility of community pharmacies, and the trust placed in pharmacists (Hohmeier *et al*, 2018; Papastergiou *et al*, 2018). These shared themes offer

important insights for reflecting on how pharmacist-led POCT might be positioned within healthcare systems such as Malta's.

1.5 Aims and objectives

The scope of the study was to identify which POCTs are available and offered within the community pharmacy setting and to examine opportunities presented by POCT. The implementation of different POCT was studied considering guidelines, devices used, standardisation, the need and pharmacoeconomics aspects.

Chapter 2

Methodology

2.1 Study overview

The study was performed to assess pharmacists' practices and patients' perceptions regarding the implementation of POCT in community pharmacies. To support this study, a literature review was conducted to explore existing research on pharmacist-led POCT services, their clinical value, implementation challenges, public acceptance, and economic feasibility. Relevant studies were sourced primarily from Google Scholar, PubMed, and HyDi using keywords such as "pharmacist-led POCT," "community pharmacy," "patient perception," and "willingness to pay." A quantitative research approach was used, utilising structured questionnaires as the primary data collection tool to gather responses from both pharmacists and the general public. The structure of this study is illustrated in Figure 2.1.

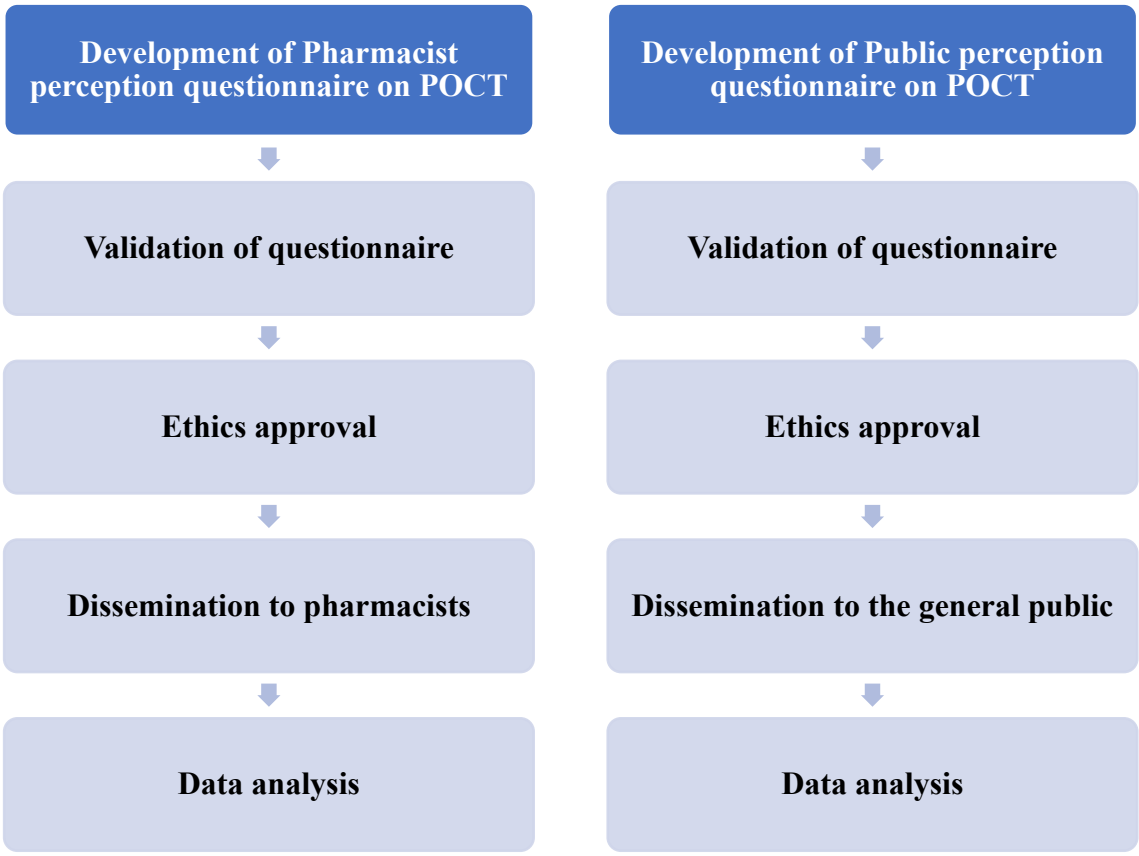

Figure 2.1 - Study overview

2.2 Development of questionnaires

Two structured questionnaires were developed and used as data collection tools in this study, one targeting community pharmacists and the other targeting members of the general public.

2.2.1 Pharmacist perception questionnaire

An anonymous questionnaire was developed for community pharmacists to assess the availability and frequency of point-of-care tests offered in pharmacies, and to evaluate pharmacists' perceptions regarding the medical devices used, including the processes involved in their standardisation and calibration. A total of 119 questionnaires were disseminated to pharmacists across various community pharmacy settings. The questionnaire was structured into four sections. Section A captured demographic information of participating pharmacists. Respondents provided their gender, age group, highest qualification obtained in pharmacy, and years of experience in community pharmacy.

In Section B of the questionnaire, participants were asked a multiple-choice question about the POCT available in their pharmacy practice including options such as blood pressure monitoring, cholesterol blood test, blood triglycerides, blood glucose test, HbA1c, BMI, COVID-19 Rapid antigen test, RT-PCR test for COVID-19, urinalysis, allergy testing, vitamin D, INR, and food intolerance test. Additionally, participants could specify any other tests offered in their pharmacy in an "Other" section. Moreover, Section B also included a 6-point Likert scale, ranging from "Never" to "Very frequently," to gauge the frequency of performing each test and the frequency of test requests.

Section C focused on assessing participants' perspectives on the medical devices used for point-of-care testing in their pharmacy practice. Questions covered overall performance satisfaction, reliability, accuracy, confidence in standardisation and calibration processes, frequency of calibration, availability of calibration standards and support/training satisfaction. Responses were collected using tailored Likert scales appropriate to each area, as shown in Table 2.1. A comment section was also provided for additional feedback.

Table 2.1 - Likert Scales Used in Section C of the Questionnaire

Assessment Area	Likert Scale Options
Performance satisfaction / training support	Very dissatisfied, Somewhat dissatisfied, Neutral, Somewhat satisfied, Very satisfied
Frequency of calibration	Never, Very rarely, Rarely, Occasionally, Frequently, Very frequently
Confidence in standardisation/calibration	Not at all confident, Somewhat unconfident, Neutral, Somewhat confident, Very confident
Perceived accuracy of devices	Not at all accurate, Somewhat inaccurate, Neutral, Somewhat accurate, Very accurate
Perceived reliability of devices	Not at all reliable, Somewhat unreliable, Neutral, Somewhat reliable, Very reliable

Section D explored the pharmacoeconomic aspect, investigating whether services provided were free of charge and, if not, whether the fee covered expenses for consumables and the pharmacist's time. Participants were also asked about the willingness of patients to contribute financially, with a focus on the patient’s perspective (Appendix 2).

2.2.2 Patient perception questionnaire

A second questionnaire was disseminated to 64 members of the general public and was developed based on findings from the pharmacist perception questionnaire. To ensure accessibility, it was available in both Maltese and English. The initial section collected demographic information, including gender, age, level of education, and locality. Respondents were asked about their use of point-of-care services at the pharmacy, specifying which services, such as blood glucose testing, blood pressure monitoring, and urinalysis, along with an open-ended option for other services. The questionnaire assessed willingness to pay for these services, presenting a range of prices ranging from €0 (free) to over €12 (Appendix 3).

2.3 Validation of developed questionnaires

Both questionnaires were validated for their content, clarity, layout and comprehensiveness by an expert panel of six persons: two community pharmacists, two other healthcare professionals and two pharmacists from quality. The validation tool consisted of structured statements using a 5-point Likert scale to evaluate the clarity, relevance, comprehensiveness, and neutrality of the questionnaire items. In addition, open comment fields were included to allow for qualitative feedback and specific suggestions for improvement.

2.4 Ethics approval

Ethics approval was obtained by submitting online applications to the Faculty Research Ethics Committee (FREC) of the Faculty of Medicine and Surgery. The first application covered the 'Pharmacist perception questionnaire' and included the dissertation proposal, study protocol, and the questionnaire itself. Approval was granted under application ID

MED-2023-00311 (Appendix 1). A second application was submitted for the 'Public perception questionnaire', developed based on findings from the pharmacist responses. This submission included the dissertation proposal, study protocol, curriculum vitae (CV), and the questionnaire. Approval was granted under application ID MED-2024-00517 (Appendix 1).

2.5 Dissemination of questionnaires

Following ethics approval, the validated questionnaires were disseminated using convenience sampling. Both the 'Pharmacist perception questionnaire' and the 'Public perception questionnaire' were developed using Google Forms® and shared via social media platforms. To maximise reach, the 'Pharmacist Perception Questionnaire' was also distributed in person to community pharmacies, accompanied by a self-addressed envelope to facilitate return and encourage participation. Responses were collected electronically via Google Forms® for subsequent analysis. Anonymity was maintained throughout the study: no email addresses or identifying details were collected from online submissions, and questionnaires distributed in person were likewise returned anonymously.

2.6 Data Analysis

Responses were exported to Microsoft Excel and analysed using descriptive methods. Data was summarised using percentages, frequency tables, pie charts, and bar graphs.

2.7 Dissemination of findings

An abstract was accepted for poster presentation at the 83rd FIP World Congress of Pharmacy and Pharmaceutical Sciences 2025, Copenhagen, Denmark, in August 2025. (Appendix 4)

Chapter 3

Results

3.1 Pharmacist perception questionnaire

3.1.1 Demographic data

Out of 119 participants, 92 were female (77%) and 27 were male (23%). Forty-two participants were aged 30–39 years (35%), followed by 35 participants aged 20–29 years (29%), 21 participants aged 50–59 years (18%), 14 participants aged 40–49 years (12%), and 7 participants aged 60 years and over (6%). The majority of participants held a Master of Pharmacy as their highest qualification, as seen in Figure 3.1.

