INFLUENTIAL FACTORS ON PATIENT SATISFACTION AND EFFECTIVENESS OF HEALTH PROMOTION IN PRIMARY HEALTHCARE, XI'AN CHINA

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June 2024

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By

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A thesis submitted to the
M. Kandiah Faculty of Medicine and Health Sciences,
Universiti Tunku Abdul Rahman,
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy (Medical Science)

June 2024

ABSTRACT

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LI HUAN

Patient satisfaction is an important indicator for evaluating the healthcare system and predicting health outcomes, gaining a deep insight into patient needs, expectations, and experiences is crucial for enhanced healthcare quality. Health promotion can effectively help people change their lifestyle, achieve the best physical, emotional, and other aspects of health, and play an important role in primary healthcare. Xi'an, as a capital city in western China, faces the dual challenges of population growth, diversified medical demand and efficient allocation of medical resources**.** Especially after the outbreak of COVID-19, Xi 'an's primary healthcare institutions have been pushed to the front line of epidemic prevention and control, face the challenges of assessing and managing COVID-19 patients in a larger population setting with limited resources in comparison to hospitals. However, so far, there is still a lack of research on the patient satisfaction with primary healthcare in Xi 'an, and the effectiveness of health promotion intervention on patient satisfaction is still limited.

The aim of the study is to determine the patient satisfaction status towards primary healthcare, to determine the factors associated with patient satisfaction, in Xi'an, China, and to determine the effectiveness of the health promotion intervention on patient satisfaction towards primary healthcare in Xi'an City.

A cross-sectional study (Phase I) was conducted in primary healthcare institutions in Xi 'an, China. The PSQ-18 questionnaire was used for data evaluation and SPSS version 23.0 for data analysis. A total of 315 patients were recruited. In the multiple linear regression analysis, the highly educated patients had a higher patient satisfaction score than the low-educated patients (β=1.138, 95% confidence interval=0.135–2.141, P=0.026).

A single-blind randomized controlled trial design (Phase II) was conducted. The patients were randomly assigned to either an intervention group or a placebo group. Both groups received 3-week Wechat education, with the intervention group receiving online intervention education including nine items, while the placebo group received related information about healthcare and health. Data were collected before and after the intervention, and the results were measured using a social demographic questionnaire and the Patient Satisfaction Questionnaire (PSQ-18), which were analysed using SPSS 23.0 version. A total of 312 patients were enrolled, with 156 assigned to the intervention group and 156 assigned to the placebo group. The Patient Satisfaction Questionnaire (PSQ-18) revealed that the

general satisfaction domain showed the most improvement, increasing from Mean (SD)=3.474 (0.060) to Mean (SD)=3.994 (0.045) before the intervention. Results from the two-way repeated measures ANOVA show to have significant effect on patient satisfaction particularly the general satisfaction, technical quality, communication, financial aspect, and time spent.

The patients with a higher educational level showed a higher patient satisfaction level than did those with a lower educational level. The intervention significantly improved patient satisfaction in the intervention group compared to the placebo group, particularly in the areas of general satisfaction, technical quality, communication, and time spent.

Keywords: Health promotion intervention; Patient satisfaction; Primary healthcare; Randomized controlled trials

ACKNOWLEDGEMENT

I would like to express my gratitude to M. Kandiah Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman and all members of the Research and Ethical Committee of Universiti Tunku Abdul Rahman and Ethical Committee of Shaanxi Energy Institute, for their kind permission to conduct this study.

My deepest and sincere gratitude must go to my supervisor Assistant Professor Ts Dr Foo Chai Nien, M. kandiah Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman, for her kind guidance, continuous close supervision in primary healthcare services field and sharing technical knowledge concerning research methods and invaluable advice for throughout this study.

I am deeply indepted and grateful to my co-supervisor Professor Dr Ching Siew Mooi, Faculty of Medicine and Health Sciences, University Putra Malaysia, former supervisors Dr Mohammed Abdulrazzaq Jabbar and Kye Mon Min Swe, for their kind guidance, continuous supervision, invaluable suggestions and opinion throughout my study.

My great thanks also would like to extend to Dr Gao Fei, Section Chief of Graduate and Continuing Education Administration, Xi 'an Medical University , Xi 'an Community Health Service Center for Patient questionnaire and data collection.

I am very greatful to all patients who participated in this study. I also thank to Science Officers of the Postgraduate Laboratory, M. Kandiah Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman and all my Postgraduate colleagues for their kind help and unreserved support throughout this research.

I would like to thank to all my senior and junior colleagues staffs, M. Kandiah Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman, for their kind support during the course of Ph.D.

My great thanks also would like to extend to Universiti Tunku Abdul Rahman as providing me with good learning conditions and opportunities.

Finally, I would like to express my deepest gratitude to my family. Without the support of my family, I would not have completed my postgraduate journey. To my lovely son, who are the joy of my life, I appreciate all your patience during mommy's Ph.D. journey. It requires lots of sacrifices and tricks to juggle the time between being a student and a mother. The unconditional love and unceasing encouragement from my family have kept me going during hard times.

I have been fortunate to have genuinely fantastic supervisors who are aware of my commitments and have been tolerant yet still assured that I have made progress, also, to those who directly or indirectly have lent their helping hands in this venture. This research project is a collective effort of all and I sincerely remember

and acknowledge them. Thanks !

APPROVAL SHEET

This thesis entitled "**INFLUENTIAL FACTORS ON PATIENT SATISFACTION AND EFFECTIVENESS OF HEALTH PROMOTION IN PRIMARY HEALTHCARE， XI'AN CHINA** " was prepared by LI HUAN and submitted as partial fulfillment of the requirements for the degree of Doctor of Philosophy (Medical Science) at Universiti Tunku Abdul Rahman.

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SUBMISSION THESIS

It is hereby certified that **LI HUAN** (ID No: **20UMD04012**) has completed this thesis entitled "INFLUENTIAL FACTORS ON PATIENT SATISFACTION AND EFFECTIVENESS OF HEALTH PROMOTION IN PRIMARY HEALTHCARE， XI'AN CHINA" under the supervision of Assistant Professor Ts Dr Foo Chai Nien (Supervisor) from M. Kandiah Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman, Professor Dr Ching Siew Mooi (External co-supervisor) from Faculty of Medicine and Health Sciences, University Putra Malaysia, and Dr Gao Fei (External co-supervisor), Faculty of Continuing Education, Xi 'an Medical

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I hereby give permission to the University to upload softcopy of my thesis in pdf format into UTAR Institutional Repository, which will be made accessible to UTAR community and public.

Yours truly,

(LI HUAN)

DECLARATION

I, LI HUAN hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

(LI HUAN)

Date : 5th June 2024

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

COVID-19	Coronavirus disease 2019
PHC	primary healthcare institutions
HP	health promotion
PS	Patient Satisfaction
SD	standard deviation
IQR	interquartile range
MYR	Malaysian Ringgit
USD	Ultimate Strength Design
PSQ-18	Patients Satisfaction Questionnaires-18
WHO	World Health Organization
CHS	Community healthcare Service
AHRQ	Agency for Healthcare Research and Quality
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Systems
Q	Question
CAHPS	Consumer Assessment of Healthcare Providers and Systems
UNICEF	United Nations International Children's Emergency Fund
MDGs	Millennium Development Goals
NPS	Net Promoter Score
PROMs	Patient-Reported Outcome Measures

CHAPTER 1

INTRODUCTION

1.1 Background

The sudden outbreak of COVID-19 in late 2019 has triggered a serious public health event that has caused great panic around the world (Bin Traiki *et al.*, 2020) . For the vast majority of people, home quarantine is the main way to combat the epidemic, and the important battlefield of epidemic prevention and control has been settled in the community. Community prevention and control work bears on the success of the epidemic prevention and control campaign, directly affects the lives and health of the people and is the top priority for epidemic prevention and control (Rasanathan and Evans, 2020). During the COVID-19 epidemic, primary healthcare institutions (PHC) are at the forefront of epidemic prevention and control (Hawrysz, Zyna Gierszewska and Bitkowska, 2021).

Establishing primary healthcare enterprises serves as a fundamental assurance for elevating the population's health status and serves as a crucial benchmark reflecting the developmental stage of a nation's medical and healthcare initiatives (Wu *et al.*, 2022). The concept of Primary healthcare (PHC) was developed by the PHC at the international Primary healthcare in Alma-Ata, the former Soviet Union,

in September 1978 (Hawrysz, Zyna Gierszewska and Bitkowska, 2021). The Declaration of Alma-Ata defines Primary healthcare (PHC) as encompassing "essential healthcare" rooted in scientifically validated and socially acceptable methods and technologies (Rifkin, 2018). This ensures that all individuals and families within a community have access to universal healthcare (Zheng zhijie et al., 2018). PHC is the basic way and strategy to realize the goal of "healthcare for all", is the core component of national health system, and is also the inseparable content of community's overall social and economic development (Kaur *et al.*, 2023).

The World Health Organization (WHO) puts forward the main method to maintain people's health in the 21st century is health education in the strategic program of healthcare in the 21st century, "New Horizon of Human health" And health promotion (James, James and Hesketh, 2022). Promoting health stands as a integral component of primary healthcare and serves as the preferred approach for addressing public health concerns (Kim *et al.*, 2021; van Agteren *et al.*, 2021). It can well prevent and control various diseases, is also one of the key links to promote the health of the people and is also an important measure to improve the health quality of the whole people. Whether it is to defeat chronic non-communicable diseases or infectious diseases, it is essential for people to adhere to a healthy lifestyle and acquire health knowledge and skills (Khatri *et al.*, 2023).

Patient satisfaction (PS) is a crucial metric for evaluating healthcare systems and predicting health outcomes (Jorgensen *et al.*, 2023), constituting an integral

component of continuous quality improvement processes within the healthcare system (Hemadeh *et al.*, 2019; Rahim *et al.*, 2021). With intensifying competition and an emphasis on consumerism, patient-centered healthcare services are paramount (Romanowicz *et al.*, 2022). In the realm of healthcare services, there is widespread acknowledgment among experts that assessing patient satisfaction catalyzes the enhancement of overall healthcare service quality (Asamrew, Endris and Tadesse, 2020; Chandra, Ward and Mohammadnezhad, 2019). Active patient involvement plays a crucial role in the continual improvement of healthcare service quality (Fang, Liu and Fang, 2019). Directly evaluating patient satisfaction serves as a measure of the effectiveness of healthcare services (Baalbaki *et al.*, 2008).

According to the main data bulletin of Xi 'an's seventh National population Census 2020, the city's permanent population is 12,952,907 (Xi 'an Bureau of Statistics, 2021). Xi 'an, as a capital city in western China, faces the dual challenges of population growth, diversified medical demand and efficient allocation of medical resources (Wu *et al.*, 2022). Especially after the outbreak of COVID-19, Xi 'an's primary healthcare institutions have been pushed to the front line of epidemic prevention and control, face the challenges of assessing and managing COVID-19 patients in a larger population setting with limited resources in comparison to hospitals (Fang et al., 2019). However, so far, there is still a lack of research on the patient satisfaction with primary healthcare in Xi 'an, and the effectiveness of health promotion intervention on patient satisfaction is still blank.

1.2 Problem statement

In the backdrop of the unprecedented challenges posed by the COVID-19 pandemic, understanding the intricate factors that shape patient satisfaction becomes imperative for enhancing the effectiveness of health promotion interventions within the context of primary healthcare (Huan Li, 2023). This study aims to investigate and elucidate the multifaceted determinants influencing patient satisfaction and their consequential impact on the efficacy of health promotion initiatives in Xi'an, China. As the pandemic has reshaped healthcare dynamics, exploring these factors becomes crucial for devising targeted strategies that can optimize patient satisfaction and contribute to the overall improvement of primary healthcare (Huan Li, 2023). This research seeks to provide valuable insights that can inform policy decisions, healthcare practices, and intervention strategies tailored to the unique challenges presented by the ongoing global health crisis in the Xi'an region.

1.3 Research questions

PHASE I:

(1) What is the level of satisfaction are patients with primary healthcare in Xi'an, China during the COVID-19 pandemic?

(2) What are the factors associated with patients' satisfaction level towards primary healthcare in Xi'an, China during the COVID-19

pandemic?

PHASE II:

(3) Is the proposed health promotion intervention effective in improving the patients' satisfaction toward primary healthcare in Xi'an China during the COVID-19 pandemic?

1.4 Research Objectives

1.4.1 General Objectives

Phase I: To determine patients' satisfaction with primary healthcare and the associated factors in Xi 'an (China) during the COVID-19 pandemic.

Phase II: To determine the effectiveness of the health promotion intervention on patient satisfaction towards primary healthcare during pandemic COVID-19 in Xi'an.

1.4.2 Specific Objectives

Phase I:

(1) To determine the patient satisfaction status towards primary healthcare in Xi'an China.

(2) To determine the relationship between the patient satisfaction and

socio-demographic characteristics (gender, age, marital status,income, educational level, health insurance, occupation) of the patients.

Phase II:

(3) To determine the socio-demographic differences in the patient satisfaction in primary healthcare.

(4) To determine the effectiveness of the health promotion intervention on patient satisfaction towards PHC in Xi'an City, China.

1.5 Research Hypotheses

PHASE I:

(1) There is significant associations between the patients' satisfaction with their socio-demographic characteristics (gender, age, marital status, income, educational level, health insurance, occupation).

PHASE II:

(2) There is significant improvement in patients' satisfactions towards primary healthcare among patients in primary healthcare institution who received health promotion intervention.

1.6 Significance of the study

Investigate the impact of health promotion on patient satisfaction within primary care clinics in China during the COVID-19 pandemic through the administration of questionnaires. This study seeks to discover strategies that improve the quality of primary healthcare, enhance the primary healthcare sector's ability to respond to emergency health events, and lay the groundwork for advancing primary healthcare across different countries.

CHAPTER 2

LITERATURE REVIEW

The concepts related to primary healthcare, the connotation, evaluation, influencing factors, measurement tools and the relationship between patient satisfaction and the quality of primary healthcare, health promotion theory, related models, the effectiveness of health promotion in improving patient satisfaction, and health promotion education are all introduced in this chapter. In this chapter, the health promotion model and its application are further studied, and the health promotion interventions are discussed, and the conceptual framework of this study is constructed.

2.1 Concepts related to primary health

The literature review in this section primarily encompasses the concept of primary healthcare and their implementation in China (Ye et al., 2017). It encompasses medical care services, primary healthcare, and community health services (Tan *et al.*, 2019). In China, the primary healthcare system comprises urban community health service systems and rural service systems centered around township health centers (Wu *et al.*, 2022). These service institutions provide comprehensive healthcare services to community residents by offering basic medical services, health management, and rehabilitation services (Li *et al.*, 2017). They aim to

address residents' basic healthcare needs and enhance the overall health level of the population.

The construction of the primary healthcare system in China serves as a crucial measure in response to challenges such as an aging population and limited medical resources, addressing significant livelihood issues like difficulty and high costs associated with seeking medical treatment (Liang, Mays and Hwang, 2018). In recent years, the Chinese government has intensified investment in the construction of community health service systems and proposed strategic objectives to promote the Healthy China initiative and achieve universal coverage of basic healthcare for all citizens (X. Li, Harlan M. Krumholz, *et al.*, 2020). However, China also faces challenges such as uneven distribution of medical resources and disparities in economic development. Particularly in western regions, the construction of the primary healthcare system lags behind, characterized by shortages of medical personnel and outdated facilities and equipment (Liu *et al.*, 2018).

Despite encountering certain challenges, the construction of China's primary healthcare system has achieved significant progress. Various regions have actively promoted the establishment of community health service centers, continually enhancing the healthcare level of community residents through measures such as resource integration, adoption of advanced technologies, and improvement of service standards (Faiza Manzoor *et al.*, 2019). Concurrently, scholars have been actively exploring avenues to further refine the primary healthcare service system,

aiming to enhance service quality and coverage to realize the goal of universal health coverage (Wang *et al.*, 2020).

In conclusion, primary healthcare play a crucial role in China, serving as a vital means to address basic healthcare needs and promote public health (Zheng *et al.*, 2021). With the development of China's economy and ongoing policy optimizations, an increasing number of scholars are actively exploring pathways for the continuous improvement of China's primary healthcare system, all aimed at providing the populace with higher quality and more accessible healthcare services (X. Li, Harlan M. Krumholz, *et al.*, 2020).

2.1.1 healthcare services

healthcare service is a series of processes by which healthcare service institutions diagnose and treat patients and provide related drugs, medical equipment and ward services for the purpose of diagnosis and treatment (Wu *et al.*, 2017). The ministry of health has formulated the scope and standards of basic healthcare services, including the basic diagnosis and treatment items, the list of medical drugs, the standards of medical service facilities and the management measures (Zhang Tian, 2019).

healthcare service can be divided into material form and non-material form, which is the service provided by medical entity to meet the essential demand of patients for healthcare service. Non-material services are symbolic, including the attitude

of medical staff, professional ethics, hospital image, etc (De Paula Amorim *et al.*, 2019). These non-technical flexible services can meet people's spiritual and psychological needs and can bring psychological trust to patients. sense. healthcare institutions provide systematic diagnosis and treatment services for patients (Sun *et al.*, 2019). It not only provides medical functions for patients, but also pays attention to patients' experience and feelings in the course of diagnosis and treatment, as well as the follow-up diagnosis and treatment and patient satisfaction with hospital services, to provide patients with more quality and efficient healthcare services (Zhang Tian, 2019).

2.1.2 Primary Health Care

Primary Health Care (PHC) is the basic healthcare that is universally available to individuals and families within the community in a manner that is acceptable to them and in which they fully participate, and at which the community and the state can bear the costs incurred (Khatri *et al.*, 2023). Primary Health Care is both a core component of national health systems and an integral part of the overall social and economic development of communities (Economics *et al.*, 2020). The Alma-Ata Declaration of 1978, jointly presented by the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF), marked the initial introduction of the concept of Primary Health Care (Valaitis *et al.*, 2020).

WHO's definition of PHC: The World Health Organization has characterized Primary Health Care (PHC) as indispensable healthcare grounded in pragmatic, scientifically valid, and socially acceptable methods and technologies (Sulis *et al.*, 2020). It aims to be universally accessible to individuals and families within the community, encouraging their active involvement, and sustaining affordability for the community and the country at every developmental stage (Emperador *et al.*, 2020). This is to be achieved in the spirit of fostering self-reliance and self-determination (Sulis *et al.*, 2020).

The Ottawa Charter for Health Promotion, introduced by the World Health Organization in 1986, underscores the significance of Primary Health Care as a foundational approach to realizing health for all and advancing health equity (Mendes *et al.*, 2020). It accentuates the imperative for collaborative efforts across various sectors, the empowerment of communities, and the recognition and mitigation of social determinants of health (Pan *et al.*, 2020).

Global initiatives: Various global initiatives have promoted the principles and implementation of PHC (Moosa, 2022). These include the Millennium Development Goals (MDGs) and later the Sustainable Development Goals (SDGs) that placed emphasis on improving access to Primary Health Care and achieving universal health coverage (Van Weel, C and Kidd, M.R, 2018).

Primary Health Care in the 21st century: In 2018, the WHO and UNICEF organized the Global Conference on Primary Health Care in Astana, Kazakhstan (Economics *et al.*, 2020). The conference reaffirmed the commitments made in the Alma-Ata Declaration and called for renewed efforts to strengthen PHC globally (Setyawan *et al.*, 2020). The Astana declaration emphasized the importance of PHC as a cornerstone of health systems, prioritizing equity, community engagement, and multisectoral action (Rasanathan and Evans, 2020).

COVID-19 pandemic: The ongoing COVID-19 pandemic has highlighted the crucial role of PHC in responding to public health emergencies (Emanuel *et al.*, 2020). PHC has been at the forefront of testing, contact tracing, vaccination campaigns, and providing essential health services during the pandemic (Sanders, D, 2019).

Today, PHC is recognized as a vital approach to achieving universal health coverage and improving health outcomes globally (Saric *et al.*, 2021). It encompasses a comprehensive range of services, including health promotion, disease prevention, diagnosis, treatment, and management of common health conditions, with a focus on community participation, equity, and accessibility (Behera, B. K., 2022).

Despite existing challenges in ensuring fair access to high-quality Primary Health Care, initiatives are underway globally, nationally, and locally to fortify health systems (Krohn et al., 2021), empower communities, and tackle the social

determinants of health. These endeavors aim to realize the vision of Health for All through Primary Health Care (Behera, B. K., 2022).

Primary health care (PHC) refers to a broad range of health services provided by medical professionals in the community. This means universal health care is accessible to all individuals and families in a community. The term "primary healthcare" is often used in place of PHC (Primary Health care) In the context of health system, services and delivery currently in China in particular, .The goal of "Health for All" through primary healthcare aims to guarantee that everyone, irrespective of their situation, can access necessary healthcare services. This vision is realized by emphasizing primary healthcare, which serves as the initial touchpoint with the health system. It offers holistic, accessible, and community-centered care that addresses people's health needs across their lifespan (Behera, B. K., 2022).

The Primary Health Care is a series of service process that medical institutions provide basic medical treatment, healthcare and rehabilitation for the residents, mainly for the patients who seek medical treatment at home but shared by all the residents (Li *et al.*, 2017). Strengthening the construction of primary-level healthcare, realizing the rational allocation and effective utilization of health resources, enabling residents to solve basic healthcare problems nearby, and reducing the cost, to enable residents to enjoy more secure healthcare services (Zhang Tian, 2019). China’s healthcare services have the attribute of public goods (Sbarouni *et al.*, 2020). To study the satisfaction degree of public goods, we need

patients to evaluate the satisfaction degree of medical treatment process and medical effect, and to test the current development of Primary Health Care, in order to further improve the proposed policy, the public benefit (F Manzoor *et al.*, 2019).

2.1.3 Community healthcare Service

In China, Community healthcare Service (CHS) encompasses a comprehensive range of healthcare activities, including preventive measures, medical treatment, rehabilitation, and health promotion (Rezapour *et al.*, 2019). These services are delivered to residents by the health department and associated entities within a specific community (Khatri *et al.*, 2023). It has two distinctive characteristics: one is the universality, which is the universality of service objects， the other is the comprehensiveness of community health services, which is the combination of prevention, treatment, rehabilitation and health promotion (Doshmangir *et al.*, 2023). Therefore, community health service is the foundation and core of the health system, which is generated by adapting to the transformation of medical model (Zhang Tian, 2019).

2.1.4 Primary healthcare system in China

In China, with the development of the economy and the aging of the population, the people's demand for medical services continues to increase (Wan *et al.*, 2021). At present, the contradiction between the people's diversified demand for medical

services and the limited health resources in China is becoming more and more intense (Rahmani *et al.*, 2022). "Seeing a doctor is difficult and expensive" has always been an important people's livelihood issue that needs to be solved urgently in China (X. Li, Harlan M Krumholz, *et al.*, 2020). Responding to the central government's call for the "enhancement of the hierarchical diagnosis and treatment model," China places significant emphasis on the development of community health services (Doshmangir *et al.*, 2023). The nation is dedicated to continually enhancing the community health service system, aiming to elevate the overall standard of community health services (Li and Chen, 2023). Community health service institutions, as the main providers of basic medical and health services for community residents, shoulder the important role of providing comprehensive health management and healthcare for residents (Li, X., 2020).

Primary healthcare institutions through the combination of medical and healthcare basic health services and community first diagnosis, family doctor and other services (Feng *et al.*, 2022), improve people's health level, reduce the risk of disease, at the same time, share the heavy load of large hospitals, form a benign order of treatment, promote the rational and optimal allocation of medical resources, and then solve the contradiction between supply and demand of medical resources in China (Li, X., 2020).

In recent years, many developed cities in China have achieved certain results, but due to the uneven distribution of medical resources, different levels of economic development (Feng *et al.*, 2022), and differences in residents' awareness, the

development of the western region is relatively lagging behind (Wang *et al.*, 2019). Some primary healthcare institutions have problems such as insufficient staffing, delayed updating of facilities and equipment, and old-fashioned service concepts . It is unable to meet the increasing needs of the people for basic health services (Li, X., 2020). The outline of China's 13th Five-Year Plan proposes advancing the construction of a Healthy China, establishing and improving the basic healthcare system (Wang *et al.*, 2019), and achieving universal access to basic healthcare services, which are important components of the strategy for healthy development (Gao *et al.*, 2022). It underscores the significance of primary healthcare in tackling health disparities by acknowledging the social determinants of health and striving to minimize the disparities in health outcomes among diverse population groups, irrespective of their socio-economic status, geographic location, or cultural background (Wang *et al.*, 2023). It emphasizes the removal of barriers to healthcare and the promotion of equitable access to basic health services. In the long run, the quality of primary healthcare has a profound impact on the realization of the "Healthy China" strategy (Zhang L, 2020).

