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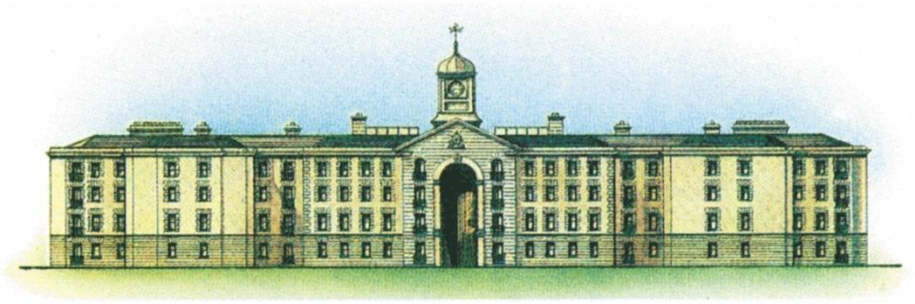
CLEAR MEDICATION LABELS FOR BETTER PUBLIC HEALTH OUTCOMES:

TACKLING NON-ADHERENCE IN INDIA



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12 May 2025

CANDIDATE DECLERATION

I BEEMA BEEVI, hereby declare that the dissertation entitled **"CLEAR MEDICATION LABELS FOR BETTER PUBLIC HEALTH OUTCOMES: TACKLING NON-ADHERENCE IN INDIA"** submitted by me to GRIFFITH COLLEGE, DUBLIN CAMPUS in partial fulfilment of the requirements for the award of the degree of MSc in Pharmaceutical Business and Technology under the supervision of ALISON CUMMINS, is my original work and has not been submitted elsewhere for any other award. All sources are properly cited, and the work complies with academic integrity guidelines.

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BEEMA BEEVI

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LIST OF ABBREVATIONS

LMICS	Low-and Middle-Income Countries
TB	Tuberculosis
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
WHO	World Health Organisation
PCL	Patient Centred Labels
US FDA	United States Food and Drug Administration
EU EMA	European Medicines Agency
CDSCO	Central Drugs Standard Control Organisation
QR Code	Quick Response Code
GDPR	General Data Protection Regulation
PIL	Patient Information Leaflet

ABSTRACT

CLEAR MEDICATION LABELS FOR BETTER PUBLIC HEALTH OUTCOMES: TACKLING NON-ADHERENCE IN INDIA

Beema Beevi

In the context of India's diverse linguistic and educational landscape, medication label clarity plays a critical role in promoting safe and effective medicine use. This study investigates how the clarity of pharmaceutical labelling affects patient adherence, with particular attention to language accessibility and visual design.

The primary aim was to examine the impact of label clarity on adherence, while secondary objectives included identifying barriers to comprehension, assessing public health implications, and proposing actionable recommendations. A quantitative survey method was employed, with responses gathered from 142 participants to examine how label design, language accessibility, and digital tools influence patient comprehension and medication-taking behaviour. The findings revealed that over half of participants reported occasionally or frequently deviating from label instructions. This behaviour was closely linked to factors such as complex terminology, small font size, and the exclusive use of English on labels. In contrast, respondents who encountered clear, visually accessible labels with simplified language and pictograms reported better understanding and adherence.

The results further demonstrated a strong public preference for multilingual labelling, colour coding, and the integration of QR codes and digital tools to support comprehension, especially among diverse linguistic groups. An overwhelming majority of 95.8% of respondents considered label standardisation important for patient safety and public health. These insights highlight the urgent need for pharmaceutical labelling reform to ensure inclusivity, reduce preventable medication errors, and improve health outcomes.

This dissertation concludes by offering practical and policy-oriented recommendations. These include the adoption of user-friendly design features, incorporation of regional languages, and digital enhancements, with suggested implementation through national regulatory bodies like the Central Drugs Standard Control Organisation (CDSCO). Limktations of the study are acknowledged, particularly the absence of inferential analysis, and future research is recommended to explore causal links between label improvements and long-term adherence behaviour across wider populations.

KEYWORDS: Medication labelling, Patient adherence, Health literacy, Label clarity, Pictograms, QR codes, Pharmaceutical policy.

CHAPTER 1

1. INTRODUCTION

1.1 OVERVIEW

This chapter establishes the foundation for the present research by contextualising the issue of medication non-adherence within the broader landscape of public health in India. It highlights the significance of medication adherence in achieving desired therapeutic outcomes, particularly in the management of chronic diseases such as diabetes, hypertension, and cardiovascular conditions. Despite the availability of pharmacological interventions, non-adherence remains a persistent challenge, often attributed to factors such as poor health literacy, linguistic barriers, and insufficient clarity in medication labelling.

The chapter outlines the purpose of the study, which is to examine how label clarity, language accessibility, and regulatory practices influence medication adherence among patients in India. It presents the rationale for the study by identifying gaps in current labelling practices and recognising the potential for improved communication strategies both traditional and digital to enhance adherence.

In doing so, the chapter defines key research objectives and articulates the primary research questions that guide the investigation. The chapter concludes with a brief description of the structure of the dissertation, providing the reader with a roadmap of the chapters that follow.

1.2 MEDICATION ADHERENCE AND LABELLING IN INDIA

Medication non-adherence remains a significant public health concern globally, with direct implications for patient safety, treatment efficacy, and healthcare costs. One critical but overlooked factor contributing to non-adherence is the clarity of medication labelling. When labels are written in overly technical language, fail to convey instructions properly, patients are more likely to misinterpret dosage, timing, and warnings potentially leading to adverse health outcomes.

India presents a particularly urgent context for this investigation. With its vast population, linguistic diversity, and varying literacy levels, the challenges of medication comprehension are amplified. A significant portion of the population relies on regional languages and may not have fluency in English, which is the predominant language used on pharmaceutical labels. Furthermore, systemic issues such as inconsistent labelling standards and limited regulation around design elements exacerbate communication gaps between healthcare providers and

patients. These issues are especially concerning in India's public health landscape, where non-communicable diseases and polypharmacy are on the rise.

1.3 RESEARCH PURPOSE

This study seeks to critically examine the persistent challenge of medication non-adherence within the Indian healthcare context, with a particular focus on the influence of medication label clarity on patient adherence behaviours. Medication adherence is widely acknowledged as a pivotal determinant in the effective management of chronic illnesses, with direct implications for clinical outcomes and the optimisation of healthcare resources. Despite availability of efficacious therapeutic interventions, adherence remains suboptimal, thereby undermining treatment effectiveness and contributing to increased disease burden. This research aims to evaluate the extent to which elements such as label design, linguistic accessibility, and the comprehensibility of dosage instructions affect patients' adherence to prescribed medication regimens in India.

1.4 SIGNIFICANCE OF STUDY

The importance of this study lies in its potential to improve medication adherence through better communication strategies. By focusing on label clarity, the research contributes to broader field of health communication and patient education, offering evidence-based solutions to address adherence challenges. Given the growing burden of chronic diseases in India, understanding how label design affects adherence can inform national healthcare policies and lead to improved health literacy. Additionally, it may guide the development of culturally sensitive and technologically supported labelling strategies that are more accessible to India's diverse population.

1.5 RESEARCH OBJECTIVES

I. PRIMARY OBJECTIVE:

- To analyse the impact of medication label clarity on adherence among patients in India

II. SECONDARY OBJECTIVE:

- To identify barriers to label comprehension
- To evaluate the public health implications of improved labelling
- To provide actionable policy recommendations for pharmaceutical labelling

1.6 RESEARCH QUESTIONS

I. How does medication label clarity impact medication adherence among Indian patients?
II. What role does language accessibility (e.g., regional languages) play in improving the effectiveness of medication labels in India?
III. To what extent do technological interventions, such as QR codes and mobile health apps, support adherence by enhancing label clarity in India?

1.7 STRUCTURE OF STUDY

The dissertation is organized into five main chapter.

Chapter 1: Introduction

This chapter providing background information about the research, its purpose, and its significance. It also outlines the aims and objectives of the study.

Chapter 2: Literature Review

This section consist of different headings and subheadings, includes a comprehensive review of existing or previously published works or literature on medication adherence, label design, health literacy, and technological interventions. The information helps to understand the research issues and objectives. This helps to discover gaps and topics for further research in the chosen field of study.

Chapter 3: Methodology

This chapter serves thorough overview to outline and present the research methodology or study execution. It encompasses the adopted philosophy, approach, and strategy employed for collecting the research data. Also includes, survey design, data analysis techniques. Additionally, it outlines the conceptual framework underlying the study.

Chapter 4: Findings & Analysis

This chapter presents and interprets the data collected through the research, employing appropriate visual representations such as tables and graphs to support the analysis. The findings are systematically examined and discussed in relation to each research question, providing a structured and evidence-based interpretation of the results. Through this analytical approach, the chapter offers comprehensive insights into the key themes and patterns emerging

from the data, thereby facilitating a clear and thorough understanding of the research objectives.

Chapter 5: Conclusion and Recommendations

This chapter primarily focuses on presenting the conclusions drawn from the research results. It also includes a discussion of limitation of study and recommendations for future research and policy changes.

CHAPTER 2

2. LITERATURE REVIEW

2.1 INTRODUCTION

Medication adherence is a cornerstone of effective healthcare, directly influencing treatment outcomes, disease control, and public health. Despite its importance, non-adherence to prescribed medications remains a pervasive issue globally (Brown & Bussell, 2021). This non-adherence significantly impacts the management of chronic conditions such as diabetes, hypertension, and cardiovascular diseases, leading to poor health outcomes, increased hospitalizations, and, in severe cases, premature death (Organization, 2022). Beyond individual health consequences, medication non-adherence also places a considerable burden on healthcare systems and economies, particularly in low- and middle-income countries (LMICs), where financial constraints, healthcare access, and literacy barriers further exacerbate the problem (Baryakova et al., 2023).

One of the key factors influencing medication adherence is the clarity and effectiveness of medication labels. These labels serve as a primary source of information for patients, providing critical details about dosage instructions, potential side effects, and proper usage (Gamma, 2024). However, unclear, overly technical, or hard-to-read labels can hinder comprehension, resulting in incorrect usage and treatment discontinuation (Ellen Hogan, 2024). This challenge is further exacerbated in multilingual populations, such as India, where over 22 regional languages are spoken. The lack of multilingual support on medication labels poses a significant barrier for patients who are not proficient in English or Hindi, increasing the risk of misinterpretation and improper medication use (Jeetu & Girish, 2010).

This literature review examines the various factors influencing medication adherence, with a specific emphasis on the impact of medication labels. It explores challenges contributing to non-adherence in India, including financial constraints and cultural influences, while analysing how labelling practices affect patient comprehension and adherence. Additionally, the review discusses potential strategies to enhance medication adherence, such as the implementation of plain language, standardized labelling formats, and technological advancements aimed at improving patient understanding and treatment compliance (Shah & Singh, 2020; Merks et al., 2021). Addressing these challenges can enhance treatment effectiveness and mitigate the negative consequences associated with medication non-adherence within the healthcare system.

2.2 IMPORTANCE OF MEDICATION ADHERENCE

Medication adherence refers to the extent to which patients take their medications as prescribed by healthcare professionals, including the correct dosage, timing, and duration. It is a critical factor in effective healthcare management, which directly influences treatment outcomes, disease control, and overall public health. Non-adherence, which includes improper use, inconsistent dosing, or discontinuation of prescribed medications, can lead to suboptimal therapeutic results, disease progression, and increased healthcare expenditures (Organization, 2022).

Adhering to prescribed medications is essential for achieving their intended therapeutic benefits, minimizing complications, and preventing disease progression. Studies indicate that adherence rates of at least 80% are crucial for optimal treatment outcomes, especially in managing chronic conditions like diabetes, hypertension, and cardiovascular diseases. However, despite its critical role in healthcare, medication adherence continues to be a widespread challenge globally (Brown and Bussell, 2021).

2.3 GLOBAL ADHERENCE CHALLENGES

Global challenges play a crucial role in medication adherence. Certain factors make a correlation to patients approaches to medication. Medication adherence remains a significant public health challenge worldwide, with nearly 50% of patients failing to take their medications as prescribed. Poor adherence is influenced by a combination of patient-related, healthcare system-related, and socioeconomic factors, which vary across different regions and healthcare settings. A major global challenge is the lack of patient understanding regarding medication usage. Many patients encounter difficulties in comprehending complex medical terminology, ambiguous dosage instructions, and unclear labelling, which frequently contribute to medication mismanagement or discontinuation (Baryakova *et al.*, 2023).

2.3.1 Financial Barriers and Limited Healthcare Access

The cost of medications is a critical factor affecting adherence, particularly in low- and middle-income countries (LMICs) where access to affordable healthcare is limited. Many patients are forced to skip doses or discontinue treatment due to financial constraints. Additionally, limited access to healthcare facilities and pharmacies, especially in rural areas, makes it difficult for patients to obtain refills or seek professional guidance. Patients who are prescribed multiple medications for chronic conditions such as diabetes, hypertension, and cardiovascular diseases

often struggle with adherence due to complex dosing schedules. Polypharmacy, where a patient takes several medications simultaneously, increases the likelihood of missed doses, drug interactions, and confusion about proper usage (Wilder *et al.*, 2021).

2.3.2 Medication Related Factors

Medication-related factors play a critical role in influencing adherence to prescribed treatment regimens. Complex dosing schedules, polypharmacy, and complicated administration methods can lead to confusion and reduce adherence. Additionally, adverse drug reactions, such as nausea or dizziness, may result in early discontinuation of medications. Patients' perceptions of a medication's efficacy, as well as their beliefs regarding the necessity of treatment, also influence adherence. The convenience of medication, including its dosing frequency and ease of administration, further impacts adherence behaviour (Yoon *et al.*, 2023).

2.3.3 Cultural Beliefs and Alternative Medicine Practices

Cultural beliefs and traditional medicine practices also impact adherence in many parts of the world. Some patients, particularly in Asia, Africa, and Latin America, may prefer herbal remedies or alternative medicine, leading to partial or complete avoidance of prescribed drugs. Additionally, fear of side effects, distrust of healthcare providers, and personal beliefs about medication necessity contribute to non-adherence in various populations. Also, lack of proper counselling and communication between healthcare professionals and patients is another significant challenge. Many doctors and pharmacists do not have enough time to explain medication instructions, potential side effects, and the importance of adherence, leading to patient confusion (McQuaid and Landier, 2018).

2.3.4 Consequences of Medication Non-Adherence—Public Impact

Medication non-adherence is a critical public health issue with serious consequences for patients, healthcare systems, and economies worldwide. When patients fail to take their medications as prescribed, it can lead to poor disease management, increased hospitalizations, higher healthcare costs, and a greater disease burden. One of the most immediate consequences of non-adherence is poor control of medical conditions, leading to worsening symptoms, disease progression, and reduced treatment effectiveness. The economic impact of medication non-adherence is substantial, affecting both individual patients and national healthcare budgets. Patients who do not adhere to their prescribed treatments face higher risks of disease complications and premature death. For infectious diseases such as tuberculosis (TB), HIV/AIDS, and bacterial infections, non-adherence can lead to antibiotic resistance, making

treatments less effective over time. For instance, studies have shown that non-adherence to heart disease medications increases mortality rates by 50% compared to adherent patients (Julius, 2022).

2.4 ROLE OF MEDICATION LABELS IN ADHERENCE

Medication labels play a crucial role in serving as a primary source of information for patients, directly impacting medication adherence. It contains essential information about medication, including dosage instructions, potential side effects, and usage guidelines. They are designed to ensure safe and effective use of medications by providing patients with clear and understandable instructions. These elements provide patients with critical guidance for safe and effective medication use. However, the effectiveness of these labels depends on their clarity, readability, and accessibility (Hataway, 2023). Clear and well-structured labels improve understanding, adherence, and treatment outcomes. Patients who struggle with label comprehension are more likely to skip doses, take incorrect amounts, or discontinue medication early (Gamma, 2024).

2.4.1 Key Factors Affecting Label Comprehension

The comprehension of medication labels by patients is important for ensuring that patients correctly understand and follow prescribed treatments. Several key factors like font size, terminology, language, and completeness of instructions. Readability issues mainly arise due to small font size, spacing, and text clarity. Research indicates that many patients, particularly the elderly and those with visual impairments, struggle with small print sizes on labels. Pharmacopeia recommends a minimum font size of 12-point for critical instructions, but many labels still use 6 or 8-point fonts, making them difficult to read (Pons *et al.*, 2019). Using complex medical or pharmaceutical terminology that patients may not understand with limited health literacy. Terms like “take 1 tablet BID,” where “BID” means “twice daily,” is a medical term that is likely to misinterpret dosage instructions (Maghroudi *et al.*, 2021).

Misinterpretation of prescription drug labels tends to increase with rising complexity, particularly among individuals with limited health literacy. Variations in reading behaviours, including diverse reading patterns or the intentional omission of certain sections, are linked to differing levels of comprehension regarding medication-related information. Engaging with written instructions is essential for acquiring the necessary information provided on drug labels; however, not all patients read these instructions thoroughly or fully comprehend them

even after reading. In contrast to text-based information, comprehension of pictograms appears to be less influenced by health literacy levels (Kim *et al.*, 2022).

Unclear medication labels are a significant barrier to medication adherence, leading to misinterpretation, dosage errors, and confusion among patients. Medication labels serve as the primary source of information regarding dosage instructions, frequency, potential side effects, and storage conditions. However, when these labels contain complex medical jargon, small fonts, or ambiguous instructions, patients often struggle to follow them correctly (Ellen Hogan, 2024).

2.4.2 Barriers to Adherence in the Indian Context

In multilingual populations, such as in India, where multiple regional languages are spoken, medication labels printed only in English limit accessibility for a large portion of the population. Patients who are not fluent in English may misunderstand dosage instructions or fail to recognize warnings leading to misuse. Studies have demonstrated that providing medication labels in multiple languages, along with pictorial representations, greatly improves comprehension and adherence. Labels should include essential information like usage indications, contraindications, and expiration dates (Jeetu and Girish, 2010).

2.5 BARRIERS TO MEDICATION ADHERENCE IN INDIA

Medication adherence is a cornerstone of effective disease management and public health, yet it remains a significant challenge in many low- and middle-income countries, including India. Despite advancements in healthcare access and pharmaceutical availability, a multitude of barriers continue to impede optimal adherence among Indian patients. These obstacles are multifaceted, encompassing socio-economic disparities, low health literacy, linguistic diversity, and systemic healthcare limitations (Arshad *et al.*, 2023). India's vast linguistic landscape limited regulatory enforcement of standardized medication labelling, and widespread reliance on traditional medicine practices further complicate adherence behaviours. Additionally, financial constraints, inconsistent access to healthcare services, and insufficient patient education contribute to suboptimal medication use. Understanding these context-specific barriers is essential for developing culturally sensitive, patient-centred strategies aimed at improving adherence and, ultimately, health outcomes across diverse Indian populations (Prasad and Kumar, 2022).