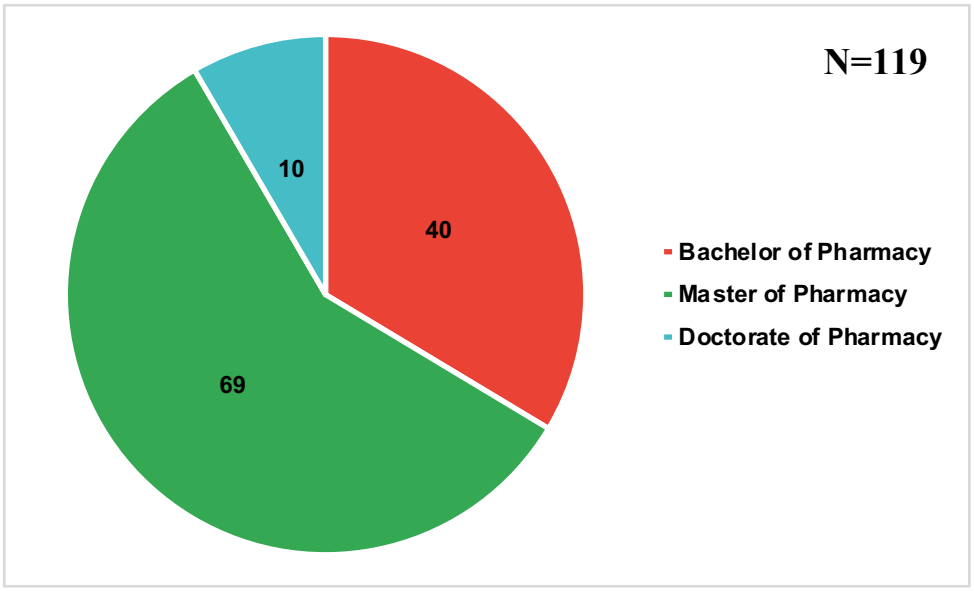

Figure 3.1- Highest qualification in Pharmacy

3.1.2 Availability and Frequency of Point-of-Care Tests in Pharmacy Practice

The results revealed that blood pressure monitoring was the most commonly offered test, with 111 participants (93%). Following closely behind were urinalysis, offered by 94 participants (79%), and blood glucose monitoring, reported by 90 participants (76%), as shown in Table 3.1.

Table 3.1- Availability of point-of-care tests across community pharmacies

Tests Available	Number of pharmacies (N=119)
Blood pressure monitoring	111
Urinalysis	94
Blood glucose test	90
BMI- body mass index	33
Cholesterol blood test	29
Blood triglycerides	24
HbA1c	22
Vitamin D	22
Allergy testing	20
COVID-19 Rapid antigen test	15
Food intolerance test	7
Microbiome Test	3
RT-PCR test COVID-19	3
Body Composition	1
INR	1

Beyond availability, pharmacists also reported on how frequently these tests are performed in practice, as well as how often they are requested by patients. Figure 3.2 presents the responses related specifically to urinalysis, which was the most routinely performed and most commonly requested test.

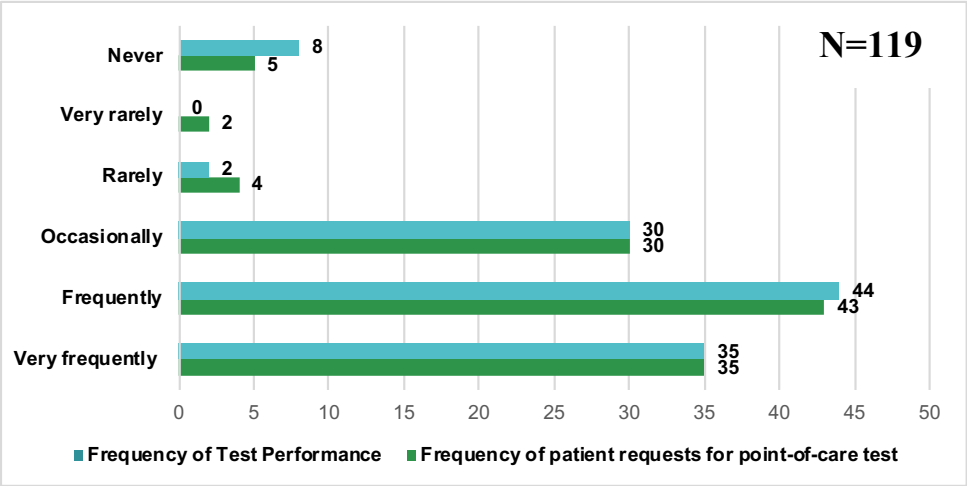

Figure 3.2- Frequency of performance and patient request of urinalysis

Tests such as blood pressure monitoring (62%) and blood glucose monitoring (33%) showed high levels of use and patient demand, with the majority of pharmacists reporting that they were performed frequently or very frequently. Blood glucose monitoring was also among the top three in both use and request frequency. Similarly, allergy testing, BMI measurement and cholesterol testing were moderately performed, though patient requests for these services appeared slightly lower. On the other hand, more specialised tests such as HbA1c, triglycerides, and COVID-19 antigen tests were generally performed occasionally or rarely, and patient requests followed a similar pattern. Tests like RT-PCR for COVID-19, vitamin D, and INR had the lowest levels of both utilisation and demand, with most respondents (over 80%) selecting "never" or "very rarely" for both questions. The findings are visually summarised in Figure 3.3, which illustrates the frequency of POCT performance across pharmacies, and Figure 3.4, which presents the corresponding frequency of patient requests.