In China, the primary healthcare system comprises two distinct frameworks: the urban community health service system and the rural service system centered around township health centers (Wu *et al.*, 2022). As of October 2016, the country boasted a total of 929,000 primary-level medical and health institutions. This encompassed 34,000 community health service centers (stations), 37,000 township health centers, 642,000 village clinics, and 201,000 individual clinics, reflecting the diverse landscape of healthcare facilities across both urban and rural settings (F

Manzoor *et al.*, 2019). The staff of primary medical institutions include the following types:

Health technicians: This is simple and straightforward. Doctors, assistant doctors, nurses, pharmacists, examiners, video technicians and so on are all front-line medical professionals (Zhang *et al.*, 2020), accounting for the majority (over 70%) of the health personnel system (Wan *et al.*, 2021).

Administrative personnel: those who are responsible for the leadership and management of medical institutions or the scientific research of hospitals, including the secretary of the Party Committee and the secretary of the Discipline inspection Committee (Wan *et al.*, 2021).

Village health worker: refers to village doctor, village health worker, etc., so chairman MAO said "barefoot doctor" please look for here (F Manzoor *et al.*, 2019) .

Others: including general technicians, skilled workers, nursing workers, toll collectors, registration staff, etc (Zhang Tian,2019) .

Currently, numerous scholars are directing their attention towards primary healthcare, aspiring to advance the development of primary healthcare through collaborative efforts (Ding *et al.*, 2021). Their aim is to enhance service delivery, ensuring improved treatment, and foster high levels of service equity and

accessibility (Feng *et al.*, 2022).

2.1.5 Community health service centers (stations)

In China, community health service centers play a crucial role in community development, guided by government leadership and community participation (Chen *et al.*, 2019). Operating under the direction of superior health institutions, these centers primarily involve grassroots health institutions with GPS as a fundamental component (Assistant Secretary for Planning and Evaluation, 2022). Emphasizing the judicious utilization of community resources and appropriate technologies, the focus is on promoting health within the community, encompassing individuals, families, and the wider community (Huang *et al.*, 2018). The unit's guidance is centered on meeting the needs of women, children, the elderly, chronic patients, the disabled, and economically disadvantaged residents (Feng *et al.*, 2022). The primary objective is to address essential health service requirements effectively, economically, conveniently, comprehensively, and continuously. This is achieved through the integration of preventive measures, medical treatment, healthcare, rehabilitation, health education, and family planning technical services, ensuring a holistic approach to basic health services in the community (Feng *et al.*, 2022).

In 1999, the National Community Health Service System was founded in alignment with the directives outlined in the "Several Opinions on the Development of Urban Community Health Service," as issued by the Ministry of

Health, the Ministry of Education, the Ministry of Civil Affairs, the Ministry of Finance, the Ministry of Personnel, and the Ministry of Construction (Huang *et al.*, 2018; Brier and lia dwi jayanti, 2020).

On December 1, 2017, the People's Republic of China national standard GB/T 30240 "Code for English Translation and Writing in the Field of Public Service" was officially implemented, stipulating that the standard of Community health service centers is called Community healthcare Center in English (Gautam, 2020). Community health service is a broad term encompassing various healthcare activities, such as prevention, medical treatment, rehabilitation, and health promotion. These services are offered by health and related departments to the residents of a specific community (Eltaybani *et al.*, 2023). The aim is to provide comprehensive care that addresses the diverse health needs of individuals within that community, fostering overall well-being and promoting a healthier lifestyle (Yunnan, 2021). Community health services are a healthcare system, including healthcare providers such as health-related departments, and health service recipients, i.e., community populations, the two are interrelated and interact with each other (Huang *et al.*, 2018). The community health service has two remarkable characteristics: one is the universality of the service target, the other is the comprehensiveness of the community health service (Su *et al.*, 2023), that is, the combination of prevention, treatment, rehabilitation and health promotion, the combination of out-of-hospital service and in-hospital service, and the combination of health department and family community service (Abate, H.K. and

Mekonnen, C.K., 2021). Hence, community health service represents the evolution of the traditional medical model and embodies a holistic approach within medical practice. At its core, community health service primarily focuses on primary healthcare, serving as the initial point of contact between the healthcare system and the population (Gu *et al.*, 2022). Therefore, it stands as both the foundation and the central component of the broader health system. This shift towards community-oriented healthcare signifies a departure from conventional medical practices, emphasizing a comprehensive perspective that addresses the diverse healthcare needs of the population (Liu, Q., Huang, S., Qu, X. and Yin, A., 2021)

2.2 Patient's satisfaction

Theoretical research on patient satisfaction has received widespread attention in the academic and medical fields (Gavurova, Dvorsky and Popesko, 2021). In 1966, Donabedian proposed to extend customer satisfaction to patient satisfaction to evaluate healthcare services (Wang Yutong, 2018) .

In the early 1990s, the concept of patient satisfaction emerged as a pivotal metric for assessing service quality, specifically measuring the extent of customer contentment within the healthcare sector (Y. Li *et al.*, 2020). This paradigm shift aimed to gauge the effectiveness of medical services by directly evaluating the satisfaction levels of patients (Hanson *et al.*, 2019). Within the realm of hospital services, experts widely endorse the assessment of patient satisfaction as a catalyst for enhancing the overall quality of medical care (Khuwa, Matlala and Ntuli,

2022). Furthermore, it is posited that active patient involvement plays a pivotal role in ensuring the continuous improvement of healthcare service quality (Qin Jiangmei, 2018). This dual approach, encompassing both evaluation and patient engagement, is considered instrumental in fostering advancements in medical service standards.

Several developed nations, including the United Kingdom and the United States, have not only recognized the significance of patient satisfaction measurement but have also enshrined it as a mandatory aspect of hospital management, backed by legislative protection (Yan *et al.*, 2022). Patient satisfaction has, over time, evolved into a cornerstone index for evaluating the quality of medical services. The integration of patient satisfaction assessments into the regulatory framework underscores its critical role in shaping healthcare policies and practices (Guadie *et al.*, 2022). As such, it has become an indispensable tool for healthcare providers and policymakers alike, shaping the landscape of medical service quality evaluation in contemporary healthcare settings (Wan *et al.*, 2021).

2.2.1 Connotation of Customer Satisfaction Theory

The study of Customer Satisfaction in foreign academic circles began in the 1930s, and by the mid-1980s, Quelch defined CS as consumers' comprehensive evaluation of products or services, factors related to the purchase and use process have an impact on customer satisfaction (F Manzoor *et al.*, 2019).

One study suggested that people compare the expected value of consumption with the actual performance level of a product and the output results (Rahmani *et al.*, 2022). One study thought that the customer judgment satisfaction mainly starts from the expected value of the product, which comes from the product itself and the service attribute of the product (Zhang Tian, 2019).

So far, there has not been a uniform definition of customer satisfaction in academic circles. Understanding and clarifying the connotation of customer satisfaction is the prerequisite for further research on customer satisfaction (Rahmani *et al.*, 2022). The concept of customer satisfaction proposed by Oliver has been widely accepted, that is, the psychological response of customers when their needs are satisfied from the product itself and its service attributes of the product (F Manzoor *et al.*, 2019).

2.2.2 Concept and characteristics of patient satisfaction

The healthcare service industry has the unique attribute of public goods. The concept of customer satisfaction cannot be directly extended from the field of economics to the field of healthcare service, have an important impact on patients' decisions and behaviour (Haave R, Bakke H and Schröder A, 2021). Scholars put forward the definition of patient satisfaction based on the characteristics of healthcare services (Chandra, Ward and Mohammadnezhad, 2019). Jvebreek proposed that expectations belong to the cognitive field, which means that patients have a certain cognitive ability for healthcare services. Keegan (2002) held that

patient satisfaction is the patient's feelings and perceptions of the healthcare services they have experienced, and the patient's medical experience and expectations of healthcare services will affect it (Hawrysz, Zyna Gierszewska and Bitkowska, 2021). Patient satisfaction, which is generally recognized in academia, refers to the comprehensive evaluation of healthcare services based on the degree to which their expectations are met . Patient satisfaction and customer satisfaction have a lot of similarities and a common goal, that is, to meet customer needs as far as possible, and to improve their own service ability according to customer satisfaction (Bin Traiki *et al.*, 2020). However, because of the public nature of the healthcare service industry, patient satisfaction is quite different from that of the general industry (Zhang Tian, 2019).

2.2.3 The Concept and Connotation of Patient Satisfaction

With the rise of the new public management theory, the Public Service Department tries to introduce the market operation mechanism, the research of patient satisfaction gradually rises and develops, and the patient-oriented healthcare service is paid more and more attention (Hu *et al.*, 2019). One study proposed patient satisfaction as a measure of how people's expectations of care compare with how they feel about the care they receive (Tito *et al.*, 2022). Pascore raised that the patient satisfaction is the degree to which the actual medical experience meets their needs according to the ideal state of healthcare service (Tito *et al.*, 2022). Chinese scholars pointed out that a patient's subjective experience in judging whether the quality of medical services meets his own medical needs is

patient satisfaction (Bin Traiki *et al.*, 2020) . Scholar also believed that patient satisfaction is an evaluation of actual service based on people's expectations for healthcare services (Qin Jiangmei, 2018) . The concept of patient satisfaction mainly includes two aspects: on the one hand, it is the diagnosis and treatment effect of disease by means of diagnosis and treatment, instrument and equipment, that is, the tangible value of healthcare to patients; on the other hand, it is the experience and feeling of patients in the process of receiving healthcare service, namely, implicit service satisfaction (Magadi and Magadi, 2022). Patients' evaluation of the healthcare services they experience is influenced by their own psychological emotion, stress, cognitive level and the current doctor-patient relationship environment. Therefore, it needs to be evaluated in a relatively rational cognitive level and an environment of relaxation (Pedersen *et al.*, 2023).

Patient satisfaction stands as a foundational concept in healthcare, serving as an indicator of the extent to which healthcare services align with and surpass patients' expectations and preferences (Kaur *et al.*, 2023). It is a multidimensional construct encompassing various aspects of the healthcare experience, and its connotation goes beyond mere contentment or happiness (Abbasi *et al.*, 2021). The concept and connotation of patient satisfaction can be broken down into several key elements:

Quality of Care: Patient satisfaction is closely tied to the quality of care received. Patients assess the competence of healthcare providers, the effectiveness of treatments, and the safety of healthcare facilities (Wan *et al.*, 2021). A high

standard of clinical care, accurate diagnoses, and successful treatments are essential components of patient satisfaction (Meyer, 2021).

Communication and Information: Effective communication between healthcare providers and patients is a vital determinant of patient satisfaction (Meyer, 2021). This includes the ability of healthcare professionals to explain medical conditions, treatment options, and expected outcomes clearly (Gao *et al.*, 2022). Patients value being heard, having their questions answered, and being involved in decisions about their care.

Empathy and Respect: Patients place great importance on the way they are treated by healthcare professionals (Meng *et al.*, 2018). Empathy, respect, and compassion from healthcare staff are crucial for patient satisfaction (Kaur *et al.*, 2023). The way patients are greeted, spoken to, and cared for profoundly influences their overall experience.

Access and Convenience: The accessibility of healthcare services, including appointment scheduling, waiting times, and the ease of accessing medical records and test results, contributes to patient satisfaction (Kaur *et al.*, 2023). Convenience in healthcare delivery, such as telemedicine options, can also enhance the patient experience (Alzeghaibi *et al.*, 2022).

Physical Environment: The cleanliness, comfort, and overall ambiance of healthcare facilities significantly impact patient satisfaction (X. Li, Harlan M

Krumholz, *et al.*, 2020) . An inviting and well-maintained environment can put patients at ease and improve their perception of the quality of care (Zimmerman *et al.*, 2020).

Personalized Care: Tailoring healthcare services to individual patient needs and preferences is another dimension of patient satisfaction (Zhang *et al.*, 2023). Patients appreciate when care plans are personalized and considerate of their unique circumstances (Setyawan *et al.*, 2020) .

Outcome and Recovery: Patient satisfaction extends to the perceived effectiveness of treatments and the outcomes of care (Hoonakker *et al.*, 2022). When patients experience positive health outcomes, they are more likely to report higher satisfaction levels (Tranberg *et al.*, 2018) .

Emotional and Psychological Well-Being: Patient satisfaction encompasses the emotional and psychological well-being of patients during their healthcare journey. Reducing anxiety, addressing fears, and providing emotional support can positively influence patient satisfaction (Nagwa N. Hegazy *et al.*, 2021) .

Patient Involvement and Autonomy: Informed and involved patients who have a say in their care decisions tend to report higher satisfaction (Kaur *et al.*, 2023) . Patient autonomy and shared decision-making are integral to patient-centered care.

Post-Care Experience: The patient's experience after receiving care is also essential. This includes follow-up care, ongoing support, and continuity of care (X. Li, Harlan M Krumholz, *et al.*, 2020) . Patients often evaluate their satisfaction based on the long-term impact of their treatment.

Fundamentally, patient satisfaction serves as a comprehensive gauge of the overall patient encounter in the realm of healthcare, encompassing diverse facets of care quality, communication, empathy, accessibility, and personalization (Zhang *et al.*, 2022). It reflects the complex interplay between healthcare providers, facilities, and patients' physical and emotional needs (Nagwa N Hegazy *et al.*, 2021). Elevated levels of patient satisfaction are linked to enhanced patient engagement, increased adherence to treatment plans, and ultimately, improved health outcomes. This underscores its pivotal role as a critical factor in the provision of patient-centered care.

2.2.4 Evaluation of patient satisfaction

Some scholars think that customer satisfaction is a general evaluation, is a holistic concept, should be evaluated with the overall satisfaction of a single item (Magadi and Magadi, 2022) . According to Day , the evaluation of customer satisfaction is the sum of the subjective responses to the product itself and its attributes (Wang Fujie, 2019). But some scholars hold different views. For example, Pfaff thought that the single overall customer satisfaction is easy to make the customer treat the complex situation and make a hasty response (X. Li, Harlan M Krumholz, *et al.*,

2020) . He proposed that customer satisfaction needs to be measured by multiple dimensions together, that is, first measure the degree of satisfaction of each attribute of the product, then sum up to obtain the overall degree of satisfaction (Brier J. *et al.*, 2020). There are two methods to measure customer satisfaction: one is to take the satisfaction degree of each attribute of a product or service as an independent variable, and the other is to establish a regression model with the overall satisfaction as a dependent variable, the regression equation can express the relationship between the satisfaction degree of each attribute and the satisfaction degree of the whole (Kaur *et al.*, 2023)， the other one is to give the weight according to the importance degree of the product attribute to the customer satisfaction, and then sum up to get the whole degree.

Assessing patient satisfaction is a vital component of evaluating and enhancing the quality of healthcare services (Weinmann *et al.*, 2023). It involves the systematic measurement and analysis of patients' perceptions and experiences with healthcare services, facilities, and providers. The primary objectives of this evaluation process are to gauge the quality of care (Huan Li, 2023), identify areas for improvement, and enhance patient-centered healthcare delivery. Key points in the evaluation of patient satisfaction include:

Measurement Tools: Different instruments and surveys are employed for gathering feedback from patients (Weinmann *et al.*, 2023). Examples of these include the Consumer Assessment of Healthcare Providers and Systems (CAHPS) and the

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). These tools typically encompass questions about communication, access to care, pain management, cleanliness, and overall satisfaction (Emperador *et al.*, 2020).

Data Collection: Data is gathered through structured questionnaires, interviews, online surveys, or mobile applications. Healthcare providers and organizations may also collect feedback through focus groups and comment cards (Sulis *et al.*, 2020).

Analysis and Reporting: Collected data is analyzed to identify trends, strengths, and areas of improvement. Reports are generated to summarize the findings and provide actionable insights (Valaitis *et al.*, 2020).

Benchmarking: Comparisons are made with benchmarks or national averages to assess how healthcare facilities or providers are performing relative to peers or industry standards. This helps in understanding where improvements are needed (Μηχανικων *et al.*, 2020).

Patient-Centered Care: Patient satisfaction evaluation is closely tied to the concept of patient-centered care, which emphasizes treating patients with respect, dignity, and active involvement in decision-making (Alexandre *et al.*, 2022).

Quality Improvement: The data collected can guide quality improvement initiatives, allowing healthcare organizations to make evidence-based changes that

enhance patient experiences and outcomes (Mangion *et al.*, 2022).

Value-Based Care: In value-based care models, patient satisfaction can impact reimbursement and financial incentives (Almezaal *et al.*, 2021). Satisfied patients are often seen as indicators of high-quality care.

Patient Feedback: Patient feedback can reveal issues like long wait times, and concerns about treatment outcomes, helping healthcare providers address these issues promptly (Gohari and Bahaadinbeigy, 2021).

Continual Feedback Loop: Patient satisfaction evaluation is an ongoing process that establishes a feedback loop between patients and healthcare providers (Mesa *et al.*, 2023). Regular assessments allow for continuous improvements in care delivery.

Enhanced Trust: Positive patient experiences and high satisfaction levels can lead to increased trust in healthcare systems and providers, which is vital for patient engagement and adherence to treatment plans (Westerling *et al.*, 2022).

In summary, the evaluation of patient satisfaction plays a crucial role in ensuring the delivery of high-quality, patient-centered healthcare (Piwowar *et al.*, 2023). It serves as a valuable tool for identifying areas of improvement, benchmarking performance, and enhancing the overall healthcare experience for patients (Heidari *et al.*, 2021), ultimately contributing to better health outcomes and increased trust

in the healthcare system.

2.2.5 Study on patient satisfaction and its influencing factors

Pascore suggested that the degree of patient satisfaction is influenced by the subjective experiences of individuals (Tito *et al.*, 2022). Jung et Al. put forward that the level of medical care, the time of diagnosis and treatment, the communication between doctors and patients are the most important factors in the healthcare services (Piwowar *et al.*, 2023). Copeland and Scholle argue that patient satisfaction is the subjective perception and evaluation that patients make when they compare their expectation of medical service with their actual experience (Chandra *et al.*, 2019).

Numerous scholars have dedicated extensive research efforts to examining the determinants of patient satisfaction (Liang, Xue and Zhang, 2021). Wasserman, Brody, and Markson's investigations have revealed correlations between patient satisfaction and the extent of engagement in healthcare services. Additionally, their findings underscore the impact of individuals' health aspirations on overall patient satisfaction (Gavurova, Dvorsky and Popesko, 2021). Notably, the provision of adaptable care within hospital settings emerges as a pivotal factor in enhancing and positively influencing patient satisfaction levels (Magadi and Magadi, 2022). Further, Roter pointed out that the amount of information provided by doctors in the process of diagnosis and treatment has a great impact on patient satisfaction, which can reflect factors such as doctors' medical skills, attitudes

toward patients, and communication with patients (Mesa *et al.*, 2023). Beck et Al. found that patient satisfaction directly affected whether a patient came back to the hospital. Rogut pointed out that the basic background factors, such as patients' sex, age, education level, and so on, have an effect on patients' satisfaction. Press et al. highlighted that patient satisfaction has emerged as a contemporary benchmark for gauging the quality of modern hospital services (Cole et al., 2021). This metric serves as an objective indicator, providing insights into the overall standard of medical care (Wang Luyao, 2019). Ferguson argued that high satisfaction with the quality of care leads to positive communication intentions. Bautistaeta believed that education and income levels have a significant impact on patient satisfaction (Gavurova, Dvorsky and Popesko, 2021).

Patient satisfaction is a very complex concept with many influencing factors. Formulating a singular definition for it proves challenging, given its subjective nature that fluctuates between individuals and evolves over time (Alexandre *et al.*, 2022). Different personal social background, life experience and concept will have an impact on the understanding of patient satisfaction. The definition most scholars agree is a comprehensive evaluation of the actual healthcare services experienced by patients based on their expectations for the services of medical personnel and the effect of diagnosis and treatment (Xie, Xie and Guo, 2022). With the deepening of the study, some scholars also questioned the limitations of patient satisfaction assessment (Zhang Tian, 2019) . For example, the study of Htzpatrik showed that because patients need diagnosis and treatment services provided by the hospital, they cannot openly express their true feelings about the

hospital, and it is difficult for patients to get their true views back to the hospital through channels (Adhikary *et al.*, 2018). Hence, the outcomes of patient satisfaction surveys may not precisely mirror the genuine quality of healthcare services.

2.2.6 Research on patient satisfaction measurement tools

The concept of measuring patient satisfaction has roots dating back to the mid-20th century, and it has continued to evolve alongside advancements in healthcare delivery and technology (Magadi and Magadi, 2022). Here is a brief overview of the research history of patient satisfaction measurement tools:

Early Developments (1950s-1960s): The earliest efforts to measure patient satisfaction emerged in the 1950s and 1960s with the development of rudimentary questionnaires and surveys. These early tools often focused on basic aspects of healthcare service, such as the cleanliness of facilities and the courtesy of staff (Jia and Jian, 2022).

The Consumer Assessment of Healthcare Providers and Systems (CAHPS), which has been in existence since the 1980s and continues to the present day, is a significant framework for evaluating and gauging the experiences of consumers within the healthcare system (Boissy *et al.*, 2016). The CAHPS program was established in the 1980s by the United States Agency for Healthcare Research and Quality (AHRQ) (Wiebe *et al.*, 2014). It played a pivotal role in the development

of standardized surveys to measure patient experiences and satisfaction (Aiken *et al.*, 2021). CAHPS surveys cover a wide range of healthcare settings and have become widely used in the United States (Westerling *et al.*, 2022).

SERVQUAL Model (1985): The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry in 1985, originally aimed to measure service quality in general but was adapted for healthcare settings (Chai, Zhang and Chang, 2020). SERVQUAL comprises five dimensions: tangibles, reliability, responsiveness, assurance, and empathy (Cole *et al.*, 2021). It has influenced the development of patient satisfaction measurement tools, emphasizing the importance of perceived service quality (Allenbaugh *et al.*, 2019).

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) was established in 2006: HCAHPS is a variation of CAHPS specifically designed for measuring patient satisfaction in hospitals (Zun *et al.*, 2019). It includes questions related to communication with healthcare providers, pain management, cleanliness, and discharge information. HCAHPS data has been publicly reported and used to compare hospital performance (Westerling *et al.*, 2022).

Net Promoter Score (NPS) (2003-Present): NPS is a widely used customer loyalty metric that has also been applied to healthcare (Jia, 2017). Individuals are inquired about their likelihood to recommend our services to a friend or family member using a scale ranging from 0 to 10 (Heidari *et al.*, 2021). NPS has been used to

measure patient satisfaction and loyalty in various healthcare settings.

Digital Tools and Technology (21st Century): In recent years, the use of digital tools and technology has transformed the way patient satisfaction is measured (Jocelyn Compton, Natalie Glass and Timothy Fowler, 2021). Online surveys, mobile apps, and social media platforms allow for real-time feedback and data collection. These tools enable healthcare providers to gather patient insights more efficiently and adapt services accordingly (Assistant Secretary for Planning and Evaluation, 2022).

Patient-Reported Outcome Measures (PROMs): PROMs focus on capturing patients' self-reported health and quality of life outcomes (Gao *et al.*, 2022). While not exclusively indicators of satisfaction, these measures are closely linked, as they evaluate the influence of healthcare interventions on the well-being of patients (Oksholm *et al.*, 2023).

Value-Based Care Initiatives: In the realm of value-based care, the assessment of patient satisfaction has gained heightened significance. Health systems and providers are incentivized to improve patient experiences and outcomes, and various patient satisfaction measures play a role in determining reimbursement and quality ratings (James, James and Hesketh, 2022).