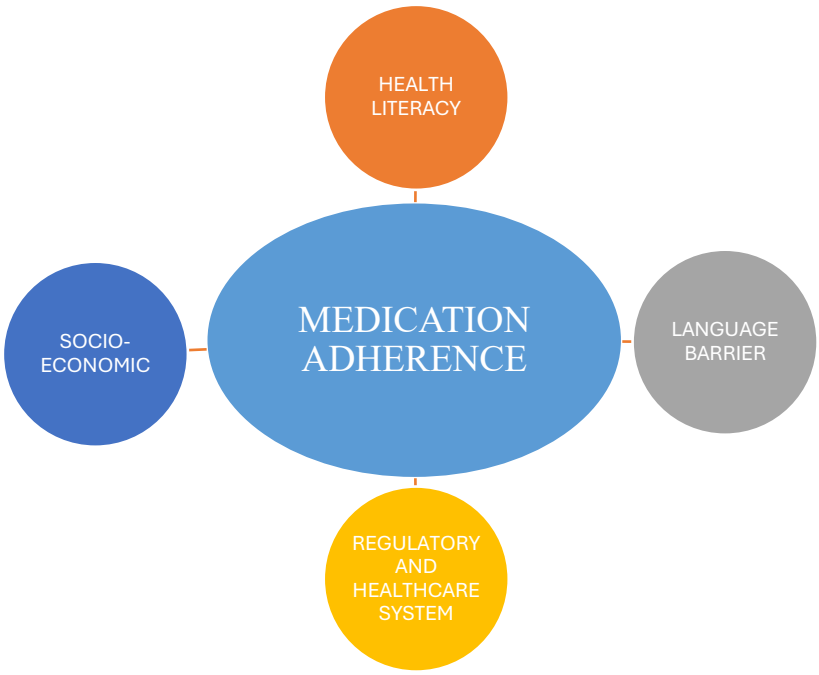

Figure 1 - Factors affecting Medication Adherence (by author)

2.5.1 Impact of Health Literacy on Medication Adherence

Health literacy is a fundamental factor influencing medication adherence, as it affects patients' capacity to comprehend prescription instructions, dosage schedules, and potential adverse effects. According to the World Health Organization (WHO), health literacy encompasses the cognitive and social competencies that enable individuals to access, interpret, and apply health-related information effectively to support and sustain their well-being (WHO, 2025).

Inadequate literacy impairs the capacity to navigate written health information, particularly complex prescription labels, thereby compromising treatment outcomes and increasing the risk of adverse events. This issue is especially pronounced in populations with low educational attainment or limited access to health education resources. The study emphasized that patients who received verbal counselling along with written instructions in their regional language showed higher adherence rates, underscoring the need for better communication strategies in healthcare settings. Also, individuals with low health literacy were 1.5 to 3 times more likely to exhibit poor medication adherence than those with adequate literacy skills (Arshad *et al.*, 2023). In the context of medication adherence, improving health literacy is essential for empowering patients to take an active role in their treatment and achieve better therapeutic outcomes.

2.5.2 Language Barriers and Medication Labelling Challenges

Diverse regional languages in India pose significant challenges for uniform medication labelling, affecting patient comprehension and adherence to medication. About 22 major languages and hundreds of dialects are spoken in India; of these, the patients were only literate in their native language and found it difficult to interpret labels printed solely in English or Hindi, potentially leading to suboptimal treatment outcomes. Especially in rural areas, misunderstanding of terms due to lack of English language fluency led to medication errors and reduced adherence (Kumar, 2024). Studies support the use of patient-centred labels (PCL) to provide clear, simple, and explicit dosing instructions. The language preferences improve satisfied label instructions. This highlights the need for multilingual options to improve comprehension. Also, regional labelling can lead to variations in drug availability and information. Translations of drug labels may not accurately convey the intended information, causing confusion for patients who do not speak the language fluently (Ayapilla, 2023) (Singh *et al.*, 2024).

Figure 2 - Bilingual Medication Label for Piles (Myupchar, 2025)

2.5.3 Regulatory Gaps and Inconsistent Labelling Standards

Regulatory and policy gaps in Indian medication labelling contribute significantly to poor adherence and patient safety risks due to inconsistent standards, inadequate multilingual support, poor readability, lack of pictograms, and weak enforcement of safety warnings. Unlike global regulatory bodies like the FDA and EMA, India lacks a universally enforced medication labelling standard, leading to inconsistencies in font size, format, and clarity of instructions. Additionally, most medication labels are limited to English and Hindi, creating barriers for non-Hindi-speaking populations, despite recommendations under the Drugs and Cosmetics Rules for multilingual labelling. Small font sizes and dense text further reduce readability,

especially for the elderly and visually impaired. Addressing these deficiencies requires policy reforms such as standardized label formats, mandated multilingual labelling, pictogram integration, enhanced safety warnings, and digital innovations (Makvana *et al.*, 2024).

Table 1 - Country-specific labelling specifications (by author)

US FDA (Research, 2024)	EU EMA (EMA, 2020)	INDIA CDSCO (CDSCO, 2025)
• Standardized Drug facts format • Plain language & large font • Black box warnings for high-risk drugs • Pictograms for safety	• Multilingual labelling • Braille for visually impaired • QR codes encouraged	• Generic name, expiry date • No mandatory pictograms or standard formats • Regional language not enforced • Detailed patient leaflets

The healthcare system is instrumental in promoting medication adherence by enhancing patient education, ensuring accessible healthcare services, and enforcing regulatory policies that enhance prescription clarity. In India, adherence to medication regimens is shaped by various factors, including healthcare infrastructure, the quality of provider-patient communication, the affordability of medicines, and the regulatory framework governing medication labelling. Effectively addressing these factors is crucial for optimizing treatment outcomes and mitigating the burden of both chronic and infectious diseases (WHO, 2025).

2.1.1 Socioeconomic Factors and Traditional Medicine Preferences

Socioeconomic status and traditional medicine preferences significantly impact medication adherence in India. Lower-income individuals often face financial barriers that prevent them from affording medications, leading to skipped doses or reduced intake. Usage of traditional medicine practices like Ayurveda or herbal remedies due to cultural beliefs and a lack of trust in modern healthcare reduces adherence to prescribed treatments. Behavioural factors, such as forgetfulness, contribute to non-adherence. Cognitive barriers, like complex dosing schedules and medication side effects, also hinder compliance. Moreover, low literacy levels may hinder patients from reading labels or understanding instructions (Prasad and Kumar, 2022).

2.2 EFFECTIVE LABELLING STRATEGIES FOR IMPROVED ADHERENCE

Using plain language in medication labels significantly improves patient comprehension and adherence. Simplified terms replace technical jargon, making instructions like dosage and frequency clearer, especially for those with low health literacy. Plain language usage increases understanding and reduces errors, which is crucial in India, where many patients face literacy challenges. The use of plain language in spoken communication also plays a critical role in healthcare settings, as it helps clinicians communicate complex health information more effectively (Shah and Singh, 2020).

Standardized formats in medication labelling play a crucial role in enhancing readability and comprehension by systematically organizing information in a coherent and accessible manner. This method ensures that essential details are readily available and easily understood, thereby minimizing errors and improving patient safety. This literature shows that structuring information into clearly defined sections with headings, bullet points, and consistent layouts enables patients to efficiently locate and understand vital details. Standardized formats enhance the presentation of essential medication information such as dosage, administration schedules, side effects, and contraindications making it more prominent and easier to understand, which reduces the risk of misinterpretation (Mohammad *et al.*, 2022).

Pictograms can convey complex medication instructions in a simple, universally understandable format, helping patients with limited literacy or language proficiency. Pictograms improve patient adherence by providing clear visual cues, possible side effects, or specific instructions. Visual representations offer an effective alternative by conveying critical medication information through universally recognized symbols. Pictogram-enhanced medication labels led to better recall of instructions and fewer medication errors among patients in clinical settings. Visual aids combined with textual instruction improved adherence by reducing confusion in patients with limited understanding of medical terminology, regardless of their primary language. These visual aids reduce reliance on text, making medication instructions more accessible, especially for patients with limited literacy skills (Merks *et al.*, 2021).

In populations with varying literacy levels, pictograms help bridge communication gaps, ensuring that even individuals with limited reading ability can grasp essential medication instructions. (Wang *et al.*, 2024) emphasize use of universally understood symbols significantly

improves comprehension, making pictograms an invaluable tool for enhancing patient education and medication adherence. Pictograms not only increase patient understanding but also empower individuals to manage their medication regimens with greater confidence and accuracy.

2.3 TECHNOLOGY IN LABELLING

Technological advancements are revolutionizing medication adherence, particularly in low-literacy and diverse linguistic populations. Emerging solutions like QR codes, audio instructions, and mobile health apps are being explored to enhance patient comprehension and treatment adherence. QR codes on medication labels provide instant access to detailed dosage instructions, videos, and multilingual translations, allowing patients to scan codes with their smartphones for simplified guidance. This intervention allows for real-time, dynamic updates and personalized information that can be adjusted to the patient's individual needs. Certain studies verify the clarity and ease of use, provide real-time updates on dosing, contraindications, and recalls, reducing medication errors. Githa and Singh conducted a study indicating that patients who utilized QR codes to access medication instructions were less likely to misinterpret dosage information and more likely to follow prescribed regimens accurately. In a study by Singh et al. (2024), QR-coded labels linking to regional-language video instructions improved medication adherence by 23% among elderly diabetic patients. The use of QR codes has been especially beneficial in populations where there is a high prevalence of illiteracy or language barriers, as they facilitate access to multilingual instructions and multimedia content (Singh *et al.*, 2024).

Audio instructions embedded in QR codes or voice-assisted smart packaging can benefit elderly patients and visually impaired individuals. Videos and interactive content address literacy gaps and simplify complex instructions, particularly in rural and low-literacy populations. The integration of audio instructions has been shown to reduce errors related to misreading or misunderstanding dosage instructions. Additionally, audio interventions have been well-received in clinical settings, particularly among elderly populations or individuals with cognitive impairments, as they facilitate better comprehension and reduce the cognitive load associated with complex medication regimen. These tools are increasingly recommended in combination with plain-language text and pictorial cues as part of standardised patient-centred labelling (PCL) practices (Rahmadi *et al.*, 2023).

Mobile health (mHealth) apps are another effective intervention. They have emerged as a comprehensive solution to support medication adherence by providing personalized reminders, tracking systems, and educational content. These apps can be customized to a patient's specific treatment regimen, offering notifications for medication times, dose adjustments, and refill reminders. The Med Assist app, iCARE, offers personalized reminders, dosage tracking, and educational support, significantly improving adherence among patients with chronic diseases. Increased engagement with digital interventions is associated with better outcomes, though standardized metrics for measuring adherence and engagement are needed (Wang *et al.*, 2024). Despite global uptake, the penetration and evaluation of these digital labelling tools in India remain limited, particularly among patients from low-income or non-digital backgrounds.

2.4 KEY FINDINGS

Medication adherence is crucial for effective disease management, patients worldwide fail to take medications as prescribed, leading to poor health outcomes, increased hospitalizations, and higher mortality rates (Brown and Bussell, 2021). Non-adherence particularly affects chronic conditions like diabetes and cardiovascular diseases, while in infectious diseases, it contributes to antibiotic resistance, worsening public health risks (Julius, 2022). Factors such as complex medical instructions, financial constraints, cultural beliefs, and lack of patient education significantly impact adherence (Baryakova *et al.*, 2023). In many regions, especially low- and middle-income countries, limited access to healthcare further exacerbates these challenges (Wilder *et al.*, 2021).

Medication labels play a critical role in adherence by providing essential drug information. However, unclear language, small font sizes, and lack of multilingual support make comprehension difficult, particularly for the elderly and low-literacy populations (Hataway, 2023) (Pons *et al.*, 2019). In India, where over 22 languages are spoken, most medication labels are available only in English and Hindi, limiting accessibility for many patients. Patients with limited literacy often struggle to comprehend medication instructions, resulting in incorrect dosages and premature treatment discontinuation. The country's vast linguistic landscape exacerbates this issue, restricting accessibility for a large segment of the population (Jeetu and Girish, 2010). Additionally, gaps in India's drug labelling regulations contribute to non-adherence. Unlike international regulatory bodies such as the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMA), India's CDSCO does not enforce standardized label formats, the use of pictograms, or multilingual support.

Consequently, medication labels frequently feature dense text in small font sizes, posing readability challenges, particularly for elderly and visually impaired patients (Makvana *et al.*, 2024). Furthermore, socioeconomic constraints, including financial limitations and cultural inclinations toward traditional medicine, significantly influence adherence. Many lower-income patients reduce or skip doses due to cost concerns, while others prefer herbal remedies, perceiving them as safer alternatives to prescribed medications. Additionally, behavioural factors such as forgetfulness and cognitive challenges related to complex dosing regimens further impede adherence (Prasad and Kumar, 2022).

To improve adherence, effective labelling strategies include using plain language, larger fonts, and pictograms to enhance comprehension (Shah and Singh, 2020) (Merks *et al.*, 2021). Standardized label formats with bullet points and bold headings help patients quickly identify vital information (Mohammad *et al.*, 2022). Technological advancements such as QR codes, audio instructions, and mobile health (mHealth) apps provide real-time medication guidance, significantly improving adherence among patients with chronic diseases (Singh *et al.*, 2025) (Wang *et al.*, 2024).

2.5 RESEARCH GAP

While research has established the importance of clear medication labelling, pictograms, and digital interventions in improving medication adherence, significant gaps remain, particularly in the Indian context. A key limitation is absence of longitudinal studies evaluating the long-term effects of enhanced medication labelling on adherence rates, patient health outcomes, and overall healthcare expenditures. Most existing studies primarily examine short-term improvements in comprehension and adherence, with limited evidence on the long-term sustainability of these effects.

Additionally, a study by Makvana highlights regional language labelling in India, despite the country's linguistic diversity. Studies predominantly examine English or Hindi labels, overlooking the challenges faced by non-Hindi-speaking populations in rural areas. Further research is needed to assess how multi-language labelling strategies or voice-assisted guidance can enhance adherence in different linguistic groups. There is a significant gap in culturally adapted solutions tailored to the Indian healthcare context. While Merk's study suggests that pictograms and standardized formats improve readability, their cultural relevance within Indian populations remains largely unexplored. Future research should prioritize developing customized interventions that account for traditional medicine practices, health beliefs, and

socioeconomic constraints to create patient-centred labelling strategies that effectively enhance adherence and improve public health outcomes.

Furthermore, research by Githa Singh examines the feasibility of digital interventions, including QR codes, audio instructions, and mobile applications, demonstrating promising outcomes on a global scale. However, there is a scarcity of studies assessing their acceptability and effectiveness among Indian patients, particularly those from lower socioeconomic backgrounds. Critical challenges such as digital literacy, smartphone accessibility, and internet connectivity require further investigation.

Finally, as digital interventions gather sensitive health information, it is essential to conduct further research on the privacy and security issues related to the use of mHealth applications and other digital tools. Safeguarding patient confidentiality and preventing breaches of health data are pivotal to fostering patient trust and ensuring the broad acceptance and adoption of digital health interventions.

2.6 CONCLUSION OF LITERATURE

Medication adherence remains a critical public health challenge, particularly in India, where factors such as low health literacy, language barriers, socioeconomic disparities, and reliance on traditional medicine contribute to non-adherence. The literature highlights how unclear medication labels, complex medical terminology, and inconsistent formats hinder patient understanding, ultimately leading to poor disease management, increased hospitalizations, and economic burdens. Research supports the adoption of plain language, pictograms, and standardized label formats as effective strategies for improving comprehension and adherence.

Emerging digital interventions such as QR codes, audio instructions, and mobile health apps present promising solutions to address literacy and accessibility barriers. Studies indicate that these tools can enhance medication adherence, particularly when tailored to regional language needs. However, gaps remain in existing research, especially in the Indian context, where longitudinal studies on labelling effectiveness, regional language accessibility, and culturally adapted interventions are still lacking. Future research must explore sustainable, patient-centred labelling strategies that integrate both traditional and digital approaches to bridge these gaps and enhance public health outcomes. Addressing these challenges through policy reforms and healthcare innovations will be essential in ensuring better medication adherence and improved health outcomes in India. Future research must focus on evaluating scalable

interventions, ensuring regulatory standardization, and promoting inclusive communication practices to bridge the adherence gap and enhance public health outcomes.

CHAPTER 3

3. METHODOLOGY

3.1 OVERVIEW

The research methodology section outlines the systematic approach adopted in this study to explore the impact of medication label clarity on adherence rates among patients in India. This study adheres to the positivist research philosophy, focusing on the collection of quantitative data to objectively assess the relationship between clear medication labels and improved adherence. The research methodology follows the structure of the research onion framework, which guides the progression from the philosophical stance to the data collection and analysis stages, ensuring a coherent and structured approach.

The research onion, as outlined by Saunders et al. (2019), consists of layers that guide the research process from broad philosophical assumptions to the specific techniques used to gather and analyse data. In this study, the outer layers of the onion, including research philosophy, research approach, and strategy, have been carefully considered to align with the aim of collecting objective, quantifiable data. The focus is on utilizing a survey-based strategy, which is appropriate for the positivist paradigm, and ensuring that the methodology supports valid, reliable, and generalizable findings (Saunders *et al.*, 2019).

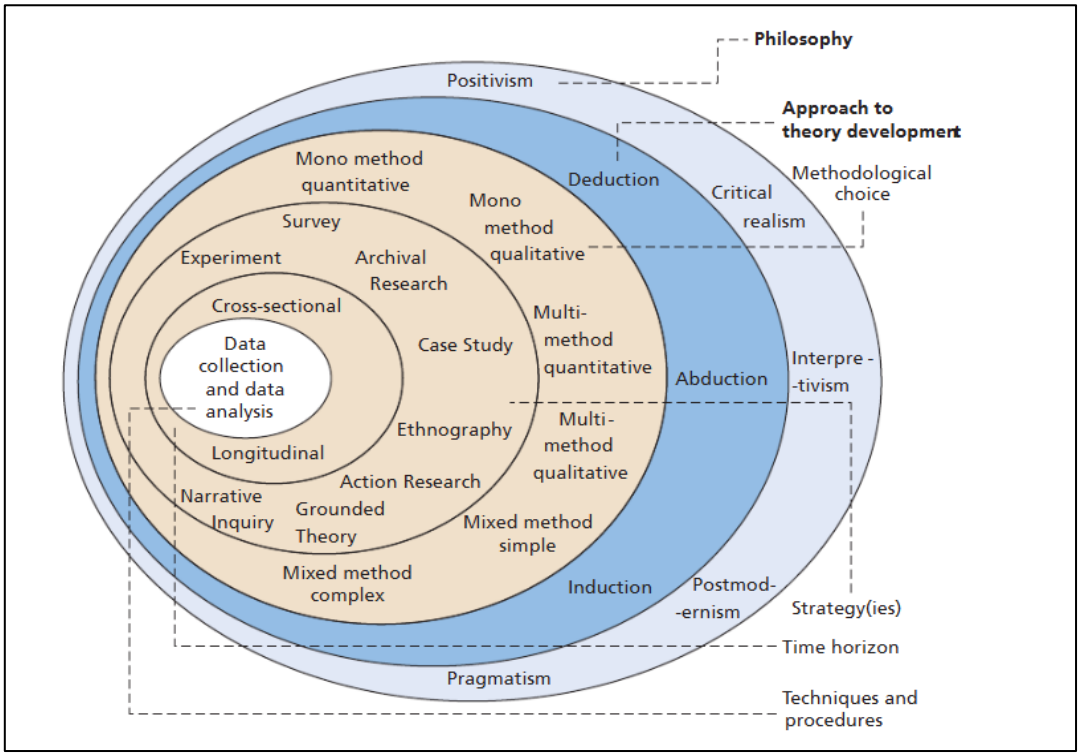

Figure 3 - Research Onion (Saunders et al., 2019)

The core of this research revolves around the use of structured surveys to gather data on participants' understanding of medication labels and their adherence behaviours. The research aims to address a gap in existing literature by exploring the effects of label clarity on adherence in the context of India, a diverse nation with significant language, socioeconomic, and literacy disparities. By adopting a deductive approach, the study tests hypotheses derived from the literature on medication adherence, using statistical analysis to validate or refute these hypotheses.

Table 2 - Overview of Methodology

PRIMARY DATA	DETAILS
PHILOSOPHY	Positivism
APPROACH	Deductive
STRATEGY	Online Questionnaire – Google Forms
STRUCTURE	8 sections comprising of 16 questions
SUBJECT	Public population in India

This methodology section will detail each step of the process, including the research design, data collection methods, sampling strategy, and the approach to data analysis. It will also address the ethical considerations that ensure the protection of participants' rights and confidentiality throughout the research process.

3.2 RESEARCH PHILOSOPHY

In the context of this study, the research philosophy guiding the research is Positivism, which is rooted in the belief that knowledge and truth can be derived from observable and measurable phenomena. Positivism asserts that reality is objective, exists independently of the researcher’s perception, and can be quantified through empirical observations (Park *et al.*, 2020).