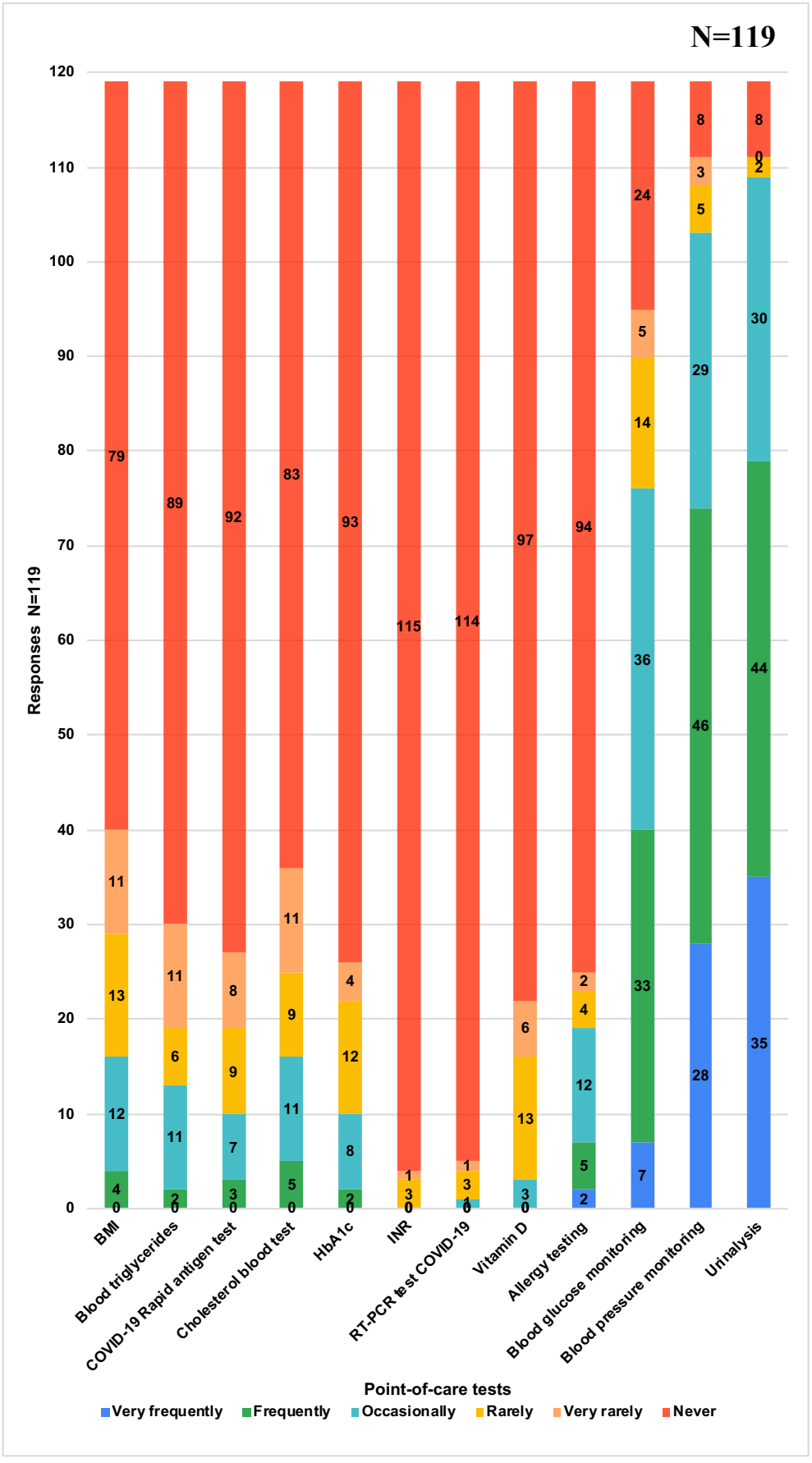

Figure 3.3 – Frequency of POCT use across community pharmacies

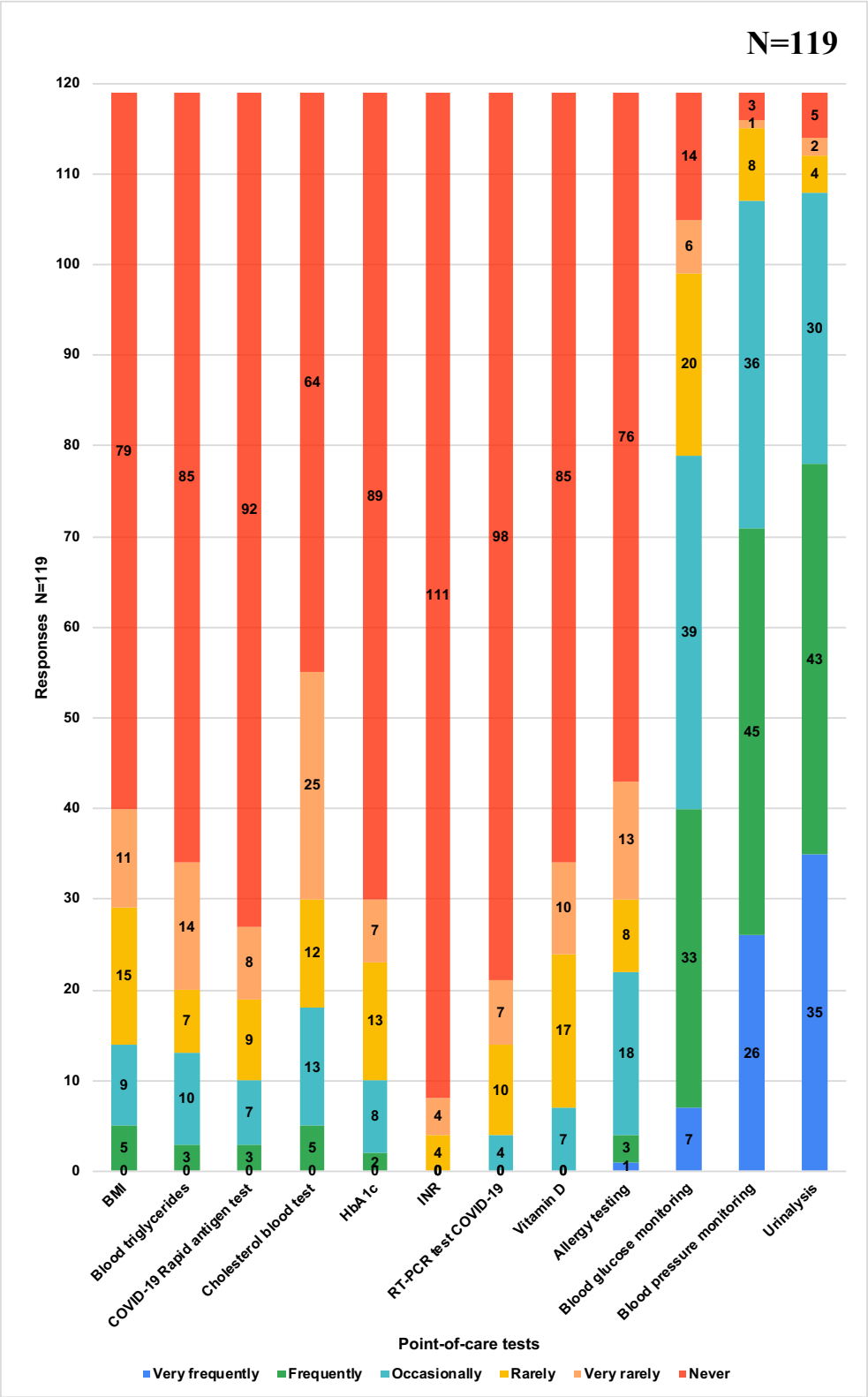

Figure 3.4 – Frequency of patient requests for POCT services across community pharmacies

3.1.3 Pharmacist Perceptions of POCT Medical Devices

Pharmacists were asked to evaluate the performance, reliability, accuracy, and calibration practices related to POCT devices used in their practice. Overall, the majority of pharmacists expressed high satisfaction with device performance, with 48 pharmacists (40%) being somewhat satisfied and 49 (41%) very satisfied (Figure 3.5).

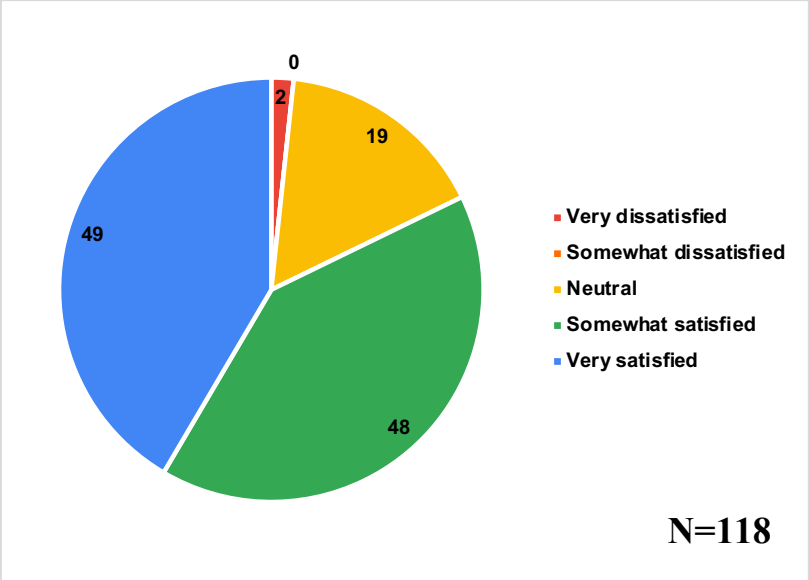

Figure 3.5 – Pharmacists' satisfaction with the performance of POCT medical devices

Similarly, the perceived reliability of devices was rated positively, with 63 pharmacists (53%) reporting they found devices somewhat reliable, and 36 (30%) reporting them as very reliable. A further 14% of respondents selected neutral. Only 2 pharmacists (2%) viewed the devices as somewhat unreliable, and none rated them as not at all reliable (Figure 3.6).

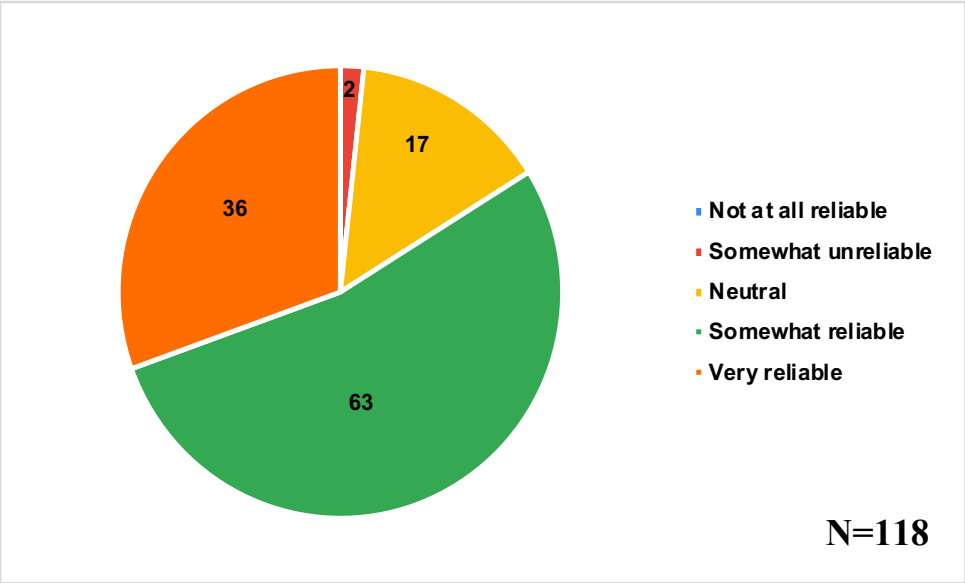

Figure 3.6 – Pharmacists' perceptions of the reliability of POCT medical devices

Responses regarding device accuracy were similarly positive. A total of 59 pharmacists (50%) considered the devices to be somewhat accurate, while 41 (35%) rated them as very accurate. Seventeen pharmacists (14%) expressed a neutral stance, and only one respondent (1%) reported any level of inaccuracy.

Confidence in the standardisation and calibration process of POCT devices was varied, as seen in Figure 3.7, with the largest proportion of pharmacists expressing moderate confidence (42%), while a notable number remained uncertain or unconfident (45%).

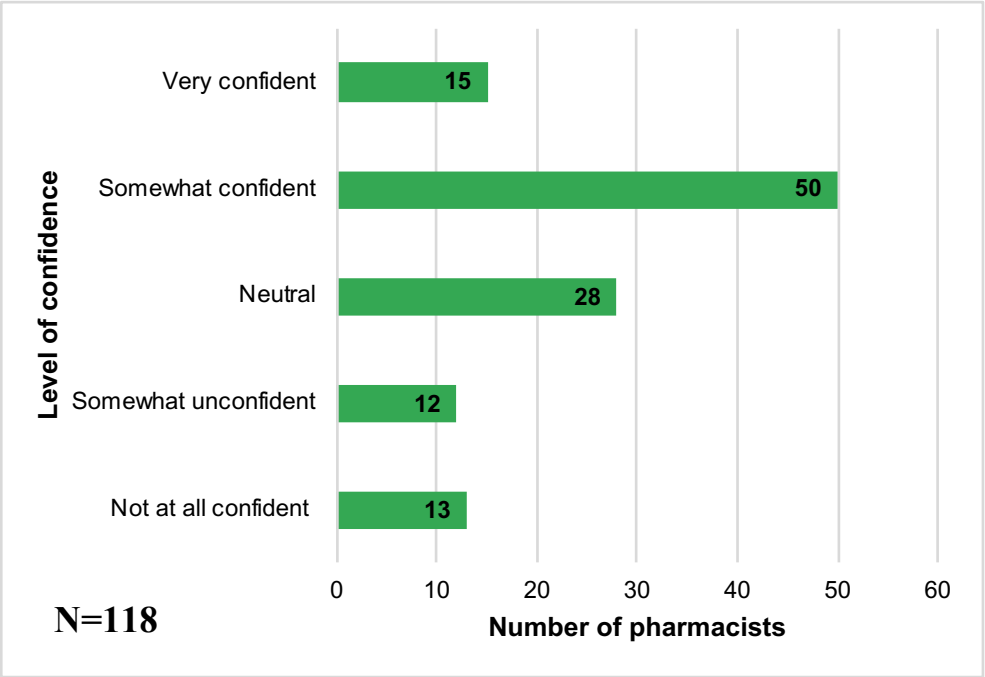

Figure 3.7 – Pharmacists' confidence in the calibration and standardisation of POCT medical devices

The frequency of device calibration showed inconsistency among pharmacists, with most reporting that it was performed only occasionally or infrequently, as seen in Figure 3.8. A comment section followed, several pharmacists indicated that calibration is performed annually, often in line with manufacturer instructions or through external suppliers. One pharmacist noted, "Usually collected by supplier yearly" while another stated, "Once a year or as advised by manufacturer". Some pharmacists were unsure about the process, especially those working across different pharmacies. A few called for more clarity, with one suggesting, "Regulatory bodies should provide clear, standard guidelines for community pharmacies". Another pointed out a practical issue, saying, "Sometimes, it's hard to interpret urinalysis strips because the colour changes can be subtle".