Many foreign scholars have studied the measurement tool of patient satisfaction (Ware and Davies, 1983). At present, the most representative one is the short-form

instrument, the PSQ-18. It is concluded that the validity of PSQ measurement is supported by various research results over the past decade (Kaur *et al.*, 2023). Numerous studies validating the reliability of Patient Satisfaction Questionnaire (PSQ) scores have established significant correlations with factors such as medical experience, expectations, behavioral intent, and a spectrum of health and disease-related behaviors. The score of the short form PSQ-18 scale is basically related to the score of the full scale and has sufficient internal consistency and reliability. The initial analyses conducted provide strong support for endorsing the utilization of PSQ-18 in situations where brevity is essential (Haider *et al.*, 2022). The reliability and validity test outcomes consistently affirm its dependability, and it has established broad usage in satisfaction studies within the health field. Based on the original English version, the scale used in this survey was translated by Eugene Nida's translation theory, and the Chinese version of PSQ-18 was finally formed after several expert arguments and modifications by brainstorming method and Delphi method (Julien *et al.*, 2021). The scale comprises 7 dimensions, encompassing a total of 18 questions, each graded on a scale of 1 to 5 points. The cumulative score for the entire scale ranges from 0 to 90 points. A higher score corresponds to a higher satisfaction rate (Uebelacker and Waage et al., 2017). In the computation of satisfaction rates, responses scoring 4 points or above are deemed indicative of satisfaction. The internal consistency, partial reliability, and structural validity of the Chinese version of PSQ-18 were assessed. The findings indicated favorable results, with a total Cronbach's α coefficient of 0.852, exceeding the threshold of 0.8. Partial reliability demonstrated a value of 0.813,

also surpassing the recommended cutoff of 0.8. Additionally, the Kaiser-Meyer-Olkin (KMO) measure yielded a score of 0.867, further supporting the instrument's appropriateness for analysis. The repeated mention of the total Cronbach's α coefficient in the original text has been revised for clarity. It indicates good reliability and validity (Hu, JL, 2017). Overall, the history of patient satisfaction measurement tools has seen significant advancements in terms of standardization, sophistication, and data collection methods. These tools have become crucial for healthcare providers and organizations seeking to deliver patient-centered care and continuously improve the quality of their services (Uebelacker and Waage et al., 2017).

2.2.7 Relationship between patient satisfaction and quality of healthcare services

Numerous factors contribute to the quality of healthcare services, including the overall competence of medical personnel, the efficacy of diagnostic and treatment procedures, and the efficiency of the medical care process. These elements collectively fall under the umbrella of healthcare service quality, exerting a significant influence on the level of satisfaction experienced by patients (Sulis *et al.*, 2020). Enhancing the quality of healthcare services has the potential to positively impact patient satisfaction by both encouraging and regulating service standards (Chowdhury, S., 2017). Scholars have developed and applied a number of patient satisfaction scales for quality of healthcare services, including publicly available scales such as Grogan's for general practice services, Ho.V.W.Km designed the AIDS patient satisfaction scale and so on, among which the most

influential one was the medical service quality monitoring scale developed by Carey et Al. Carey believed that most patient satisfaction scales have defects at different levels, making it difficult to produce an authoritative, widely used patient satisfaction scale (Kaur *et al.*, 2023). The evaluation of patient satisfaction can describe the status quo of healthcare service from the perspective of patients, find out the problems in the process of service and put forward improving strategies, which is of great significance to the management of healthcare service (Tobias *et al.*, 2020).

2.3 Health promotion/Education theory

Health promotion represents a relatively recent domain within both research and professional spheres. The World Health Organization (WHO) has played a pivotal role in shaping, promoting, and delineating the global evolution of this field (Liveng, Andersen and Lehn-Christiansen, 2018). A landmark contribution from WHO came in 1986 with the formulation of the Ottawa Charter for Health Promotion. This initiative empowered governments and organizations to foster conditions conducive to health and well-informed choices through policy modifications (Paulus, 2022). The articulated targets and objectives within this charter placed a significant emphasis on health promotion programs as instrumental mechanisms for cultivating a healthier society (van Agteren *et al.*, 2021).

Howat propose that the terms health promotion and health education can be used interchangeably. According to these authors, health education employs educational strategies to instigate changes related to health, while health promotion encompasses a broader spectrum of strategies (Percival *et al.*, 2018). This broader perspective includes not only health education but also incorporates political changes aimed at enhancing public health outcomes (Tubert-jeannin and El, 2022). Certain alterations are associated with apprehensions regarding the genetic inclination to various disease types. These modifications bear significance in terms of comprehension and ramifications for health promotion (Lane-Martin, 2019). Moreover, there is a growing apprehension regarding globalization, which is contributing to a widespread outbreak of diet-related diseases globally. This concern stems from the promotion of energy-dense foodstuffs and dietary patterns, exacerbating health issues on a global scale (Tubert, 2022).

2.3.1 Health promotion

The field of health promotion, grounded in applied science, has formulated its theoretical foundation by integrating insights from a diverse range of disciplines, including Social Psychology, Behavioral Psychology, Sociology, Social Marketing, Anthropology, Communication, and Community Organizational practice (Rogers et al., 2021). According to the World Health Organization (WHO), health promotion represents a synergistic amalgamation of educational, organizational, economic, and political initiatives strategically designed to engage consumers actively (Ghahramani, de Courten and Prokofieva, 2022). The overarching

objective is to improve health outcomes by fostering changes in attitudes, behaviors, social dynamics, and environmental factors (WHO, 1997). Despite the diversity of theories in health promotion, they all converge on the determinants of health (Elsadek and Baker, 2023). These determinants encapsulate five factors that interact to shape the health of individuals or populations: Lifestyle, including behaviour, Biological factors such as aging and genetics, Environment, which includes communicable discases, The use of and access to health services, Social and economic factors (Oosman *et al.*, 2021).

Health promotion in the context of aging is often viewed as a factor that individuals have limited control over. Rather than seeking to exert direct control, the primary objective is to proactively "delay the entry into the disability zone" (Kim *et al.*, 2021). When considering the morbidity graph and examining changes in the survival curve, specifically the percentage of individuals living beyond 70 years, a gradual progression toward a state of 'rectangularization' becomes evident (Barmania and Reiss, 2021). This phenomenon envisions the extension of a rectangular zone on the graphical representation, symbolizing a period where individuals maintain a higher level of health and functionality as they age (Pearson *et al.*, 2015). In essence, health promotion strategies aim to optimize the quality of life for older individuals by fostering conditions that contribute to a more extended and healthier lifespan, ultimately influencing the shape and trajectory of the aging curve (Evensen, Bull and Ness, 2021).

Rectangularization focuses on elevating the average age at which individuals first experience infirmity, aiming to flatten and extend the morbidity curve (Meiers *et al.*, 2021). Consequently, a fundamental principle in health promotion involves the formulation and advancement of strategies to 'rectangularize' the survival curve (Hempler *et al.*, 2018). This approach underscores the importance of interventions that not only enhance longevity but also contribute to compressing the period of illness, promoting a more even distribution of health and infirmity across the lifespan (Kim *et al.*, 2021).

One proposed strategy for advancing health promotion involves adopting an ecological model. This theoretical framework acknowledges the impact of the environment on both health and health-related behaviors (Ottemöller *et al.*, 2021). The model integrates an individual's endeavors to modify health behavior within the broader environmental context. Emphasizing the interplay between an individual's actions and the surrounding environment, the ecological approach concentrates on both individual efforts and environmental interventions to improve physical and social surroundings (Tubert, 2022). This perspective conceptualizes health as a result of the interdependence between the individual and the ecosystem (Rogers *et al.*, 2021).

Environmental changes ha e long been regarded as fundamental elements in the realm of public health, encompassing vital provisions such as potable water, waste disposal, and sanitation. However, these enhancements in living standards have, to a certain extent, contributed to environmental degradation (Cambon, Terral, and

Alla, 2019). Alternatively, critics of this model argue that it implies the existence of factors beyond an individual's control (Suparyanto and Rosad, 2020). These factors include social, physical, economic, housing, and unsafe work environments, as well as disparities in gender, socioeconomic status, and ethnicity. This perspective forms the basis for the argument that structural and socio-political determinants significantly contribute to the prevalence of ill-health (Van Agteren et al., 2021). Consequently, governments emerge as pivotal players in a nation's health, carrying the responsibility to promote positive health practices to prevent illness (Appiah, 2020). While acknowledging the influence of external factors, individuals also possess a degree of agency over their health, extending beyond the parameters of the ecological approach. This agency may be attributed to the attitudes and behaviors developed by the individual.

Health behavior, much like any other behavior, is driven by prominent stimuli present in an individual's environment (Van Agteren et al., 2021). Various elements of individual behavior, including attitudes, values, motives, and intentions, have been central to numerous models of behavioral change (Appiah, 2020). The probability of individuals being motivated to embrace health-promoting behaviors rather than those compromising health depends on their level of knowledge, attitudes, and skills in relation to the associated health risks (Tubert and El, 2022). Several behavioral models, such as the Social Cognitive model, have been developed to explore the impact of behavior on health and to understand how these models can be applied in the realms of health education and promotion.

2.3.2 Health belief Models

The Health Belief Model, formulated by Rosenstock, stands as a notable behavioral model, focusing on an individual's perception of the world and the subsequent influence on their behavior ((Tubert, 2022). This model operates on several key assumptions regarding behavioral change:

(1) The individual must hold the belief that their health is at risk.

(2) The person needs to recognize the potential severity of the condition concerning factors such as pain, discomfort, time away from work, economic challenges, among others.

(3) After assessing the situation, the individual must be convinced that the benefits resulting from the recommended behavior outweigh the associated costs and inconveniences and are realistically achievable.

(4) A "cue to action" or a triggering force must be present, compelling the individual to feel the necessity of taking proactive measures (Rogers et al., 2021).

If an individual perceives themselves as vulnerable to a particular illness and deems the illness to be severe, the mere existence of this belief does not guarantee that they will take proactive measures (Oosman et al., 2021). Within this model, two dimensions, namely the belief in susceptibility and the belief in the severity of consequences, may be construed as a manifestation of fear related to a disease, condition, or behavior-a potent motivating factor (Oosman *et al.*, 2021).

2.3.3 Behavioural model

Numerous theories endeavor to forecast or elucidate individuals' behaviors concerning their health (Adewoyin, Wesson and Vogts, 2022). With a primary emphasis on psychological factors (Kim et al., 2021). Additionally, there are other theories within this realm (Lorimer *et al.*, 2021).

One behavioral theory under scrutiny is the Theory of Planned Behavior, positing that behavior serves as a precursor to intentions (Evensen, Bull, and Ness, 2021). This theoretical model suggests the presence of perceived behavioral control as a significant factor in shaping our actions. It contends that perceived behavioral control can exert influence over intentions, alongside attitudinal and normative components, particularly in situations where an individual does not have complete control over their behavior (Kim et al., 2021). The model underscores the importance of altering attitudes and dimensions as integral to behavior change.

(1) The action element, specifying the behavior to be performed.

(2) The target element, identifying the target toward.

(3) The outlining the context in which the behavior is to occur.

(4) The specifying when the behavior is expected to take place. (Oosman *et al.*, 2021).

A fundamental goal within any health education or promotion initiative is to instigate a shift in attitudes. Achieving this objective involves utilizing a model that scrutinizes the four distinct components of attitude and their connection to

behavioral change. The modification of attitudes can be accomplished through the reassessment of knowledge or values, as well as by influencing individuals' behaviors (Tuber and El, 2022).

2.3.4 Transtheoretical model

A particularly intriguing behavioral model is the Transtheoretical Model (TM), specifically concentrating on the eradication of adverse behaviors like smoking (Cambon, Terral, and Alla, 2019). The core focus of the TM framework is to comprehend and analyze the transformative process involved in discontinuing habits such as smoking (Appiah, 2020). The significance of this model in comprehending changes in health behavior lies in its acknowledgment of the temporal dimension within which these changes unfold (Tubert and El, 2022). Essentially derived from various theories related to behavioral change, the Transtheoretical Model integrates theories such as Self-efficacy and Decisional Balance, as proposed by Prochaska & Marcus (Hashemzadeh *et al.*, 2019). This model encompasses several crucial dimensions, with a primary emphasis on the concept of stages of change (Rogers et al., 2021). Furthermore, these stages are further subdivided into various sub-stages.

Within the Transtheoretical Model (TM), behavioral changes manifest at each stage, with the process not adhering strictly to a linear progression; instead, it may follow a cyclical pattern, as individuals often make repeated attempts at behavioral change before reaching their desired objectives (Oosman et al., 2021). Some

people assert that the stages of change provide a microanalytical examination of the process, offering insights relevant to outcome and process considerations, thus posing a significant challenge for the development of interventions (Kim et al., 2021).

The Precede/Proceed (CAPS) planning model assesses the deployment of resources and their delivery to the community (Rogers et al., 2021). The Empowerment theory, rooted in the belief that equality and participation equity are linked not only to access to necessary health services and physical health status but also to emotional well-being (Tubert and El, 2022). Health education, aligned with empowerment, furnishes essential information, aids in skill development, and cultivates a healthy level of self-esteem, enabling individuals to perceive significant control residing within themselves rather than being subject to external forces beyond their influence (Cambon, Terral, and Alla, 2019). These theories, Social Exchange Theory, and various communications theories, should primarily function as planning frameworks for action against specific diseases or risk factors (Tubert and El, 2022). Health promotion theory, crucially, provides guidance for interventions that extend beyond the individual and family levels.

2.3.5 Self-empowerment model

Tones identifies four pivotal factors integral to the concept of empowered action for individuals:

(1) Environmental Circumstances: These can either facilitate the exercise

of control or present barriers to free action.

(2) Possession of Competencies and Skills: Individuals need these to control aspects of their lives and possibly overcome environmental barriers.

(3) Perceived Control: It involves the extent to which individuals believe they are in control.

(4) Emotional States or Traits: Different beliefs about control are often accompanied by emotions like helplessness, depression, or feelings of self-worth.

A critique against the educational approach is that understanding a health issue is insufficient for prompting health action (Dewi *et al.*, 2023). Information provision should be coupled with processes of belief clarification, values, and decision-making practice, typically in a simulated setting. For self-empowerment, a developmental program focusing on personal growth aspects is necessary, with self-esteem and locus of control being crucial personality characteristics (Kim et al., 2021).

In community development, many nurses empower individuals and groups, with agendas often set by the community rather than professionals. Nurses act as facilitators and partners, responding to community needs (Haron *et al.*, 2023). In hospitals, institutional nature poses challenges to empowerment, but positive nurse-patient interactions can play a vital role. Respecting individual wishes and granting them the right to choose minimizes disempowerment. Believing in one's control over life is beneficial, but competencies are also crucial for empowerment (Rogers et al., 2021).

Wilson-Barnett asserts that agencies, including health professionals, should aim to enable individuals to maximize their potential. However, the role of nurses in facilitating patients' personal growth needs examination within the context of the counseling relationship (Tubert and El, 2022).

2.3.6 Health promotion model

Theories and models play a crucial role in program planning, serving as tools to comprehend and elucidate health behavior while providing guidance for the identification, development, and implementation of interventions (Lee *et al.*, 2020). When selecting a theory or model to steer health promotion initiatives, careful consideration of various factors is essential. These factors include the specific health issue under consideration, the targeted population(s), and the contextual elements influencing the program's implementation (Appiah, 2020). Health promotion efforts typically draw upon one or more theories or models, with the ultimate goal of achieving improvements in patient satisfaction scores, scores related to patient education in self-management, and scores reflecting patient risk factor education.

Interventions aimed at attaining the highest standard of health are delivered across the continuum of care, embracing a lifelong approach (Van Agteren et al., 2021). While the concept of levels of care has traditionally shaped health systems, the 21st-century perspective favors a continuum of care that aligns with coordinating centers, care pathways, and a system centered on the patient rather than services

(Rogers et al., 2021). This continuum spans actions delivered through a multisectoral approach, public health services for the population, individual primary care, and coordination with highly specialized consultation services for rare and complex health problems. The shift towards this comprehensive continuum underscores the evolving nature of healthcare delivery and emphasizes a holistic approach to improving health outcomes .

2.4 The effectiveness of health promotion in improving patient satisfaction

A review of the literature reveals a substantial body of evidence supporting the effectiveness of health promotion initiatives in positively influencing patient inspection behaviors. Studies consistently highlight the role of health promotion in encouraging individuals to prioritize regular health check-ups and screenings (Liao and Bercea, 2021). Educational campaigns and interventions designed to raise awareness about the importance of preventive care contribute significantly to improved patient inspection rates. Furthermore, the literature emphasizes the impact of tailored health promotion strategies that consider diverse demographic and socio-economic factors, catering to the specific needs of different patient populations (Aqtam and Darawwad, 2018). Effective communication strategies, integration of technology, and community-based approaches are recurrent themes in the literature, showcasing the dynamic and evolving nature of health promotion efforts aimed at enhancing patient inspection behaviors (Nohra *et al.*, 2022). As healthcare systems globally recognize the value of preventative measures, the

literature underscores health promotion as a key driver in fostering a proactive and engaged patient approach to routine inspections, ultimately contributing to better health outcomes and increased patient satisfaction (Aqtam and Darawwad, 2018).

2.5 Ways to promote health education

The current literature on health education interventions highlights a diverse array of approaches aimed at promoting informed decision-making and fostering positive health behaviors. Traditional methods, such as classroom-based education, remain prevalent, leveraging structured curriculum and instructional materials to disseminate health information (Kim et al., 2021). However, a shift towards more interactive and engaging approaches is evident, with the integration of technology playing a pivotal role. Digital health education interventions, including mobile applications, online platforms, and virtual reality tools, are increasingly recognized for their ability to reach diverse populations and tailor information to individual needs (Appiah, 2020). Community-based interventions, involving local organizations and grassroots initiatives, are gaining prominence for their contextual relevance and cultural sensitivity. Moreover, social media platforms are being leveraged as powerful tools for health education, enabling the dissemination of timely information and fostering peer-to-peer engagement (Evensen, Bull and Ness, 2021). The literature emphasizes the importance of considering diverse learning styles, cultural nuances, and health literacy levels when designing and implementing health education interventions. This dynamic and evolving landscape reflects a recognition that effective health education requires a

multifaceted, adaptable approach to meet the diverse needs of individuals and communities.

Wechat, often referred to as Weixin in China, is a multifaceted and widely popular social software application that has transformed the way people communicate, connect, and interact in the digital age (Liao et al., 2021). Launched in January 2011 by Tencent, a Chinese tech giant, Wechat has become one of the world's most influential and versatile social platforms, with over a billion monthly active users as of my knowledge cutoff date in early 2022. This mobile app has redefined the concept of social networking by seamlessly integrating various features and services, offering users an all-in-one digital ecosystem where they can chat, make voice and video calls, share moments, pay for goods and services, play games, and more (Song et al., 2021).

As of the second quarter of 2016, Wechat has covered more than 94% of China's smart phones, with 806 million monthly active users. Wechat provides functions such as public platform, moments, and message push (Chen et al., 2020). Users can add friends and follow the public platform by "shake", "Search number", "nearby people" and scanning QR code. At the same time, Wechat will share the content with friends and share the wonderful content that users see to the Wechat circle of friends(Song et al., 2021).

Certainly, there are limitations and potential biases associated with utilizing Wechat for health promotion interventions:

Self-selection bias: Participants engaging in interventions may already possess a higher awareness or motivation toward health, potentially leading to an overly optimistic outcome.

Privacy concerns: Conducting interventions on social media platforms like Wechat may raise issues regarding personal privacy protection, which if not addressed properly, could evoke resistance from users.

Insufficient user engagement: Despite being a widely used platform, users may lack the sustained motivation to participate, thereby potentially diminishing the effectiveness of the intervention.

To address these limitations and potential biases, the following solutions can be considered:

Multichannel recruitment: Recruiting participants from randomly selected diverse primary healthcare service institutions to ensure a more representative sample.

Randomized control: Designing control and intervention groups and conducting random allocation to minimize the impact of self-selection bias.

Enhanced privacy protection: Implementing measures to ensure user privacy, such as anonymizing data, clearly informing users about data usage, and adhering to

relevant privacy regulations.

Personalized interventions: Designing personalized intervention schemes based on users' interests, needs, and health conditions to increase user engagement and sustainability.

By employing these methods, the limitations and potential biases associated with Wechat-based health promotion interventions can be minimized to maximize intervention effectiveness and sustainability.

2.6 Theoretical framework

Through literature review, expert consultation, and ultimately, we chose the health promotion model that best matched our research. The model focuses on the three areas (individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes) (Thombs *et al.*, 2020), Eight behavior-specific beliefs (Perceived benefits of action, Perceived Barriers to Action, Perceived Self-Efficacy, Activity-related affect, Interpersonal influences, Situational influences, Commitment to plan of action, and Immediate competing demands) to determine the health-promoting behavior (Weltermann *et al.*, 2020).

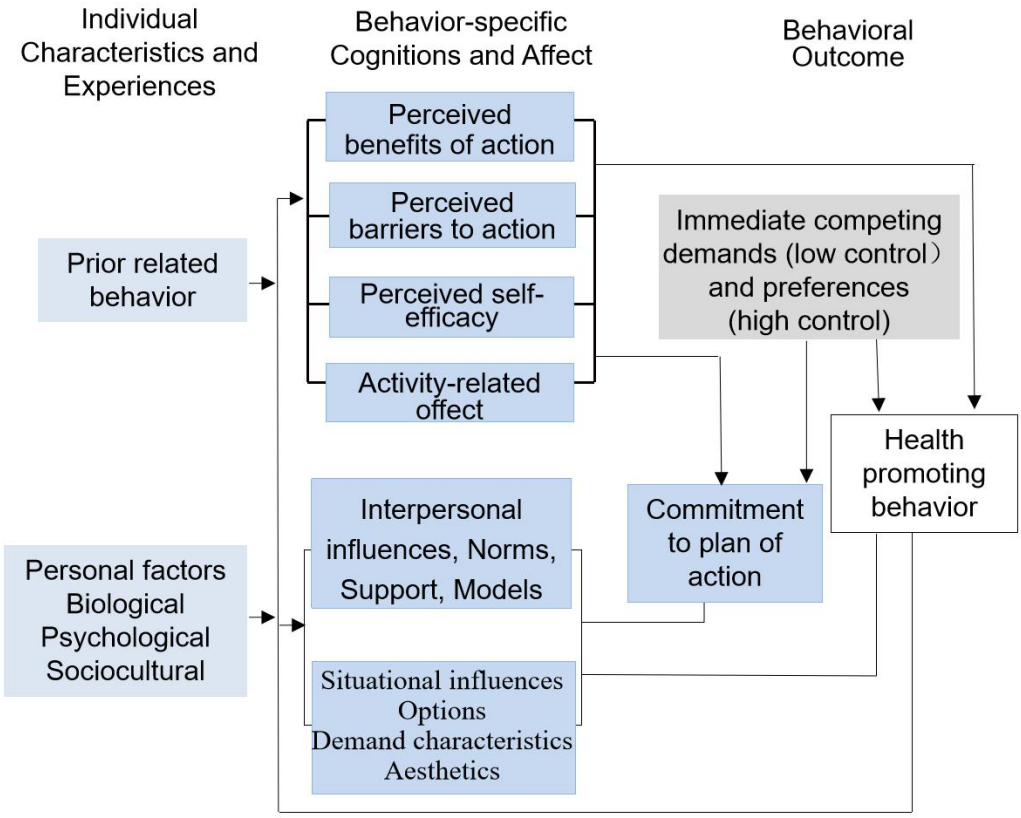


Figure 2.1. Health Promotion Model

2.7 Conceptual Framework

We build this conceptual framework based on the health promotion model and the self-empowerment model. Individual Characteristics and Experiences to be included as my phase I study. And we are based on five behavior-specific beliefs (perceived benefits of action, activity-related impact, interpersonal impact, situational impact, and commitment to an action plan) (Weltermann *et al.*, 2020) and two key elements of the self-empowerment model (Environmental Circumstances and Possession of Competencies and Skills) (Sheeran *et al.*, 2020) have developed health promotion module, and measured our results in patient satisfaction and intervention via Wechat.