Positivism is an appropriate choice for this study because it focuses on the quantitative assessment of clear medication labels and their role in improving medication adherence in India. The primary aim is to measure the relationship between medication label clarity and patient adherence to prescribed medication regimens using statistical analysis. Positivist research seeks to establish patterns or correlations that are universally applicable, and this aligns with the goal of this study to generate generalizable results on how medication labels affect adherence among diverse patient groups in India.

This research employs a survey-based approach, which is a widely used quantitative research method within the positivist paradigm. It enables the collection of objective data that can be statistically analysed to identify patterns and relationships between independent variables (such as language, clarity, font size, etc.) and dependent variables (such as adherence rates).

Study focusses on objective measurement rather than subjective interpretation, which aligns with the positivist assumption that reality is independent of the researcher and can be understood through observable data (Jansen, 2023). The use of a structured survey consisting of closed-ended questions allows for the collection of measurable, numerical data, which can be analysed statistically. Although two open-ended questions are included to gain supplementary insights into participants' opinions, these responses are used to complement rather than drive the core analysis. As such, the study primarily adheres to a positivist methodology by focusing on quantifiable data and aiming to test hypotheses or identify patterns.

3.3 RESEARCH APPROACH

This study employs a deductive research approach, which is well-suited for examining a clearly articulated research problem within the framework of established theoretical constructs. Deductive reasoning involves deriving hypotheses or propositions from existing literature and subjecting them to empirical testing (Dudovskiy, 2024). In the context of this investigation "Clear Medication Labels for Better Public Health Outcomes: Tackling Non-Adherence in India", the research is anchored in previously established evidence linking clarity of medication labelling with improved adherence behaviours among patients.

The deductive methodology is particularly appropriate for this study, as it seeks to test the research question. The objective is not to develop novel theoretical models, but to validate and contextualize existing theoretical assumptions through structured empirical inquiry using a survey-based design (Dudovskiy, 2024).

By adopting this approach, the research ensures a systematic progression from theory to data collection and analysis, facilitating the evaluation of specific, measurable outcomes. The deployment of a quantitative questionnaire is consistent with the deductive paradigm and enables objective assessment and statistical analysis, thereby supporting the generation of findings that can be generalized to the broader population.

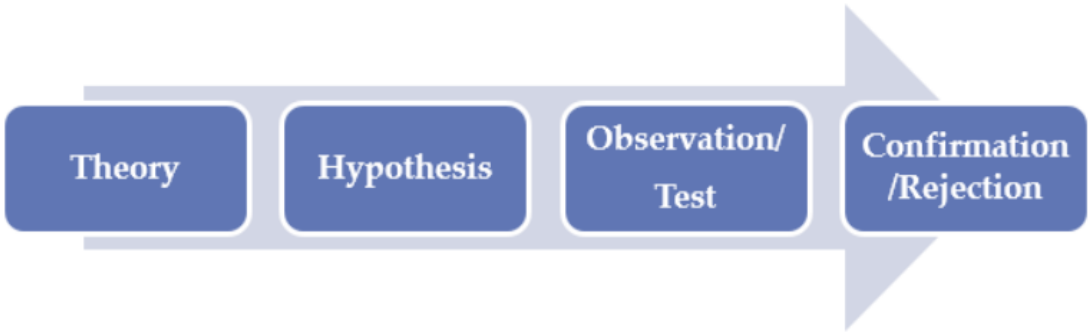

Figure 4 - Deductive Approach (Dudovskiy, 2024)

3.4 RESEARCH STRATEGY

The research strategy represents the overarching plan employed to systematically investigate the research objectives and test the proposed assumptions regarding the relationship between medication labelling and adherence. In alignment with study's quantitative and deductive orientation, a survey-based strategy was deemed most appropriate, enabling the collection of structured and quantifiable data from a broad sample of respondents.

A cross-sectional research design was adopted to capture data at a single point in time, allowing the study to explore existing patterns and associations between independent variables (e.g., label clarity, font size, language use) and the dependent variable (medication adherence). This approach is well-suited for identifying prevalent issues and informing public health interventions within a defined temporal framework.

The data collection instrument comprised a self-administered, structured questionnaire distributed through online platforms like Facebook, WhatsApp and Instagram. The questionnaire design emphasized clarity and simplicity, considering potential variations in respondent literacy levels and language proficiency. By applying a survey strategy, the study seeks to yield empirically grounded insights that are directly applicable to improving medication labelling policies and enhancing patient comprehension across India's diverse demographic spectrum.

3.4.1 Sampling

The primary aim of the sampling strategy was to collect data from individuals with varied linguistic, educational, and socioeconomic backgrounds to examine how these factors influence their understanding of medication labels and adherence behaviours. This makes certain that sample representation of population and reduce selection bias.

The sample size for the study was calculated using the Survey Monkey sample size calculator, which determined based on 95% confidence level and 8% margin of errors.

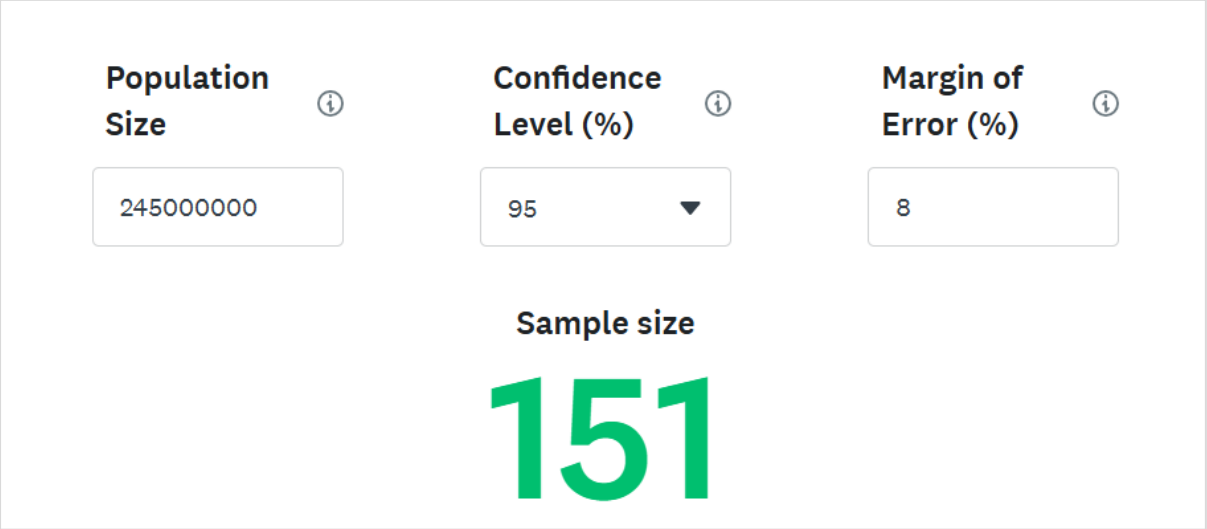

Figure 5 - Sample size calculation by SurveyMonkey

3.4.2 Participants

The participants in this study comprised individuals residing in India who have experience using prescribed or over-the-counter medications. The study aimed to capture a range of perspectives across different linguistic, educational, and socioeconomic backgrounds, which are crucial variables influencing medication adherence and label comprehension.

Inclusion criteria:

- Individuals aged 18 years and above
- All gender
- Current, recent or previous users of any prescribed or over-the-counter medication
- No mental/cognitive impairment or severe illness

Exclusion criteria:

- Individuals with no exposure to medication labels
- Respondents who failed to give informed consent or submitted incomplete surveys

3.4.3 Validity and Reliability

Ensuring the validity and reliability of the research instrument is essential for producing credible and trustworthy results. In this study, a structured questionnaire was employed as the primary tool for data collection. To establish content validity, the questionnaire was developed

based on a thorough review of existing literature related to medication labelling, health literacy, and adherence behaviours. This helped ensure that the questions adequately reflected the research objectives and conceptual framework of the study.

The exclusion of individuals unfamiliar to exposure to medication labels strengthens the reliability of the data, as it minimizes the risk of collecting irrelevant or uninformed opinions. Additionally, the use of multiple-choice and closed-ended questions reduced subjectivity in responses and improved the consistency of the data collected. This careful methodology enhanced the overall credibility of the research findings.

3.4.4 Ethical Consideration

All research involving human participants must adhere to strict ethical standards to ensure the protection of individual rights, dignity, and welfare. This study was conducted in accordance with the ethical approval guidelines set by Griffith College and aligned with the principles of the General Data Protection Regulation (GDPR). Participants were fully informed about the purpose, scope, and voluntary nature of the research through a Participant Information Leaflet (PIL) provided at the outset of the online survey. Informed consent was obtained via explicit confirmation before participation, with individuals given the right to decline or withdraw from the study at any stage without penalty.

To uphold confidentiality and anonymity, no personally identifiable information was collected, and all data were handled in compliance with GDPR requirements. Responses were stored securely, with access limited solely to the researcher, ensuring that all personal data remained protected and untraceable. The research design posed no physical, psychological, or emotional risk to participants, and all questions were formulated to be non-intrusive and ethically appropriate. By adhering to these ethical principles, study ensured not only compliance with institutional and legal obligations but also contributed to the credibility, transparency, and integrity of the research process.

3.5 DATA COLLECTION

The primary method of data collection for this research was an online self-administered questionnaire, designed to gather quantitative data on public perceptions and experiences related to medication labelling and adherence in India. This method was selected for its efficiency, cost-effectiveness, and ability to reach a geographically diverse population, especially given digital accessibility among a growing number of respondents.

The survey was developed using Google forms. Questions were derived from insights gained through the literature review and aligned with the research objectives, focusing on key themes such as language preferences, label clarity, pictograms, and health literacy. The online format ensured ease of access, anonymity, and voluntary participation, which were essential for collecting honest and unbiased responses.

3.6 DATA ANALYSIS

The collected data were analysed using descriptive statistical techniques to identify trends, frequencies, and patterns related to medication labelling comprehension and adherence behaviour. Quantitative data from multiple-choice questions were processed using Microsoft Excel to calculate percentages, graphs, and summary statistics.

3.7 LIMITATIONS OF METHODOLOGY

This study was constrained by sample size due to short time. Also, the method of data analysis - online survey excluded individuals without digital access, potentially limiting demographic representation. Despite this limitation, the chosen methodology aligned with the research objectives and practical constraints.

3.8 CONCEPTUAL FRAMEWORK

This conceptual framework illustrates the relationship between label clarity and medication adherence within the Indian healthcare context. At its core, the model proposes that enhanced label clarity defined through font size, plain language, pictograms, and multilingual support positively influences medication adherence, including correct dosage, timely intake, and consistent treatment.

This central relationship is moderated by key variables such as health literacy, language accessibility, socioeconomic factors, and cultural beliefs, which either strengthen or weaken the patient's ability to interpret and act on label information. Furthermore, technological interventions act as enabling tools that reinforce this connection. The broader regulatory framework, including labelling standards and policies set by CDSCO, also shapes the effectiveness and implementation of label clarity strategies across diverse populations.

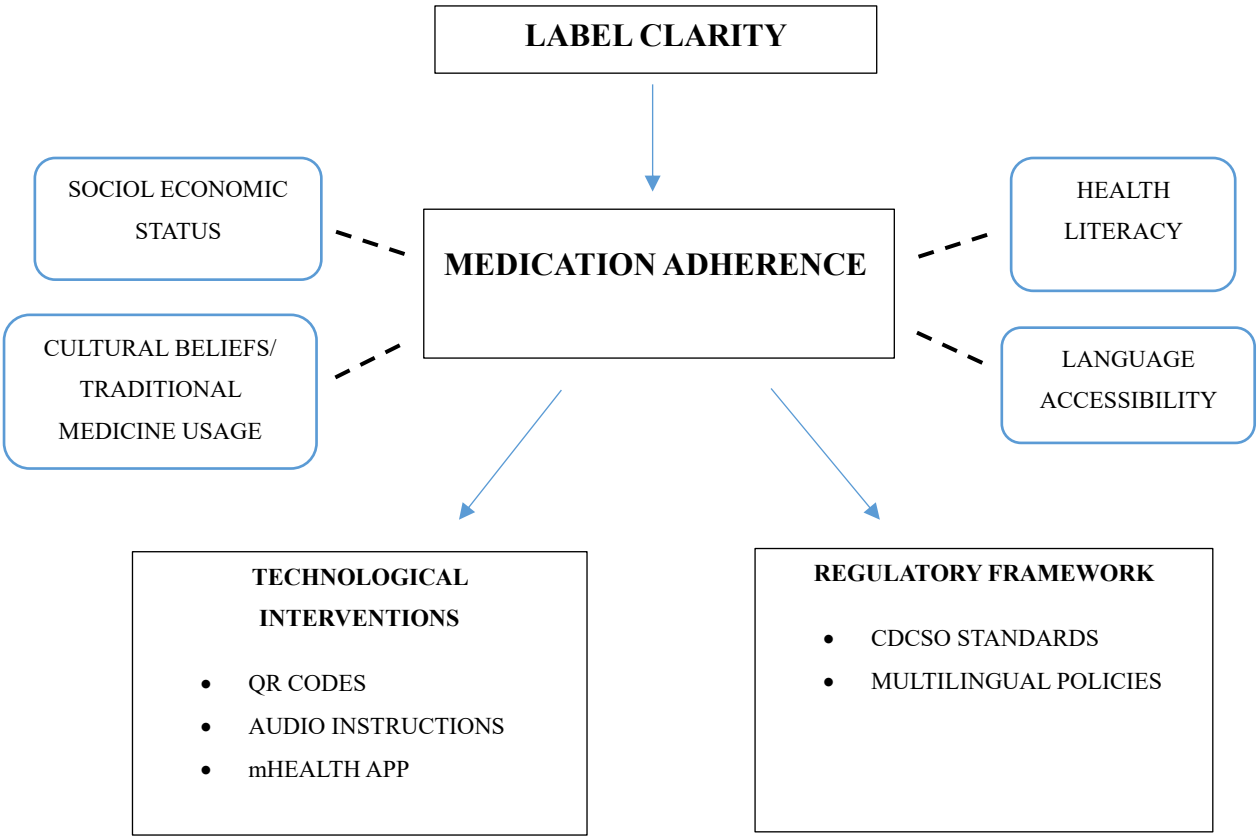

Figure 6 - Conceptual Framework (by author)

CHAPTER 4

4. FINDINGS AND ANALYSIS

4.1 OVERVIEW

This chapter presents a detailed analysis of the data collected to explore how label clarity affects adherence in India. Drawing from the questionnaire responses, findings are organised around the study's key research questions, including the impact of label design, language accessibility, and the potential role of digital tools. Patterns are examined to identify barriers to comprehension and opportunities for improvement.

4.2 INTRODUCTORY QUESTIONS

An introductory paragraph explaining the survey's purpose and significance. Also, two initial mandatory screening questions to ensure ethical research compliance. These questions were intended to confirm that the participants had both read the participant information leaflet and willingly agreed to take part in the study.

Question 1: Purpose of study

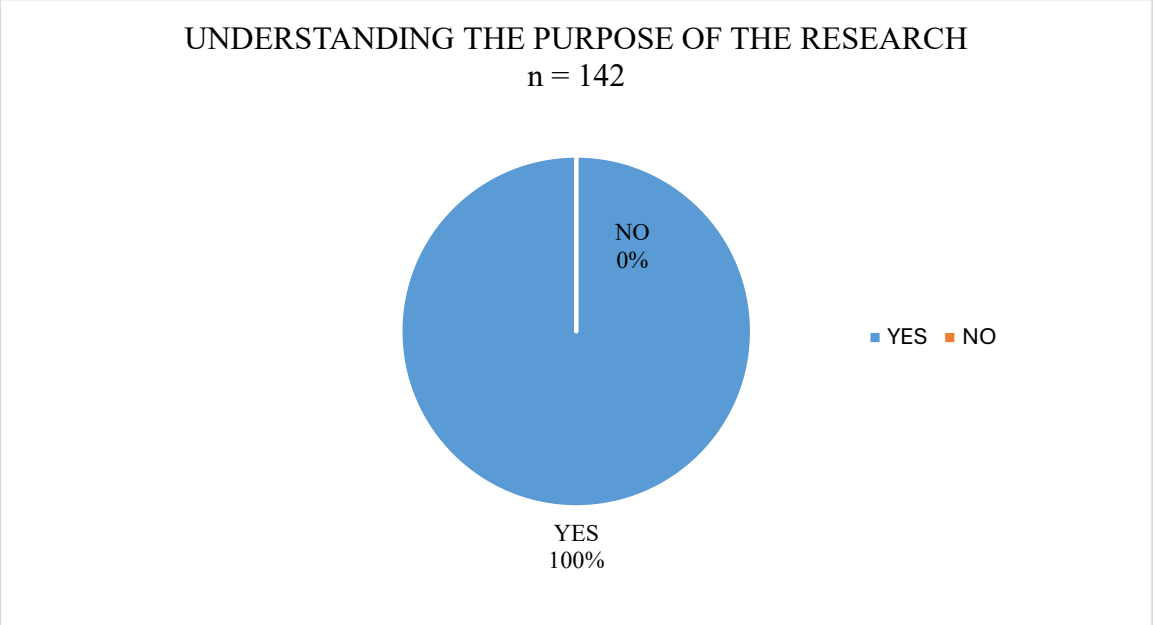

Figure 7 - Pie chart for understanding purpose of study

The above pie chart diagram illustrates that all the respondents (n=142) 100% selected “Yes”, indicating that they had reviewed and understood the information about the study’s purpose, data usage.

The unanimous response indicates that all participants affirmed reading and understanding the participant information sheet. This demonstrates that respondents were fully informed about the study’s purpose and affirms transparency and adherence to ethical research principles.

Question 2: Consent of Participation

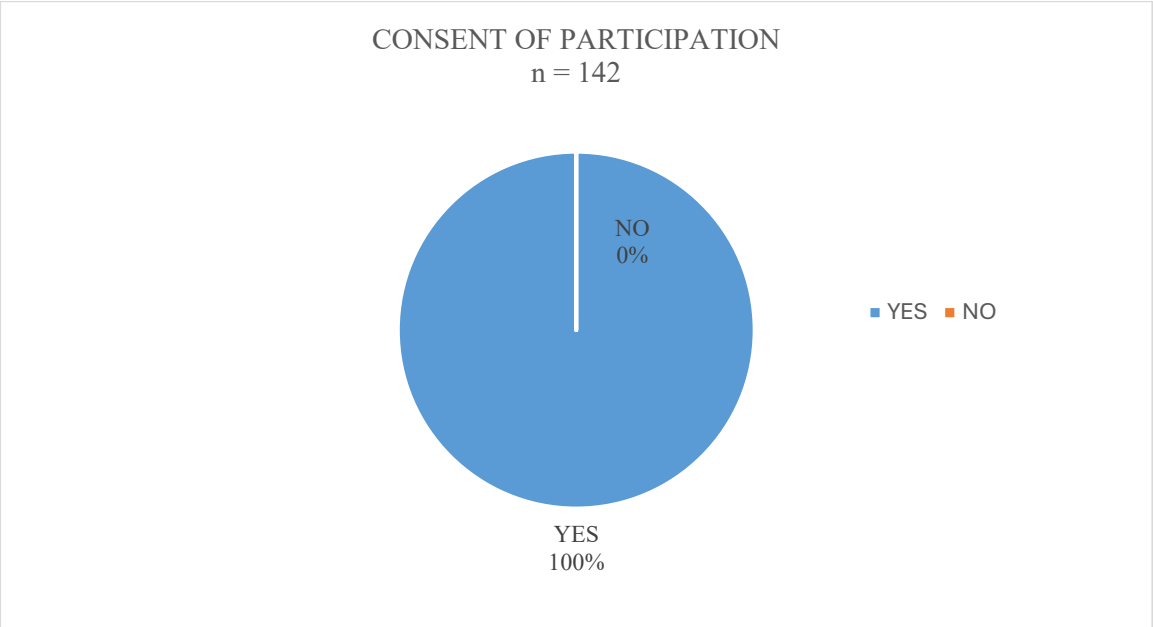

Figure 8 - Pie chart showing consent of participants in the study

As reflected in pie chart, all respondents (n=142) provided active consent to participate in the study. This confirms that participation was voluntary and aligns with the principles of informed consent, as outlined in the institutional research ethics guidelines and GDPR compliance framework. Additionally, this high level of participation suggests a strong interest or investment in the survey topic, which could enhance the quality and depth of the responses gathered.