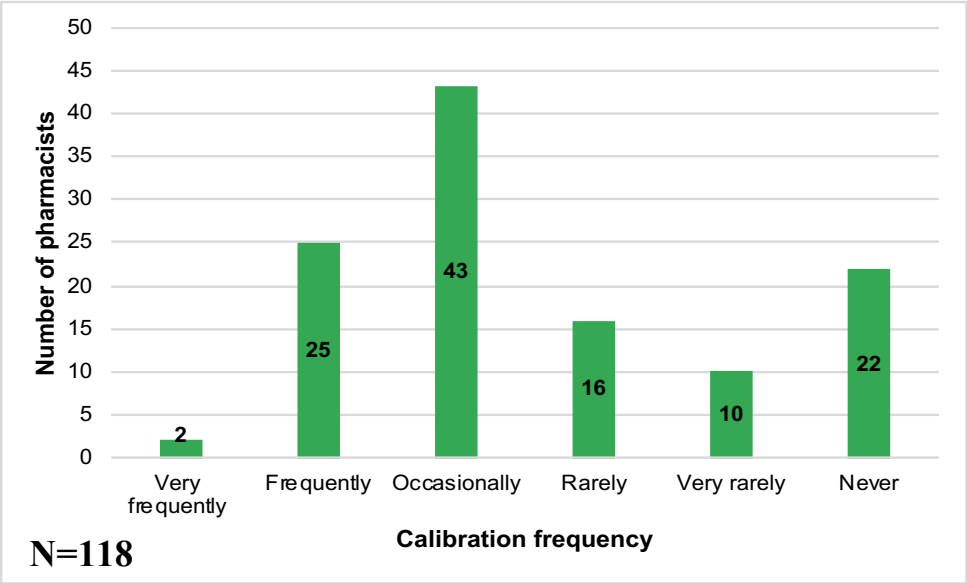

Figure 3.8 – Reported frequency of calibration of POCT medical devices by community pharmacists

Pharmacists expressed mixed views regarding the availability of calibration resources and support. While 22 respondents (19%) said they were somewhat satisfied with access to calibration materials and reference standards, nearly half (44%) gave neutral responses (Figure 3.9).

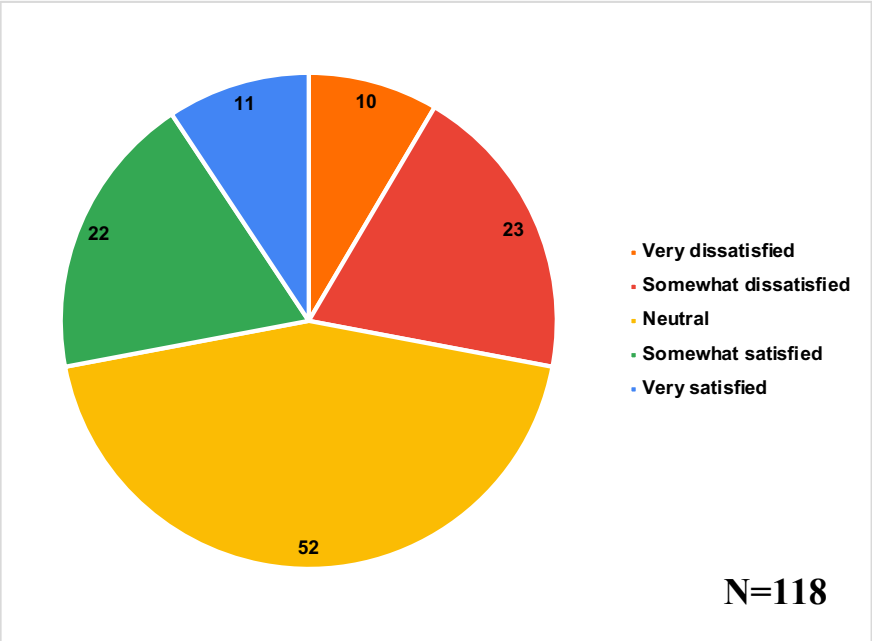

Figure 3.9 – Pharmacists' satisfaction with the availability of calibration standards, reference materials, and services for POCT medical devices

A similar trend was reflected in relation to the level of training and support provided to pharmacists, with 42% expressing neutrality and 37% reporting some level of dissatisfaction (Figure 3.10).

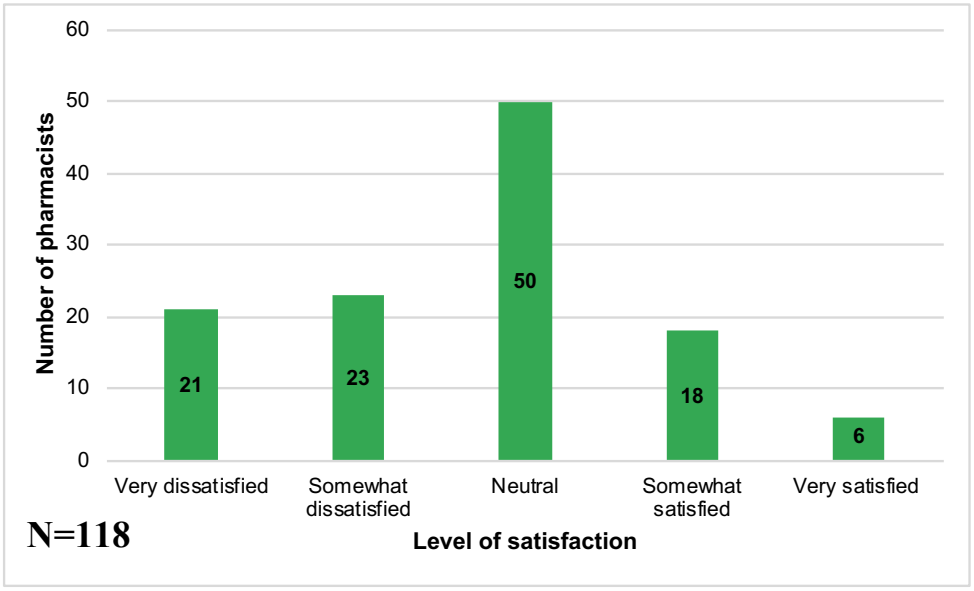

Figure 3.10 – Pharmacists' satisfaction with training and support provided for the calibration of POCT medical devices

3.1.4 Pharmacoeconomic data

The vast majority of pharmacists (91%) reported that POCT services in their practice are not provided free of charge, with only 11 respondents offering the service without a fee. Among those who charged for the service, 85 pharmacists (79%) stated that the fee adequately covered both consumable costs and pharmacist time, while 22 (21%) indicated that it did not. When asked about patient willingness to pay for POCT services, responses were generally favourable. A combined 63 participants (64%) reported that patients were either willing or very willing to contribute financially. Meanwhile, 19 respondents (19%) noted a neutral stance, and only a small proportion indicated reluctance (Figure 3.11).

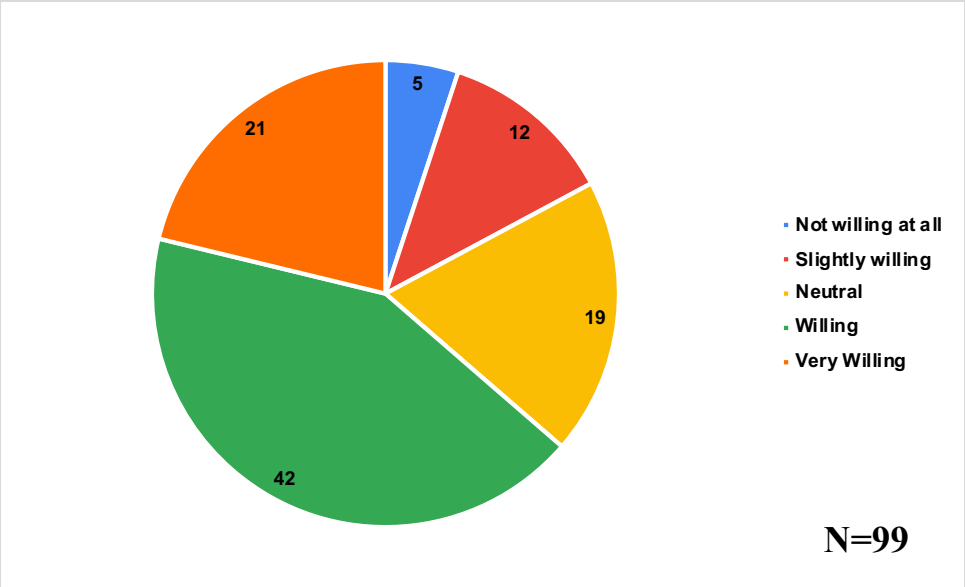

Figure 3.11 – Pharmacists' perceptions of patient willingness to contribute financially for POCT services

3.2 Patient perception questionnaire

3.2.1 Demographic Data

A total of 64 respondents completed the questionnaire. The majority were female (n=46), while 18 participants identified as male. Most respondents were aged 18–24 years, with fewer participants represented in the older age groups (Figure 3.12).

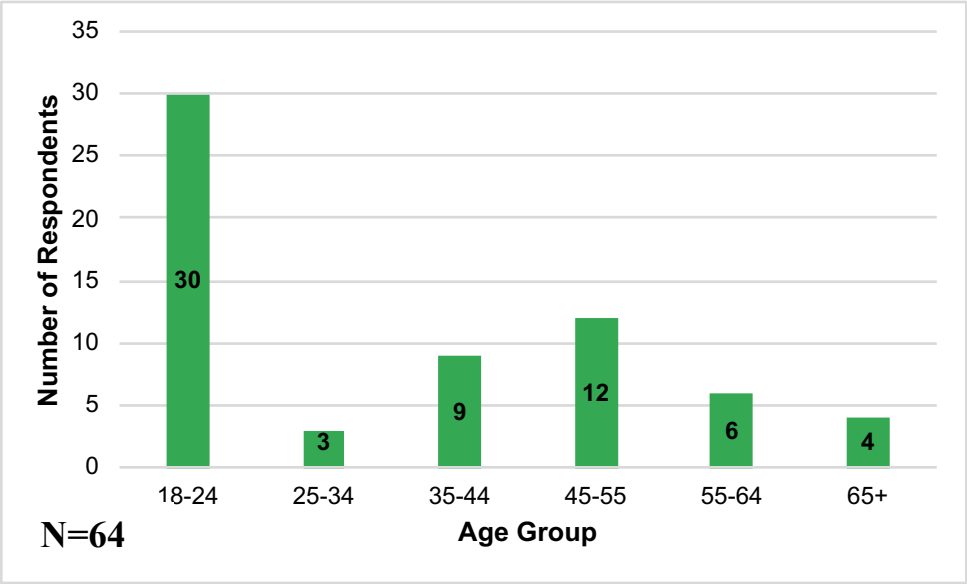

Figure 3.12 – Age Distribution of Respondents

With regard to education, over half of the respondents had achieved a tertiary qualification (n=36), while post-secondary education was reported by 18 participants. Fewer participants had completed secondary (n=9) or primary education (n=1). Respondents were distributed across different geographic regions of Malta with the majority residing in the central zone (Figure 3.13).