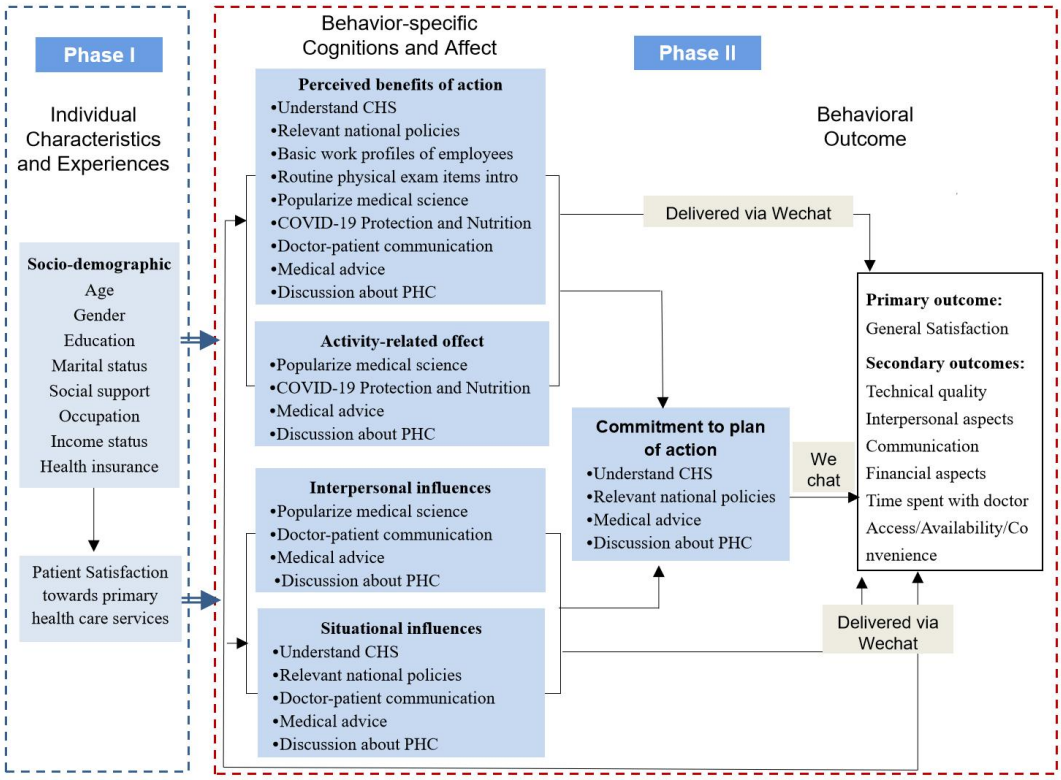


Figure 2.2. Conceptual Framework

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This investigation comprised two distinct phases: a cross-sectional study (Phase I) followed by a randomized controlled trial (Phase II), aimed at fulfilling the specified research objectives.

The methodology of Phase I involved an exploration of the existing landscape concerning patient satisfaction within the community health service center in Xi'an, China. A comprehensive review of pertinent literature was conducted to contextualize the research landscape. Deliberations with academic mentors were instrumental in refining the research specifics, supplemented by seeking expert consultations to delineate the questionnaire and research methodologies. A meticulously crafted research plan was formulated, incorporating a pre-survey, iterative revisions, and enhancements to the research design and interview framework, thus priming for the forthcoming survey.

Utilizing a multi-stage random sampling technique, A simple random sampling method was used to select 12 community health service centers, and then a systematic random sampling method was used to select patients who met the

inclusion criteria and volunteered to participate in the selected community health service centers. A questionnaire survey was conducted on the selected patients, and statistical analysis was carried out with SPSS software and excel documents. The specific steps are as follows:

Firstly, the names of all 121 community health service centers were randomly input into an Excel document, and a subsequent random sampling procedure, facilitated by the Excel random sampling function, was executed to select 12 community health service centers.

Subsequently, the 12 chosen community health service centers underwent further randomization to establish the survey site visitation schedule. In accordance with the determined survey timeline, the selected community health service centers were then subjected to investigation. Ultimately, a random sampling method was applied at each of the 12 community health service centers on the designated survey day. This encompassed all patients who met the predefined inclusion criteria and expressed voluntary participation in the study. Consequently, a total of 315 patients were enrolled in the investigation across the 12 community health centers, thereby ensuring a comprehensive representation of the targeted population.

In Phase II, an in-depth analysis of the Phase I findings underpinned the identification of health-promoting factors, intervention formulation, and preparatory measures for intervention trials. The specific steps are as follows:

The same multi-stage random sampling method as Phase I was adopted to re-select 12 institutions and randomly determine the investigation time.

On the day of the study, we randomly assigned patients to each institution using a coin toss. If the coin heads face up, the odd-numbered patients enter the intervention group and the even-numbered patients enter the placebo group. If the flower side is up, the even-numbered patients enter the intervention group, and the odd-numbered patients enter the placebo group. We ended up with 156 patients in each group.

Throughout the process, we have taken steps to keep random assigned sequences secret. The pre- and post-intervention questionnaires were collected from both the intervention and placebo groups for subsequent statistical analyses. The conclusive steps involved drafting the thesis, submitting the report, and fulfilling all requirements pertinent to the completion of the research project.

3.2 Phase 1: Study design and procedures

The phase I study is conducted from June 2020 to December 2021, as delineated in Table 3.1.

Table 3.1. Research plan for phase I study

Research stage	Research progress	Research content
Phase I: The cross-sectional study design	June to September 2020	Consult the literature, improve the research plan, and write the proposal
	October to December 2020	Research plan argumentation, and revision.
	January to February 2021	Prepare research materials, volunteer training, contact research institutions
	February to March 2021	Pre-survey in Xi'an, China
	April 2021	Preparation before research
	May to June 2021	Field surveys in Xi'an, China
	July to September 2021	Data sorting and analysis
	October to December 2021	Analysis and summary of Phase I research results, Write paper

Phase I is a cross sectional study. Twelve out of 121 PHC in Xi'an, China to be included in our study using simple random method. All the patients attended to the 12 CHS were systematic random sampled. Out of a total of 635 patients, 408 is eligible patients, 93 refused to answer, and 315 patients were eventually included and analytical.

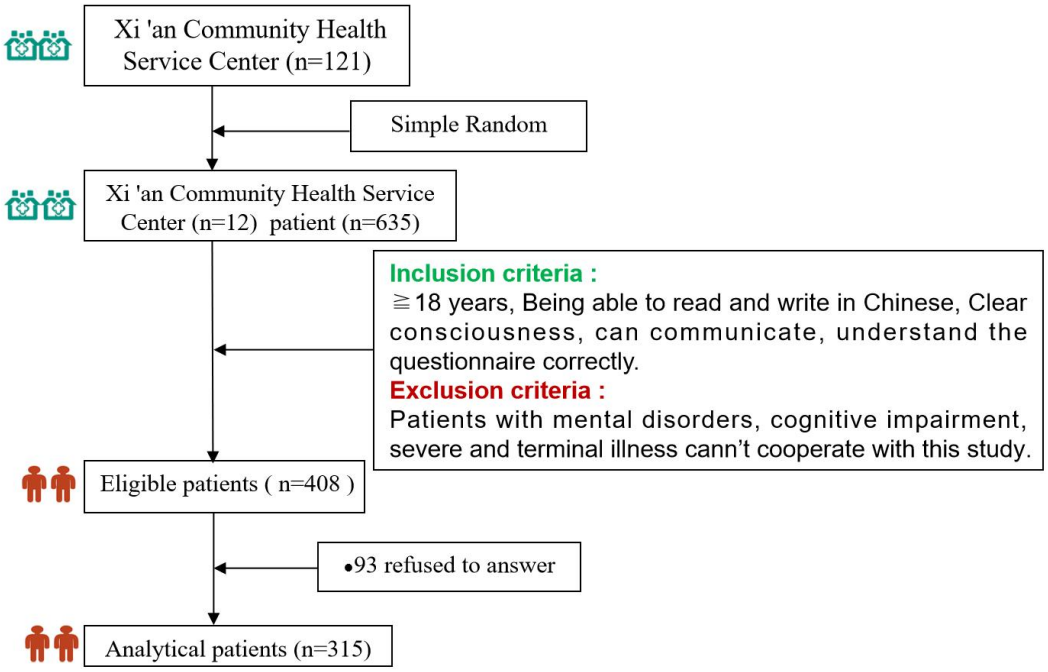


Figure 3.1. The flow of phase I study

3.2.1 Study Location and Population

Xi'an, a pivotal capital city in northwest China, played a significant role during the COVID-19 pandemic, rendering it a compelling focus for extensive research. The Statistical Yearbook of Urban Construction 2019, issued by the Ministry of Housing and Urban-Rural Development, reported a population of 6,378,100 in Xi'an's main urban area (Li *et al.*, 2017)， has a dense population and strong demand for optimal allocation of medical resources, which has a certain representativeness.

In addition，during an epidemic, it's better to choose a stable and manageable area for research. In Xi'an, researchers can easily reach out to patients and health providers for the study, making it vital for carrying out interventions and gathering data.

Following a comprehensive evaluation that factored in the research plan and budget considerations, the project team decisively selected Xi'an, China as the primary research site. The initiation phase involved meticulously cataloging Xi'an's community health service centers. Using a stringent random sampling approach, 12 community service centers in Xi'an were systematically chosen for an in-depth investigation.

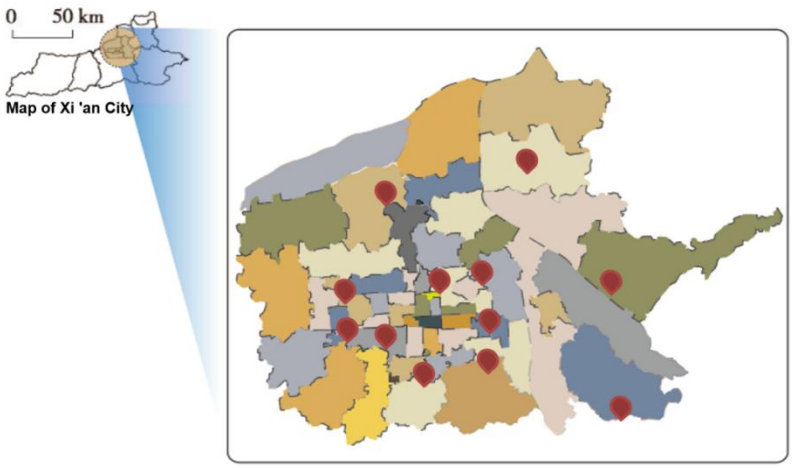


Figure 3.2. Study location

3.2.2 Sampling Technique and Sample Size

Multi-stage sampling was employed for the selection of community health service centers in Xi'an, Shaanxi Province, China. The statistical records indicated the presence of 121 community health service centers in the region as of 2019.

We adopted the method of multi-stage sampling, simple random method (clinic) and systematic random sampling method (patients).

Institution selection and sorting: According to statistics, there are 121 primary healthcare institutions in Xi 'an City. We recorded the names of all primary healthcare institutions into excel document, and randomly selected 12 institutions by using excel's random sampling function. To ensure the randomness and representativeness of the sample.

Survey time determination: The 12 institutions were further randomly sorted, and the survey time of each institution was randomly determined. This further ensures randomness throughout the study and prevents selection bias.

Patient random allocation: Systematic random sampling of patients was conducted at each of the 12 institutions. In the end, we enrolled 315 patients.

Random sequence privacy: Throughout the process, we have taken steps to keep random assigned sequences secret. The process of institution selection, ranking, and research timing was carried out by independent research team members who were not directly involved in patient intervention and data collection until the actual intervention was assigned, when patients were kept in the dark to prevent the effects of informed bias. Specific sampling steps in figure 3.2. Table 3.2 shows the extracted CHS and their respective sample sizes.

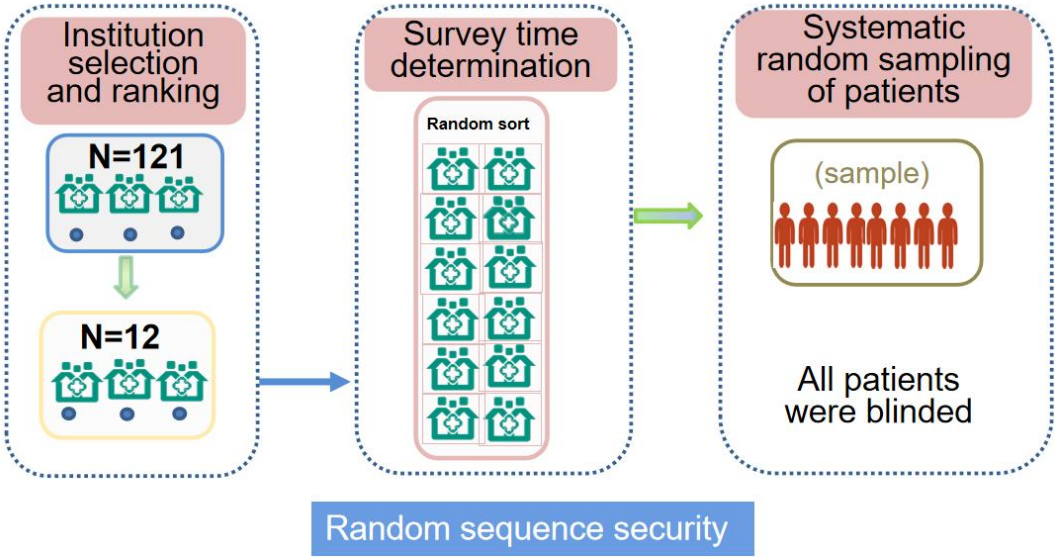


Figure 3.3 Multistage random sampling

Table 3.2. List of CHS and their respective sample sizes

No	Name of organization	Distance	Period	Remark
1	Baqiao District Textile City Community Health Service Center	19.7km	2021.05.12	28
2	Xi 'an Lianhu District Zaoyuan Community Health Service Center	28.5km	2021.05.14	15
3	Xi 'an Lianhu District Xiguan Civil Aviation Community Health Service Center	23.2km	2021.05.19	24
4	Jiefangmen Community Health Service Center, Xincheng District, Xi 'an City	15.9km	2021.05.21	26
5	Health Service Center, Zhongshan Gate Community, Xincheng District, Xi 'an City	16km	2021.05.26	22
6	Miaohou Street Community Health Service Center, Lianhu District, Xi 'an City	19.6km	2021.05.28	18
7	Hongmiaopo Community Health Service Center, Lianhu District, Xi 'an City	18.2km	2021.06.02	26
8	Baqiao District Shilipu Community Service Center	14.4km	2021.06.04	28
9	Community Health Service Center, Changle Middle Road, Xincheng District, Xi 'an City	13.5km	2021.06.09	28
10	Bai Shulin Community Health Service Center, Beilin District, Xi 'an City	17.2km	2021.06.11	35
11	Community Health Service Center, Changle West Road, Xincheng District, Xi 'an City	14.6km	2021.06.16	32
12	Health Service Center, Dongguan South Street Community, Beilin District, Xi 'an City	14.6km	2021.06.18	33
	Total			315

The determination of the sample size was conducted in accordance with the sample size estimation formula, as stipulated by Kish, taking into account the specified absolute precision of 5 percent, a range commonly chosen within the interval of 3 to 5. The calculation is expressed by the formula:

$$n = (Z_{1-\alpha/2})^2 \frac{P(1-P)}{\mathrm{D2}}$$

In this context, a 95% confidence interval ($1-\alpha=0.95$) was employed, corresponding to $Z_{1-\alpha/2)}=1.96$, a standard value derived from the normal distribution table for a 95% confidence interval. The prevalence (P) utilized in the

calculation was established at 20%, reflecting the calculated prevalence for this particular study. The designated absolute precision (D) was set at 5% or 0.05 in this instance. Substituting these values into the formula, the sample size (n) was computed as follows:

$$n = \frac{0.2 \text{ x } (1 - 0.2)}{0.05^2} = 245.84$$

Taking into account a 25% attrition rate, the final adjusted sample size amounted to 308. Subsequently, employing a randomizer calculator, 12 community health service centers were systematically selected, implementing a universal sampling approach that encompassed all patients present on the designated visit day. This comprehensive sampling strategy resulted in the inclusion of more than 308 patients in the study.

3.2.3 Survey Methods

The research team comprised recruited investigators who underwent standardized training. They utilized uniform questionnaires in accordance with prescribed guidelines, conducting surveys with the explicit informed consent of the subjects, as advocated by Agarwal and Biswas (2017). The investigators possessed a foundational background in medical research and received specialized training to ensure that participants comprehensively understood the nature of the study.

Upon imparting basic information about the research, participants were afforded the opportunity to pose questions and make an autonomous decision regarding

voluntary participation. Participants retained the freedom to decline or withdraw from the study at any juncture without incurring adverse consequences (Tolk *et al.*, 2021).

Throughout the designated survey period, randomly selected patients were admitted to a specified institution on a predetermined day, adhering to predefined inclusion and exclusion criteria. Participants were given the option to choose between an electronic or paper questionnaire, and investigators conducted in-depth field investigations based on participant preferences (Cai *et al.*, 2022). Verbal confirmation emphasizing the voluntary nature of the investigation and the strict confidentiality of personal information was provided to respondents. After filling out the questionnaire, participants sealed it in an envelope and placed it into a specified ballot box, where investigators would collect it (Tolk *et al.*, 2021).

The entirety of the study received ethical approval from both the Ethics Committee of the University of Tunku Abdul Rahman and the Academic Committee of Shaanxi Energy Vocational and Technical College. Stringent quality placebo measures were implemented at every stage of the research process to uphold the accuracy and reliability of the collected data.

These criteria were established to ensure that the selected participants possess the necessary attributes to contribute meaningful data to the study while mitigating potential confounding factors that could impact the reliability and validity of the research findings. The details for both inclusion and exclusion criteria are as

follow:

Inclusion Criteria:

1. Age 18 years or older.

2. Proficiency in reading and writing in the Chinese language.

3. Clear consciousness.

4. Normal communication abilities.

5. Ability to understand the questionnaire accurately.

Exclusion Criteria:

1. Patients with language expression disorders resulting from their underlying medical conditions.

2. Over-aged patients with impaired speech communication.

3. Individuals with diagnosed mental disorders.

4. Participants with cognitive impairments.

5. Those suffering from severe and terminal diseases, rendering them unable to cooperate with the research procedures.

3.2.4 Study's Instruments

In this study, a comprehensive questionnaire was utilized, comprising two distinct sections. The first segment encompassed items focusing on sociodemographic factors, while the second segment featured the implementation of the validated 18-item Patient Satisfaction Questionnaire (PSQ-18), as introduced by Yao in 2017.

The PSQ-18 was specifically designed to evaluate patient satisfaction with community health service centers. Comprising 18 items distributed across 7 dimensions, it gauges general satisfaction (2 items), access and convenience (4 items), interpersonal attitudes (2 items), technical quality (4 items), financial aspects (2 items), communication (2 items), and time spent with doctors (2 items). Respondents utilized a 5-point Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree), providing nuanced responses. The PSQ-18 in Chinese, adapted from its English counterpart, underwent a rigorous validation process in China, involving thorough discussions to ensure its validity and necessary modifications. The Chinese iteration exhibited reliability, as evidenced by a Cronbach's α coefficient of 0.791.

It is important to note that modifications were applied to the ratings of specific items (1, 2, 3, 5, 6, 8, 11, 15, and 18), involving a conversion from the original scores (1 to 5, 2 to 4, 3 to 3, 4 to 2, and 5 to 1). Simultaneously, the scores for other items (4, 7, 9, 10, 12, 13, 14, 16, and 17) were left unchanged, according to Thayaparan AJ in 2018.

Table 3.3. Scoring items

Item Numbers	Original Response Value	Scored Value
1,2,3,5,6,8,11,15,18	1	1
	2	2
	3	3
	4	4
	5	5
4,7,9,10,12,13,14,16,17	1	5
	2	4
	3	3
	4	2
	5	1

The PSQ-18 questionnaire exhibited a high matching degree with this study and demonstrated robust validity and reliability, with a coefficient of 0.89. The PSQ-18's brevity and its alignment with the PSQ-II's dimensions make it a suitable instrument for situations where a concise yet comprehensive assessment of patient satisfaction is required.

Further validation and reliability considerations for the PSQ were underscored by its historical development, with multitrait and factor analytic scaling studies contributing to the construction of subscales and global scales. Reliability estimates, employing both internal consistency and test-retest methods, met or exceeded recommended standards, reinforcing the instrument's robustness. Moreover, the PSQ's validity was supported by various studies, encompassing content validity, factor analytic and discriminant validity studies, multitrait-multimethod analysis, and predictive validity.

Modifications were introduced in the development of the PSQ-III, underscoring its evolution. The quest for a short, reliable, and effective version led to the creation of the PSQ-18, strategically selected through empirical and conceptual considerations. The correlation between the PSQ-18 and its corresponding long-form scale was evaluated, further affirming its utility in efficiently measuring patient satisfaction.

3.2.5 Operational Definition of the study's variables

The independent variable in this study included age, gender, education, employment, health insurance, socioeconomic status, marital status, and social support. The dependent variable included patient satisfaction towards technical quality, service quality, waiting time, general satisfaction, financial aspects, communication, interpersonal aspects, time spend with the doctor, hardware facilities, access/availability/convenience, and primary care. The details of the definition for each variable are presented in Table 3.4.

Table 3.4. List of definitions for the key variables

Variables	Type of Variable	Conceptual Definition	Operational Definition
Age	Independent Variable	The number of years that have passed since a person's date of birth.	Categorical/ Polynomial self-reported age in (completed) years at the respondent's last birthday
Gender	Independent Variable	How a person identifies their masculine or feminine characteristics.	Categorical/nominal Male, female, LGBT
Education	Independent Variable	The degree to which the patient is educated.	Categorical/ Ordinal Bachelor's degree or above, higher vocational, high school, junior high school or below
Employment	Independent Variable	The work in which an individual serves society and serves as his principal source of livelihood.	Categorical/ Ordinal Have a very good job. Have a good job, job satisfaction is average, not satisfied, no job
Health insurance	Independent Variable	When an insured body appears disease, the person insurance that pays insurance is paid to it by the underwriter.	Categorical/ Ordinal full coverage, basic health insurance, no health insurance
Socioeconomic status	Independent Variable	Combined with economics and sociology, an overall measure of a person's work experience and an individual or family's economic and social status relative to others based on factors such as income, education, and occupation.	Categorical/ Ordinal High social status, respected, average, low social status
Marital Status	Independent Variable	Marriage status of the person.	Categorical/ Polynomial Married, Single, Divorced/widow
Social support	Independent Variable	A general term for support that comes from outside the individual.	Categorical/ Ordinal Rich and good social relations, good, average, poor, a person

Table 3.4. List of definitions for the key variables (continued)

Variables	Type of Variable	Conceptual Definition	Operational Definition
General Satisfaction	Dependent Variable	Patients' subjective evaluation of the overall quality of the whole process (Ganasegeran *et al.*, 2015).	Categorical/ Ordinal （1-5） Very good, good, average, bad, very bad
Patient Satisfaction towards Financial aspects	Dependent Variable	Refers to personal, family, or other economic income, etc (Nagwa N. Hegazy *et al.*, 2021).	Categorical / Ordinal （1-5） Very good, good, average, bad, very bad
Patient Satisfaction towards Communication	Dependent Variable	The process of exchanging information. Give each other what you have (Nagwa N. Hegazy *et al.*, 2021).	Categorical / Ordinal （1-5） Very good, good, average, bad, very bad
Patient Satisfaction towards Interpersonal aspects	Dependent Variable	The direct psychological relationship between people through interaction and interaction (Nagwa N. Hegazy *et al.*, 2021).	Categorical/ Ordinal （1-5） Very good, good, average, bad, very bad
Patient Satisfaction towards Time spent with the doctor	Dependent Variable	The total amount of time the doctor talks to the patient (Alexandre *et al.*, 2022).	Categorical/ Ordinal （1-5） Very good, good, average, bad, very bad
Patient Satisfaction towards Technical quality	Dependent Variable	The output quality of the service process refers to the actual output obtained by patients from the service process and the quality of the service results provided to patients.	Categorical/ Ordinal （1-5） Very good, good, average, bad, very bad
Patient Satisfaction towards Access/Availability/Convenience	Dependent Variable	Unimpeded access to medical care/The probability or expectation of time occupancy that the system functions at a given time. Along the optimum; Cheap and nice to get (Nagwa N. Hegazy *et al.*, 2021).	Categorical/ Ordinal （1-5） Very good, good, average, bad, very bad

3.2.6 Description of Statistical Analysis

The data analysis utilized the SPSS software, showcasing continuous variables as either means or medians, while categorical variables were represented in terms of

frequencies. This study determined the relationship between the independent variable and the dependent variable is linear through the scatter plot, and the Homoscedasticity of the residual at the level of all the independent variables. Histogram and Shapiro-Wilk tests are used to check the normality of the residuals. The variance inflation factor (VIF) was used to assess whether there was a high correlation between the independent variables. Ultimately, Univariable Linear Regression is the analysis of the influence of an independent variable on a dependent variable. Multiple Linear Regression analyzes the factors associated with patient satisfaction among patients attended at a primary healthcare in China. The dependent variable is a continuous data and the independent variables include socio-demographic data, thus multiple linear regression analysis was used in this study. In the linear regression, those variables p value <0.25 from the bivariate analysis are included in the final analysis.

3.3 Phase II: Study Design and Procedures

By conducting a comparative analysis in the initial stage, health promotion factors were identified, leading to the formulation of intervention measures in preparation for the intervention experiment. Phase II study is conducted between January 2022 to July 2023 (see Table 3.5) and the flow of the study is presented in Figure 3.1.