4.3 DEMOGRAPHIC INFORMATION

To contextualise the findings and assess their relevance across population segments, demographic data were collected from all participants. The variables included age, gender, and educational qualifications. This information helps to understand the diversity and representativeness of the sample, and to identify any trends in medication adherence across different groups.

Question 1: Age

The survey respondents were asked to indicate their age range. Understanding the age distribution of the sample is critical in examining potential differences in medication adherence behaviours, visual comprehension, and the usability of label information across life stages.

Table 3 - Table representing age groups of participants

AGE	NUMBER OF RESPONSES (n= 142)	PERCENTAGE OF RESPONSE (%)
18-24	37	26.1
25-34	83	58.5
35-44	17	12
45-59	2	1.4
60 and above	3	2.1

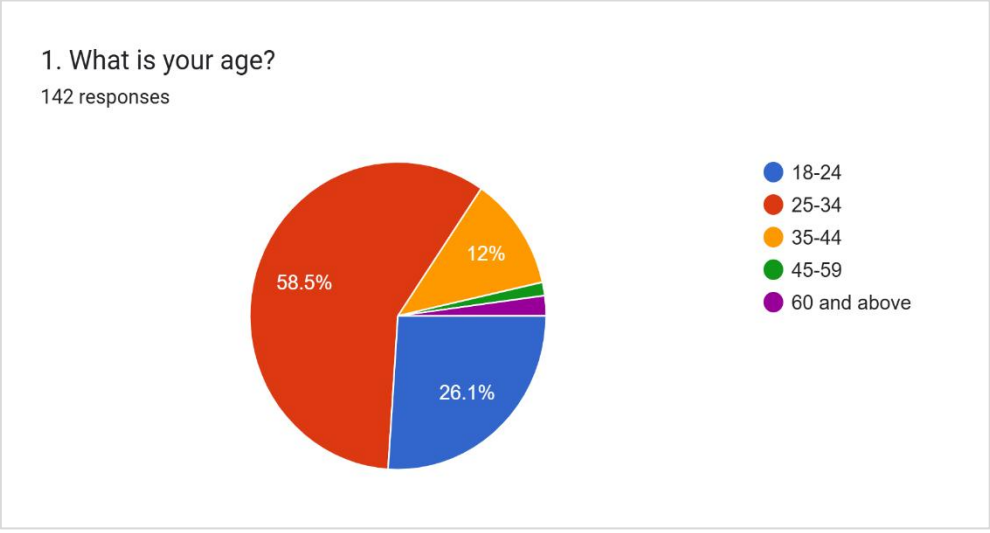

Figure 9 - Pie chart representing age of participants

The data show that most respondents (84.6%) were between the ages of 18 and 34, with 58.5% in the 25–34 category and 26.1% in the 18–24 category. This indicates a strong representation of younger adults, who are typically more familiar with digital platforms and may have higher levels of general and health-specific literacy. In contrast, only a small proportion of the sample (3.5%) were aged 45 and above, including just 2.1% aged over 60, a group more likely to experience age-related challenges such as reduced vision, cognitive decline, or increased medication burden.

This age distribution is particularly relevant to the study's focus on medication label clarity. Older adults may require larger font sizes, simpler instructions, or audio-visual aids to enhance comprehension. However, the under-representation of this demographic suggests that the findings of this study may be more generalisable to younger and middle-aged adults than to the elderly population, who are often at greater risk of non-adherence due to complex health regimens.

Therefore, while the age distribution supports insights into label clarity among digitally literate, younger populations, it also highlights a potential gap in data concerning the elderly, which could be addressed in future research to improve inclusive labelling strategies.

Question 2: Gender

Participants were asked to indicate their gender to assess the gender diversity within the sample. Gender-based analysis can be particularly valuable in public health research, as previous studies have identified gender as a potential factor influencing medication-related behaviours, communication preferences, and access to healthcare information.

Table 4 - Table showing gender of participants

GENDER	NUMBER OF RESPONSES (n=142)	PERCENTAGE OF RESPONSE (%)
Woman	71	50
Man	70	49.3
Other	0	0
Prefer not to say	1	0.7

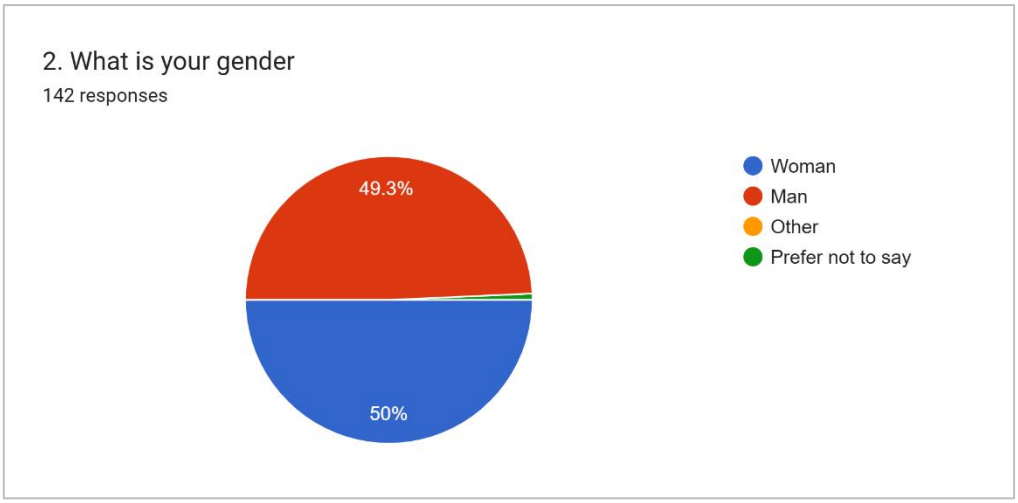

Figure 10 - Pie chart showing gender of participants

The gender distribution of respondents was nearly balanced, with 50% identifying as women and 49.3% as men. Only one respondent (0.7%) chose not to disclose their gender. This balanced representation allows for a more equitable interpretation of the findings across gender lines and reduces the likelihood of gender bias in the results.

This distribution enhances the robustness of the study by ensuring that perspectives on medication label clarity and adherence are drawn from both male and female participants in relatively equal proportions. It also supports broader generalisability across gender demographics.

Question 3: Educational Qualification

To assess the health literacy potential of the sample, respondents were asked to report their highest level of formal education completed. Educational attainment is widely acknowledged as a significant determinant of health literacy, which subsequently influences an individual's capacity to comprehend and adhere to medication instructions. Higher levels of education are generally associated with improved understanding of medical terminology, greater awareness of dosage requirements, and enhanced ability to interpret label warnings.

Table 5 - Table representing educational qualification of respondents

EDUCATIONAL QUALIFICATION	NUMBER OF RESPONSES (n=142)	PERCENTAGE OF RESPONSE (%)
No formal education	0	0
Primary school (up to 5th standard)	0	0
Secondary education (6th -10th standard)	3	2.1
Higher secondary (11th – 12th)	11	7.7
Graduate (bachelor's degree)	77	54.2
Postgraduate (masters/Ph. D)	51	35.9

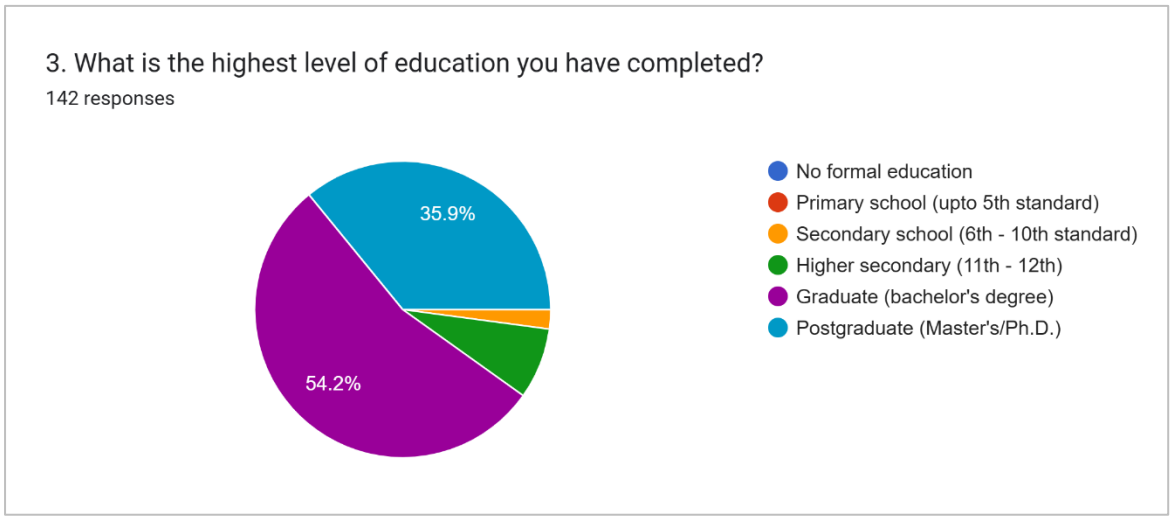

Figure 11 - Pie chart representing educational qualification of respondents

Most respondents (90.1%) had completed higher education, with over half (54.2%) holding a bachelor's degree and 35.9% having completed postgraduate qualifications. A small minority (9.8%) had only secondary or higher secondary education, and no respondents reported having no formal education or primary-level schooling.

This high level of educational attainment suggests that the respondent group possesses relatively strong health literacy, which likely enhances their ability to understand and follow medication instructions. Respondents with secondary education or below were more likely to report misinterpretation than those with postgraduate qualifications. It also implies a potentially

higher awareness of the implications of non-adherence, as well as greater exposure to written and digital health communication formats.

Question 4: Primary Language Spoken

Language plays a central role in the interpretation of medication labels and health communication materials. In a country as linguistically diverse as India, assessing respondents' primary language helps contextualise how language barriers might influence their understanding of medication instructions and associated adherence behaviours.

Table 6 - Table showing primary language spoken by respondents

PRIMARY LANGUAGE SPOKEN	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
English	45	31.7
Hindi	2	1.4
Regional Language	64	45.1
Multilingual	31	21.8

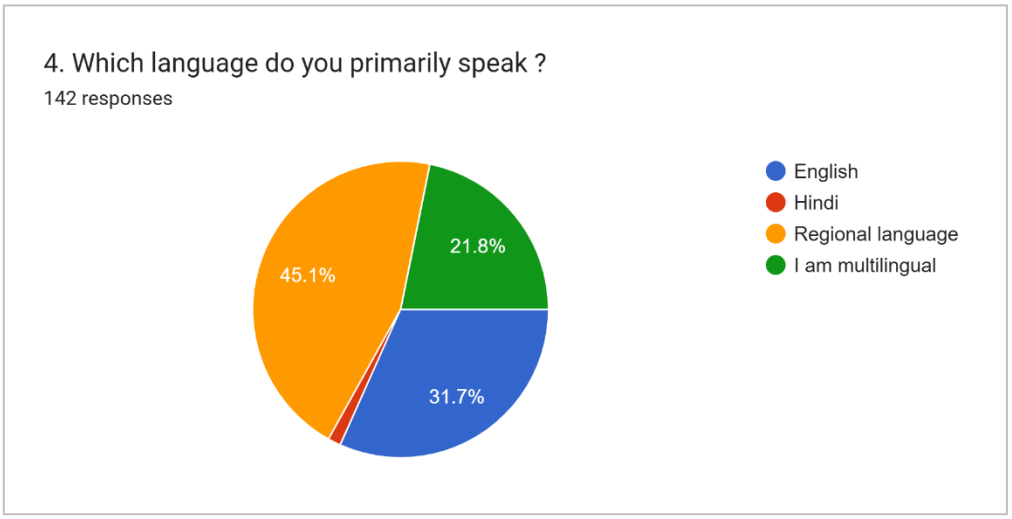

Figure 12 – Pie chart showing primary language spoken by respondents

A significant portion of respondents (45.1%) indicated that they primarily speak a regional language, while 21.8% identified as multilingual. A smaller proportion reported English (31.7%) as their primary language, and only 1.4% listed Hindi.

This distribution underscores the linguistic diversity of the respondent group and reflects the broader Indian population, where regional languages dominate daily communication. The relatively low representation of Hindi speakers highlights the limitation of India's current dual-language labelling approach (English and Hindi) and suggests that a significant number of individuals may face difficulties comprehending medication labels that are not available in their native languages (Kumar, 2024).

The presence of multilingual respondents is encouraging, as it may indicate some flexibility in language interpretation. However, it is important to note that multilingualism does not guarantee proficiency in English or Hindi, particularly in interpreting medical terminology.

Future policy considerations should prioritise inclusive language design and offering digital supports. These would greatly improve accessibility for populations with low health literacy.

4.4 MEDICATION USAGE AND ADHERENCE

4.4.1 Current use of Prescription Medication

To gauge the relevance of medication adherence among respondents, participants were asked whether they currently take prescription medication on a regular basis. This question helps distinguish between those for whom medication adherence is an active concern and those who may be responding from experience or theoretical understanding.

QUESTION 1: Do you currently take prescription medication regularly?

1. *Yes*
2. *No*
3. *I used to, but not anymore*

Table 7 - Table representing current usage of prescription medication

CURRENT USE OF PRESCRIPTION MEDICATION	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
Yes	51	36
No	76	53
I used to, but not anymore	15	11

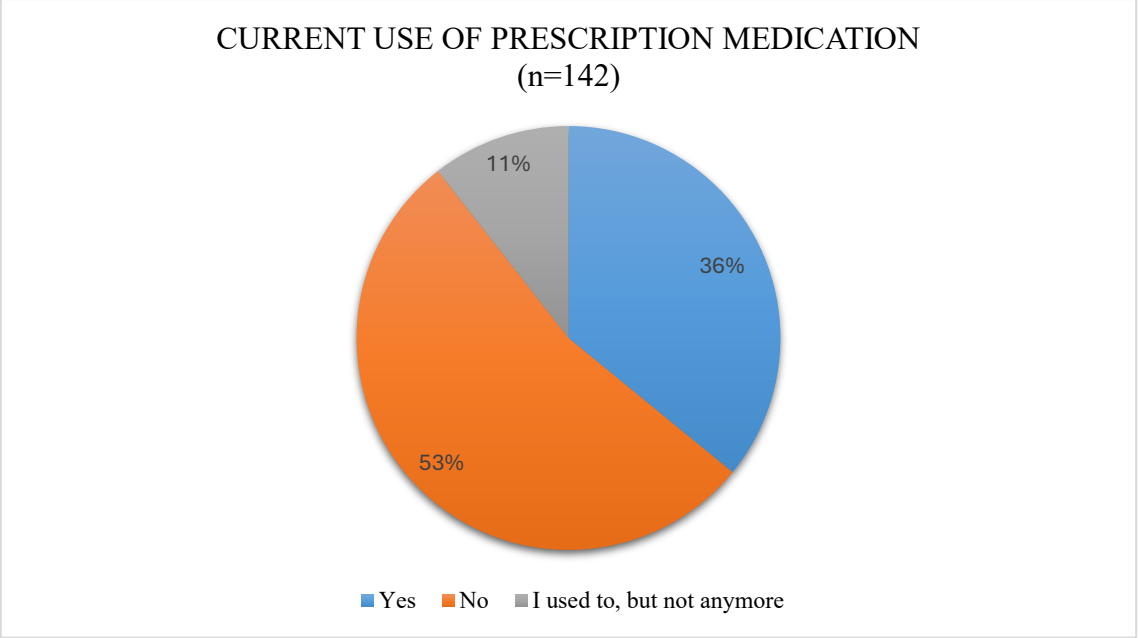

Figure 13 - Pie chart representing current use of prescription medication by respondents

Many respondents (53.5%) reported that they do not currently take prescription medications. However, a significant proportion (35.9%) indicated regular use, while 10.6% had prior experience with prescribed medications. These findings suggest that while over half of the participants are not actively taking medications, nearly half have either current or previous experience with them, making them suitable to evaluate label clarity and its implications on adherence.

The responses provide a balanced mix of current users, past users, and non-users, offering diverse perspectives on the challenges related to interpreting medication instructions. Importantly, the 35.9% currently on medication represent a crucial subgroup for whom clear labelling is directly relevant to daily adherence behaviours and treatment outcomes.

4.4.2 Frequency of Non-Adherence to Medication Label Instructions

To investigate behavioural patterns related to adherence, participants were asked how frequently they deviate from instructions provided on medication labels. This question is intended to gauge the prevalence of non-adherence behaviours and to determine the extent to which packaging instructions are clearly understood and reliably followed by patients.

QUESTION 2: How often do you find yourself not following the instructions on your medication labels?

1. *Never*
2. *Rarely*
3. *Sometimes*
4. *Often*
5. *Always*

Table 8 - Table showing frequency of non-adherence to medication label instructions

FREQUENCY OF NON-ADHERENCE TO MEDICATION LABEL INSTRUCTIONS	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSES (%)
Never	23	16.2
Rarely	46	32.4
Sometimes	57	40.1
Often	9	6.3
Always	7	4.9

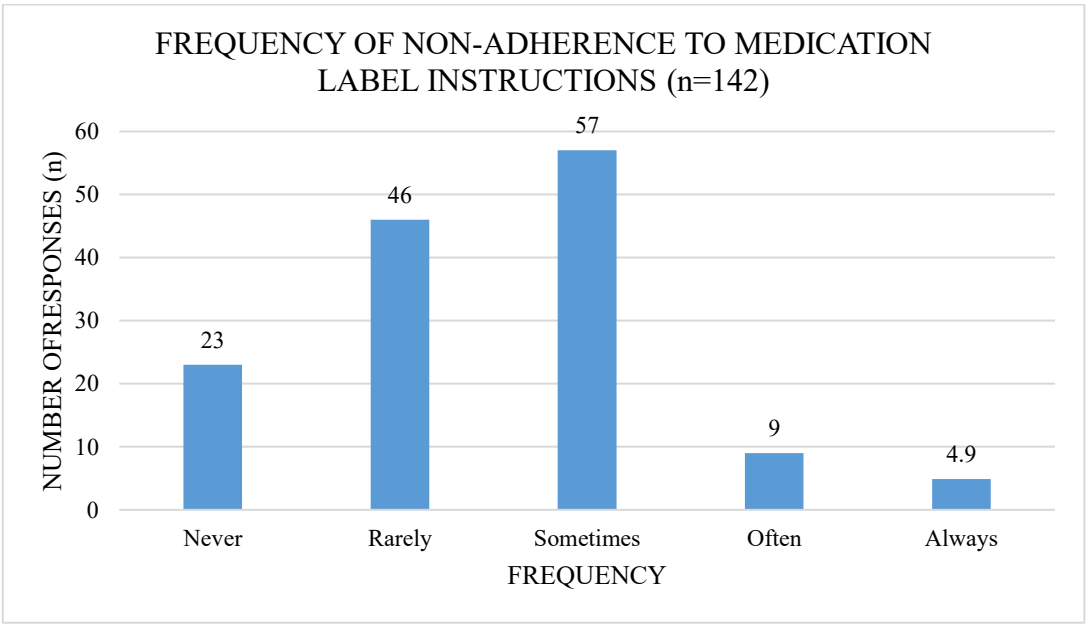

Figure 14 - Bar graph showing frequency of non-adherence to medication label instructions by respondents

The findings reveal that a combined 51.3% of respondents (those who answered “Sometimes,” “Often,” or “Always”) admitted to not consistently following instructions on medication labels. Specifically, 40.1% reported that they “sometimes” ignore the instructions, and a smaller but notable proportion reported frequent non-adherence.