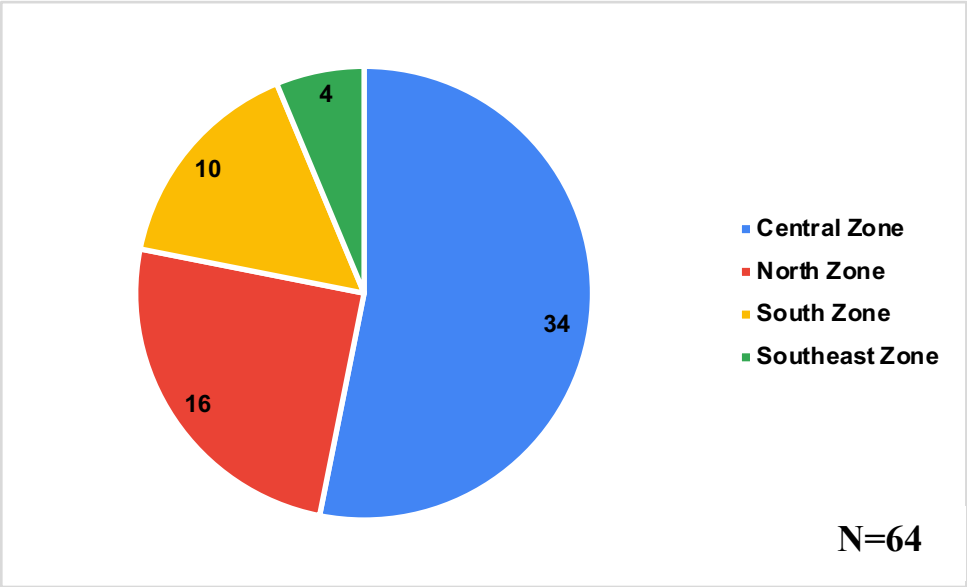

Figure 3.13 – Distribution of respondents by locality

3.2.2 Use of POCT

Out of the 64 respondents, 42 reported having previously used a point-of-care service at a pharmacy, while 22 had not. Respondents who had previously used point-of-care services were asked to indicate which specific tests they had accessed at the pharmacy. Urinalysis was the most frequently reported service (n = 17), followed by blood pressure monitoring (n = 15) and blood glucose testing (n = 10). Participants were also invited to suggest additional POCT services they would like to see offered in pharmacies. The responses revealed interest in the following areas:

- Nutritional/Vitamin Testing – e.g., Vitamin D
- Infection-related Tests – e.g., for common cold symptoms, influenza, and other infections
- Chronic Disease Monitoring – e.g., ambulatory blood pressure monitoring, HbA1c testing, heart-related assessments
- Other Tests – pregnancy testing, drug screening, food intolerance testing, and eye tests

3.2.3 Willingness to Pay

Participants were asked how much they would be willing to pay for three POCT services: blood pressure monitoring, blood glucose testing, and urinalysis. The majority of participants were willing to pay between €1 and €5 for each service. Notably, blood pressure monitoring had the highest proportion of respondents who expected the service to be free (n=17). In contrast, urinalysis and blood glucose testing showed greater willingness to pay at higher tiers (≥ €6) as seen in Figure 3.14.

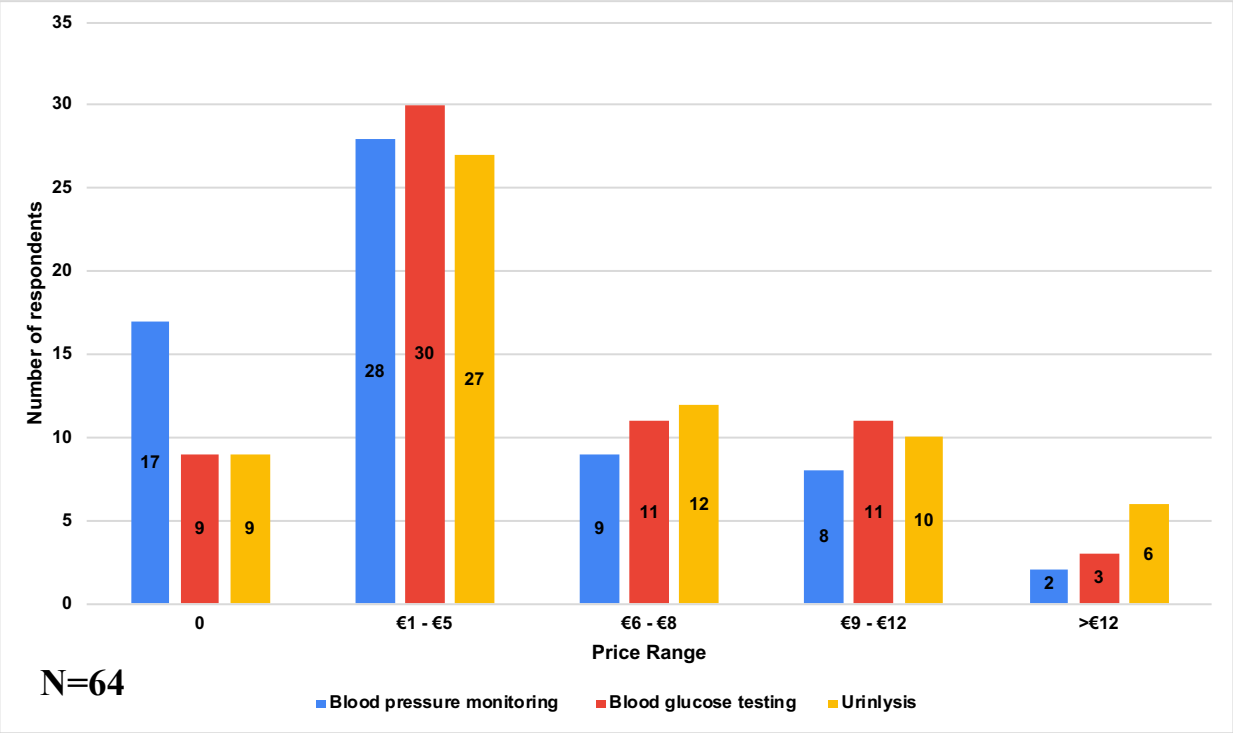

Figure 3.14 – Willingness to pay for POCT in Pharmacies

Chapter 4

Discussion

4.1 Findings

This study explored the current practices of pharmacist-led POCT services in Maltese community pharmacies, with a dual focus on the perceptions of community pharmacists and the general public. The research aimed to identify which POCT services are most commonly offered, assess the practical challenges related to POCT delivery, particularly device performance and calibration and evaluate the willingness of patients to engage with and pay for these services. To achieve this, two validated, ethics-approved questionnaires were distributed to pharmacists and members of the public, yielding responses from 119 pharmacists and 64 members of the general population. Results showed that POCT is somewhat established in Maltese community pharmacies, with certain tests such as blood pressure monitoring, urinalysis, and blood glucose testing being widely available and frequently used. However, the study also revealed key limitations, including inconsistent calibration protocols, variable training and support for pharmacists, and limited public engagement with more specialised tests such as HbA1c, INR, and vitamin D. These findings suggest that although pharmacists are generally capable and open to offering POCT, there are challenges that must be addressed to enable broader integration of these services.

4.2 POCT availability and use

The findings of this study revealed a clear trend in the types of POCT services most commonly available in Maltese community pharmacies. Blood pressure monitoring was the most widely offered service (93%), followed by urinalysis (79%) and blood glucose testing (76%). These results are consistent with international trends, where easily administered, high-demand tests for chronic disease management are the most routinely offered in community pharmacy settings (Hutchings & Shiamptanis, 2022). This high

prevalence suggests that pharmacists in Malta are already engaging with POCT in a way that complements their established roles in health promotion, medication counselling, and chronic disease support. In contrast, more specialised POCT services such as triglyceride and cholesterol testing (20–24%), HbA1c testing (18%), vitamin D assessment (18%) and INR testing (0.8%), were offered far less frequently. This highlights a notable gap in the use of more advanced or condition-specific testing options, despite their clinical importance.

Responses from the general public questionnaire revealed a strong interest in POCT services that extend beyond those commonly offered, including vitamin D testing, infection screening (such as influenza), and chronic disease monitoring like ambulatory blood pressure and HbA1c testing. These preferences align with global trends indicating growing patient acceptance of pharmacist-led testing in areas traditionally overseen by general practitioners (Hohmeier *et al*, 2018; Papastergiou *et al*, 2018). The gap between existing services and public demand highlights an unmet need and presents a valuable opportunity to expand and enhance community pharmacy services.

HbA1c testing has been shown to provide a more reliable indicator of long-term glycaemic control compared to capillary glucose measurements and is a recommended component of diabetes management guidelines globally[5]. Similarly, INR and lipid profile testing can play a vital role in the management of patients at risk of cardiovascular events or requiring anticoagulation therapy.

The limited use of tests such as INR and lipid profiles in Malta contrasts with their successful implementation in other countries. Rossiter *et al* (2013) found that pharmacist-

led INR POCT in Canada significantly improved patients' TTR. Similarly, Alshehri *et al* (2020) reported that pharmacist interventions reduced cholesterol, LDL-C, and triglyceride levels in patients with cardiovascular risk factors. In Malta, however, POCT for INR and cholesterol testing remain underutilised, which may be due to a lack of national guidelines, regulatory frameworks, or incentives that would support pharmacists in expanding their scope of practice beyond traditional services.