Table 3.5. Research plan for phase II study

Research stage	Research progress	Research content
Phase II: Randomized controlled trial	January to February 2022	Sampling, identification of research units, preparation for intervention tests
	March to April 2022	Volunteer training and patient recruitment
	May to June 2022	Patient intervention and Questionnaire collection in Xi'an, China
	July to December 2022	Data collation and input
	January to February 2023	Statistical analysis of data
	March to April 2023	Write paper, Complete doctoral dissertation, form research results
	April to July 2023	complete graduation defense, Research project submission

Phase II is a randomized controlled trial. Using Multi-satge sampling; 12 out of 121 PHC using Simple random method (clinic) and A systematic allocation was used to choose patient based on their registration number. Patient with odds number was assigned to intervention group, even number was assigned to placebo group using flip coin method. Eligible patients are 493,181 patient refused to attend,we finally selected 156 people from each group.

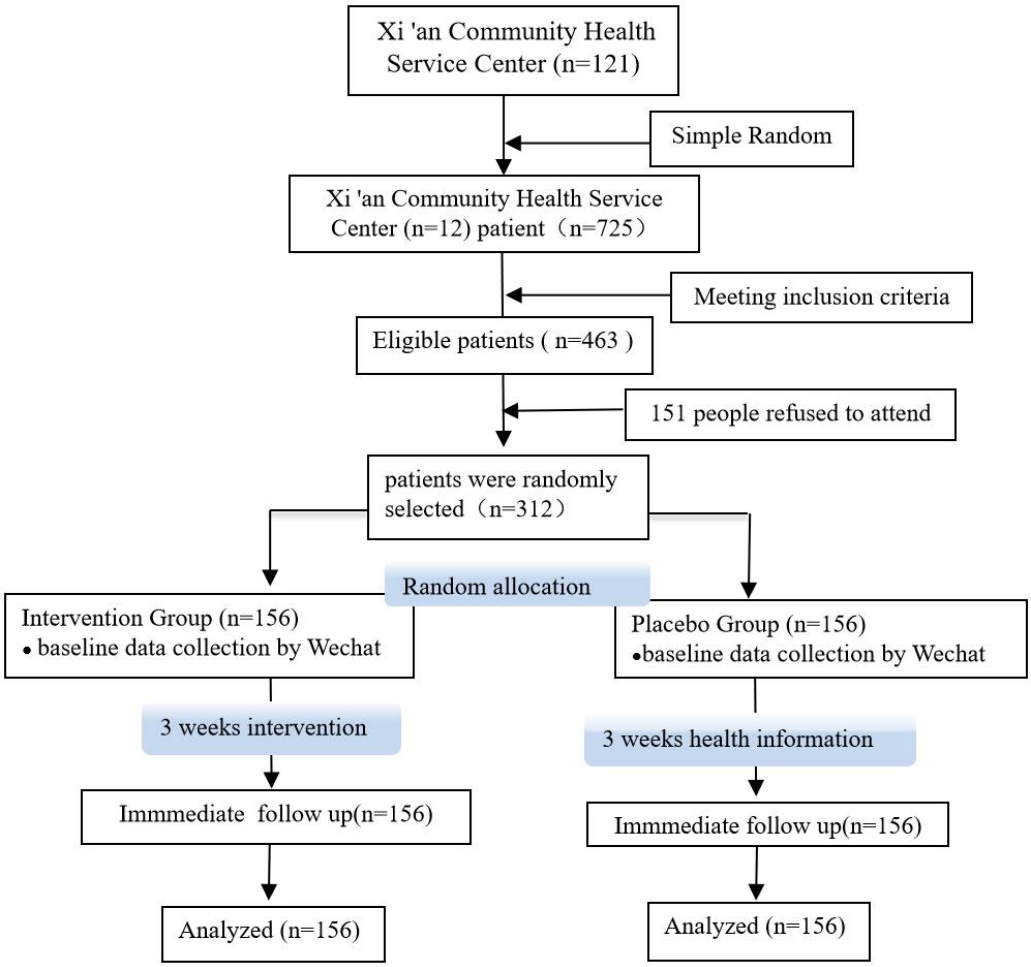


Figure 3.4 The flow of phase II study

3.3.1 Study Location and Population

Similarly, to the Phase I study, the population under investigation in this study comprises patients who seek services at community health service centers in Xi'an, China.

3.3.2 Sampling Technique and Sample Size

In employing a multi-stage sampling approach, the study first randomly selected 12 community health service centers out of a pool of 121 centers in Xi'an, Shaanxi Province, China. The selection process involved in putting the center names into an excel document and using the random sampling function. Subsequently, the 12 selected centers were randomized to determine the survey time. The investigation was then conducted at the respective community health service centers in accordance with the designated time schedule. A systematic allocation was used to choose patient based on their registration number. Patient with odds number was assigned to intervention group, even number was assigned to placebo group using flip coin method.

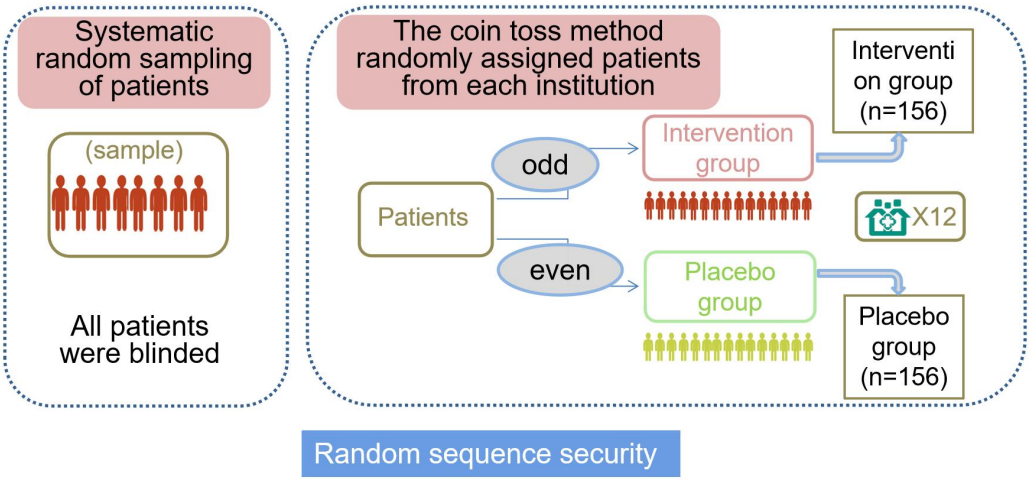


Figure 3.5 Multi-stage sampling

Similar to the approach employed in the Phase I study, respondents in Phase II were selected based on predefined inclusion and exclusion criteria. This method

ensured a consistent and systematic participant selection process, aligning with the established criteria to maintain research homogeneity and uphold the integrity of the study design.

Inclusion Criteria: Participants were randomly selected from designated community health service centers, demonstrating voluntary participation in the research and meeting specific inclusion criteria among patients seeking medical consultation on the day of the research. The inclusion criteria encompassed: Age 18 years or older, Proficiency in reading and writing in Chinese, Ownership of a smartphone and familiarity with Wechat usage, Clear consciousness, Normal communication abilities, Capability to comprehend the questionnaire accurately.

Exclusion Criteria: Conversely, individuals meeting any of the following criteria were excluded from the study: Patients with language expression disorders attributed to their medical conditions, Over-aged patients with impaired speech communication, Individuals with mental disorders, Those experiencing cognitive impairments, Patients with severe or terminal diseases, impeding their ability to cooperate with the research requirements.

To assess patient satisfaction before and after the intervention, the study employed sociodemographic questionnaires and PSQ-18 questionnaires. Table 3.6 shows the extracted CHS and their respective sample sizes.

Table 3.6. Survey institution and sample size

Serial number	Institutions	Intervention group	Placebo group
1	Tumen Community Health Service Center of Lianhu District	11	11
2	Second Community Health Service Center of zaoyu an in Lianhu District	13	13
3	Xi'an Xincheng Hansenzhai Community Health Serv ice Centre	6	6
4	Jiefangmen Community Health Service Center, Xinc heng District, Xi 'an	14	14
5	Health Service Center, Zhongshan Gate Community, Xincheng District, Xi 'an	12	12
6	Miaohou Street Community Health Service Center, B eiyuanmen, Lianhu District	17	17
7	Community Health Service Center of Zifang Village, Hongmiaopo, Lianhu District	12	12
8	Baqiao District Shilipu Community Service Center	15	15
9	Community Health Service Center, Changle Middle Road, Xincheng District, Xi 'an	13	13
10	Bai Shulin Community Health Service Center, Beilin District, Xi 'an	15	15
11	Community Health Service Center, Changle West Ro ad, Xincheng District, Xi 'an	12	12
12	Health Service Center, Dongguan South Street Com munity, Beilin District, Xi 'an	16	16
	The total	156	156

Subsequently, the sample size of phase II study is counted using the formula suggested by Zhang (2009).

$$N = 2 \times \left(\frac{z_{1-\frac{\alpha}{2}} + z_{1-\beta}}{\delta_0} \right)^2 \times p \times (1-p)$$

Z1-α/2 =1.96 for 95% confident Interval

Z 1-β = 0.845

D = 0.20 P=0.4 (Prevalence of patient satisfaction= 40%) (Tolk, J.J. et al., 2021)

$$N = \frac{2(1.96+0.84)^2 \times 0.4\ (0.6)}{(0.2)^2}$$

= 94 (+ 40% attrition)

= 156 (in each group)

Hence, therefore, 156 patients were recruited in the placebo and intervention groups respectively.

3.3.3 Survey methods

The survey methods in Phase II are divided into three-steps, including pre-investigation and training phase, during the investigation and after the investigation.

Prior to commencing the survey, an extensive review of pertinent literature was conducted, complemented by consultations with subject matter experts. Survey questionnaires were meticulously designed, and pre-investigations were undertaken. Upon identifying issues, prompt modifications and enhancements were made to both the survey plan and questionnaires. Unified survey methods, intervention materials, and guidelines for questionnaire completion were established.

Investigators underwent comprehensive training before the survey's initiation. This training encompassed the survey's purpose, requirements, methodologies,

questionnaire content, on-site survey skills, and foundational knowledge related to the health workforce. The training aimed to standardize the survey process, ensuring that all participating investigators possessed the capability to collect data, as validated through a qualifying test.

During the investigation, investigators obtained informed consent from respondents before conducting one-to-one surveys using standardized questionnaires. Rigorous care was exercised in accurately completing the questionnaires.

While at the conclusion of the investigation, quality control personnel reviewed the questionnaires. If discrepancies, errors, or missing information were identified, respondents were contacted, or a follow-up investigation was conducted on the subsequent day. A comprehensive review of encountered issues took place, with collaborative discussions aimed at devising effective solutions (Zhang Tian, 2019). Prior to the commencement of data collection, ethical approval was secured from both the Scientific Research and Ethics Committee of Universiti Tunku Abdul Rahman University (U/SERC/02/2021) and the Academic Committee of Shaanxi Energy Vocational and Technical College.

Furthermore, this study was registered on ClinicalTrials.gov (Identifier: NCT05383638, website: https://register.clinicaltrials.gov/prs/app/action/SelectProtocol?sid=S000BY0A&selectaction=Edit&uid=U00066CY&ts=94&cx=4p17xj) at the initiation of the

research. The training and execution of study methods strictly adhered to the planned schedule.

3.3.4 Study's Instruments

In the phase II of the study, a comparative analysis of the first stage informed the identification of health promotion factors, leading to the formulation of intervention measures in preparation for the subsequent intervention experiment. Health education materials were collaboratively developed with the assistance of experts. For instance, initiatives were introduced to enhance social distancing by imparting health education on daily health protection habits. Addressing prolonged wait times involved pre-scheduled appointments, designated patient consultants, and the provision of medical guidance through various channels such as video presentations, brochures, and an online Q&A system.

A targeted approach to doctor-patient communication was adopted, aiming to familiarize patients with medical processes, equip them to handle common issues, enhance their understanding of healthcare professionals' roles, and foster a perspective-taking mindset. Diverse modes of health promotion, including bulletin boards, concise manuals, short videos, oral explanations, Wechat group discussions, and electronic articles, were employed.

Research timelines were randomly allocated across sampling institutions, with informed consent and contact information obtained from patients on the same day

as the samples. A dedicated contact group was established to ensure intervention effectiveness, with subsequent invitations extended for a post-intervention evaluation.

Given the widespread use of Wechat as the predominant social media app in China, its integration into the intervention strategy was pivotal, leveraging its popularity and accessibility.

3.3.5 Intervention Development

The formulation of intervention measures is a systematic process (Martinez and Mahoney, 2022), through literature review, clinical consultation, expert discussion and other methods to understand the existing relevant research commonly used intervention measures. Ultimately, drawing upon the Health Promotion Model and self-empowerment model (Wartiningsih et al., 2020), we formulated the conceptual framework and intervention measures for this study. The Health Promotion Model focuses on three key areas, including eight behavior-specific beliefs that influence health-promoting behaviors (Rega et al., 2012). The concept of empowered action includes four pivotal factors. Similarly, our study focuses on three areas: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Rega et al., 2012), five behavior-specific beliefs: Perceived benefits of action, Activity-related affect, Interpersonal influences, Situational influences, and Commitment to plan of action (Friedman et al., 2009)， and incorporates two key elements of the self-empowerment model

(Environmental Circumstances and Possession of Competencies and Skills) have developed health promotion module, and develop health intervention.

The developed module and health intervention were reviewed by a group of experts in varies field (Kijima et al., 2021). Meanwhile, the final content of the module and health intervention was pre-tested among a group of 25 patients in health center setting in Xi'an China. Intervention module topics are shown in the table 3.7.

Table 3.7. Health Promotion Intervention Project Table

Project	Examples of intervention data	Knowledge Required for Patients to Understand Post-Intervention
What is community health service	What are the community health service centers, the important medical services they provide, the department Settings, their status in China's medical system, etc.?	The community health service centers, the important medical services they provide, the department Settings, their status in China's medical system
The rights and welfare of patients	What benefits did you enjoy when you visited the community health service center? Relevant national policy rapid treatment measures how to seek help	Benefits provided by the Community health service Center, relevant national policies, rapid treatment measures, how to seek help in the community health service center
The basic workflow of staff	Work tasks and hours of doctors, nurses, technicians, etc	Work tasks and hours of doctors, nurses, technicians
Introduction of routine physical examination items for patients	The results of various common tests require time cost, etc	The results of various common tests require time cost
Popularizing common medical knowledge	Common diseases and medical tips	Common diseases and medical tips
Protection and nutrition during COVID-19	Social distancing, hand hygiene, protein eating, etc	Social distancing, hand hygiene, protein eating
Doctor-patient communication skills	Perspective-taking uses positive words, etc	Perspective-taking uses positive words
Medical advice	Improve medical consultation services and the accessibility of medical consultation services	How can I get medical advice
Discussion about primary healthcare services	Patients can freely discuss with patients and staff about primary health services.	Understand any confusion about primary health services

Intervention Process: The intervention was conducted for 3 weeks, and three interventions were completed every week (Graham *et al.*, 2020), A questionnaire survey was conducted before intervention, and immediately after intervention. Details of specific interventions in Table 3.8.

Table 3.8. Research arrangement for Phase II study

	Time	Group	Content	note
1	The first week of intervention	Intervention group	About Primary healthcare The basic workflow of the staff The rights or welfare of the patients (Huan Li, 2023)	
		placebo group	A healthy diet and, a healthy body， Easy five viscera, must learn to release， Five grains and miscellaneous grains, nourish your health	
2	The second week of intervention	Intervention group	Introduction of routine medical examination items Popularization of science Protection and nutrition during COVID-19 (Huan Li, 2023)	
		placebo group	Information on Healthy bones and prevention of osteoporosis Chinese residents dietary guidelines, Early signs of blood clots.	
3	Third week of intervention	Intervention group	Doctor-patient communication skills Medical advice Discussion (Huan Li, 2023)	
		placebo group	Disease Prevention How to prevent "heat Stroke" The healthiest lifestyle is the most hardcore disease prevention strategy.	

Intervention group： After the patient was confirmed to participate in this study, the patient's personal Wechat (A social media app widely used in China) account was first added (Bhojak, 2023), and the patient was randomly entered into the intervention group and the placebo group (whether the patient is entered into the intervention group or the placebo group is kept secret from the patient (Khatri et al., 2023). According to the intervention plan, the research assistant sent relevant research materials in advance, reminded the patient to learn, and discussed the intervention content with the patient to ensure that the intervention was effective. All patients who receive health promotion interventions must be able to answer the

basic questions for each intervention (see Table 3.8 for details). We answered any relevant questions of patients, maintain good interaction with patients, and encourage patients in the group to communicate with each other and share their experience (Galante *et al.*, 2021).

placebo group： According to the intervention plan, push the relevant information of the placebo group on time, maintain regular contact with patients, protect the privacy of patients, and respect the legitimate rights and interests of patients. Patients in the placebo group can also ask questions in the Wechat group, discuss with other patients, or interact with staff individually (Rogers *et al.*, 2021).

3.3.6 Description of Statistical Analysis

Responses will be coded uniformly, with data entry and verification procedures implemented to uphold accuracy and consistency (James, James and Hesketh, 2022). Statistical analyses will be conducted utilizing IBM SPSS version 21, employing a significance threshold of $p<0.05$ (Tubert and El, 2022).

Descriptive analysis was employed to delineate the characteristics of the study respondents. Continuous variables were presented as mean [standard deviation (SD)] or median [interquartile range (IQR)], contingent on the normality of the data distribution. For normally distributed data, the mean and SD were reported, while for non-normally distributed data, the median and IQR were provided.

Several normality tests were conducted, including the Kolmogorov-Smirnov and Shapiro-Wilk tests, histogram, Q-Q plot, and statistical tests involving skewness and kurtosis scores (Z test). The Z-test, specifically applied for normality tests using skewness and kurtosis, involved obtaining scores by dividing skew or kurtosis values by their standard errors (George, 2011). An absolute Zkurtosis or Z skewness score less than -1.96 or greater than 1.96 was considered significant at $p<0.05$, indicating non-normal distribution (George, 2011) (See APPENDIX D).

The effect of intervention on patient satisfaction was analyzed by two-way repeated measure ANOVA (Li *et al.*, 2023). The Shapiro-Wilk test checks whether the dependent variable satisfies the assumption of a normal distribution within each group. Use Levene's test to check whether the variances within the groups are equal. If an interaction is found between time and group, explain the meaning of the interaction carefully (Silvera *et al.*, 2021). Tukey's Honestly Significant Difference (HSD) tests are conducted after the fact to determine which specific groups or time points have significant differences (Chai, Zhang and Chang, 2020). The study employed a Two-Way Repeated Measures ANOVA to explore the impact of time spent in different domains and the influence of groups (placebo and intervention) on the satisfaction of health center across all seven domains of the PSQ-18 (Li *et al.*, 2023).

CHAPTER 4

RESULTS

4.1 PHASE 1: Investigation on satisfaction of patients in community Health Service Center

In the initial phase of the study, a comprehensive cohort of 315 patients was recruited in Xi'an, Shaanxi Province, China, utilizing a multi-stage random sampling approach. The detailed findings for phase I study are included in section 4.2 to section 4.4.

4.2 Sociodemographic background

Among the 315 patients included in the study, 63.2% were female, reflecting a higher degree of cooperation and willingness to participate among female patients. In situations where couples were surveyed together, it was common for men to delegate questionnaire completion to their wives, indicating a potential gender-dependent trend in survey participation. Regarding age distribution, 46.6% of participants were between 18 and 47 years old, with 34% between 48 and 64 years old, and 19.4% aged 65 and above. The inclusion criteria mandated participants to be at least 18 years old, resulting in the exclusion of those younger. Additionally, older patients faced challenges in participating due to hearing and communication issues.

Marital status analysis revealed that 88.3% of patients were married, while 4.8% were single, and 6.9% were divorced, separated, or widowed. Per capita annual income showed that the majority fell within the middle and low-income groups, with 6.3% earning above 150,000 yuan, 40% earning between 60,000 and 150,000 yuan, 38.4% earning between 24,000 and 60,000 yuan, and 15.2% earning below 24,000 yuan. Family size demonstrated a relatively simple structure, with 54.9% having three or fewer members.

Educational levels varied, with 13.3% having the least primary school education, 39.7% having middle school education, and 47% having a university education or above. The majority of patients (87%) had basic medical insurance, with 13% having complete medical insurance. Occupationally, the study included 45.4% blue-collar workers, 29.2% white-collar workers, 16.2% retirees, 8.6% unemployed individuals, and 0.6% from other occupations.

In summary, the study population predominantly comprised females, with a relatively young age distribution. Most patients were married, had middle to low annual incomes, and were educated, reflecting a diverse demographic profile. The findings provide a comprehensive understanding of the sociodemographic characteristics of patients attending community health service centers in Xi'an. See Table 4.1 for details.

Table 4.1. Sociodemographic characteristics of the participants (N=315)

Characteristics	n	%
Gender		
Male	116	36.8
Female	199	63.2
Age (year)		
18–47	147	46.6
48–64	107	34
≥65	61	19.4
Marital status		
Married	278	88.3
Single	15	4.8
Divorced/separated/widow	22	6.9
Per capita annual income (RMB)		
>150,000 yuan	20	6.3
60,000–150,000 yuan	126	40
24,000–60,000 yuan	121	38.4
<24,000 yuan	48	15.2
Number of household members		
≤3	172	54.9
>3	143	45.1
Highest educational level		
Primary/never been to school	42	13.30
Junior/senior high school	125	39.7
Junior college/higher	148	47.0
Health insurance		
Perfect	41	13.0
General	274	87.0
Occupation		
Blue collar	143	45.4
Retired	92	29.2
White collar	51	16.2
Unemployed	27	8.6
Others	2	0.6

1 Yuan is equivalent to 0.66 MYR and 0.33 USD at the time of the study

4.3 Results of Patients Satisfaction Questionnaires-18 (PSQ-18)

4.3.1 Questions 1: Doctors are good about explaining the reason for medical tests

Among the 315 patients surveyed, the analysis of their perceptions regarding doctors' explanations for medical examinations revealed that 17.1% considered

doctors to be proficient in explaining the reasons for medical examinations. A majority, comprising 53%, expressed satisfaction with doctors' explanations. Additionally, 14.3% rated the explanations as average, while 15.6% were dissatisfied with the reasons provided by doctors. In general, the majority of patients expressed satisfaction with the clarity and comprehensibility of doctors' explanations.

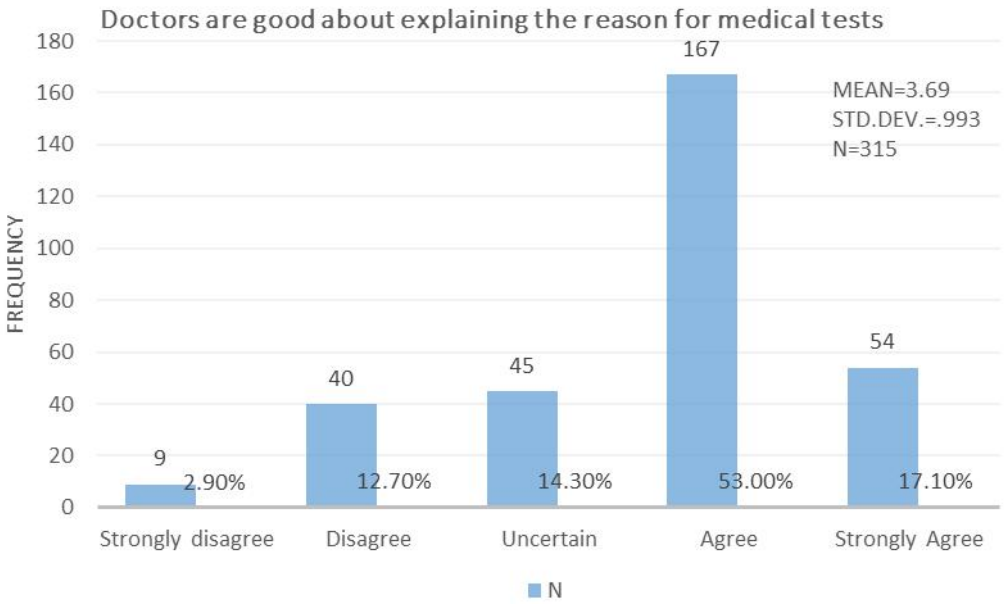


Figure 4.1 Mean and standard deviation for Question 1 (Mean=3.69, SD= 0.99)

Table 4.2. Question 1 investigates the situation (N=315)

Q1	N	%
Strongly disagree	9	2.9%
Disagree	40	12.7%
Uncertain	45	14.3%
Agree	167	53.0%
Strongly Agree	54	17.1%

4.3.2 Question 2: I think my clinic/institution has everything needed to provide complete medical care

The majority of patients expressed satisfaction with the medical facilities at community service centers. Specifically, 55.6% believed that community medical institutions possessed all the necessary conditions to provide comprehensive medical care. Another 29.2% felt that community medical conditions could adequately meet general needs. A smaller proportion, 14.9%, believed that community medical care conditions were insufficient to meet all needs. A minimal percentage of patients, 0.3%, expressed strong dissatisfaction with the conditions. This overall satisfaction is aligned with the community health service center's primary role of addressing the basic medical requirements of the local population, even if it lacks some advanced equipment or expensive medications, striving to provide optimal medical treatment within its capabilities.