Only 16.2% indicated that they “never” disregard medication label instructions, while 32.4% stated that this happens “rarely.” These findings point to a concerning trend where nearly four out of five participants are not consistently adhering to medication instructions. These results suggest that while some participants make a conscious effort to adhere to labelling guidelines, a considerable proportion regularly overlook them.

Such patterns could be attributed to factors such as poor label readability, unfamiliar terminology, or unclear dosage instructions highlighting the need for clearer, more user-friendly labelling formats (Baryakova et al., 2023). This behaviour poses significant implications for treatment outcomes and reinforces the urgency of addressing labelling-related barriers to medication adherence, especially in populations with varying literacy and linguistic capabilities.

Further analysis could explore whether factors such as age, education level, or language proficiency influence this behaviour. For instance, are older individuals or those with limited literacy more likely to report "often" or "always" missing instructions.

4.4.3 Misinterpretation of Medication Label Instructions

This item assesses whether respondents have experienced difficulties understanding medication labels, a key factor potentially undermining medication adherence. Misinterpretation can result from complex terminology, small font sizes, ambiguous directions, or language barriers.

QUESTION 3: Have you ever misunderstood the instructions on your medication labels (e.g., due to complex language, small font, unclear directions, or language barriers like being unable to read English)?

1. *Yes*
2. *No*
3. *Maybe*

Table 9 - Table representing misinterpretation of medication label

MISINTERPRETATION OF MEDICATION LABEL	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
Yes	64	45
No	55	39
Maybe	23	16

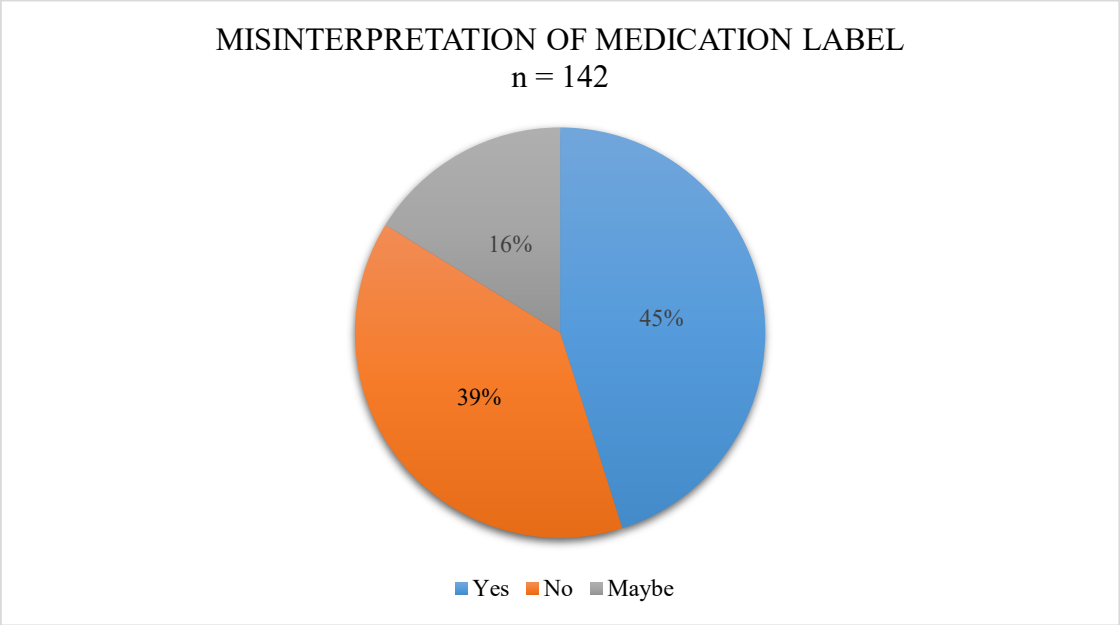

Figure 15 - Pie chart representing misinterpretation of medication label

Almost half of the respondents (45%) acknowledged that they had at minimum once, misinterpreted the instructions on a medication label. An additional 16% indicated uncertainty suggesting that they have occasionally felt confused while the remaining 39% asserted that they had never experienced any misunderstanding.

These results reveal that more than 60% of the sample either definitively misread or were unsure about medication label directions, underscoring a widespread comprehension challenge. The high incidence of potential misinterpretation highlights an urgent need to improve clarity and accessibility of pharmaceutical labelling. Key recommendations include increasing font sizes to enhance readability, employing plain language to reduce cognitive load, and incorporating multilingual instructions to accommodate diverse linguistic backgrounds.

Implementing these design improvements could substantially reduce confusion, support correct medication use, and ultimately contribute to better health outcomes across India.

4.4.3.1 Specific Causes of Label Misinterpretation

Among the 142 total respondents, 106 indicated that they had misunderstood medication label instructions. This sub-question identifies the primary factors that contributed to misinterpretation, allowing for targeted recommendations to improve label design.

QUESTION 3a: If yes, what was the issue? (Select all that apply)

Table 10 - Table illustrating specific causes of label misinterpretation

CAUSES	NUMBER OF RESPONDENTS (n=106)	PERCENTAGE OF RESPONSES (%)
Complex Language	29	27.4
Small font size	51	48.1
Confusing instructions	31	29.2
Language barrier	15	14.2
Poor written/unclear labels	45	42.5

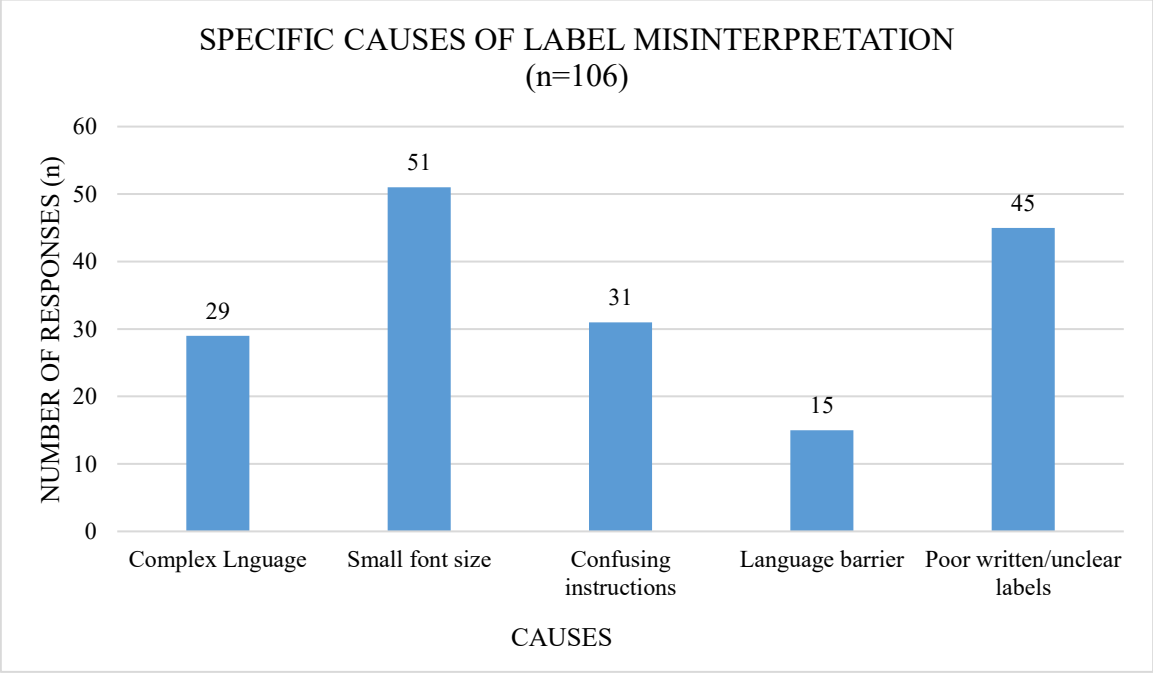

Figure 16 - Bar chart illustrating specific causes of label interpretation

The most reported difficulty encountered by respondents was the small font size on medication labels, cited by 48.1% of participants. This was closely followed by concerns about poorly written or unclear labels, reported by 42.5%, and confusing or ambiguous instructions, noted by 29.2%. Additionally, 27.4% of respondents identified the use of complex or technical language as a barrier, while 14.2% pointed to language barriers as a contributing factor to misunderstanding.

These findings clearly indicate that issues related to font size and the clarity of written content are most significant challenges impeding accurate interpretation of medication labels. Those who reported misunderstanding also tended to report non-adherence, suggesting a causal link. Although the use of technical terminology and language-related difficulties also present notable obstacles, the data suggest that a substantial proportion of comprehension problems could be alleviated through targeted improvements in label design.

To address these concerns effectively, pharmaceutical labelling practices in India should prioritise increasing font size for better readability, enhancing the clarity and conciseness of written information, and presenting instructions in a simplified, structured format such as bullet points or numbered steps (Mohammad *et al.*, 2022). These changes have the potential to significantly reduce user confusion, promote more accurate adherence to medication regimens, and contribute to safer, more effective public health outcomes.

4.5 MEDICATION LABEL COMPREHENSION

This section explores how respondents perceive the clarity and accessibility of information presented on medication labels. The questions in this segment are designed to measure comprehension, readability, and linguistic accessibility factors closely linked to medication adherence and patient safety.

4.5.1 Ease of Understanding Medication Label Instructions

Respondents were asked to rate the ease with which they understand the instructions on their medication labels using a 5-point Likert scale. This question aims to evaluate user comprehension of current labelling practices in India.

Scale Point from 1-5; 1= Very easy, 2= Easy, 3= Neutral/Moderate, 4= Difficult and 5= Very Difficult.

Question 1: How easy is it for you to understand the instructions on your medication labels?

1. *Very easy*
2. *Easy*
3. *Neutral/Moderate*
4. *Difficult*
5. *Very difficult*

Table 11 - Table showing perceived ease of label comprehension

EASE OF UNDERSTANDING	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
Very easy	32	23
Easy	41	29
Neutral/Moderate	36	25
Difficult	27	19
Very difficult	6	4

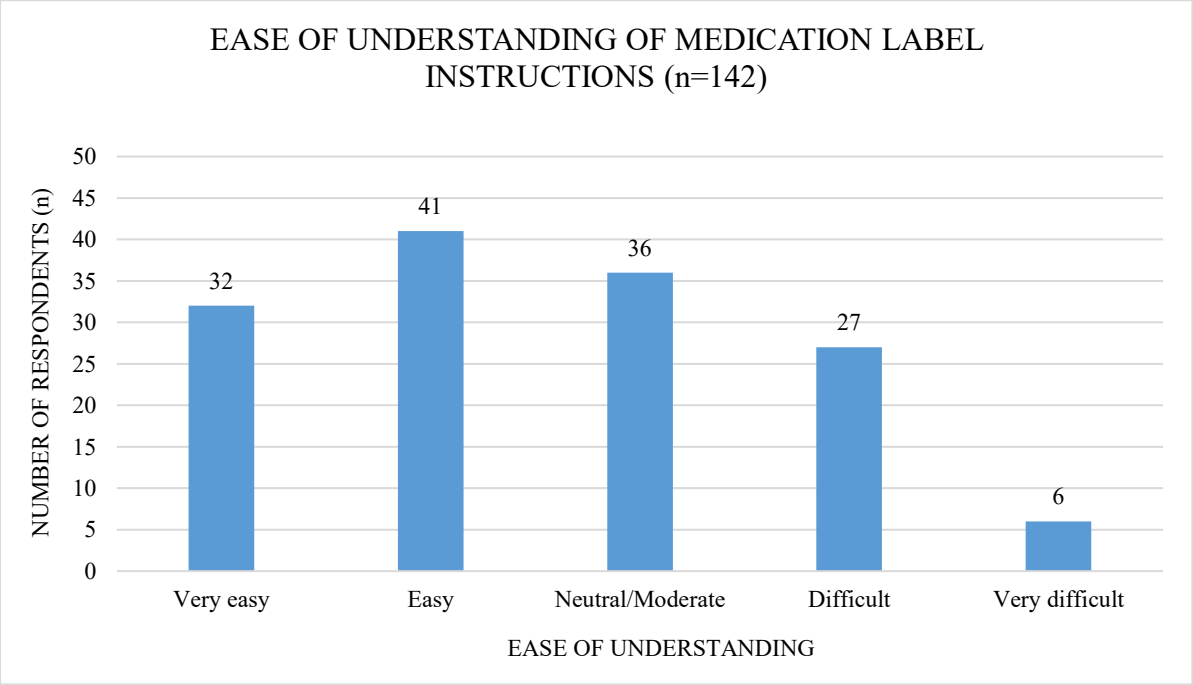

Figure 17- Bar chart showing ease of understanding of medication label instructions

The data reveal a nuanced distribution in the perceived ease of understanding medication labels. While a slight majority of respondents (51%) indicated that they found the labels either easy or very easy to understand, a considerable 49 % reported experiencing varying levels of difficulty. Within this group, 19% found the instructions difficult to interpret, and 4% considered them very difficult, pointing to a notable segment of the population for whom label comprehension poses a serious challenge.

This near-equal divide highlights a critical public health concern. Although many individuals can interpret medication labels effectively, a substantial proportion of the population struggles with understanding essential information. This has significant consequences for medication adherence, as misinterpretation can lead to incorrect dosing, unintended discontinuation of therapy, or potentially dangerous drug interactions. Inadequate comprehension of label information may compromise treatment outcomes and increase the risk of adverse health events.

The findings underscore the urgent need for a systematic and inclusive approach to medication label design. Standardisation efforts should prioritise readability, clarity, and accessibility (Hataway, 2023). This includes simplifying medical terminology, increasing font sizes, improving layout through logical structuring and visual cues and providing multilingual support to accommodate the linguistic diversity of the population. Redesigning medication labels with these principles in mind would not only enhance user comprehension but also play a crucial role in improving medication adherence and promoting equitable healthcare outcomes across India's varied demographic landscape.

4.5.2 Perceived Sufficiency of Information on Medication Labels

Respondents were asked whether they believe the information provided on their medication labels is sufficient to ensure safe usage. This question evaluates whether current labelling practices meet users' informational needs, including clarity on dosage, administration, warnings, and contraindications.

Question 2: Do you feel that the labels on your medication provide all the information you need to use the medicine safely?

1. *Yes*
2. *No*

3. *Sometimes*

Table 12 - Table representing sufficiency of information on medication label

SUFFIECIENCY OF INFORMATION	NUMBER OF RESPONDENTS (n)	PERCENTAGE OF RESPONSE (%)
Yes	69	48
No	21	15
Sometimes	52	37

Nearly half of the respondents (48%) reported confidence that medication labels provide all the necessary information required for the safe use of their prescriptions. However, 37% indicated that the labels offered only partial clarity, while 15% stated that the labels lacked clarity altogether. These figures suggest that a considerable segment of the population encounters informational deficiencies when relying solely on medication labels to guide safe and effective use.

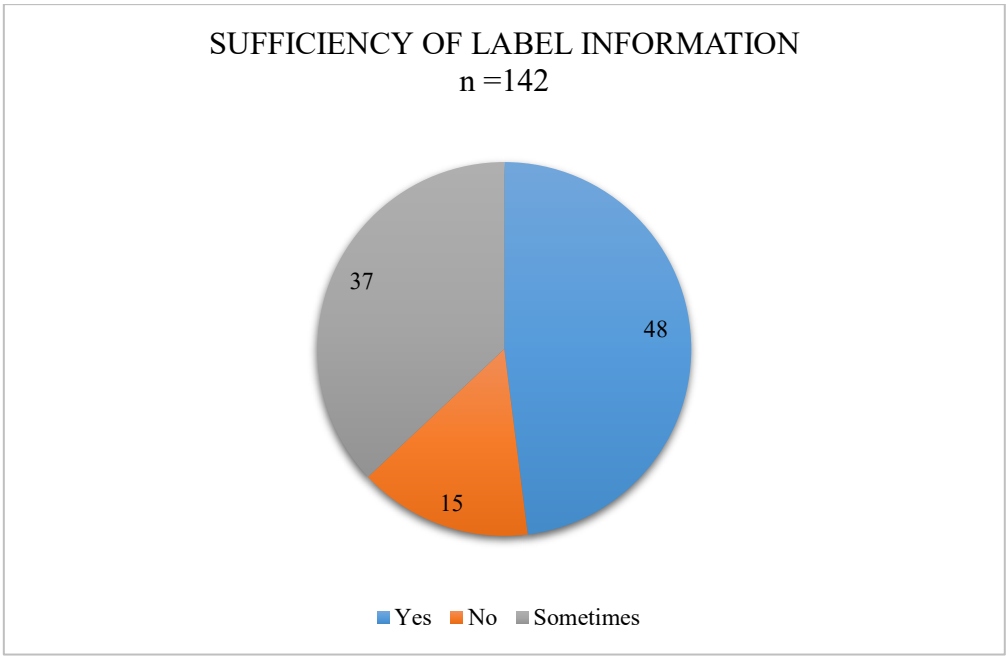

Figure 18 - Pie chart representing sufficiency of label information

The findings imply that although many medication labels are perceived as sufficiently informative, a significant proportion of users experience gaps in the information provided or

find the presentation of information inconsistent. Such deficiencies may stem from missing critical elements, such as detailed usage instructions, comprehensive warnings about potential side effects, or information that is inaccessible due to language barriers or low literacy levels. These challenges are particularly pronounced in multilingual societies and among populations with varying degrees of health literacy, as is the case in India.

From a policy standpoint, these results underscore the urgent need for the development and implementation of more standardised, user-centred labelling protocols. It is not sufficient for labels to convey accurate medical information; they must also be designed to enhance usability across diverse patient populations. To achieve this, future label design strategies should integrate visual aids, simplified and plain language, multilingual translations, and rigorous user testing with diverse demographic groups. Such measures would contribute significantly to improving clarity, accessibility, and overall effectiveness of medication labels, thereby promoting safer medication practices and supporting better public health outcomes.

4.5.3 Impact of Local Language Labelling on Comprehension

To assess the potential benefits of multilingual medication labels, respondents were asked whether they believed that having instructions available in their local language would improve their understanding. This question aims to highlight the role of language accessibility in promoting medication adherence and reducing misinterpretation risks.

Question 3: Do you think having labels in your local language would help you understand your medication instructions better?