Several factors may contribute to this underutilisation. One explanation is the higher cost and technical demands of performing more advanced tests, such as HbA1c and INR testing which often require more complex devices, regular calibration, and adherence to strict procedural standards. In the absence of structured training or national guidelines, pharmacists may be reluctant to offer such services. This concern was reflected by the feedback obtained from pharmacists in the study, many of whom expressed uncertainty or discomfort regarding device calibration procedures.

This is consistent with findings by Luppa *et al* (2011), who noted that although POCT is generally accurate, its reliability is highly dependent on proper staff training, consistent quality assurance, and appropriate environmental conditions. Similarly, Chan *et al* (2023) highlighted the need for structured post-training certification covering testing procedures, result interpretation, and device maintenance. The lack of such frameworks in Malta may be a significant barrier to service expansion. Moreover, since pharmacists in Malta do not have access to patients' electronic medical records, the clinical relevance of offering advanced tests like HbA1c or INR may be decreased, particularly if the results cannot be efficiently shared with general practitioners or specialists for collaborative care.

Similar patterns have been observed internationally, where basic services such as blood pressure, glucose, and urinalysis dominate pharmacy practice, while more advanced tests are less consistently adopted (Hutchings & Shiamptanis, 2022). In Europe, variation exists, with UK pharmacists involved in POCT while Greek pharmacists remain largely limited to dispensing (Peletidi *et al*, 2019). In Canada, pharmacist-led streptococcus testing has been successfully delivered in community pharmacies, with patients paying a fixed fee and reporting high satisfaction with the service (Papastergiou *et al*, 2018). In contrast, settings like Vietnam demonstrate strong public acceptance but much lower willingness to pay (Vinh Nguyen *et al*, 2024). In Australia and Croatia, evidence highlights that patient trust, affordability, and endorsement by general practitioners or government support are critical enablers (Fehir Šola *et al*, 2025; Karia *et al*, 2025). Taken together, these trends suggest that Malta reflects the wider European model of emphasising routine monitoring, yet could strengthen its approach by adopting best practices from international contexts to support the broader integration of advanced POCT.

4.3 Pharmacist Perceptions of POCT Devices

The effectiveness and accuracy of POCT devices are crucial to their successful use in community pharmacies. In this study, the majority of Maltese pharmacists reported being satisfied with the accuracy (85%) and performance (83%) of the devices they used. This positive perception is supported by international evidence showing that many POCT devices, when properly operated, can produce results comparable to those from central laboratories (Yonel *et al*, 2022). Devices such as the Siemens DCA Vantage for HbA1c and the Nova StatSensor for creatinine testing have demonstrated concordance rates exceeding 95% with reference standards, supporting their suitability for clinical use in

non-laboratory environments. These findings suggest that pharmacists are already working with technology capable of delivering high-quality diagnostic outcomes in accessible settings.

However, satisfaction with device performance did not extend consistently to areas such as calibration, standardisation, and training. Despite 55% pharmacists reporting confidence in calibration procedures, 45% reported infrequent or inconsistent calibration practices. One respondent remarked, "Regulatory bodies should provide clear, standard guidelines for community pharmacies," highlighting the lack of and widespread need for uniform practice standards. Another pharmacist noted, "Sometimes it's hard to interpret urinalysis strips because the colour changes can be subtle," drawing attention to the practical challenges even with basic testing tools. Several respondents indicated that calibration was only performed annually, often by an external supplier, or "as advised by the manufacturer." Some also admitted uncertainty about the appropriate calibration frequency, especially when working across different pharmacy locations. This discrepancy indicates that even though pharmacists are satisfied with the day-to-day function of devices, there may be a lack of awareness or uncertainty about the processes needed to maintain analytical accuracy over time.

This variability is likely influenced by the lack of a national standardisation protocol in Malta, as well as gaps in training and support. In this study, nearly half of the respondents were neutral regarding satisfaction with available calibration materials, and 37% reported dissatisfaction with training availability. These findings align with those of Luppa *et al* (2011), who emphasised that the accuracy of POCT results depends not only on the technical quality of the device itself but also on careful adherence to testing protocols,

appropriate environmental conditions, and consistent quality assurance. Even minor issues such as improper storage of test materials, insufficient staff training, or infrequent calibration can introduce variability that compromises clinical reliability.

Similar conclusions were drawn by Chan *et al* (2023), who found that healthcare providers who underwent structured training followed by certification demonstrated greater confidence and consistency in performing POCT. Pope *et al* (2021), noted that structured training with certification significantly improved confidence, consistency, and perceived acceptability of POCT. These findings highlight the need for robust training infrastructure, regulatory oversight, and access to technical support. This contrasts with other countries such as Canada or the UK, where POCT protocols are often embedded in continuing professional development programmes and regulated through pharmacy bodies (Papastergiou *et al*, 2018; Peletidi *et al*, 2019). Without these support systems in place, pharmacist confidence may not translate into consistently accurate or clinically reliable practice. Although Maltese pharmacists demonstrate the motivation and competence to deliver these services, their ability to do so reliably may be constrained by the lack of structured training systems, regulatory oversight, and access to calibration tools and reference standards. Addressing this gap through national training standards, access to calibration reference materials, and integration of POCT into continuing professional development programmes would not only improve device reliability but also expand pharmacists' readiness to offer more complex diagnostic services.

4.4 Public Perception on POCT Services

The demographic profile of respondents in this study revealed that the majority were young adults aged 18–35, predominantly female, and educated to a tertiary level. Forty-

two participants reported previous experience with POCT through services such as blood pressure and glucose testing. This figure suggests that a majority of respondents are already familiar with the concept of pharmacy-based testing in the community pharmacy setting. The most frequently accessed services were urinalysis (n = 17), blood pressure monitoring (n = 15), and blood glucose testing (n = 10). Interest in service expansion was evident. Respondents expressed a desire for tests beyond the common offerings, including vitamin D, infection screening such as influenza, HbA1c, alongside other requests such as pregnancy testing, drug screening, food intolerance testing, and eye checks. These findings mirror trends reported in the U.S (Hohmeier *et al*, 2018) and Canada (Papastergiou *et al*, 2018), where patients increasingly favour pharmacies for chronic disease screening and basic diagnostic services. The responses suggest clear public demand for an expanded POCT service offering in Malta.

Cost emerged as an important consideration. For blood pressure monitoring, 17 respondents expected the service to be free, while others (n = 28) were willing to pay between €1 and €5. For blood glucose monitoring, 30 respondents selected €1–€5, though more people than in the blood pressure category indicated they would pay higher amounts, with 11 willing to pay €6–€8 and another 11 willing to pay €9–€12. Urinalysis was valued even more highly, with 27 respondents choosing €1–€5, but larger groups opting for higher brackets. Affordability clearly shaped responses in this study, with the majority of participants indicating a willingness to pay only €1–€5 for most services. This pattern reflects the broader healthcare context in Malta, where most primary care services are publicly funded and accessible free of charge, thereby shaping public expectations that pharmacy-based testing should also be offered at minimal cost. This observation suggests that the successful integration and uptake of POCT in Malta may require pricing

strategies that align with existing patient expectations, or alternatively, incorporation of such services into state-supported healthcare schemes.

4.5 Pharmacist-Led POCT in addressing NCD

The WHO has set clear objectives for the reduction of NCDs, emphasising the importance of prevention, early detection, timely intervention, and equitable access to healthcare services. In Malta, the burden of NCDs is particularly significant, with cardiovascular disease and diabetes ranking among the most common causes of death.[2] The findings of this study, when viewed in light of WHO objectives, suggest that pharmacist-led POCT within community pharmacies can play a vital role in strengthening the national response to NCDs.

Community pharmacies, with their extended hours, convenient locations, and no appointment requirements, offer highly accessible healthcare that removes key barriers to screening. This accessibility is consistent with the WHO's objectives for healthcare systems to expand their reach into community settings in order to identify individuals at risk of NCDs at an earlier stage. In this study, pharmacists confirmed that tests such as blood pressure monitoring, urinalysis, and blood glucose testing are already widely available and frequently requested by patients. These findings demonstrate that community pharmacies in Malta are already contributing to the early detection of hypertension, diabetes, and kidney-related complications, which are major risk factors for NCD morbidity and mortality.

The integration of POCT within community pharmacy practice also enables pharmacists to assume a more proactive role in health promotion. Lifestyle counselling relating to diet, smoking cessation, physical activity, and adherence to therapy becomes more

impactful when supported by objective diagnostic results that patients can directly observe. For instance, individuals who receive HbA1c or blood pressure measurements in the pharmacy may be more receptive to recommendations for lifestyle modification when the clinical significance is explained by a trusted healthcare professional. This relationship between diagnostic testing and health education is particularly valuable in addressing modifiable risk factors, which remain a central priority in international strategies for the prevention and control of NCD.

Despite these opportunities, this study also identified gaps that must be addressed if community pharmacy POCT is to contribute to NCD reduction. Pharmacists highlighted uncertainty regarding calibration procedures and reported limited access to structured training and technical support. Without national guidance on standardisation and quality assurance, the reliability of advanced POCT services may be compromised. Furthermore, patients expressed willingness to use POCT services but were generally price sensitive, reflecting the expectation that healthcare should be low-cost or free within the Maltese healthcare system. These findings suggest that the expansion of POCT services would require not only professional support structures but also policy initiatives, such as partial funding or integration into state-supported schemes, to ensure affordability and encourage uptake across all population groups.

This study shows that while Maltese community pharmacies are already contributing to early detection of NCDs through widely available POCT services, further development is required to ensure reliability, affordability, and integration with national health policy. Strengthening training, standardisation, and financial support mechanisms would allow

these services to more effectively align with WHO objectives and contribute meaningfully to the reduction of the NCD burden.

4.6 Limitations of the study

Limitations should be considered when interpreting the findings of this study. Sampling bias is possible because questionnaires were mainly shared through social media and in selected pharmacies. This means the responses may have come from pharmacists and patients who are already more engaged with, or interested in, POCT services. Since convenience sampling was used, the results may not fully represent the views of all pharmacists or patients in Malta.

The study also relied on self-reported data from both groups. This introduces the risk of recall bias and social desirability bias. For instance, pharmacists may have reported offering POCT services more frequently than they actually do, while patients may have indicated a greater willingness to use or pay for POCT services than they would in reality.