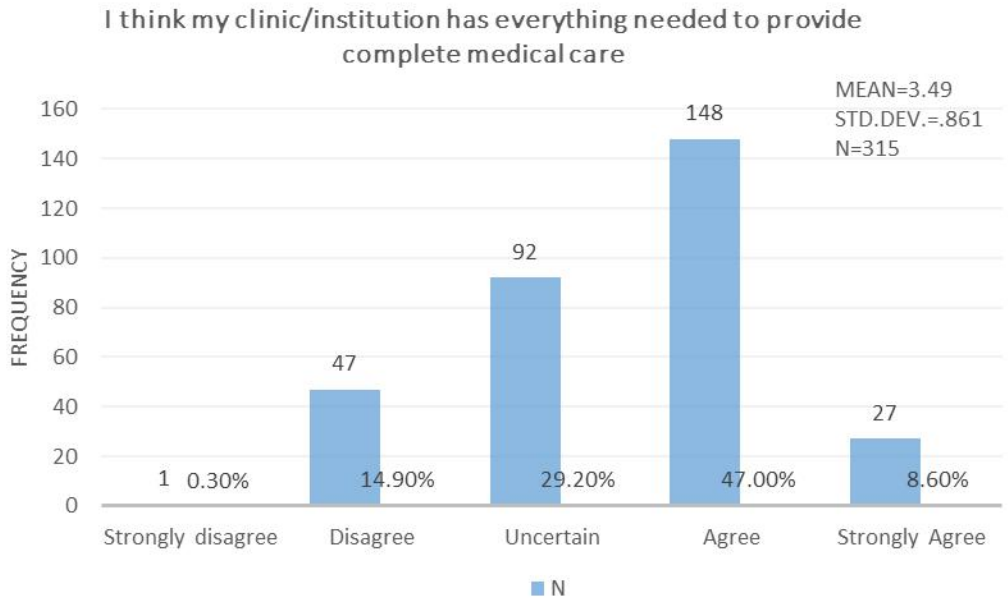


Figure 4.2. Mean and standard deviation for Question 2 (Mean=3.49, SD= 0.86)

Table 4.3. Question 2 investigates the situation (N=315)

Q2	N	%
Strongly disagree	1	0.3%
Disagree	47	14.9%
Uncertain	92	29.2%
Agree	148	47.0%
Strongly Agree	27	8.6%

4.3.3 Questions 3: Doctors are good about explaining the reason for medical tests

In the survey conducted, it was found that 13.7% of the respondents perceived the medical services they received as highly satisfactory. Additionally, 68.3% expressed satisfaction with the medical services, while 11.7% remained uncertain about their satisfaction level. On the other hand, 5.1% of respondents indicated dissatisfaction, and a further 1.3% reported being very dissatisfied with the medical services provided.

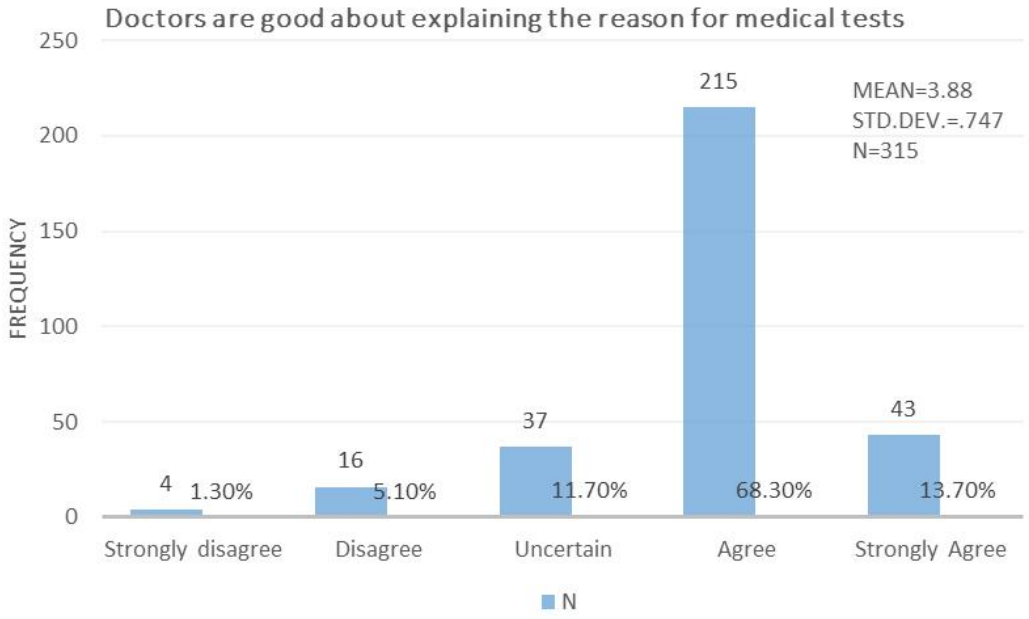


Figure 4.3. Mean and standard deviation for Question 3 (Mean=3.88, SD= 0.75)

Table 4.4. Question 3 investigates the situation (N=315)

Q3	N	%
Strongly disagree	4	1.3%
Disagree	16	5.1%
Uncertain	37	11.7%
Agree	215	68.3%
Strongly Agree	43	13.7%

4.3.4 Questions 4: Sometimes doctors make me wonder if their diagnosis is correct

In accordance with the survey findings, it is notable that 17.1% of patients have consistently harbored no doubts regarding the accuracy of the doctor's diagnosis. A significant portion, constituting 41%, confidently accept the doctor's diagnosis without harboring doubts, while 15.6% remain uncertain about the veracity of the

diagnosis. A smaller percentage, specifically 1.3%, vehemently express strong doubt regarding the accuracy of the doctor's diagnosis.

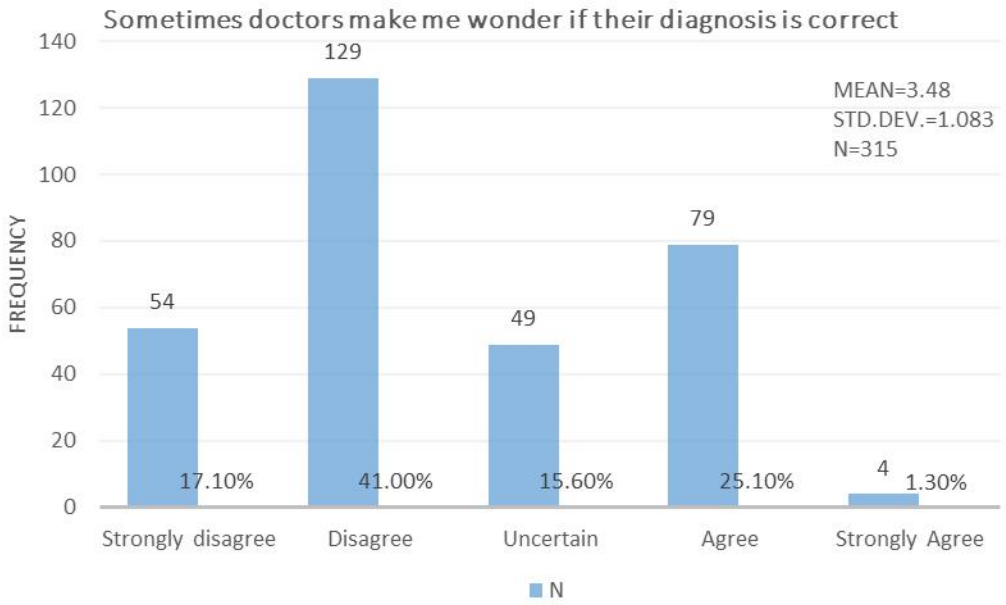


Figure 4.4. Mean and standard deviation for Question 4 (Mean=3.48, SD= 1.00)

Table 4.5. Question 4 investigates the situation (N=315)

Q4	N	%
Strongly disagree	54	17.1%
Disagree	129	41.0%
Uncertain	49	15.6%
Agree	79	25.1%
Strongly Agree	4	1.3%

4.3.5 Questions 5: I feel confident that I can get the medical care I need without being setback financially

Within the cohort of 315 survey respondents, a notable 23.2% expressed the belief that medical expenses at community health service centers would never impose an

economic burden. Additionally, a significant majority, comprising 37.5% of the patients, shared the perspective that such medical expenses would not lead to economic strain. However, a segment, constituting 18.1% of respondents, remained uncertain about the economic implications of these expenses, while 18.4% acknowledged that the medical costs would indeed pose a burden. A smaller proportion, specifically 2.9%, articulated their anticipation of being burdened by community medical expenses. From the findings, it is pertinent to note that the state has implemented various subsidy policies for community medical service centers, ensuring a high reimbursement rate for patients seeking medical consultations.

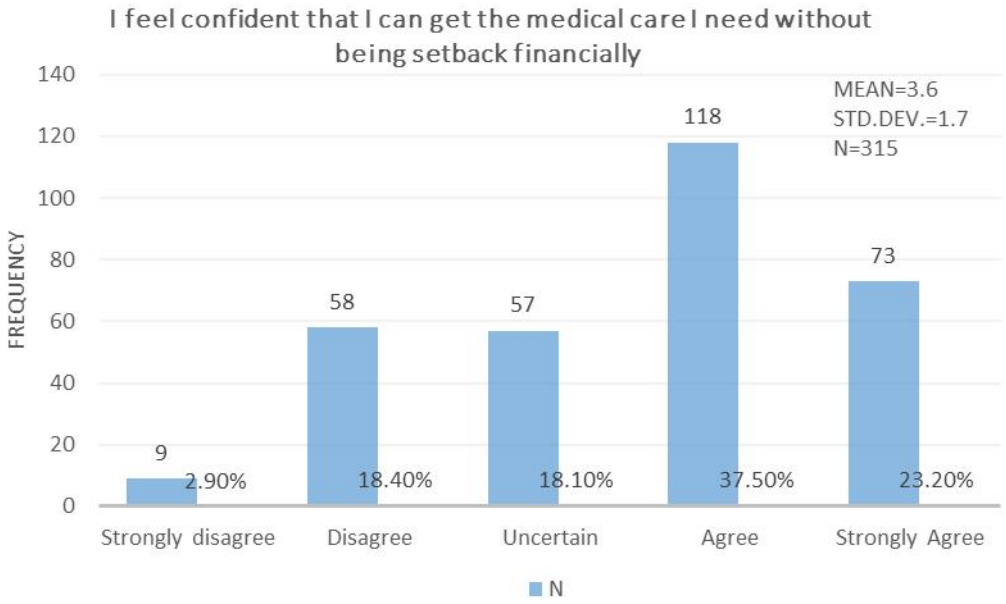


Figure 4.5. Mean and standard deviation for Question 5 (Mean=3.60, SD= 1.10)

Table 4.6. Question 5 investigates the situation (N=315)

Q5	N	%
Strongly disagree	9	2.9%
Disagree	58	18.4%
Uncertain	57	18.1%
Agree	118	37.5%
Strongly Agree	73	23.2%

4.3.6 Questions 6: When I go for medical care, they are careful to check everything when treating and examining me

Among 315 respondents, 80% believed that the staff of community hospitals could carefully examine and treat patients, 9.8% were uncertain about the task, and 10.2% of patients thought that the staff of community hospitals were not careful enough about the examination and treatment of patients.

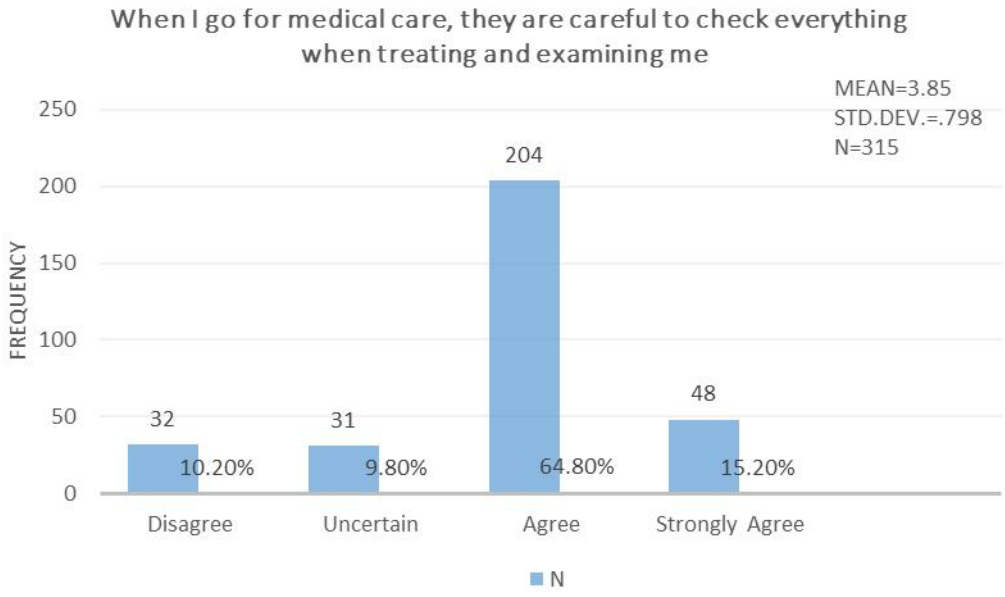


Figure 4.6. Mean and standard deviation for Question 6 (Mean=3.85, SD= 0.80)

Table 4.7. Question 6 investigates the situation (N=315)

Q6	N	%
Disagree	32	10.2%
Uncertain	31	9.8%
Agree	204	64.8%
Strongly Agree	48	15.2%

4.3.7 Questions 7: I have to pay for more of my medical care than I can afford

A total of 1.9% of the surveyed patients believed that the required payment exceeded their financial means significantly, while 16.8% perceived it as beyond their affordable range. Additionally, 7.6% considered the cost to be average, and the majority, comprising 73.6% of respondents, deemed it within their financial capacity. It is noteworthy that community health service centers primarily address prevalent medical conditions, and the associated costs are typically not exorbitant.

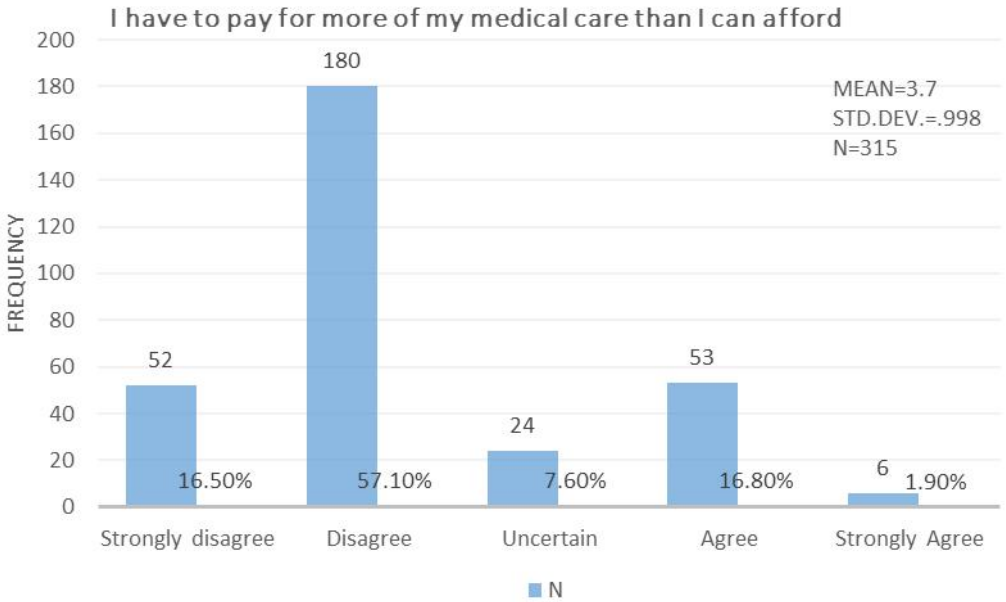


Figure 4.7. Mean and standard deviation for Question 7 (Mean=3.70, SD= 0.99)

Table 4.8. Question 7 investigates the situation (N=315)

Q7	N	%
Strongly disagree	52	16.5%
Disagree	180	57.1%
Uncertain	24	7.6%
Agree	53	16.8%
Strongly Agree	6	1.9%

4.3.8 Questions 8: I have easy access to the medical specialists I need

A total of 32.4% of patients found it convenient to locate medical experts, while 33% remained uncertain. Conversely, 32.1% expressed the view that finding medical experts was not easy, and 2.50% perceived it as very difficult. Currently, community hospitals have the option to enlist the services of retired experts for patient care, and there is an initiative to encourage doctors from larger hospitals to rotate through community hospitals. However, it is important to note that the current execution of these measures is imperfect, leading to significant variations in the quality of medical services across different community hospitals.

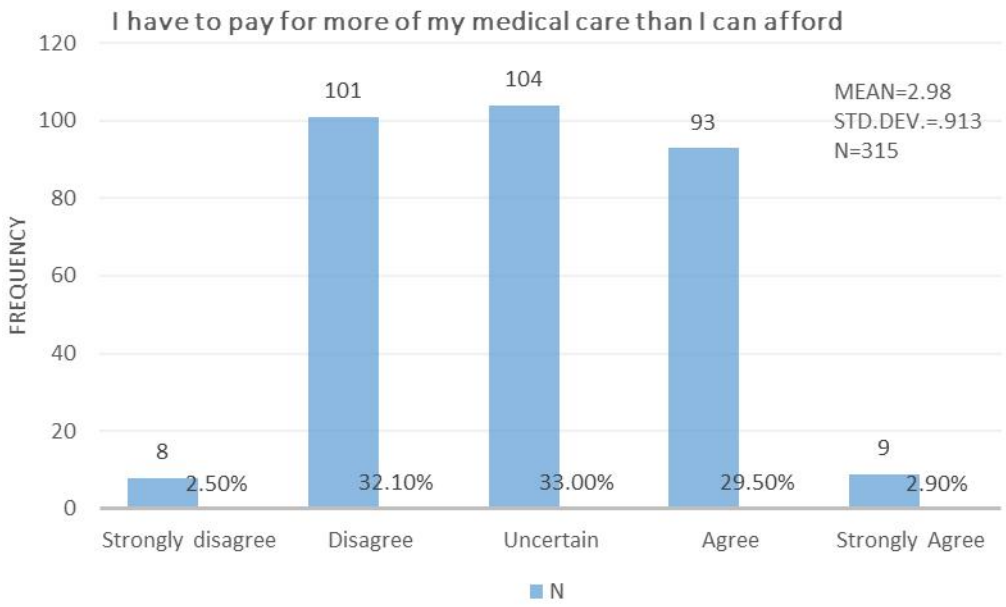


Figure 4.8. Mean and standard deviation for Question 8 (Mean=2.98, SD= 0.91)

Table 4.9. Question 8 investigates the situation (N=315)

Q8	N	%
Strongly disagree	8	2.5%
Disagree	101	32.1%
Uncertain	104	33.0%
Agree	93	29.5%
Strongly Agree	9	2.9%

4.3.9 Questions 9: Where I get medical care, people have to wait too long for emergency treatment

From the analysis of survey responses from 315 patients, it is evident that the patient volume in community hospitals is relatively modest, and wait times are generally minimal. Approximately 14% of respondents perceived a prolonged wait for doctor consultations in community hospitals, while 3.8% expressed uncertainty

regarding the waiting duration.

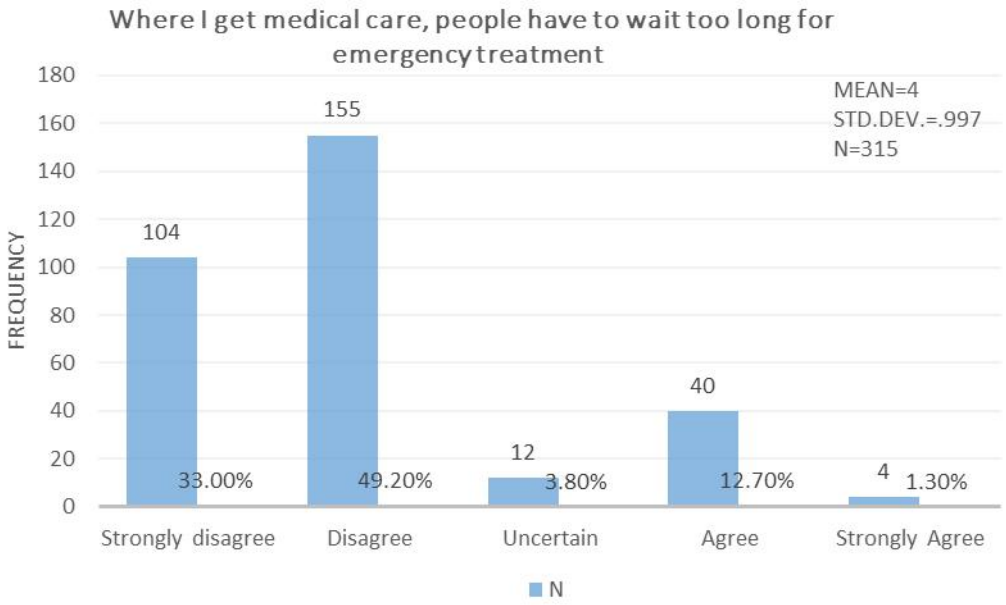


Figure 4.9. Mean and Standard Deviation for Question 9 (Mean=4.0, SD= 0.99)

Table 4.10. Question 9 investigates the situation (N=315)

Q9	N	%
Strongly disagree	104	33.0%
Disagree	155	49.2%
Uncertain	12	3.8%
Agree	40	12.7%
Strongly Agree	4	1.3%

4.3.10 Questions10: Doctors act too business like and impersonal toward me

The graphical representation in Figure 10 indicates that a minimal 1.9% of patients believe that doctors exhibit a demeanor of being excessively busy and impersonal towards patients. Seven percent of respondents expressed a perception of an

average attitude from doctors, while the majority of patients disagreed with the assertion that doctors are too busy and impersonal.

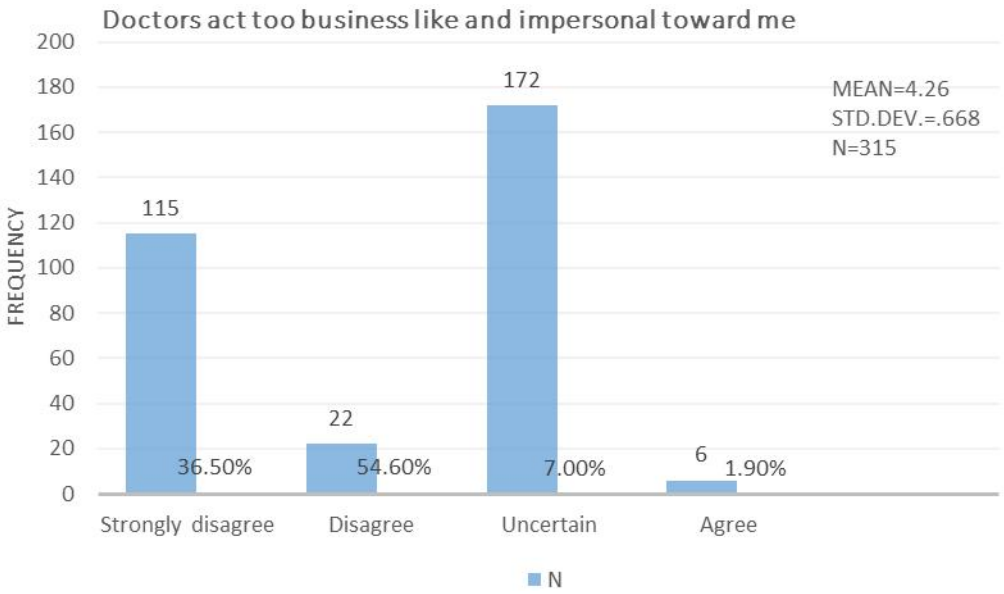


Figure 4.10. Mean and Standard Deviation for Question 10 (Mean=4.26, SD= 0.67)

Table 4.11. Question 10 investigates the situation (N=315)

Q10	N	%
Strongly disagree	115	36.5%
Disagree	22	54.6%
Uncertain	172	7.0%
Agree	6	1.9%

4.3.11 Questions 11: My doctors treat me in a very friendly and courteous manner

In accordance with the survey findings, a marginal 3.5% of patients expressed disagreement with the notion that doctors exhibit a very friendly and polite

demeanor during treatment. Conversely, 8.6% of respondents perceived the doctor's attitude as average, while an overwhelming majority of 88% affirmed that they found doctors to be very friendly and polite during their treatment. Overall, the doctor-patient relationship appears to be predominantly harmonious.