1. *Yes*
2. *No*
3. *Maybe*

Table 13 - Table representing impact of local language labelling on comprehension

IMPACT OF LOCAL LANGUAGE LABELLING ON COMPREHENSION	NUMBER OF RESPONDENTS (n = 142)	PERCENTAGE OF RESPONDS (%)
Yes	93	65.5
No	14	9.9
Maybe	35	24.6

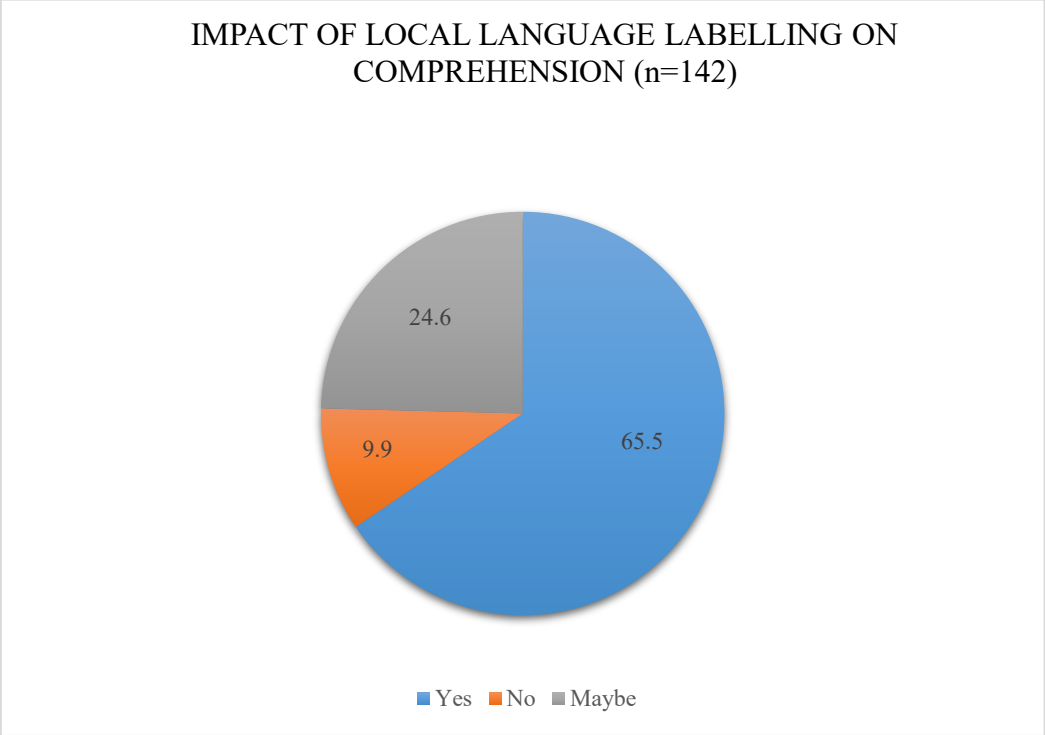

Figure 19 - Pie chart representing impact of local language labelling on comprehension

A substantial majority of respondents (65.5%) indicated that having medication labels available in their local language would significantly improve their understanding of usage instructions. A further 24.6% suggested that local language labelling could potentially be beneficial, while only 9.9% believed that it would have little to no impact on their comprehension.

These findings provide strong empirical support for the implementation of multilingual labelling strategies within the Indian healthcare context. Considering India's vast linguistic diversity, a system that relies primarily on English or Hindi inherently marginalises a considerable segment of the population, particularly individuals from rural areas and speakers of regional languages. Enhancing language accessibility on medication labels would likely lead to improved patient comprehension, a reduction in medication errors, and stronger adherence to prescribed treatment regimens, thereby contributing to broader public health improvements.

Moreover, these results are consistent with existing research that underscores positive correlation between language-congruent health communication and improved patient outcomes, particularly in terms of adherence and safety. The findings therefore reinforce the urgent need for policy interventions that mandate the inclusion of regional language options on

medication packaging, alongside nationally standardised languages. Such measures would not only promote equity in healthcare access but also support overarching goal of enhancing medication safety and effectiveness across India's diverse population.

4.5.4 Perceived Helpfulness of Pictograms on Medication Labels

Participants were asked whether they believed that the inclusion of pictograms would assist them in understanding medication usage more effectively. This question evaluates the potential for visual aids to address literacy barriers and improve patient adherence.

Question 4: Would you find it helpful if medication labels included pictograms (symbols or pictures)?

1. *Yes*
2. *No*
3. *Maybe*

Table 14 - Table representing helpfulness of pictogram on medication labels

HELPFULNESS OF PICTOGRAM	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
Yes	113	79.6
No	5	3.5
Maybe	24	16.9

An overwhelming majority of respondents (79.7%) indicated that the inclusion of pictograms would make medication instructions easier to understand. In contrast, only 3.5% disagreed with this view, and 16.9% reported uncertainty.

This finding offers strong empirical support for the growing body of literature emphasising the effectiveness of visual aids in enhancing comprehension, particularly among individuals with low health literacy or limited proficiency in the language used on labels. Pictograms have the potential to communicate essential information quickly and intuitively, bridging linguistic and literacy gaps while reducing the cognitive effort required to interpret complex or technical medical instructions.

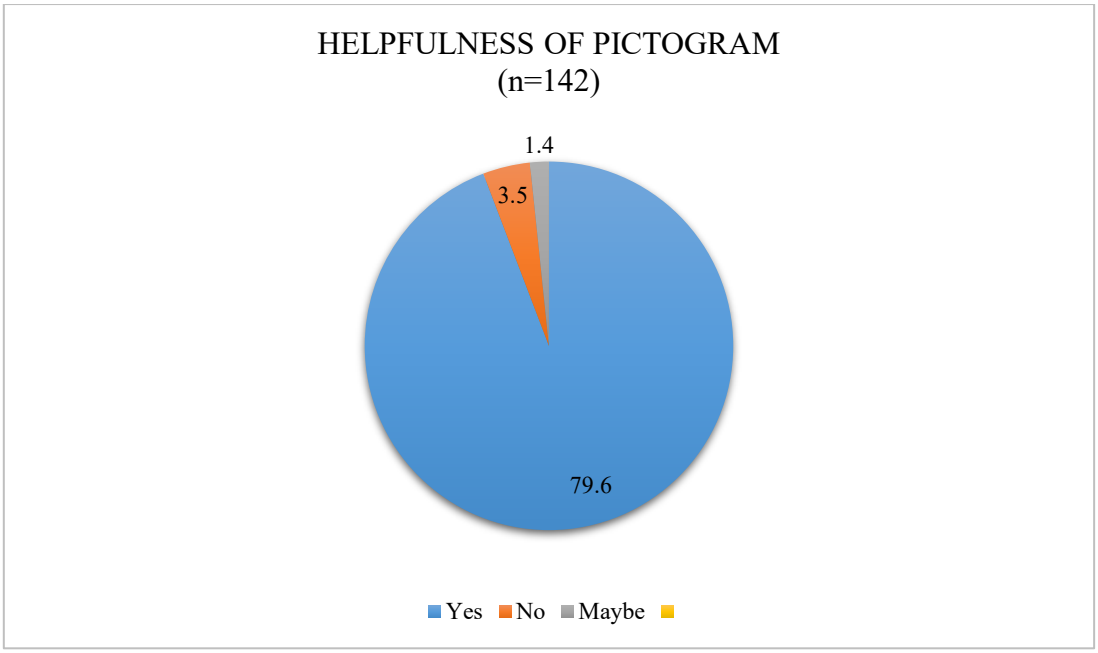

Figure 20 - Pie chart representing helpfulness of pictogram on medication labels

In the context of India's significant linguistic and literacy diversity, the integration of pictogram-based labelling presents itself as a particularly promising strategy to facilitate safer medication practices and improve adherence outcomes. This approach would not only aid in overcoming language barriers but also simplify critical information for users across varying educational backgrounds. Furthermore, the adoption of pictograms is consistent with international best practices, aligning with recommendations from global health authorities such as the World Health Organization (WHO) and the U.S. Food and Drug Administration (FDA), both of which advocate for the use of visual communication tools to enhance the clarity and accessibility of pharmaceutical information. Implementing pictogram-enhanced labelling could therefore represent a pivotal step toward advancing equitable healthcare delivery and strengthening public health initiatives in India.

4.6 IMPACT OF CLEAR LABELLING ON ADHERENCE

This section shows the impact of label clarity on the patients' level of adherence. Analysing the impact of clearer, more user-friendly labels on the actual behaviours on medication taking is important for formulating effective public health strategies and enhancing health outcomes.

4.6.1 Influence of Clear Labelling on Instruction Adherence

Participants in the study were asked if clearer medication labels and instructions would motivate them to adhere to the prescriptions as they have been provided. This question captures both qualitatively and behaviourally impact, undertakes through revision of labels.

Question 1: If medication labels were clearer and easier to understand, would you be more likely to follow the instructions properly?

1. *Yes*
2. *No*
3. *Maybe*

Table 15 - Table representing clear labelling influence on adherence

CLEAR LABELLING INFLUENCE ON ADHERENCE	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
Yes	127	89.4
No	4	2.8
Maybe	11	7.7

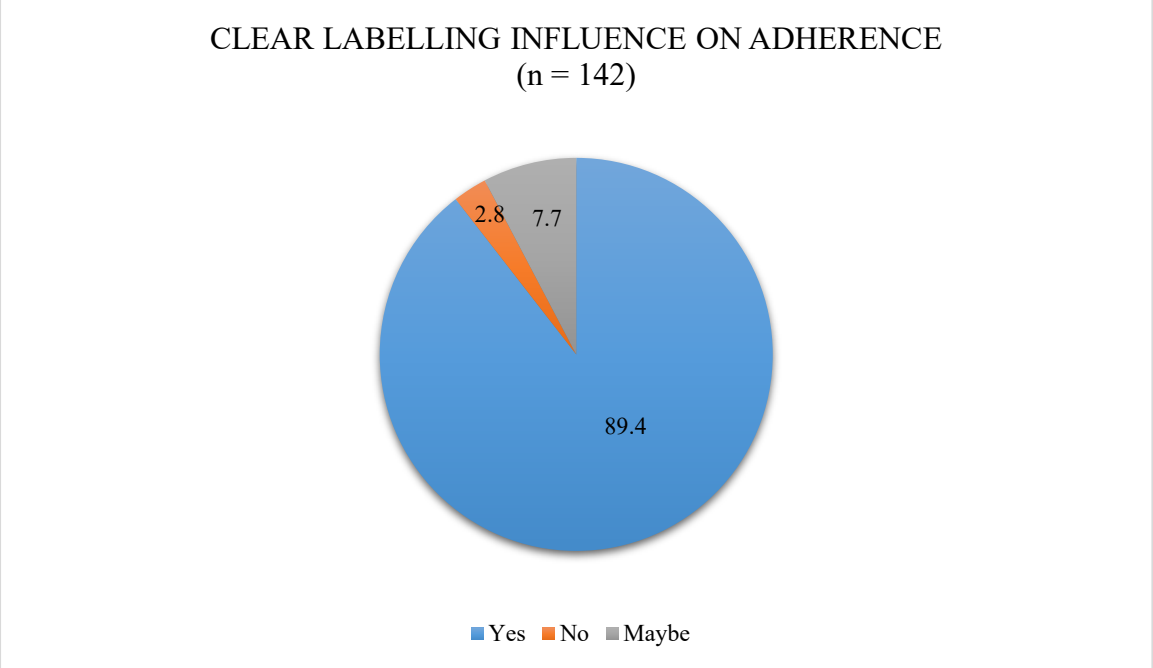

Figure 21 - Pie chart representing clear labelling influence on adherence

Respondents expressed that clearer and more understandable medication labels would increase their chances of following directions given to them by 89.4%. Only 2.8% stated that no degree of attention given to label clarity would change their adherence behaviour, 7.7% were undecided.

Regarding the above results, it is reasonable to suggest that label clarity plays an important role in the factors that affect labelled medication adherence. This is in accordance with more than one research study that documents how health information communication is deliberately or designed to be easily understood, improving patients' belief towards self-management of their treatment. Improved comprehension of the label correlates with decreased medication errors, omissions of doses, premature therapy withdrawal, and therapy stoppage all of which are critical for achievement of one's health objectives.

Considering that there was consensus among the respondents, it is suggested that health policymakers, regulatory agencies, and pharmaceutical companies need to rethink their strategies and start aggressively pursuing comprehensive label revision proposals. Replace jargon with plain language, make fonts bigger and clear, add pictorials for better understanding, and translate to regional languages for quicker comprehension.

4.6.2 Participants Reflections for Effective Medication Labelling

Participants were invited to reflect on their experiences with medication labels and suggest improvements based on what they found effective or challenging. This question aimed to gather first-hand insights on the design elements, language preferences, and structural features that support or hinder understanding of pharmaceutical instructions.

Question 2: What specific changes to medication labels would help you understand and follow instructions better? (e.g., larger font, simpler language, pictograms, translated labels, etc.)

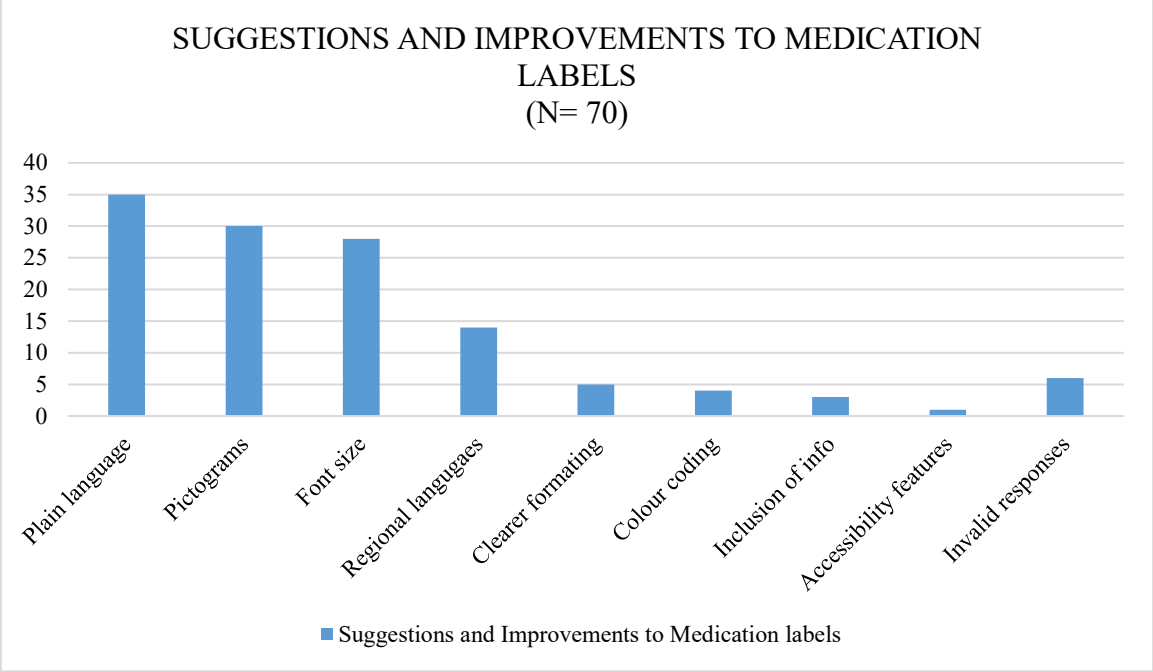

Figure 22 - Bar graph showing suggestions and improvements to medication labels

The open-ended answers showed some common ideas about what helped people understand medicine labels and what changes they'd like to see. A big theme was the need for easy everyday language. Many people said that hard-to-understand medical words often confused them. They felt surer about following dose and use instructions when the wording was clear. Some responses like “Make the font bigger and bold”; “Small font is hard to read”; “Block letters helped me understand”. The size of the letters and how easy they were to read came up a lot with older folks. They had trouble with small or light text. Another popular feature was pictures and symbols. “Pictograms show how to take the medicine better than words”; “Pictures helped me understand timing and dosage”- People found these helpful to understand when to take medicine how much to take, and what to watch out for. This was true for those who had trouble reading or didn't know the language well.

Several participants emphasised the need for colour coding, particularly for drawing attention to warnings or critical information like side effects and contraindications. “Red for precautions and side effects”; “Colour codes make warnings stand out”; “Bright background with bold print is helpful”.

Respondents also suggested the use of QR codes and mobile-friendly features to supplement printed labels with videos or audio instructions. “Add QR code to explain in video”; “Link to app would help people like my parents”; “QR for audio instructions is useful for older users”.

These suggestions reflect a willingness to engage with digital interventions if they improve clarity and accessibility. Also, respondents provide accessibility considerations for disabled peoples. “QR codes for visually impaired”; “Braille should be added”; “Colour coding and simplified diagrams work for everyone”.

The findings closely mirror the international literature (e.g., Merks et al., 2021) which supports the idea that label clarity, visual communication, and language inclusion significantly enhance medication adherence. Participants also underscored the importance of standardisation echoing earlier quantitative results where 85.2% supported government-mandated labelling formats. Taken together, these themes reinforce earlier quantitative findings and highlight the real-world challenges that patients face in interpreting medication labels. They suggest a strong user preference for patient-centred, visually accessible, and linguistically inclusive designs, which align with global recommendations for improving medication safety and adherence.

4.6.3 Importance of Standardised Labelling in India

To evaluate public support for regulatory action, respondents were asked how important they believe it is for the government and pharmaceutical companies to implement standardised medication labelling across India. This question aimed to gauge perceptions of policy responsibility in ensuring clear, accessible, and safe labelling practices.

Question 1: In your opinion, how important is it for the government and pharmaceutical companies to standardize medication labels in India?

1. *Very important*
2. *Somewhat important*
3. *Neutral*
4. *Not very important*
5. *Not important at all*

Table 16 - Table representing importance of standardised labelling in India

IMPORTANCE OF STANDARDISED LABEL	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSES (%)
Very important	121	85.2
Somewhat important	15	10.6
Neutral	6	4.2

Not very important	0	0
Not important at all	0	0

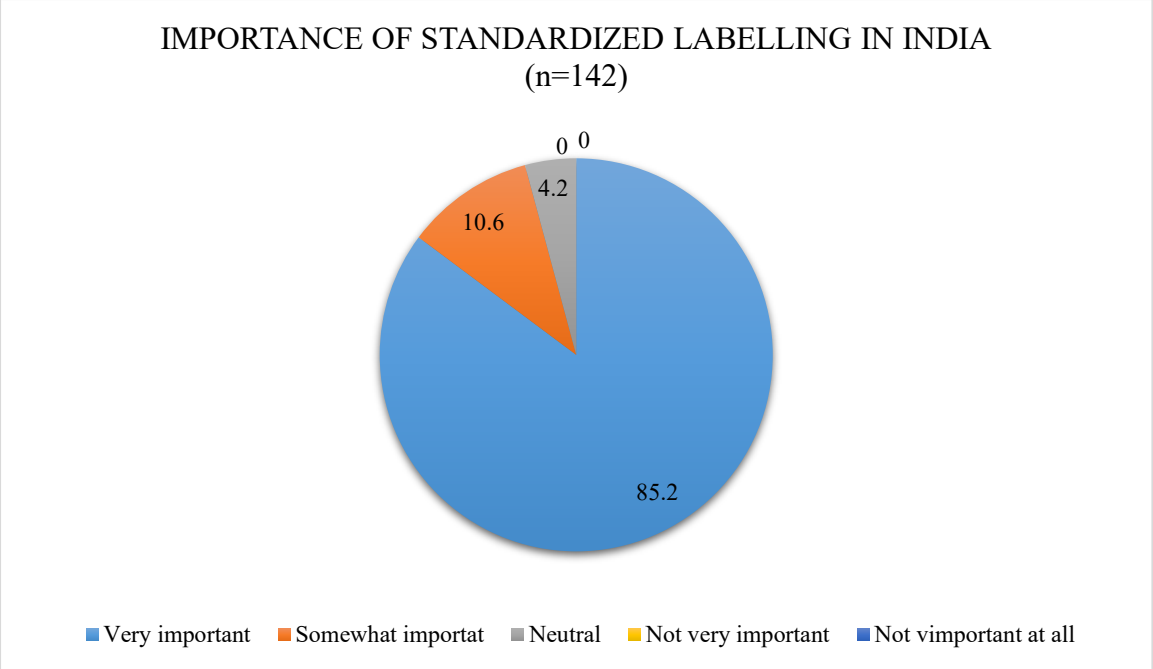

Figure 23 - Pie chart representing importance of standardized labelling in India

A substantial majority of participants (85.2%) regarded the standardisation of medication labelling by governmental and pharmaceutical authorities as highly important, with an additional 10.6% perceiving it as somewhat important. This widespread consensus points to a strong public demand for reform that ensures medication labels are consistent, accessible, and patient-focused. Rather than merely highlighting numerical trends, this finding underscores a critical awareness among the population regarding the health risks associated with inconsistent and unclear labelling—risks that include non-adherence, dosing errors, and treatment discontinuation.

The responses further suggest that the public values practical measures such as plain language, regional language translation, larger fonts, and the use of pictograms to enhance comprehension. These preferences align with existing evidence supporting universal design principles in health communication (Merks et al., 2021; WHO, 2021). In the context of India's linguistic and socioeconomic diversity, such standardisation—ideally through national

regulatory bodies like the CDSCO could serve as a vital tool in reducing medication-related errors, promoting adherence, and advancing public health equity.