Additionally, non-response bias cannot be excluded. Those who chose not to participate may differ from respondents, such as pharmacists less likely to offer POCT services or patients with lower awareness or interest in pharmacy-led testing. Their absence from the dataset could have skewed the overall findings.

The cross-sectional design of the study provides only a snapshot of pharmacist and patient perceptions at a single point in time. It does not capture how practices or attitudes may evolve in response to regulatory changes, training initiatives, or shifts in public health priorities. Repeated cross-sectional studies would therefore be needed to track changes in POCT implementation and acceptance over time.

4.7 Recommendations for Further Research

The findings of this dissertation highlight several areas where further research is needed to strengthen the evidence base for POCT in community pharmacy practice. There is the potential for qualitative research to complement survey findings. Semi-structured interviews or focus groups with pharmacists, patients, and policymakers could generate deeper insights into the attitudes, motivations, and barriers that affect the utilisation of POCT services. Such research would help to identify influences such as patient attitudes and expectations toward pharmacy services, as well as healthcare system structures like regulation, funding, and professional collaboration, which cannot be fully captured through structured questionnaires alone.

Further, economic evaluations are required to assess the cost-effectiveness and sustainability of POCT in the Maltese healthcare system. While this study explored willingness to pay, future analyses should include detailed assessments of service costs, reimbursement models, and potential savings to the public healthcare system.

In addition, interventional studies should be undertaken to evaluate the clinical outcomes of specific POCT services. For instance, pharmacist-led HbA1c testing could be assessed in terms of its effectiveness in improving glycaemic control or facilitating timely referral, while INR or lipid testing could be evaluated for their impact on cardiovascular risk reduction.

Finally, research should explore the integration of pharmacy-based POCT into digital health infrastructure, particularly the national myHealth portal. Studies that assess how sharing results with general practitioners and specialists affects continuity of care and

interprofessional collaboration would be valuable. Long-term research could also establish whether regular pharmacist-led POCT contributes to improved adherence, reduced hospital admissions, and better long-term management of NCD.

4.8 Conclusion

This study has explored the role of pharmacist-led POCT in community pharmacies in Malta, focusing on service availability, pharmacist perspectives, patient experiences, and willingness to pay. The findings show that POCT is already embedded, to some extent, within pharmacy practice. Services such as blood pressure monitoring, urinalysis, and blood glucose testing are the most widely available and used, whereas more advanced tests including HbA1c, INR, and lipid profiling remain underutilised, despite strong international evidence supporting their value in early disease detection and management. Pharmacists expressed confidence in the performance of POCT devices but also highlighted challenges, particularly inconsistent calibration practices and limited access to training and technical support. These findings point to the need for clear national guidelines, alongside structured education and training programmes, to ensure standardisation and reliability across all pharmacy settings. From the patient perspective, pharmacists were seen as trustworthy providers, and there was interest in expanding POCT services. However, willingness to pay was modest, reflecting the expectations created by Malta's publicly funded healthcare system.

Overall, the findings highlight the strong potential of POCT in community pharmacies to support the WHO's goals of reducing the impact of NCD. Pharmacies, being highly accessible, are well placed to offer early detection, prevention, and monitoring services while also helping patients remain engaged with their treatment in familiar community settings. To bring this potential into everyday practice, further investment is required in

pharmacist training, clear regulatory guidance, integration with digital health systems, and financial models that are practical and sustainable for Malta.

The broader implication of this research suggests that pharmacist-led POCT could serve as a practical and cost-effective way to strengthen Malta's primary healthcare system while tackling the ongoing challenge of NCDs. By adapting international best practices to Malta's healthcare setting, pharmacists can take on a stronger role in public health. This would allow community pharmacies to expand their clinical role, improve patient outcomes, narrow gaps in access to care, and play an active part in achieving both national and global health goals.

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Appendices

Appendix 1 – Ethics Approval

L-Università ta' Malta

Faculty of Medicine & Surgery
University of Malta
Msida MSD 2080, Malta

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Ref No: MED-2023-00311

15 February 2024

Ms Natalia Ferris
Xatt il-Palm, 44,
Alta Marea,
Bahar ic-Caghaq,
NXR5185

With reference to your application submitted to the Faculty Research Ethics Committee in connection with your research entitled:

Community Pharmacy-based Point-of-Care Testing

The Faculty Research Ethics Committee is granting ethical approval for the above-mentioned application.

Professor Anthony Serracino Inglott
Chair
Faculty Research Ethics Committee

FREC Approval for "Pharmacist perception questionnaire"

Application ID	Application Date	Project Title	Faculty	Status
MED-2024-00517	08/01/2025	Pharmacist led Point-of-Care Testing services	Faculty of Medicine & Surgery	Acknowledged

FREC Approval for “Patient perception questionnaire”

Appendix 2 - Pharmacist perception questionnaire

Community Pharmacy-based Point-of-Care Testing.

Dear Sir/Madam,

My name is Natalia Ferris and I am a Master of Pharmacy student at the University of Malta. I am currently conducting a research study for my dissertation titled 'Community Pharmacy-based Point-of-Care Testing', under the supervision of Professor Lilian M. Azzopardi.

As part of my dissertation, I developed a questionnaire intended for pharmacists about point-of-care testing. This questionnaire consists of 25 questions and takes less than 5 minutes to complete.

I hereby declare that this questionnaire will be used for research purposes only and you will remain anonymous.

Your cooperation would be greatly appreciated and thank you for your time and patience.

Yours Sincerely,
Natalia Ferris

Directions: Please place an "X" mark in the box of your answer.

Section A: Demographic questions

Gender

□ Male

□ Female

□ Prefer not to say

□ Other

Age

□ 20-29

□ 30-39

□ 40-49

□ 50-59

□ 60+

Highest qualification in pharmacy

□ Bachelor of Pharmacy

□ Master of Pharmacy

□ Doctorate of Pharmacy

Years of experience in community pharmacy

□ 1-5 years

□ 6-10 years

□ 11-15 years

□ 16-20 years

□ 21-25years

□ 26 years and above

Section B: Point-of-care tests

Directions: Please place an "X" mark in the box of your answer.

Which tests are offered in your pharmacy?

□ Blood pressure monitoring
□ Cholesterol blood test
□ Blood triglycerides
□ Blood glucose test
□ HbA1c
□ BMI- body mass index
□ COVID-19 Rapid antigen test
□ RT-PCR test COVID-19
□ Urinalysis
□ Allergy testing
□ Vitamin D
□ INR
□ Other: _____

Blood pressure monitoring

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Cholesterol blood test

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Blood triglycerides

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Blood glucose test

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

HbA1c

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

BMI- body mass index

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

COVID-19 Rapid antigen test

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

RT-PCR test COVID-19

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Urinalysis

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Allergy testing

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Vitamin D

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

INR

	Never	Very Rarely	Rarely	Occasionally	Frequently	Very frequently
How often do you perform the test?						
How frequently is the test requested?						

Section C: Medical Devices

Directions: Please place an "X" mark in the box of your answer.

How satisfied are you with the overall performance of the medical devices used for point-of-care testing in your practice?

□ Very dissatisfied
□ Somewhat dissatisfied
□ Neutral
□ Somewhat satisfied
□ Very satisfied

What is your perspective regarding the reliability of the medical devices used for point-of-care testing in your practice?

□ Not at all reliable
□ Somewhat unreliable
□ Neutral
□ Somewhat reliable
□ Very reliable

How accurate are the medical devices used for point-of-care testing in your practice?

□ Not at all accurate
□ Somewhat inaccurate
□ Neutral
□ Somewhat accurate
□ Very accurate

How confident are you in the process of standardization and calibration of the medical devices used for point-of-care testing in your practice?

□ Not at all confident
□ Somewhat unconfident
□ Neutral
□ Somewhat confident
□ Very confident

How often do you perform calibration of the medical devices used for point-of-care testing in your practice?

□ Never
□ Very rarely
□ Rarely
□ Occasionally
□ Frequently
□ Very frequently

Comments

_____

_____

How satisfied are you with the availability of calibration standards, reference materials, and services for the medical devices used for point-of-care testing in your practice?

□ Very dissatisfied
□ Somewhat dissatisfied
□ Neutral
□ Somewhat satisfied
□ Very satisfied

How satisfied are you with the level of training and support provided for the process of calibration of medical devices used for point-of-care testing in your practice?

□ Very dissatisfied

□ Somewhat dissatisfied

□ Neutral

□ Somewhat satisfied

□ Very satisfied

Section D: Pharmacoeconomics

Is the service provided free of charge?

□ Yes

□ No

If "No", does the fee cover expenses for consumables and the pharmacist's time?

□ Yes

□ No

If “No” to the question ‘Is the service provided free of charge?’, how willing are patients to contribute financially?

□ Not willing at all

□ Slightly inaccurate

□ Neutral

□ Willing

□ Very willing

Appendix 3 – Patient perception questionnaire

Dear Sir/Madam,

My name is Natalia Ferris, and I am a Master of Pharmacy student at the University of Malta. I am currently conducting a research study for my dissertation titled "Pharmacist-led Point-of-care Testing Services" under the supervision of Professor Lilian M. Azzopardi.

As part of my dissertation, I have developed a 9-question questionnaire on point-of-care testing for the general public, which takes less than 5 minutes to complete.

There are no direct benefits or anticipated risks in taking part. Participation is entirely voluntary, i.e., you are free to accept or refuse to participate. At no point will you be asked to provide your name or any other personal data that may lead to you being identified.

By completing the questionnaire, you are consenting to take part in the study. The submission is anonymous, and there is no traceability to the individual completing the questionnaire. I hereby declare that this questionnaire will be used for research purposes only. Your cooperation would be greatly appreciated, and I thank you for your time and patience.

Should you have any questions or concerns, you may contact myself on natalia.ferris.20@um.edu.mt or my supervisor on lilian.m.azzopardi@um.edu.mt .

Yours sincerely,
Natalia Ferris

Għażiż/ Għażiża Sinjur/a,

Jiena Natalia Ferris, studenta fil-Master tal-Farmaċija fl-Università ta' Malta. Bħalissa qed nagħmel riċerka bit-titlu " Pharmacist-led Point-of-care Testing Services," taħt is-superviżjoni tal-Professur Lilian M. Azzopardi.