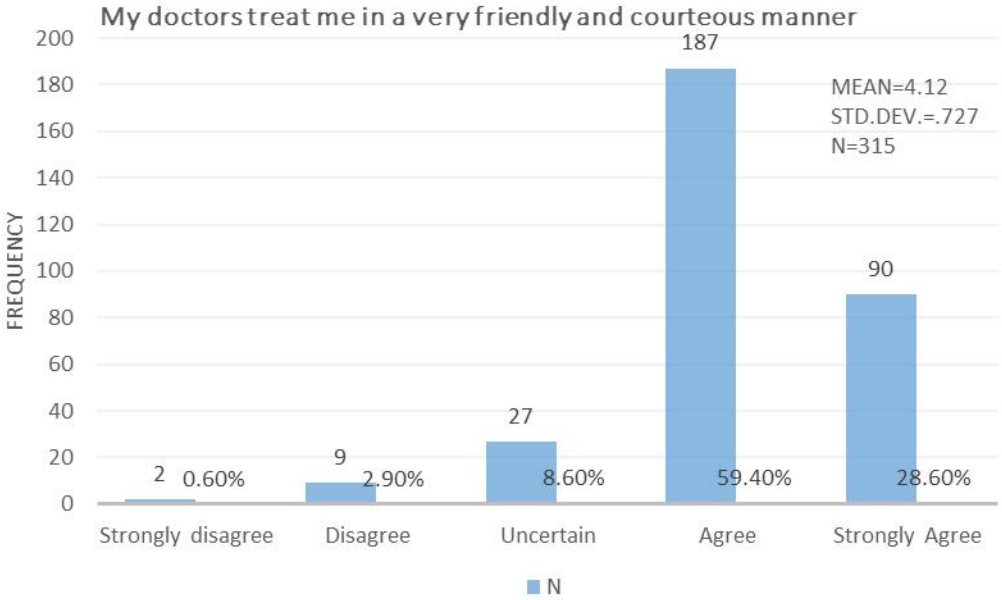


Figure 4.11. Mean and Standard Deviation for Question 11 (Mean=4.32, SD= 0.73)

Table 4.12. Question 11 investigates the situation (N=315)

Q11	N	%
Strongly disagree	2	0.6%
Disagree	9	2.9%
Uncertain	27	8.6%
Agree	187	59.4%
Strongly Agree	90	28.6%

4.3.12 Questions 12: Those who provide my medical care sometimes hurry too much when they treat me

Based on the survey outcomes, 20% of the patients expressed the view that medical service providers occasionally demonstrate a sense of haste, while 15.2% perceived this aspect to be of average frequency. Notably, a significant majority, comprising 64.7% of respondents, disagreed with the notion that medical service providers are prone to hastiness. The prevailing sentiment among the majority of patients is that medical workers exhibit a serious demeanor when delivering medical services.

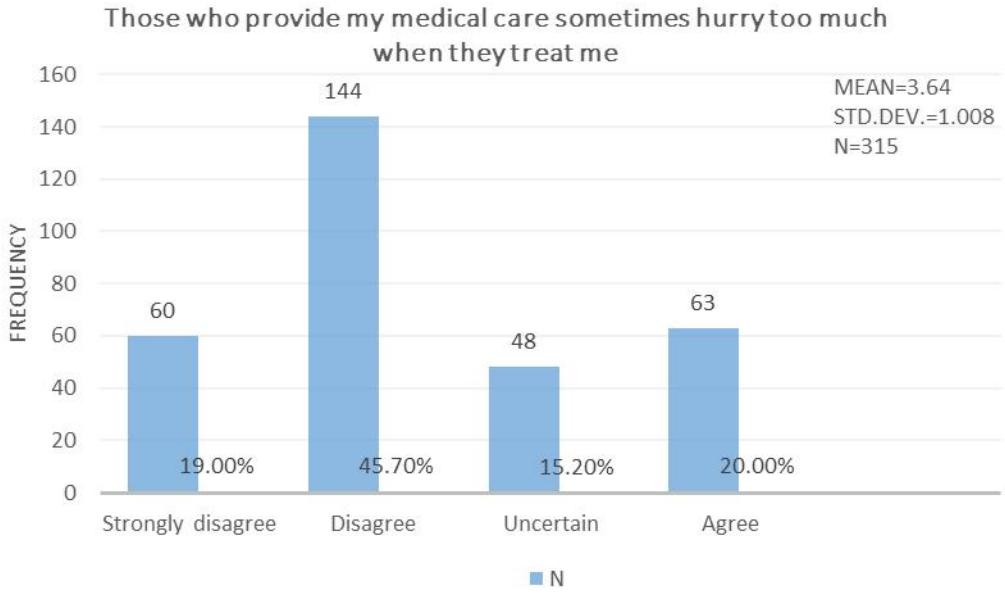


Figure 4.12. Mean and Standard Deviation for Question 12 (Mean=3.64, SD= 1.00)

Table 4.13. Question 12 investigates the situation (N=315)

Q12	N	%
Strongly disagree	60	19.0%
Disagree	144	45.7%
Uncertain	48	15.2%
Agree	63	20.0%

4.3.13 Questions 13: Doctors sometimes ignore what I tell them

In the survey findings, 15.2% of patients indicated that they perceived instances where the doctor occasionally overlooked their statements. Another 17.8% expressed uncertainty in this regard. In contrast, a substantial majority of 67% affirmed that they did not perceive the doctor ignoring their statements. Furthermore, some patients noted that the doctor demonstrated a high level of attentiveness and seriousness during their conversations.

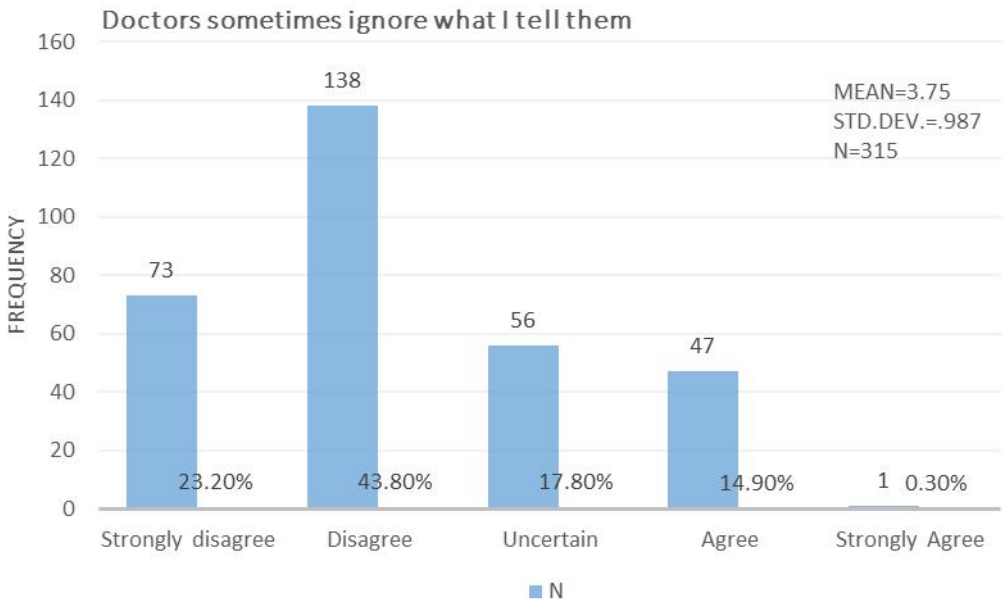


Figure 4.13. Mean and Standard Deviation for Question 13 (Mean=3.75, SD= 0.99)

Table 4.14. Question 13 investigates the situation (N=315)

Q13	N	%
Strongly disagree	73	23.2%
Disagree	138	43.8%
Uncertain	56	17.8%
Agree	47	14.9%
Strongly Agree	1	0.3%

4.3.14 Questions 14: I have some doubts about the ability of the doctors who treat me

According to the survey data, 16.2% of patients harbored doubts about the competence of the doctors treating them, while 12.1% remained uncertain. Encouragingly, a substantial majority of 71.8% expressed confidence and did not doubt the proficiency of their doctors. The prevailing sentiment suggests that the majority of patients maintain a high level of trust in the abilities of the medical professionals attending to them.

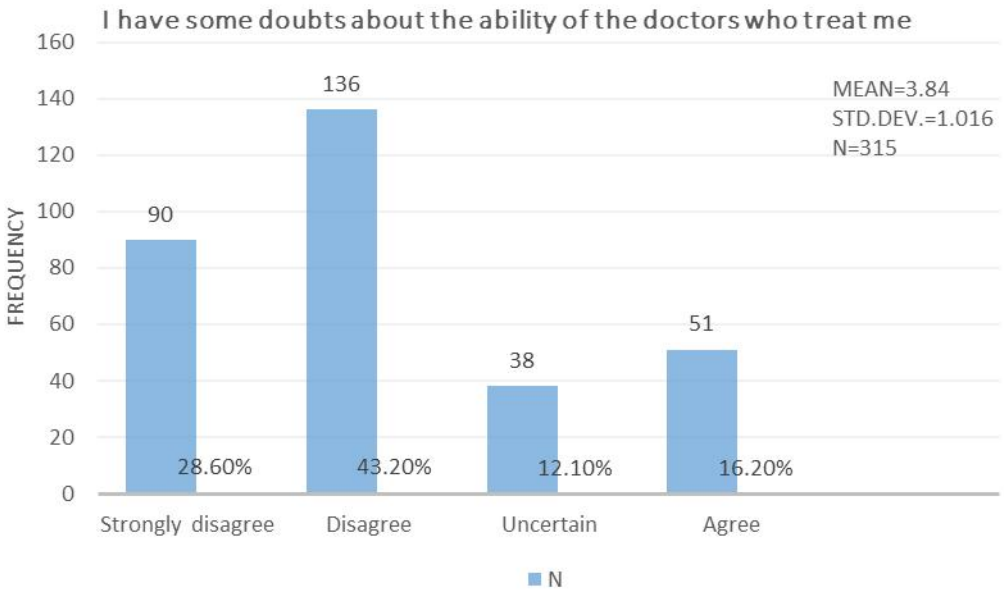


Figure 4.14. Mean and Standard Deviation for Question 14 (Mean=3.84, SD= 1.02)

Table 4.15. Question 14 investigates the situation (N=315)

Q14	N	%
Strongly disagree	90	28.6%
Disagree	136	43.2%
Uncertain	38	12.1%
Agree	51	16.2%

4.3.15 Questions 15: Doctors usually spend plenty of time with me

Based on the survey findings, 16.2% of patients didn't think the perception that doctors typically allocate a substantial amount of time to patients. Another 21.6% of patients believe that the time doctors spend on them is within a normal range. A significant majority of 62.7% of patients perceived doctors as investing an excessive amount of time on cases. Interestingly, during interviews with select patients, it was observed that some individuals feel that doctors can provide meticulous treatment without necessarily requiring an extended duration. This perspective often stems from the recognition that time is a valuable commodity.

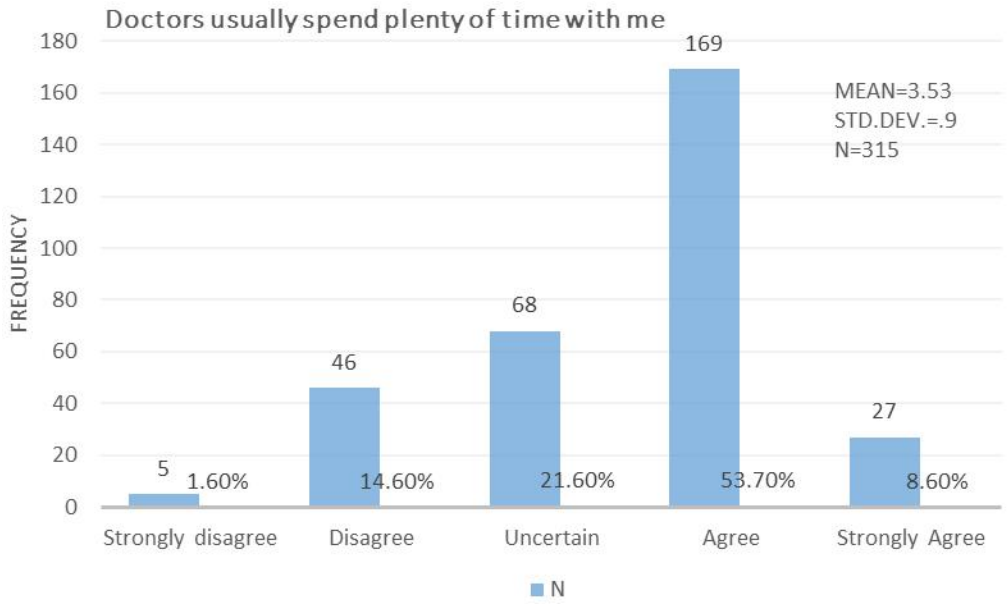


Figure 4.15. Mean and Standard Deviation for Question 15 (Mean=3.53, SD= 0.90)

Table 4.16. Question 15 investigates the situation (N=315)

Q15	N	%
Strongly disagree	5	1.6%
Disagree	46	14.6%
Uncertain	68	21.6%
Agree	169	53.7%
Strongly Agree	27	8.6%

4.3.16 Questions 16: I find it hard to get an appointment for medical care right away

As per the survey results, 14.3% of patients perceived difficulty in securing immediate appointments for medical care, while 4.8% expressed uncertainty in this regard. In contrast, a substantial majority of 80.9% found it not challenging to schedule an appointment promptly. The prevailing sentiment among most patients is that making appointments at a community hospital is highly convenient.

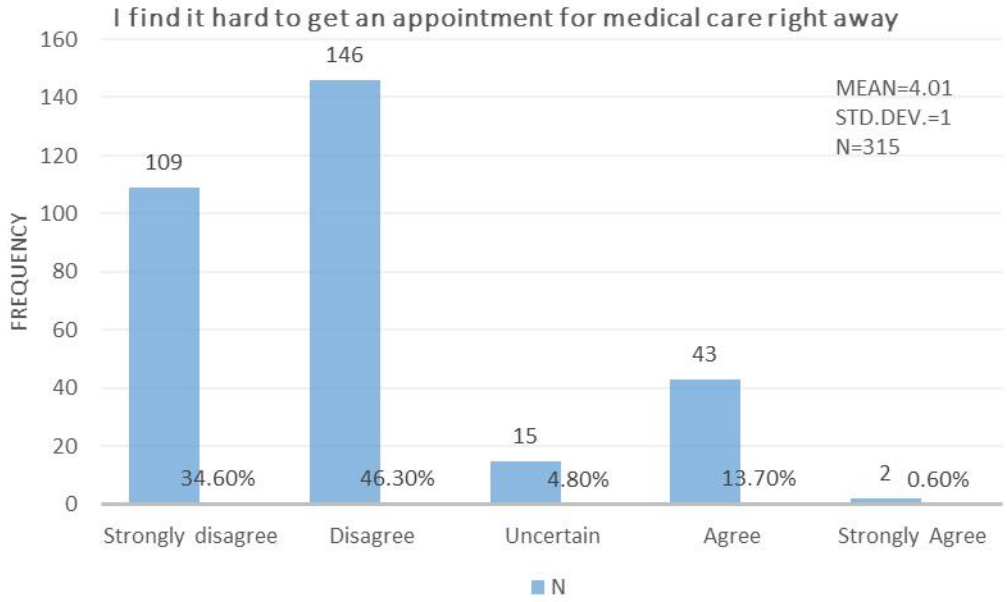


Figure 4.16. Mean and Standard Deviation for Question 16 (Mean=4.01, SD= 1.00)

Table 4.17. Question 16 investigates the situation (N=315)

Q16	N	%
Strongly disagree	109	34.6%
Disagree	146	46.3%
Uncertain	15	4.8%
Agree	43	13.7%
Strongly Agree	2	0.6%

4.3.17 Questions 17: I am dissatisfied with some things about the medical care I receive

According to the survey findings, 25.7% of patients expressed dissatisfaction with certain aspects of the medical services they received, while 14.3% remained uncertain. Encouragingly, a majority of 60% conveyed contentment with the medical services provided. Interestingly, during interviews, some patients raised concerns about the community's preparedness for certain emergencies, indicating potential areas for improvement in the healthcare infrastructure.

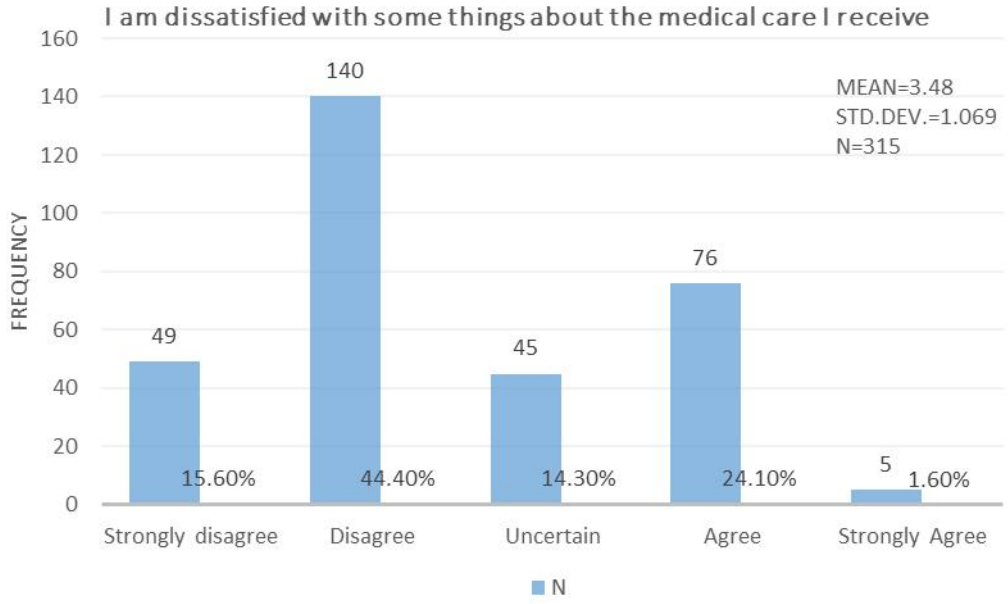


Figure 4.17. Mean and Standard Deviation for Question 17 (Mean=3.48, SD= 1.07)

Table 4.18. Question 17 investigates the situation (N=315)

Q17	N	%
Strongly disagree	49	15.6%
Disagree	140	44.4%
Uncertain	45	14.3%
Agree	76	24.1%
Strongly Agree	5	1.6%

4.3.18 Questions 18: I am able to get medical care whenever I need it

Based on the survey results, 16.2% of patients affirmed that they could access medical care at any time, while 12.1% expressed uncertainty regarding this possibility. The majority, comprising 68.9% of respondents, did not believe they could access medical care at any time. It's noteworthy that some patients perceived the notion of obtaining medical care at any time as somewhat absolute, suggesting a nuanced perspective on the accessibility of healthcare services.

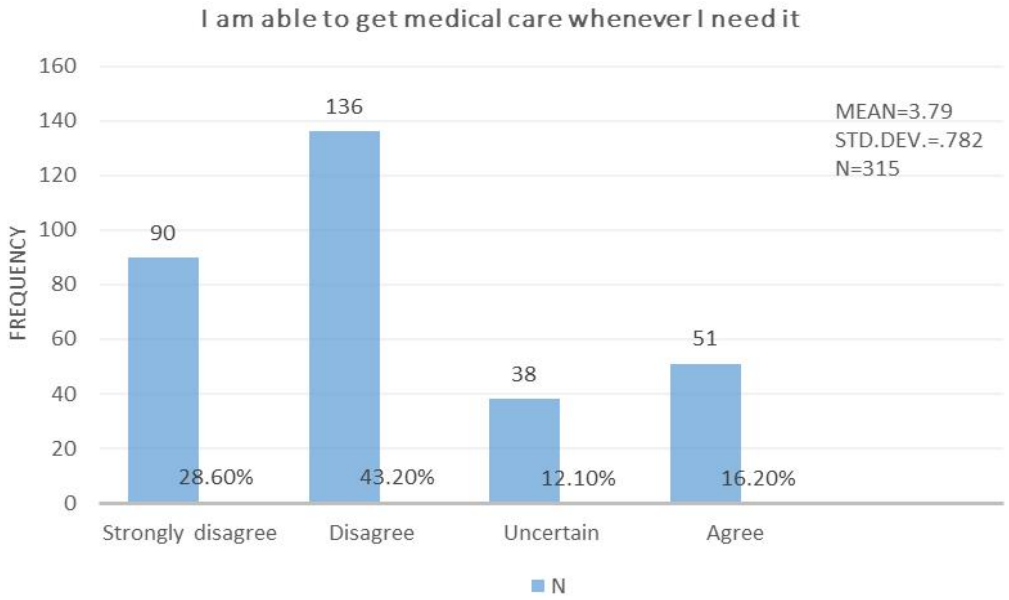


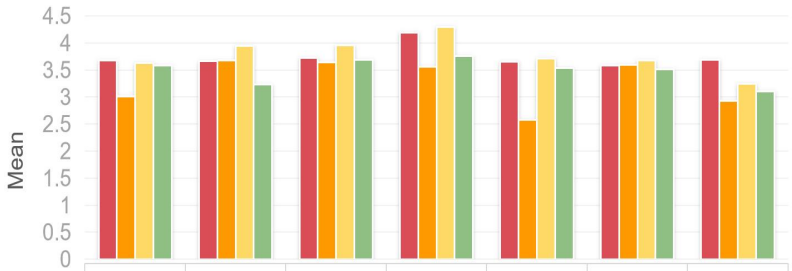
Figure 4.18. Mean and Standard Deviation for Question 18 (Mean=3.79, SD= 0.78)

Table 4.19. Question 18 investigates the situation (N=315)

Q18	N	%
Disagree	19	6.0%
Uncertain	79	25.1%
Agree	166	52.7%
Strongly Agree	51	16.2%

Our research, along with a study in Nepal, indicates that interpersonal manner scores highest at 4.19 and 4.29, respectively， followed by communication. China excels in accessibility and convenience, outperforming other countries. However, there's room to enhance time with the doctor, technical quality, and communication. See figure 4.19.

In the first stage of our study, we should prioritize assessing the influence of education level on patient satisfaction and consider the patient's cultural background to enhance communication effectiveness. Furthermore, when designing intervention strategies, think a little more in the areas of time with the doctor, technical quality, and communication.



	General satisfaction	Technical quality	Communication	Interpersonal manner	Financial aspects	Time with the doctor	Accessibility and convenience
Our study	3.68	3.66	3.72	4.19	3.65	3.58	3.69
Stavros Partheniadis(2022)Greece	3.01	3.67	3.64	3.56	2.58	3.59	2.93
Lisasha Poudel(2020)Nepal	3.63	3.95	3.96	4.29	3.71	3.68	3.24
Rima KAVALNIENĖ(2019)Lithuanian	3.58	3.23	3.69	3.76	3.53	3.51	3.1

Figure 4.19. Related research PSQ-18 survey results statistics

4.4 Patient satisfaction

This section presents the scores reflecting patient satisfaction with the community health service center. The total Cronbach's α score for each subdomain of patient satisfaction is breakdown as table 4.20.

Table 4.20. The categories of Cronbach's alpha

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Our study reveals a total Cronbach's α score of 0.791, with a mean of 26.1±3.1, indicating the internal consistency of all items across subdomains (see table 4.21). This finding aligns with Iacobucci and Duhachek's work, emphasizing a strong internal consistency for overall patient satisfaction scores when Cronbach's α exceeds 0.7 (Iacobucci & Duhachek, 2003).