4.7 IMPROVEMENTS AND SUGGESTIONS

This section captures participants' views on how medication labelling can be improved, with a focus on digital tools and user-preferred features. The aim is to identify practical, patient-centred strategies that enhance comprehension and support adherence, especially within India's diverse and multilingual context.

4.7.1 Role of Digital Tools in Enhancing Label Comprehension

To assess the acceptance and perceived utility of digital health tools, participants were asked whether mobile-based technologies such as QR codes, mobile health apps, or audio-visual aids could help improve their understanding of medication instructions. This question explored role of emerging digital solutions in addressing gaps in label clarity, especially among patients with varying levels of literacy and language proficiency.

Question 1: Do you think digital tools (such as mobile apps or QR codes) could improve your understanding of medication instructions?

1. *Yes*
2. *No*
3. *Not sure*
4. *I don't use a smartphone*

Table 17 - Table representing digital tools for enhancing label comprehension

DIGITAL TOOLS FOR ENHANCING LABEL COMPREHENSION	NUMBER OF RESPONDENTS (n=142)	PERCENTAGE OF RESPONSE (%)
Yes	114	80.3
No	5	5
Not sure	22	15.5
I don't use a smartphone	1	0.7

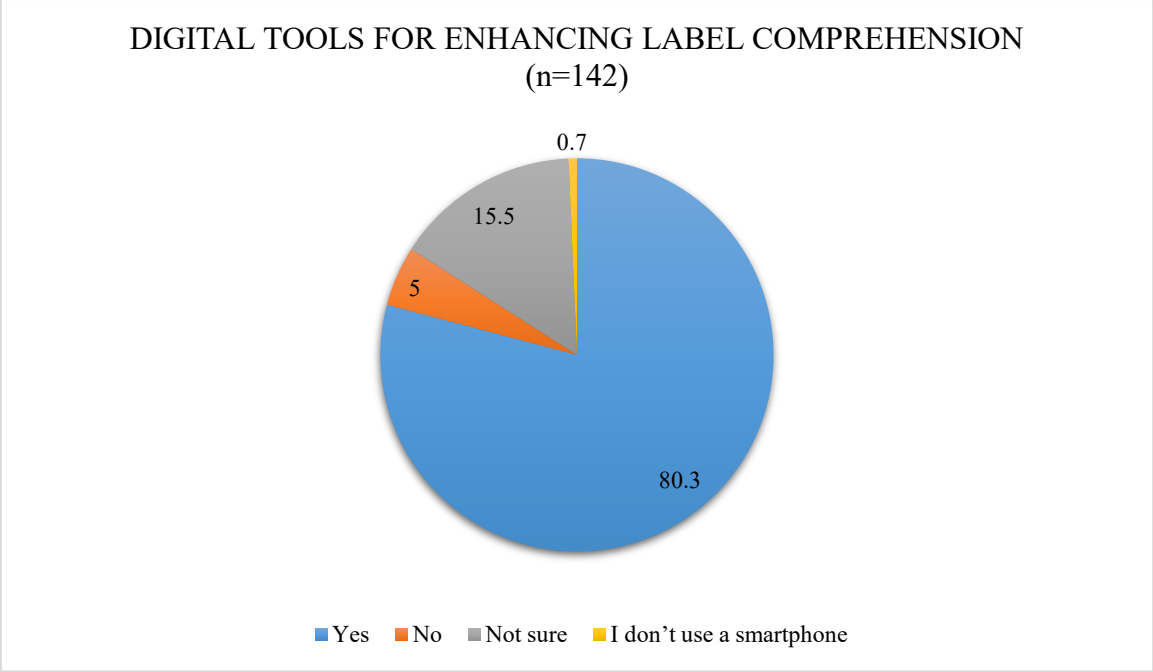

Figure 24 - Pie chart representing digital tools for enhancing label comprehension

When asked whether digital tools such as mobile apps or QR codes could enhance their understanding of medication instructions, a significant majority of participants (80.3%) responded affirmatively. Only a minimal fraction (3.5%) disagreed, while 15.5% were unsure, and 0.7% indicated they do not use a smartphone.

This strong endorsement reflects a growing receptiveness to digital health interventions among the public. Rather than simply indicating approval, these responses suggest that patients recognise limitations of current label formats and see technology as a potential bridge to overcome language, literacy, and accessibility barriers.

The findings resonate with existing research advocating for mobile health (mHealth) tools and smart labelling as scalable strategies to support medication adherence, particularly in low- and middle-income countries (Rahmadi et al., 2023; Singh et al., 2025). Digital solutions can offer audio instructions, video demonstrations, or regional language support, thereby personalising the medication-taking experience. However, the small percentage of respondents expressing uncertainty or lacking smartphone access also highlights the need to balance digital innovation with inclusive, non-digital alternatives to ensure equitable access.

4.7.2 Experiences with Clear Labels and Participant Recommendations

To conclude the survey, participants were asked to offer any additional suggestions for improving medication labels in India. This open-ended question provided space for respondents to reflect on their personal experiences, concerns, and creative recommendations not captured in previous structured items.

Question 2: Have you seen a medication label that was clear and easy to understand? What made it helpful, and how can labels be improved?

KEYWORDS	DESCRIPTION	RESPONSES
Simple Language	Avoiding technical/medical jargon; using plain, simple language	"Simple instructions", "Avoid difficult words", "Easy to understand language"
Larger and Bolder font	Emphasis on readable font size and style, especially for older adults and visually impaired.	"Big letters", "Bold font helped me", "Font size too small to read clearly"
Pictogram and Icons	Visual representations to convey dosage, timing, and safety information.	"Pictograms helped me follow timing", "Icons are easier than words"
Colour Coding	Using colours to distinguish warnings, dosages, or instructions.	"Red for side effects", "Colour code for different times"
Accessibility Features	Braille, audio formats, or visual enhancements for those with impairments	"Add Braille", "Audio instructions", "Make it easier for visually impaired"
QR codes/Digital Tools	Suggestions for tech integration to enhance label comprehension.	"QR for videos", "App-based labels", "QR codes for more information"

Out of 142 participants, the majority provided detailed insights. Their responses offer a ground-level understanding of public interaction with pharmaceutical labelling and reveal significant patterns in user needs, preferences, and challenges.

- **Clarity through Simplicity**

One of the most consistent themes across responses was the importance of simple, non-technical language. Respondents frequently described labels as clear and helpful when they used everyday terms instead of medical jargon. Phrases such as “simple language”, “easy terms”, and “uncomplicated instructions” appeared repeatedly. This especially significant in the Indian context, where a large segment of the population may not have health or scientific literacy.

- **Font size and Legibility**

Numerous participants emphasized font size as a barrier or enabler of understanding. Statements such as “large fonts”, “bold letters”, and “block letters” were associated with positive experiences, while phrases like “small font”, “not readable”, and “hard to read” described negative interactions. Particularly among elderly respondents, font size was cited as a key determinant of label clarity. Several noted that increasing the size of text would significantly improve their ability to self-administer medications safely.

- **Visual Aids: Pictograms and Colour coding**

Visual elements emerged as critical tools for comprehension. Respondents who had encountered pictograms, icons, and colour codes reported greater ease in following instructions, especially regarding dosage and timing. Comments like “picture/icons,” “red for warnings,” “color-coded labels,” and “visual representation” point to the value of graphic communication in bridging literacy gaps. Notably, multiple participants appreciated when children’s medications or inhalers were labelled with diagrams, which made them more intuitive to use.

- **Technological Enhancements: QR codes and Digital tools**

Modernisation through technology was positively received. A significant portion of participants suggested the inclusion of QR codes that link to video demonstrations, multilingual content, or detailed instructions. Some stated that QR codes would be helpful in explaining complex jargon or dosage regimens, especially for first-time users. While the digital divide remains a concern in parts of India, the overall sentiment towards digital supplements was strongly supportive.

- **Language and Regional Representation**

A critical insight from responses was the need for multilingual or regional language labelling. Several participants felt that English-centric labels do not meet the needs of India's diverse population. Comments like "labels in local scripts," "translated labels," and "regional language helps more people understand" reflect a strong desire for inclusivity. A few also noted that while tools like Google Translate help, they are not a reliable substitute for native-language instructions.

Overall, these insights reinforce earlier quantitative findings and align with global literature calling for patient-centred, inclusive labelling strategies (WHO, 2021; Merks et al., 2021). The responses underline the critical role of clear, consistent, and localised communication in improving medication safety and supporting adherence—particularly in resource-limited and multilingual contexts like India.

4.8 SUMMARY

This chapter highlighted several clear trends in how people in India experience and interpret medication labels:

- Many participants admitted they don't always follow the instructions on their medication labels. While 16.2% said they "never" miss following them, 40.1% said it happens "sometimes," and 6.3% said "often."
- Language is a significant factor, 45.1% of participants primarily spoke a regional language, and many noted that labels in English or Hindi often don't meet their needs.
- There was widespread support for government-led standardisation of medication labels, with more than 85% saying it was "very important."
- Most respondents (80.3%) felt that digital tools like QR codes and mobile apps could help them better understand how to take their medicine correctly.

While this study focused on descriptive explore people's experiences and preferences, inferential statistics (such as testing correlations between demographic factors and label understanding) were not included, as they were beyond the study's scope. However, future research could build on these findings by applying more advanced statistical methods to uncover deeper relationships between variables like age, education, and label comprehension.

4.9 CONCLUSION

The findings from the study offer comprehensive view of how medication label design influences user comprehension, especially in the Indian context, where linguistic diversity, literacy levels, and access to digital tools vary widely. Throughout the quantitative data results highlighted clear patterns – most participants struggle with technical jargon, lack of multilingual options, small fonts, while qualitative responses further reinforced these concerns, revealing that labels use plain language, large fonts, pictograms, and consistent formatting.

The data strongly consensus among participants that government and pharmaceutical bodies should standardise labels, with broad support for integrating digital tools like QR codes. These findings underscore the need for policy reforms aimed at improving health literacy and medication safety. Beyond merely describing user difficulties, this analysis brings forward actionable insights, demonstrating the direct link between label design, user behaviour and public health outcomes.

By blending statistical patterns with user perspectives, this chapter not only relays on current challenges but also outlines a clear direction for future improvements. These insights now pave way for the discussion chapter, where they will be interpreted through the lens of existing literature and health communication frameworks.

CHAPTER 5

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 PRIMARY OBJECTIVE

This study examined how medication label clarity influences patient adherence in India. Findings showed that 51.3% of respondents deviate from instructions, often due to unclear language and hard-to-read fonts. In contrast, those exposed to simple wording, clear dosage details, and visual aids reported greater confidence and adherence. This underscores that label clarity is not just a design issue but a key factor in improving health outcomes.

5.1.2 SECONDARY OBJECTIVES

- **Identifying barriers to label comprehension**

A key aim of the study was to identify barriers to understanding medication labels. The linguistic profile of the sample revealed that a majority were regional or multilingual speakers, highlighting a disconnect between English-dominated labels and patient needs. Common obstacles included complex medical terms, small fonts, and lack of visual aids. Participants suggested improvements such as block letters, bullet-point formatting, and regional language scripts. These findings align with existing health literacy research, reinforcing the need for language accessibility and visual clarity to ensure equitable understanding across diverse populations.

- **Evaluating public health implications**

This study also examined the wider public health implications of improved medication labelling. A striking 95.8% of respondents viewed standardised labelling as important, reflecting strong public awareness of the risks posed by inconsistent or unclear labels—including missed doses and harmful drug interactions. The incorporation of multilingual instructions and pictograms was seen as a crucial step toward enhancing patient safety and reducing preventable hospitalisations, thereby supporting broader national health and economic goals.

- **Providing actionable policy recommendations**

The study sought to develop both practical and policy-level recommendations to improve pharmaceutical labelling in India. A significant majority (80.3%) supported the use of digital tools like QR codes linked to multimedia content, highlighting the potential of technology and universal design to improve understanding. Participants also called for visual enhancements such as pictograms, colour-coded warnings, and the inclusion of Braille for visually impaired users. These insights reinforce the need for the CDSCO to prioritise language accessibility and visual clarity, ensuring that labelling practices are inclusive and effective across India's diverse population.

5.1.3 RESEARCH QUESTIONS

- **How does medication label clarity impact medication adherence among Indian patients?**

Clarity strongly influences medication adherence. Over the half of participants (51.3%) admitted to not always following instructions, with unclear labels being a commonly cited factor. Those who reported clear, easy-to-read demonstrated better understanding and adherence, especially when labels included simple language, larger fonts and structured dosage instructions.

These findings strongly support existing literature, such as WHO's emphasis on health literacy and the importance of patient-friendly pharmaceutical communication. In the context of India where education levels and language literacy vary widely clarity is not just a preference, but a necessity for safe and effective medication adherence. Inadequate comprehension can lead to missed doses, overdoses, or inappropriate usage, all of which pose serious public health risks.

- **What role does language accessibility (e.g. regional languages) play in improving the effectiveness of medication labels in India?**

A major role. With only 31.7% using English as their primary language and 45.1% using regional languages, many participants emphasized the need for multilingual labelling. The data indicates that using regional languages, simple terms, and local scripts would significantly improve comprehension for a large portion of the population.

These responses align with public health principles that prioritize equity and accessibility. Patients are less likely to adhere to medication instructions they cannot read or understand. As a result, multilingual labelling can directly influence health outcomes, particularly in rural or

semi-literate populations. This supports calls for standardized, regional-language labels to be mandated by regulatory authorities like the CDSCO, enhancing inclusivity and reducing healthcare disparities.

- **To what extend do technological interventions, such as QR codes and mobile health apps, support adherence by enhancing label clarity in India?**

Significantly. 80.3% of participants believed digital tools could improve their understanding of labels. Suggestions included QR codes linking to videos, mobile apps for translation, and visual demonstrations of dosage. These tools were especially recommended for addressing complex jargon and enhancing engagement among tech-literate users.

The smartphone penetration in India, even in rural areas, this is a practical solution. These findings also resonate with international health communication trends where eHealth and mHealth are being increasingly used to improve medication adherence. Implementing such technology in India, through government approved application or CDSCO verified platforms, could modernise patient engagement and significantly reduce errors in medication use.

COMPARISON WITH EXISTING LITERATURE

While past studies, have highlighted health literacy as a determinant of medication adherence, this study provides new insights into how design and real-world adoption of pictograms and colour coding tools across socio-economic groups. This study confirms earlier findings on the link between label clarity and medication adherence but adds new insights from Indian context about the role of regional languages and mobile technologies. Also, unlike some prior assumptions that digital health tools might not be accessible to lower-literacy populations, this study shows growing openness to digital solutions among diverse users. Any tech-driven solution must therefore be inclusive, ensuring accessibility across devices and education levels.

5.2 RECOMMENDATIONS

5.2.1 PRATICAL RECOMMENDATIONS

Based on the results, the following practical steps are recommended:

- Pharmaceutical companies should adopt simplified language, larger fonts, and pictograms across all labels
- Use of multilingual labels, especially in major regional languages like Hindi, Malayalam, Tamil, and Bengali to address diverse literacy needs.

- Include QR codes that link to visual/audio instructions in various languages for those with limited literacy.
- Develop mobile applications and online tools that offer medication guidance using visuals, voice and text formats.

5.2.2 POLICY RECOMMENDATIONS

At the policy level, the following are suggested:

- The CDSCO should implement national labelling standards mandating readable fonts, colour coding, pictograms, and multilingual formats.
- Incentivise pharmaceutical manufactures to integrate universal design principles into packaging, especially for vulnerable populations.

5.2.3 SUGGESTIONS FOR FUTURE RESEARCH

- Future studies should examine label comprehension across rural vs. urban popular, especially those with low literacy.
- Further exploration into AI-based digital tools for medication guidance in Indian languages would be valuable.
- Comparative studies between countries with strong labelling laws and India could highlight best practices for adaption.

FINAL REFLECTION

Completing this dissertation has deepened my understanding of the intersection between health communication, literacy and policy. Initially appeared to be a design challenge soon revealed itself as a public health priority that affects millions across India. This research not only enhanced my analytical and methodological skills but also instilled in me a greater awareness of the real-world impact that thoughtful, inclusive communication can have in healthcare.

REFERENCES

1. Arshad, M.P.A. *et al.* (2023) 'Diabetes Health Literacy, Drug Adherence and Factors Associated with Them among Urban Patients in Kerala, India'. *Journal of Postgraduate Medicine, Education and Research*, 57(3), pp. 124–130. DOI: 10.5005/jp-journals-10028-1632.
2. Ayapilla, P. (2023) *The Impact of Regional Labeling on Drug Accessibility | Freyr - Global Regulatory Solutions and Services Company*. Available at: https://www.freyrsolutions.com/blog/the-impact-of-regional-labeling-on-drug-accessibility (Accessed: 24 March 2025).
3. Baryakova, T.H. *et al.* (2023) 'Overcoming Barriers to Patient Adherence: The Case for Developing Innovative Drug Delivery Systems'. *Nature Reviews. Drug Discovery*, 22(5), pp. 387–409. DOI: 10.1038/s41573-023-00670-0.
4. Brown, M.T. and Bussell, J.K. (2021) 'Medication Adherence: WHO Cares?' *Mayo Clinic Proceedings*, 86(4), pp. 304–314. DOI: 10.4065/mcp.2010.0575.
5. CDSCO. (2025) *Circulars*. Available at: https://cdsco.gov.in/opencms/opencms/en/Acts-and-rules/Guidance-documents/ (Accessed: 31 March 2025).
6. Ellen Hogan, M. (2024) '(PDF) Enhancing Medication Adherence by Improving the Clarity of Labels for Prescription Drugs'. *ResearchGate*. DOI: 10.3821/1913-701X-144.5.236.
7. EMA. (2020) *Product-Information Requirements | European Medicines Agency (EMA)*. Available at: https://www.ema.europa.eu/en/human-regulatory-overview/marketing-authorisation/product-information-requirements (Accessed: 31 March 2025).
8. Gamma. (2024) *The Importance of Proper Labeling in Medical Fields*. Available at: https://www.gammacompliance.com/compliance101/the-importance-of-proper-labeling-in-medical-fields (Accessed: 20 March 2025).
9. Hataway, L. (2023) *Patient-Friendly Prescription Labels Help Patients Take Medications*. *UGA Today*. Available at: https://news.uga.edu/patient-friendly-prescription-labels-boost-medication-adherence/ (Accessed: 9 January 2025).
10. Dudovskiy, J. (2024) *Research Approach*. *Research-Methodology*. Available at: https://research-methodology.net/research-methodology/research-approach/ (Accessed: 9 April 2025).
11. Jansen, D. (2023) *Research Philosophy & Paradigms: Positivism, Interpretivism & Pragmatism*. *Grad Coach*. Available at: https://gradcoach.com/research-philosophy/ (Accessed: 10 April 2025).
12. Jeetu, G. and Girish, T. (2010) 'Prescription Drug Labeling Medication Errors: A Big Deal for Pharmacists'. *Journal of Young Pharmacists : JYP*, 2(1), p. 107. DOI: 10.4103/0975-1483.62218.
13. Julius, M.E. (2022) DOI: 10.31730/osf.io/arpqj.
14. Kim, S.K. *et al.* (2025) 'Effectiveness of Mobile Health Intervention in Medication Adherence: A Systematic Review and Meta-Analysis'. *Journal of Medical Systems*, 49(1), p. 13. DOI: 10.1007/s10916-024-02135-2.
15. Kumar, S. (2024) *Overcoming Various Challenges to Risk Communication and Minimization in India*. *DIA Global Forum*. Available at: https://globalforum.diaglobal.org/issue/september-2024/overcoming-various-