Bħala parti mir-riċerka tiegħi, ħloqt kwestjunarju ta' 9 mistoqsijiet dwar servizzi ta' "point-of-care" fl-ispiżerija għall-pubbliku, li jieħu inqas minn 5 minuti biex jitlesta.

Jekk tagħżel li tipparteċipa, jekk jogħġbok innota li ma hemm l-ebda benefiċċju dirett għalik.

Niddikjara li dan il-kwestjonarju se jintuża biss għal skopijiet ta' riċerka, u t-tweġibiet tiegħek se jibqgħu anonimi u ma hemm l-ebda mod kif wieħed jista' jsegwi min qed jimla' l-kwestjonarju. L-għajnuna tiegħek hija apprezzata ħafna, u nirringrazzjak tal-ħin tiegħek.

Jekk ikollok xi mistoqsija, tiddejjaqx tikkuntattjani fuq natalia.ferris.20@um.edu.mt. Tista' tikkuntattja wkoll lit-tutur tiegħi fuq: lilian.m.azzopardi@um.edu.mt .

Tislijiet,
Natalia Ferris

DECLARATION BY RESPONDENT*/ DIKJARAZZJONI TAL-PARTEĊIPANT*

I hereby confirm that I am 18 years of age or older. I am aware that completing and submitting this anonymous questionnaire implies that I am participating voluntarily and with full informed consent on the conditions listed above.

Nikkonferma li għandi 18-il sena jew iktar. Jiena konxju/a li meta nimla u nissottometti l-kwestjunarju nkun qed nagħti l-kunsens tiegħi skont l-informazzjoni miktuba hawn fuq.

- ☐ I agree to participate – begin survey / *Naċċetta li nipparteċipa*
- ☐ I do not wish to participate – exit the survey / *Ma nixtieqx nipparteċipa*

Demographic Questions
Dettalji demografiċi

Gender
Sess

- ☐ Male / *Raġel*
- ☐ Female / *Mara*
- ☐ Other / *Ieħor*
- ☐ Prefer not to say / *Nippreferi ma nweġibx*

Age
Età

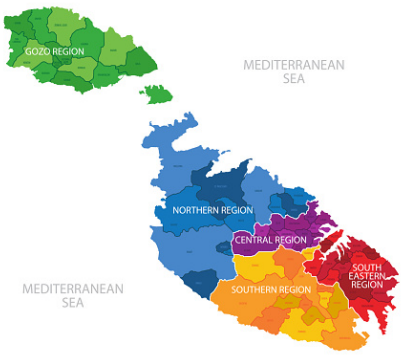
- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65 or over
  65 jew aktar

Highest education level
L-ogħla Livell ta' Edukazzjoni

- ☐ Primary / *Primarja*
- ☐ Secondary */ Sekondarja*
- ☐ Post-Secondary */ Post-sekondarja*
- ☐ Tertiary */ Terzjarja*

Locality
Lokalità

- ☐ North Zone / *Żona tat-Tramuntana*
- ☐ South Zone / *Żona tan-Nofsinhar*
- ☐ Central Zone/ *Żona Ċentrali*
- ☐ Southeast Zone / *Żona tax-Xlokk*



Point-of-care testing Questions
Mistoqsijiet dwar servizz ta' "point-of-care"

Have you ever used a point-of-care service at the pharmacy?
Qatt użajt servizz ta' "point-of-care" fl-ispiżerija?

- ☐ Yes / *Iva*
- ☐ No / *Le*

If "yes" which of the services below have you used?
Jekk "Iva," liema mis-servizzi t'hawn taħt ġieli użajt?

- ☐ Blood glucose test / Test *taz-zokkor*
- ☐ Blood pressure monitoring / *Test tal-pressjoni*
- ☐ Urinalysis / *Test tal-awrina*
- ☐ Other / *Ieħor/Oħrajn*: _____

What point-of-care services do you wish that the pharmacy offers?
Liema servizzi ta' 'point-of-care' tixtieq li toffri l-ispiżerija?

_____
_____
_____

How much would you be willing to contribute financially to a point-of-care service at a pharmacy?
Kemm tkun lest/a li tħallas għal servizz ta' 'point-of-care' fi spiżerija?

(Please select one price range for each service/ Jekk jogħġbok agħżel risposta waħda għal kull servizz)

Blood pressure monitoring/ *Test tal-pressjoni*:

- ☐ €0 (Free/ B'xejn)
- ☐ €1 - €5
- ☐ €6 - €8
- ☐ €9 - €12
- ☐ >€12

Blood glucose testing/ Test *taz-zokkor*:

- ☐ €0 (Free/ B'xejn)
- ☐ €1 - €5
- ☐ €6 - €8
- ☐ €9 - €12
- ☐ >€12

Urinalysis/ *Test tal-awrina*:

- €0 (Free/ B'xejn)
- €1 - €5
- €6 - €8
- €9 - €12
- >€12

Thank you
Grazzi

Appendix 4 - List of Publications and Abstracts

Presented at the 83rd FIP World Congress of Pharmacy and Pharmaceutical Sciences 2025, Copenhagen, Denmark, in August 2025

Pharmacist-Led Point-of-Care Testing Services

Natalia Ferris, Lilian M. Azzopardi

Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta

Introduction
Point-of-care testing (POCT) provides rapid diagnostic results outside traditional laboratory settings, offering access to diagnosis and monitoring of biological parameters. The elaboration of POCT in community pharmacies supports the provision of pharmaceutical care service increasing opportunities for diagnosis, patient monitoring, and personalized patient management. POCT reduces waiting time and the need for patient referral to centralized laboratory services. Pharmacist-led POCT within a collaborative multidisciplinary practice enhances detection and management of non-communicable diseases. Challenges with POCT services include calibration, standardization, and financial sustainability, all of which must be addressed to ensure robust service. The aim of this study was to identify available POCT services in community pharmacies.

Method
A questionnaire was developed, validated and distributed to community pharmacists via social media and personal delivery in community pharmacies. The pharmacist questionnaire assessed the range of POCT services provided, test frequency, device reliability, and pharmacoeconomic considerations. A separate patient survey captured usage patterns, willingness to pay, and perceptions of service availability.

Results
A total of 119 (n= 92 females) pharmacist questionnaires were collected. The majority of participants fell within the 30–39-year age range (n=42) Blood pressure monitoring was the most commonly offered test (111) followed by urinalysis (104) and blood glucose monitoring (88). Pharmacists reported positive perceptions of device reliability and accuracy but highlighted gaps in calibration and standardization practices (53). Financially, the majority (85) claimed that fees covered expenses, and pharmacists reflected that patients were willing to pay the fee requested (63).

Patient responses (n=64) revealed that many had previously used POCT services in pharmacies, with urinalysis (n=17) being the most commonly used test followed by blood pressure monitoring (n=15) and blood glucose testing (n=10). Payment expectations varied across tests. While some respondents expected blood pressure monitoring (n=17) and blood glucose testing (n=9) to be free, the majority were willing to pay a small fee of €1-€5. For urinalysis, payment expectations were more varied, with most patients willing to pay €1-€5 (n=27), though some expected it to be free (n=9) or were open to fees of €6 or higher (n=28)

Conclusion
Community pharmacy-based POCT is widely utilized and contributes to non-communicable disease screening and management. Challenges in calibration, training, and cost accessibility remain significant barriers. Addressing these gaps through standardization efforts, improved pharmacist training, and better financial models is crucial in ensuring equitable access to

POCT services and optimization of patient care outcomes. Expanding the scope of POCT in pharmacies could further enhance disease prevention and early detection while reducing the burden on healthcare systems.

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Pharmacist-led Point-of-Care services

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INTRODUCTION

- **The role of pharmacists has evolved to include patient-focused activities, administrative duties, and public health responsibilities.**
- **Point-of-care testing (POCT) is a diagnostic test performed outside a lab, providing quick and accurate results for managing chronic diseases and acute infections.[1]**

AIMS

- **Identify POCTs available and offered within the community pharmacy setting.**
- **Examine opportunities presented by POCT.**
- **Study implementation of different POCTs considering guidelines, devices used, standardization, need, and pharmacoeconomics aspects.**

METHOD

Development and validation of questionnaire

Distribution of questionnaire

Pharmacist questionnaire

- Range of POCT services provided
- Test frequency
- Device reliability
- Pharmacoeconomic considerations

Patient Questionnaire

- Usage patterns
- Willingness to pay
- Perception of serve availability

RESULTS

Pharmacist perception questionnaire (N=119)

•**Most Common Tests**:
- Blood pressure monitoring (n=111)
- Urinalysis (n=104)
- Blood glucose monitoring (n=88)

•**Device Reliability**:
- Positive feedback, but concerns on calibration and standardization.

•**Financials**:
- Majority of pharmacists (n=85) reported fees covered expenses.
- A total of n=63 pharmacists expressed that patients were willing to pay the fee.

Patient perception questionnaire (N=64)

- Payment expectations varied across tests, some respondents expected free blood pressure (n=17) and blood glucose testing (n=9), most were willing to pay a small fee. Payment expectations for urinalysis were more varied, with some open to higher fees.

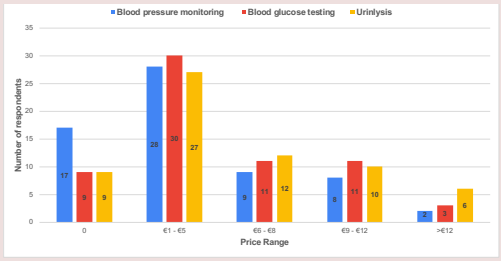

Figure 1: Willingness to pay for Point-of-Care Testing Services in Pharmacies (N=64)

CONCLUSION

POCT in Community Pharmacies
- Widely used for screening and managing non communicable diseases

Challenges
- *Calibration*
- *Training*
- *Cost accessibility*

Solutions
- *Standardization*
- *Improved pharmacist training*
- *Better financial models*

Impact
- *Ensures access to POCT*
- *Optimizes patient care*
- *Enhances disease prevention*
- *Reduces healthcare burden*

REFERENCE

1.Khan AR, Hussain WL, Shum HC, Hassan SU. Point-of-care testing: a critical analysis of the market and future trends. Front Lab Chip Technol. 2024; 3:1394752 doi: 10.3389/frlct.2024.1394752