challenges-to-risk-communication-and-minimization-in-india/ (Accessed: 24 March 2025).
16. Maghroudi, E. *et al.* (2021) 'The Impact of Textual Elements on the Comprehensibility of Drug Label Instructions (DLIs): A Systematic Review'. *PLOS ONE*, 16(5), p. e0250238. DOI: 10.1371/journal.pone.0250238.
17. Makvana, S.H., Deshpande, S. and Zaveri, M. (2024) 'Comparative Analysis Of Drug Labeling Requirements In The USA And India: Regulatory Frameworks And Compliance Standards'. *IJPS Journal*. DOI: 10.5281/zenodo.11620505.
18. McQuaid, E.L. and Landier, W. (2018) 'Cultural Issues in Medication Adherence: Disparities and Directions'. *Journal of General Internal Medicine*, 33(2), pp. 200–206. DOI: 10.1007/s11606-017-4199-3.
19. Merks, P. *et al.* (2021) 'Medication Adherence and the Role of Pictograms in Medication Counselling of Chronic Patients: A Review'. *Frontiers in Pharmacology*, 12, p. 582200. DOI: 10.3389/fphar.2021.582200.
20. Mohammad, A. *et al.* (2022) 'Comparing Comprehensibility of Standard and Enhanced Prescription Medicine Labels: A Randomized Simulation'. *International Journal of Pharmacy Practice*, 30(4), pp. 332–341. DOI: 10.1093/ijpp/riac034.
21. Myupchar. (2025) *Baidyanath Nagpur Sidpiles Tablet (25): Uses, Price, Dosage, Side Effects, Substitute, Buy Online*. *myUpchar*. Available at: https://www.myupchar.com/en/medicine/baidyanath-nagpur-sidpiles-tablet-p37157884/25s-v258992 (Accessed: 1 April 2025).
22. Organization, W.H. (2022) *Adherence to Long-Term Therapies: Evidence for Action*. Geneva: World Health Organization.
23. Park, Y.S., Konge, L. and Artino, A.R.J. (2020) 'The Positivism Paradigm of Research'. *Academic Medicine*, 95(5), p. 690. DOI: 10.1097/ACM.0000000000003093.
24. Pons, E. da S. *et al.* (2019) 'Users' Preferences and Perceptions of the Comprehensibility and Readability of Medication Labels'. *PLOS ONE*, 14(2), p. e0212173. DOI: 10.1371/journal.pone.0212173.
25. Prasad, M. and Kumar, V.S. (2022) 'ASSESMENT OF SOCIO – ECONOMIC FACTORS ON MEDICATION ADHERANCE AND QUALITY OF LIFE IN PATIENTS WITH HYPERTENSION AND TYPE 2 DIABETES'. 20(19).
26. Rahmadi, C., Efendi, F. and Makhfudli, M. (2023) 'The Effect of Reminder System and Audio-Visual Education to Improve Treatment Adherendce on Pulmonary Tuberculosis Patients: A Systematic Review'.
27. Research, C. for D.E. and. (2024) 'Patient Labeling Resources'. *FDA*. Available at: https://www.fda.gov/drugs/fdas-labeling-resources-human-prescription-drugs/patient-labeling-resources (Accessed: 26 March 2025).
28. Saunders, M.N.K., Lewis, P. and Thornhill, A. (2019) *Research Methods for Business Students*. eighth edition. New York: Pearson.
29. Shah, S. and Singh, A. (2020) 'Drug Labeling: The Study of Compliance of Regulatory Requirements for Prescription Drugs in India'. *Perspectives in Clinical Research*, 11(4), pp. 164–167. DOI: 10.4103/picr.PICR_195_18.
30. Singh, S. *et al.* (2024) 'Presbyopes and Ophthalmic Medication Labels: Challenges and Suggestions'. *Indian Journal of Ophthalmology*, 72(5), p. 760. DOI: 10.4103/IJO.IJO_1476_23.
31. Wang, T., Huang, Y.-M. and Chan, H.-Y. (2024) 'Exploration of Features of Mobile Applications for Medication Adherence in Asia: Narrative Review'. *Journal of Medical Internet Research*, 26, p. e60787. DOI: 10.2196/60787.

32. WHO. (2025) *Health Literacy*. Available at: https://www.who.int/news-room/fact-sheets/detail/health-literacy (Accessed: 2 April 2025).
33. Wilder, M.E. *et al.* (2021) 'The Impact of Social Determinants of Health on Medication Adherence: A Systematic Review and Meta-Analysis'. *Journal of General Internal Medicine*, 36(5), pp. 1359–1370. DOI: 10.1007/s11606-020-06447-0.
34. Yoon, S. *et al.* (2023) 'Factors Influencing Medication Adherence in Multi-Ethnic Asian Patients with Chronic Diseases in Singapore: A Qualitative Study'. *Frontiers in Pharmacology*, 14. DOI: 10.3389/fphar.2023.1124297.

APPENDICES

APPENDIX A – SURVEY QUESTIONNAIRE

https://forms.gle/pdckRjDT7bo92PNM9

MEDICATION LABELLING AND CONSUMER UNDERSTANDING SURVEY

Dear Participant,
My name is Beema Beevi, and I am currently pursuing my Master's in Pharmaceutical Business and Technology at Griffith College, Dublin, Ireland. As part of my academic journey, I am conducting a survey as part of my dissertation titled *"Clear Medication Labels for Better Public Health Outcomes: Tackling Non-Adherence in India."*

- The main focus of this study is to explore how the clarity and design of medication labels impact patient adherence to prescribed treatments in India. Given the diverse linguistic, educational, and cultural landscape of the country, the study aims to identify barriers related to label comprehension and suggest improvements that could foster better health outcomes.

Brief Instructions:

- 🕓 Estimated time: 5 minutes
- 🔐 All responses are anonymous and confidential. Data will be securely stored and processed in compliance with ethical research standards.
- 🤝 Participation is entirely voluntary, and you may choose to withdraw at any time.
- 📧 For any inquiries or further information regarding this survey, please feel free to contact me: beema.beevi@student.griffith.ie

* Indicates required question

1. I have read and understood the above information provided *

Mark only one oval.

- ◯ Yes *Skip to question 2*
- ◯ No *Skip to section 2 (DECLINED PARTICIPATION)*

DECLINED PARTICIPATION

You have declined to participate in the survey. Thank you for your time. You may close the browser or click submit below.

CONSENT OF PARTICIPATION

2. I agree to participate in this research survey *

Mark only one oval.

- ◯ Yes *Skip to question 3*
- ◯ No *Skip to section 2 (DECLINED PARTICIPATION)*

DEMOGRAPHIC INFORMATION

3. 1. What is your age? *

Mark only one oval.

- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-59
- ◯ 60 and above

4. 2. What is your gender *

Mark only one oval.

- ◯ Woman
- ◯ Man
- ◯ Other
- ◯ Prefer not to say

5. 3. What is the highest level of education you have completed? *

Mark only one oval.

- ◯ No formal education
- ◯ Primary school (upto 5th standard)
- ◯ Secondary school (6th - 10th standard)
- ◯ Higher secondary (11th - 12th)
- ◯ Graduate (bachelor's degree)
- ◯ Postgraduate (Master's/Ph.D.)

6. 4. Which language do you primarily speak ? *

Mark only one oval.

- ◯ English
- ◯ Hindi
- ◯ Regional language
- ◯ I am multilingual

MEDICATION USAGE AND ADHERENCE

7. 5. Do you currently take prescription medication regularly? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I used to, but not anymore

8. 6. How often do you find yourself not following the instructions on your medication labels? *

Mark only one oval.

- ◯ Never
- ◯ Rarely
- ◯ Sometimes
- ◯ Often
- ◯ Always

9. 7. Have you ever misunderstood the instructions on your medication labels (e.g., due to complex language, small font, unclear directions, or language barriers like being unable to read English)? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe

10. 7a. If yes, what was the issue? (Select all that apply)

Check all that apply.

- ☐ Complex language
- ☐ Small font size
- ☐ Confusing instructions
- ☐ Language barrier
- ☐ Poor written or unclear labels
- ☐ Other: _____

MEDICATION LABEL COMPREHENSION

11. 8. How easy is it for you to understand the instructions on your medication labels? *

Mark only one oval.

	1	2	3	4	5	
Very	◯	◯	◯	◯	◯	Very difficult

12. 9. Do you feel that the labels on your medication provide all the information you need to use the medicine safely? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Sometimes

13. 10. Do you think having labels in your local language would help you understand your medication instructions better? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe

14. 11. Would you find it helpful if medication labels included pictograms (symbols or pictures)? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe

IMPACT OF CLEAR LABELLING ON ADHERENCE

15. 12. If medication labels were clearer and easier to understand, would you be more likely to follow the instructions properly? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe

16. 13. What specific changes to medication labels would help you understand and follow instructions better? (e.g., larger font, simpler language, pictograms, translated labels, etc.) *

_____

17. 14. In your opinion, how important is it for the government and pharmaceutical companies to standardize medication labels in India? *

Mark only one oval.

- ◯ Very important
- ◯ Somewhat important
- ◯ Neutral
- ◯ Not very important
- ◯ Not important at all

IMPROVEMENT SUGGESTIONS

18. 15. Do you think digital tools (such as mobile apps or QR codes) could improve your understanding of medication instructions? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not sure
- ◯ I don't use a smartphone

19. 16. Have you seen a medication label that was clear and easy to understand? What made it helpful, and how can labels be improved? *

Survey Completed

Thank you for your valuable time😊. Your response has been recorded.

APPENDIX B – ETHICS FORM

Innopharma education

GRIFFITH COLLEGE

Ethics Application & Declaration Form

DISSERTATION TITLE: CLEAR MEDICATION LABELS FOR BETTER PUBLIC HEALTH OUTCOMES: TACKLING NON-ADHERENCE IN INDIA

RESEARCHER'S NAME: BEEMA BEEVI

PROGRAMME OF STUDY: MSC IN PHARMACEUTICAL BUSSINES & TECHNOLOGY

SUPERVISOR'S NAME: ALISON CUMMINS

DECLARATION:
The information in this application form is accurate to the best of my knowledge. I undertake to abide by the principles outlined by Innopharma/Griffith College ethics policy in my research dissertation. I confirm that I have completed a full ethics assessment for my research dissertation as per the college guidelines. I will not begin my primary research until such approval from my supervisor and/or ethics Committee has been obtained.
I pledge to carry out my research according to the Innopharma/Griffith College academic integrity standards. Any results presented in my dissertation will be from my own, original research, I will reference and/or acknowledge any material or sources used in its preparation and I will not plagiarise the work of anyone else.

For Student:
STUDENT SIGNATURE: 

DATE: 05/03/2025

The research contained within this research dissertation proposal has been approved.

For Supervisor:
Ethics Committee Approval Required: Yes [Y] No [ ]

SUPERVISOR SIGNATURE: Alison Cummins

DATE: 10/03/2025

For Ethics Committee (if required):
Ethics Committee Approval Given: Yes [ ] No [ ]

ETHICS COMMITTEE MEMBER SIGNATURE:

DATE:

NOTE: Supervisors are responsible for ensuring their students fill in this form correctly and that all ethical areas have been considered.

SECTION 1: DESCRIPTION OF RESEARCH STUDY

1.1 Purpose and objectives of research

To determine the current situation of medication adherence by clear labelling and understand the key barriers of adhesion. The purpose of this study is to identify key barriers to medication adherence in India and explore how clearer medication labelling can improve patient compliance & how to improve the labelling for better public health outcomes. Many patients struggle to understand prescription labels due to complex medical terminology, language barriers, and low literacy levels, leading to incorrect medication use and poor health outcomes.

- To analyse the impact of medication label clarity on adherence
- To identify barriers to label comprehension
- To evaluate the public health implications of improved labelling
- To provide actionable policy recommendations for pharmaceutical labelling

1.2 Research methodology: *[300 words maximum/ detail how you will acquire your primary data (focus groups/interviews/online surveys etc). Proposed questions for questionnaires and/or interviews **must be included** in the appendix].*

This study will use online surveys - questionnaire as the primary method of data collection to assess the impact of medication labelling on adherence in India. The survey will be conducted through Google Forms and distributed via WhatsApp, email, and social media platforms such as Facebook, Telegram, and online health forums. The structured questionnaire will include closed-ended questions (Yes/No, multiple-choice) for statistical analysis and open-ended questions to gather patient experiences and suggestions for improving medication labels. The survey will take approximately 10–15 minutes to complete, making it accessible and convenient for participants.

The target participants will be patients who regularly take prescription medications, ensuring relevant insights. A total of 50–100 participants will be selected. All responses will remain anonymous and confidential, and participants will have the option to withdraw at any time. This research approach ensures efficient and cost-effective data collection, providing valuable insights into how clearer medication labels can improve adherence and public health outcomes in India.

Questionnaire question include:

- Age/ gender/ education level
- How often do you take prescription medications?
- Do you sometimes forget to take your medication as prescribed?
- Do you sometimes forget to take your medication as prescribed?
- How often do you take prescription medications?
- Do you ever skip doses of your medication due to confusion or difficulty with the label instructions?
- How easy do you find the information on your medication labels to understand?
- What kind of information on medication labels is most confusing for you?
- Do you understand the language used on your medication labels?
- What would make medication labels easier for you to understand?
- Have you ever asked a pharmacist or doctor for clarification on your medication label?
- Do you think better medication labels would help improve your medication adherence?
- What suggestions do you have for improving medication labels to make them more user-friendly?

SECTION 2: POSSIBLE ETHICAL ISSUES

Answer 'yes' or 'no' to the following questions.

SUBJECT MATTER

Does the research proposal involve:

Research into specific company activities that would be deemed sensitive or confidential	No
Research into politically and/or racially/ethnically and/or commercially sensitive areas	No
Sensitive, personal, professional or corporate issues	No

RESEARCH PROCEDURES

Does the research proposal involve:

Research that might damage the reputation of companies or participants	No
Research that may negatively affect the reputation of Griffith College/Innopharma	No
Use of personal records without consent	No
Use of company data without consent	No
The offer of any inducements to participate	No
Audio or visual recording without consent	No
Using a language other than English	No

PARTICIPANTS

Does the research proposal involve:

People who are not competent and/or fluent in English	No
Does your research group include any of the following vulnerable groups	No

(Adults with psychological impairments; Adults with learning difficulties; Adults under the protection/control /influence of others (e.g. in care/prison); Relatives of ill people (e.g. parents of sick children); Hospital or GP participants recruited in a medical facility; persons under the age of 18)

If you have answered NO to ALL questions, please go straight to Section 4.

If you have answered YES to ANY question in SECTION 2, you must fill in SECTION 3.

SECTION 3: STEPS TAKEN TO AVOID ETHICAL ISSUES

[Only fill in this section if you answered YES to ANY of the questions in Section 3. For example, if you answered yes to including participants who are not fluent in English, you might put forward a plan that offers your survey in two languages to take this into account. Another example could be a study where the researcher wants to include information about the care received by children with a long-term condition but it would not be ethical to approach the children directly but it might be acceptable to instead ask parents questions about their child's care. If these plans are acceptable to your supervisor, you may not need to apply for ethical approval from the Ethics Committee].

3.1. If your ethics relates to ***Subject Matter***, outline your action plan to work around any sensitive issues.
3.2. If your ethics relates to ***Research Procedures***, outline your action plan to deal with possible ethical issues in your research procedures.
3.3. If your ethics relates to ***Participants***, outline how you will protect vulnerable persons or those that do not have English as their first language.

SECTION 4: ABOUT YOUR PARTICIPANTS

4.1. Outline your participant profile and why you have chosen them for this study *[Do not provide names except where it is deemed impossible to conceal identity].*

- Adults who take prescription medications regularly.
- People from both urban and rural areas in India.
- Individuals with different literacy levels and language backgrounds to understand how well they comprehend medication labels.

The participants are chosen because they have direct experience with medication labels, making them the ideal group to provide insights into the problems people face and how it affects their medication adherence. This diverse group will help identify common barriers to label comprehension and offer ideas for improving labels to make them more understandable for everyone.

4.2 How do you plan to gain access to/contact/approach your participant(s).

To gain access to participants for this study, I will use a combination of methods to ensure a wide and diverse sample. First, I will distribute the online survey through popular platforms such as WhatsApp, Facebook, and Telegram, allowing me to reach participants across India. In addition, I plan to collaborate with local pharmacies, where healthcare providers like pharmacists can help inform and encourage patients to participate in the study. Throughout the process, I will emphasize that participation is voluntary, and that responses will remain anonymous and confidential. This approach will help ensure a broad and representative sample for the study.

SECTION 5: INFORMATION, CONSENT AND CONFIDENTIALITY

5.1 **Participant Information Letter (PIL) for participants**

[You must submit an information letter for participants with this application, as part of your appendices document. For online surveys, it is sufficient to include a paragraph summarising and explaining the purpose of the research at the beginning of the survey. In all other research e.g. interviews, phonecalls, a PIL should be provided to each participant before they are asked for their consent to take part. A template PIL is available in Moodle].

Please confirm below that your information letter covers:	
Description of the research topic and method	No
Details of what participation will involve	No
Rights to anonymity	No
Confidentiality	No
Rights to withdraw from the research	No
The contact details of the researcher and supervisor (if necessary)	No

5.2 **Informed Consent Form (ICF) for participants**

[Informed consent is required for most research. For online surveys, it is sufficient to get the participant to tick two boxes at the beginning of the survey – one to state they understand the research and one to give consent. In all other research e.g. interviews, phonecalls, a signed consent form is required. If the data is gathered online e.g. zoom, a signed consent form can be scanned and sent to the researcher. A template ICF is available in Moodle. The signed ICFs, along with the surveys, audio files or interview notes etc. must be stored in the primary data folder on moodle and can be accessed by Innopharma staff for the purposes of verifying the authenticity of the research carried out and the data collected].

Please indicate below if your research requires a signed consent form by selecting the relevant option only:

No: my research study involves an online survey only and/or does not require signed consent

SECTION 6: STORAGE OF DATA

[Please ensure that you are abiding by GDPR and the national Data protection laws https://www.hrb.ie/funding/gdpr-guidance-for-researchers/gdpr-and-health-research/).

*The student is responsible for storage of data and this will be handed over to the college in an electronic format as part of the thesis submission i.e. primary data and completed ICFs where applicable will be added to the primary data folder on moodle. The rationale is to keep data **as long as it is still useful** and there is an intention to use it further **for research** so if this is not the case then this can be stipulated here and a shorter retention period given.]*

6.1. How will you store the research data and for how long? How will you manage data protection issues?

The collected information will be stored on a laptop secured with a password. Additionally, the raw data will be electronically submitted to the designated Moodle folder under my name at the college, where it can be accessed by the supervisor or an external examiner. The data protection will adhere to the General Data Protection Regulation (GDPR) and the policies of Griffith College. This raw data will be retained for a maximum of two years, after which it will be permanently deleted.

SECTION 7: NON-DISCLOSURE AGREEMENT & STUDENT CONSENT

7.1 **Non-Disclosure Agreement (NDA)**
Will the final dissertation contain any information pertaining to any source what would warrant the use of a Non-Disclosure Agreement (NDA) e.g. industry-based research?

No

7.2 **Student consent**
If a Non-Disclosure Agreement (NDA) is not required, does the Student consent to allow their completed dissertation to be held/published by Innopharma/Griffith College?

Yes

SECTION 8: RECORDING AND RETENTION OF DISSERTATION VIVA

8.1 **Viva Recording**
The Dissertation viva will be recorded. This recording may be used to facilitate assessment by Innopharma staff, a third reader if necessary and/or if requested by the external examiner for the Programme. The recording will be held in line with current GDPR guidelines and will not be made publicly available.

SECTION 9: DOCUMENT CHECKLIST

NOTE: Applicants must attach the following documents in electronic format to the appendix.

Which documents are added to the appendix? Please tick N/A if not applicable:

9.1 Participant Information Letter (PIL) for participant	No
9.2 Informed Consent Form (ICF) for participant	N/A
9.3 Questions/survey for interviewees/focus groups etc *(can be in draft form)*	Yes
9.4 Any other documents e.g. Non-Disclosure Agreement	N/A

I confirm that this application is complete and all required documents are included in the appendix.

For Student:
STUDENT SIGNATURE: 

DATE: 05/03/2025