- General Satisfaction: The subdomain assessing general satisfaction with medical care yielded a Cronbach's α value of 0.343, with a mean of 3.68±0.716. This relatively low α value suggests limited questions in this domain (items 3 and 17).
- Technical Quality: The subdomain evaluating the technical quality of

medical care displayed a Cronbach's α value of 0.528, with a mean of 3.66±0.609. A weak internal consistency among items (2, 4, 6, and 14) is implied.

- Interpersonal Manner: The subdomain focusing on doctor-patient interaction yielded a Cronbach's α value of 0.675, with a mean of 4.19±0.607. A low α value suggests a scarcity of questions in this domain (items 10 and 11).
- Communication: The subdomain gauging communication effectiveness produced a Cronbach's α value of 0.167, with a mean of 3.72±0.731. The extremely low α value indicates very weak internal consistency, possibly due to the limited number of questions (items 1 and 13).
- Financial Aspects: The subdomain evaluating satisfaction related to healthcare finances displayed a Cronbach's α value of 0.182, with a mean of 3.65±0.786. This indicates a very weak internal consistency within this subdomain (items 5 and 7).
- Time Spent with a Doctor: The subdomain measuring satisfaction with the time doctors spend with patients had a Cronbach's α value of 0.395, with a mean of 3.58±0.754. The relatively low α value suggests moderate internal consistency for items 12 and 15 within this subdomain.
- Accessibility and Convenience: The subdomain assessing satisfaction with the accessibility and convenience of medical care yielded a Cronbach's α value of 0.440, with a mean of 3.69±0.567. The α value suggests relatively low internal consistency within this subdomain for items 8 and 9.

In Table 4.21, the total Cronbach's α score, indicating the internal consistency of all items across subdomains, was 0.791, with a mean of 26.1±3.1. This high α value underscores a relatively strong internal consistency for overall patient satisfaction scores. It is essential to note that subdomains with low Cronbach's α values may warrant further analysis and item revision to enhance internal consistency and ensure reliable measurements of patient satisfaction in those areas. These findings align with a study in India, where Cronbach's α values for subdomains ranged from 0.160 to 0.987 (Shrivastava et al., 2017). However, subdomains with low α values may still benefit from additional analysis and item revision to improve internal consistency.

Table 4.21. Scores for each subdomain of patient satisfaction

Subdomain	Cronbach's α	Mean ±SD
General satisfaction	0.343	3.68±0.716
The medical care I have been receiving is just about perfect.		3.88±0.75
I am dissatisfied with some things about the medical care I receive.		3.48±1.07
Technical quality	0.528	3.66±0.609
I think my doctor's office has everything needed to provide complete medical care.		3.49±0.86
Sometimes, doctors make me wonder whether their diagnosis is correct.		3.48±1.00
When I go for medical care, they are careful to check everything when treating and examining me.		3.85±0.80
I have some doubts about the ability of the doctors who treat me.		3.84±1.02
Interpersonal manner	0.675	4.19±0.607
Doctors act too business-like and impersonal towards me.		4.26±0.67
My doctors treat me in a very friendly and courteous manner.		4.32±0.73
Communication	0.167	3.72±0.731
Doctors are good about explaining the reason for medical tests.		3.49±0.99
Doctors sometimes ignore what I tell them.		3.75±0.99
Financial aspects	0.182	3.65±0.786
I feel confident that I can get the medical care I need without being set back financially.		3.60±1.11
I have to pay for more of my medical care than I can afford.		3.7±0.99
Time spent with a doctor	0.395	3.58±0.754
Those who provide my medical care sometimes hurry too much when they treat me.		3.64±1.00
Doctors usually spend plenty of time with me.		3.53±0.90
Accessibility and convenience	0.440	3.69±0.567
I have easy access to the medical specialists I need.		2.98±0.91
Where I get medical care, people have to wait too long for emergency treatment.		4.00±0.99
I find it difficult to get a medical appointment right away.		4.01±1.00
I am able to get medical care whenever I need it.		3.79±0.78
Total score	0.791	26.1±3.1

Note: SD=Standard deviation

Table 4.22. Univariate linear regression analysis of patient satisfaction with primary healthcare services (N=315)

Overall patient satisfaction score		
Variable	**Unstandardised β**	**P-value**
Gender	0.597	0.098
Age	−0.022	0.050
Marital status	0.06	0.912
Annual income	0.065	0.853
Number of household members	−0.079	0.823
Educational level	1.138	0.026*
Health insurance	−0.378	0.466
Occupation	−0.021	0.957

Note: *P<0.05

4.5 Predictors of patient satisfaction with primary healthcare in the multiple linear regression analysis

In Table 4.22. Univariate linear regression analysis, each variable is analyzed separately to determine its effect on the overall patient satisfaction score. The Unstandardized (Beta) coefficient indicates the direction and magnitude of the effect each independent variable has on patient satisfaction. Among the variables, gender has positive (0.597) suggests that being male might be associated with higher satisfaction. However, the P-value(0.098) indicates it is not statistically significant. On the other hand, educational level with positive and relatively large(1.138 &P=0.026) indicates that higher educational levels are associated with increased satisfaction having statistically significant effect, suggesting education level is a meaningful predictor of satisfaction. Age has the negative (= -0.022, P=0.050) suggesting that as age increases, satisfaction slightly decreases. The small positive or negative 's of other variables indicate a slight association between them and satisfaction, but are not statistically significant.

Table 4.23 presents an examination of factors influencing patient satisfaction among individuals receiving care at a community health service in China. The dependent variable in this study is continuous data, and the independent variables encompass socio-demographic factors. To analyze these relationships, multiple linear regression was employed. During the linear regression analysis, variables with a significance level of <0.25 from the bivariate analysis were incorporated, along with those deemed clinically significant, for the final analysis. In multiple regression, there are three selected predictor variables.

As depicted in table 4.23 individuals with a secondary school education or higher exhibited a greater degree of patient satisfaction when contrasted with those who had completed only primary school or had education levels below primary school. Education (Unstandardized β =0.24,Standardized =0.144,t=2.373,P = 0.018). The negative suggests that as age increases, patient satisfaction slightly decreases.The P-value (0.053) is just above the typical significance threshold (0.05), indicating a borderline effect. Confidence interval for :(-0.011, 0). Moreover, the negative suggests that being male might be associated with lower satisfaction, though the effect is minimal.

Table 4.23. Multiple linear regression analysis of the predictors of overall patient satisfaction with primary healthcare services (N=315)

	Unstandardised β	Standard error	Standardised β	t	P-value	95% confidence interval for β	
						Lower Bound	Upper Bound
Age	-0.005	0.003	-0.143	-1.946	0.053	-0.011	0
Education	0.24	0.101	0.144	2.373	0.018*	0.041	0.439
Gender	-0.069	0.068	-0.059	-1.019	0.309	-0.202	0.064

Note: *P<0.05 after adjustments for age, gender, educational level and mental state

4.6 PHASE 2: Investigation on satisfaction of patients in CHC

In phase 2, the randomized controlled trial was performed to enhance patient satisfaction with community health services through a Wechat health promotion intervention. Following predefined inclusion criteria, a total of 312 patients were recruited from community health service centers, with 156 assigned to the intervention group and 156 to the placebo group. Pre- and post-intervention assessments were conducted utilizing a sociodemographic questionnaire and the PSQ-18 questionnaire. Subsequently, the gathered data underwent thorough statistical sorting and analysis. The details of the results are as presented in Section 4.6 to Section 4.10.

4.7 Sociodemographic characteristics

In table 4.24, the analysis indicates no statistically significant difference between the intervention group and the placebo group in terms of the general characteristics

outlined in the sociological questionnaire. This suggests that the placebo group and the intervention group are well-matched in terms of these general characteristics (Li, 2023).

The study involved a total of 312 participants, evenly distributed between the placebo group and the intervention group, with 156 patients in each. Age distribution in the placebo group showed 70 participants between 18 and 64 years old, accounting for 48.6% in this age bracket. Additionally, 45 patients were aged 48-64 (46.9%), and 41 patients were 65 and above (56.9%). In the intervention group, 74 patients were aged 18-64 (51.4%), 51 were aged 48-64 (53.1%), and 31 were 65 and above (43.1%). The chi-square test yielded a non-significant p-value of 0.392, indicating that age was well-matched between the two groups.

Regarding gender, the placebo group comprised 63 males (50.8%) and 93 females (49.5%), while the intervention group had 61 males (49.2%) and 95 females (50.5%). Despite a relatively higher female participation rate, the chi-square test demonstrated no statistically significant difference (p=0.817), indicating gender matching between the groups.

Analysis of the highest education level revealed that 23 patients in the placebo group had primary school education or no formal schooling (50%), 63 were middle school students (49.6%), and 70 had a university education or above (50.4%). The intervention group mirrored these figures closely. The chi-square test showed no significant difference (p=0.992), indicating education level matching between the

groups.

Marital status distribution indicated that 132 patients in the placebo group were married (50.4%), 7 were single (38.8%), 8 were divorced (53.3%), and 9 were widowed (52.9%). In the intervention group, 130 were married (49.6%), 11 were single (61.1.8%), 7 were divorced (46.7%), and 8 were widowed (47.1%). A chi-square test (p=0.794) confirmed no statistically significant difference in marital status between the groups.

Examining the number of households, 95 patients in the placebo group had a family size of 3 or less, while 61 had more than 3 people. In the intervention group, these numbers were 11 less and 11 more, respectively. The chi-square test (p=0.208) revealed no significant difference, indicating matching in the number of families.

Occupationally, the placebo group comprised 32 blue-collar workers, 58 white-collar workers, 52 retired individuals, and 14 unemployed participants. The intervention group had 37 blue-collar patients, 56 white-collar patients, 47 retired patients, and 16 unemployed patients. The chi-square test (p=0.853) showed no significant difference in patient occupation between the placebo and intervention groups, indicating matching.

Regarding per capita annual income, there was no statistically significant difference between the placebo and intervention groups (p=0.337). The distributions in both groups were closely aligned across income categories.

In terms of health insurance, 27 people in the placebo group had full medical insurance, 128 had basic medical insurance, and 1 person did not have insurance. In the intervention group, 18 had full health insurance, and 138 had basic health insurance. The chi-square test ($p=0.204$) confirmed no statistically significant difference between patients in the placebo and intervention groups in terms of medical insurance, indicating matching.

Table 4.24. Characteristics of the Participants in Placebo and Intervention Groups and the association between the groups

Characteristics	Groups		p-value
	placebo 156	Intervention 156	
	n(%)	n (%)	
Age (years)			0.392
18-47 year	70(48.6%)	74(51.4%)	
48-64 year	45(46.9%)	51(53.1%)	
65 and above	41(56.9%)	31(43.1%)	
Gender			0.817
Male	63 (50.8%)	61(49.2%)	
Female	93(49.5%)	95(50.5%)	
Highest education level			0.992
Primary/never been to school	23(50.0%)	23(50.0%)	
Junior/senior high school	63(49.6%)	64(50.4%)	
Junior college/higher	70(50.4%)	69(49.6%)	
Marital status			0.794
Married	132(50.4%)	130(49.6%)	
Single	7(38.9%)	11(61.1%)	
Divorced	8(53.3%)	7(46.7%0	
Widow/widower	9(52.9%)	8(47.1%)	
The number of households			
3 people and less	95(53.1%)	84(46.9%)	0.208
More than three	61(45.9%)	72(54.1%)	
Occupation			0.853
Blue collar	32(46.4%)	37(53.6%)	
Retired	52(52.5%)	47(47.5%)	
White collar	58(50.9%)	56(49.1%)	
Unemployed	14(46.7%)	16(53.3%)	
Percapita annual income (RMB)			0.337
More than 150,000 yuan a year	14(63.6%)	8(36.4%)	
60,000-150,000 yuan a year	59(48.4%)	63(51.6%)	
24,000-60,000 yuan a year	52(46.0%)	61(54.0%)	
Less than 24,000 yuan a year	31(56.4%)	24(43.6%)	
Health Insurance			0.204
Perfect health insurance	27(60.0%)	18(40.0%)	
General health insurance	128(48.1%)	138(51.9%)	
No health insurance	1(100%)	0(0.0%)	

*1 Yuan is equivalent to * 0.66MYR and 0.33 USD at the time of study

4.8 The satisfaction domains of patients in the placebo group and intervention group before and after the intervention.

Before and after the trial, notable improvements were observed in seven satisfaction domains of PSQ-18 within the intervention group, with particular emphasis on the general satisfaction domain. The mean (SD) for general satisfaction increased from 3.474 (0.060) before the intervention to 3.994 (0.045) after the intervention. In contrast, the placebo group exhibited minimal changes in the seven satisfaction domains of PSQ-18 before and after the trial, as indicated by the findings presented in table 4.25(Liao et al., 2021).

Table 4.25 presents an overview of patients' satisfaction domains for both the placebo and intervention groups before and after the trial. Notably, the Mean (SD) of the placebo group's general satisfaction somains was 3.580 (0.057) before the intervention and experienced minimal change to 3.561 (0.056) after the intervention. In contrast, the intervention group displayed a significant improvement, with the Mean (SD) increasing from 3.561 (0.056) before the intervention to 3.994 (0.045) after the intervention.

Examining the technical quality domains, the Mean (SD) before and after the intervention was 3.631 (0.048) in the placebo group and 3.621 (0.047) after the intervention, while the intervention group showed improvement from 3.582 (0.045) to 3.811 (0.039) after the intervention.

In the interpersonal manner domains, the placebo group's Mean (SD) slightly improved from 4.013 (0.051) before the intervention to 3.919 (0.051) after the intervention. In contrast, the intervention group demonstrated improvement, with the Mean (SD) changing from 4.045 (0.050) before the intervention to 4.174 (0.043) after the intervention.

Examining communication domains, the placebo group showed no significant change with a Mean (SD) of 3.564 (0.060) before the intervention and 3.539 (0.055) after the intervention. In the intervention group, there was improvement, as reflected in the Mean (SD) changing from 3.577 (0.057) before intervention to 3.797 (0.490) after the intervention.

For financial aspects domains, the placebo group exhibited minimal changes, with a Mean (SD) of 3.603 (0.064) before intervention and 3.565 (0.060) after the intervention. The intervention group showed improvement from 3.626 (0.060) before intervention to 3.671 (0.057) after the intervention.

In time spent domains, both groups displayed no significant change, with the placebo group having a Mean (SD) of 3.471 (0.062) before and 3.436 (0.058) after the intervention. The intervention group's Mean (SD) was 3.436 (0.0629) before and 3.623 (0.056) after the intervention, reflecting a certain improvement.

In accessibility convenience domains, the placebo group's Mean (SD) changed from 3.625 (0.043) before intervention to 3.558 (0.040) after the intervention. The

intervention group showed improvement from 3.587 (0.045) before intervention to 3.671 (0.041) after the intervention.

Overall, interpersonal manner scored the highest in both groups before intervention, with scores of 4.013 (0.051) for the placebo group and 4.045 (0.050) for the intervention group. After the intervention, the scores were 3.919 (0.051) for the placebo group and 4.174 (0.043) for the intervention group, indicating limited change in the placebo group and moderate improvement in the intervention group. Time spent received the lowest scores before intervention, with the placebo group at 3.471 (0.062) and the intervention group at 3.436 (0.0629). After the intervention, time spent remained the lowest-scoring domain in both groups, with scores of 3.436 (0.058) for the placebo group and 3.623 (0.056) for the intervention group. Additionally, minimal significant changes were observed in the placebo group's scores before and after the intervention in each domain. In the intervention group, the general satisfaction domain showed the most improvement, reaching 3.994 (0.045), followed by communication at 3.797 (0.490), technical quality at 3.811 (0.039), and time spent at 3.623 (0.056). Accessibility convenience scored 3.671 (0.041), and financial aspects had a score of 3.671 (0.057), both reflecting certain improvements before and after the intervention (Liao et al., 2021).

Table 4.25. The level of patient satisfaction in all domains for both placebo and intervention groups before and after the trial

PSQ-18 Domains	Before Trial 156		After Trial 156*	
	Placebo Mean (SD)	Intervention Mean (SD)	Placebo Mean (SD)	Intervention Mean (SD)
General Satisfaction	3.580 （0.057）	3.474 （0.060）	3.561 （0.056）	3.994（0.045）
Technical Quality	3.631 （0.048）	3.582(0.045)	3.621 （0.047）	3.811 （0.039）
Interpersonal manner	4.013(0.051)	4.045(0.050)	3.919 （0.051）	4.174 （0.043）
Communication	3.564(0.060)	3.577(0.057)	3.539 （0.055）	3.797（0.490）
Financial aspects	3.603(0.064)	3.626(0.060)	3.565 （0.060）	3.671 （0.057）
Time spent	3.471(0.062)	3.436(0.0629)	3.436 （0.058）	3.623（0.056）
Accessibility Convenience	3.625(0.043)	3.587(0.045）	3.558 （0.040）	3.671 （0.041）

Note: (i) Data of 1 patient is missing from the intervention group after the trial on the communication domain; (ii) Data of 1 patient is missing from the intervention group after the trial on Time Spent domain; (iii) Data of 1 patient is missing from the placebo group after the trial on the accessibility domain

4.9 The results of the two-way repeated measures ANOVA test

The two-way repeated measures ANOVA was employed to assess the impact of the intervention on patients' satisfaction across various domains. To ensure the validity of the analysis, the assumptions were evaluated, including the examination of data distribution and the identification of outliers. Box plots and the Shapiro-Wilk test of normality were utilized for this purpose, focusing on the data set encompassing general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with doctors, and access and convenience at both pre-test and post-test levels. The results indicated the absence

of outliers and confirmed the normal distribution of the data, given that the measurements were within subjects at two levels (pre-test and post-test).

Significant Effects of Time: There are significant time effects on General Satisfaction,Technical Quality, Communication, and Time Spent. This indicates that patient satisfaction in these areas changes signirficantly over time . No Significant Time Effects: No significant time effects were observed for Interpersonal Manner, Financial Aspects, and Accessibity/Convenience. Significant Effects of Group: There are significant group effects on all measured aspects of patient satisfaction. This indicates that there are significant differences in satisfaction levels between different groups.

The two-way repeated measures ANOVA was then conducted to explore the combined impact of time and intervention groups (placebo and intervention) on primary care patients' satisfaction across all seven domains of the PSQ-18. The analysis revealed a significant effect of time (within-subjects factor) on patient satisfaction, specifically in general satisfaction ($F(1,310) = 50.571$, $p < 0.001$), technical quality ($F(1,310) = 72.976$, $p < 0.001$), communication ($F(1,310) = 34.418$, $p < 0.001$), and time spent ($F(1,310) = 14.107$, $p < 0.001$). However, no significant main effect of time was observed on interpersonal manner ($F = 2.781$, $p = 0.096$), financial aspects ($F = 0.819$, $p = 0.366$), or accessibility convenience ($F = 1.528$, $p = 0.217$).

In contrast, the impact of the intervention (between subjects) played a more dominant role in influencing patients' satisfaction across diverse domains.

Specifically, the intervention significantly affected general satisfaction ($F(1,310) = 54.143$, $p < 0.001$), technical quality ($F(1,310) = 79.365$, $p < 0.001$), interpersonal manner ($F(1,310) = 53.224$, $p < 0.001$), communication ($F(1,309) = 45.928$, $p < 0.001$), financial aspects ($F(1,310) = 8.652$, $p = 0.004$), time spent ($F(1,309) = 31.109$, $p < 0.001$), and accessibility convenience ($F(1,309) = 45.284$, $p < 0.001$) (Table 4.26). These findings underscore the substantial impact of the intervention in enhancing various aspects of patient satisfaction within the studied domains.

The degrees of freedom (df) are denoted as (1, 310) or (1, 309), specifying the degrees of freedom for time and groups, respectively. The F-values serve as indicators of the ratio of between-group variability to within-group variability, while the p-values signify the statistical significance of the interaction effects. Asterisks (*) accompanying the p-values indicate statistical significance, with $p < 0.001$ signifying a highly significant result. See table 4.26 for details.

Table 4.26. The results of the two-way repeated measures ANOVA test

Variables		*df*	*F*	*p*
Time	General_Satisfaction	(1, 310)	50.571	<0.001*
	Technical_Quality	(1, 310)	72.976	<0.001*
(Test of within-subjects)	Interpersonal_manner	(1, 310)	2.781	0.096
	Communication	(1, 309)	34.418	<0.001*
	Financial_aspects	(1, 310)	0.819	0.366
	Time_spent	(1, 309)	14.107	<0.001*
	Accessibility_Convenience	(1, 309)	1.528	0.217
Groups	General_Satisfaction	(1, 310)	57.143	<0.001*
	Technical_Quality	(1, 310)	79.365	<0.001*
(Test of between subjects)	Interpersonal_manner	(1, 310)	53.224	<0.001*
	Communication	(1, 309)	45.928	<0.001*
	Financial_aspects	(1, 310)	8.652	0.004*
	Time_spent	(1, 309)	31.109	<0.001*
	Accessibility_Convenience	(1, 309)	45.284	<0.001*

4.10 The Profile Plots of the two-way repeated measures ANOVA test

The data presented in figure 4.20 indicates that the general satisfaction score of both the placebo group and the intervention group is comparable before the intervention, with the placebo group slightly surpassing the intervention group at approximately 3.57. Following the intervention, the placebo group's score remains largely unchanged, experiencing a slight decrease. In contrast, the intervention group demonstrates substantial improvement after the intervention, reaching close to 4 points. These findings suggest that the intervention has proven effective in enhancing the general satisfaction domain.

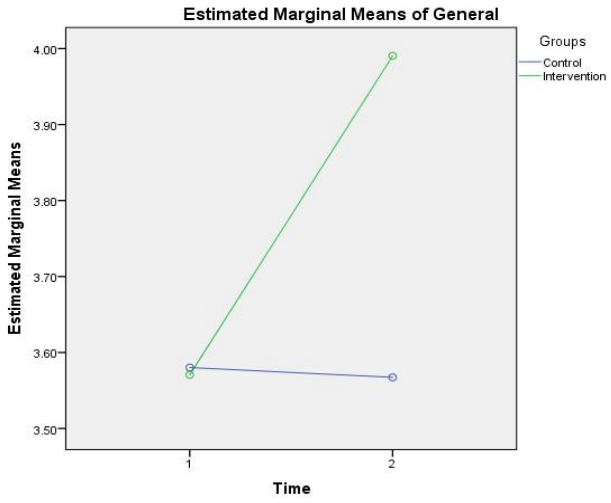


Figure 4.20. General Satisfaction Score on pre-test and Post-test for both placebo and Intervention groups

Figure 4.21 shows that the technical quality score of the placebo group is higher than that of the intervention group before the intervention, but the score of the

placebo group barely changed after the intervention, while the score of the intervention group great improvement after the intervention, higher than 3.8 points. It indicates that the intervention is effective for the technical quality domain.

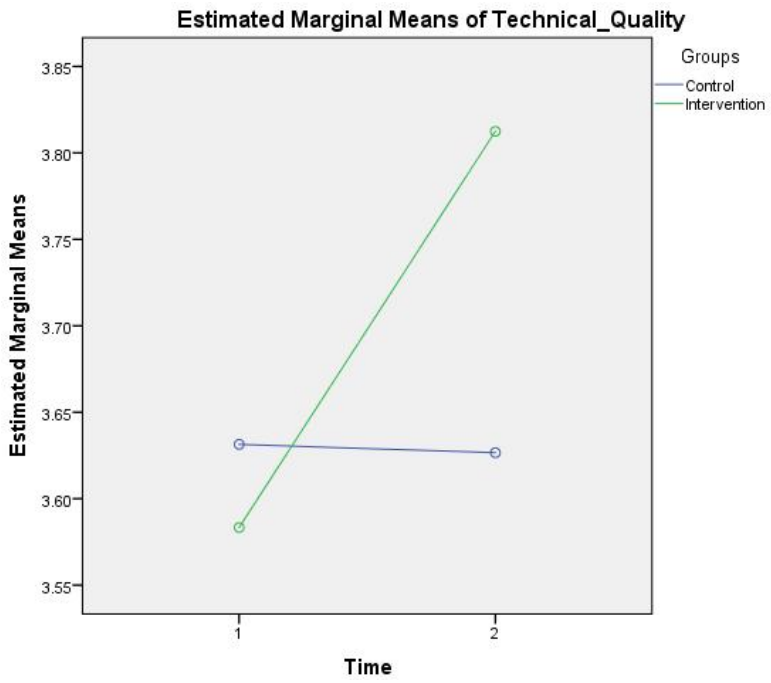


Figure 4.21. Technical Quality Score on pre-test and Post-test for both placebo and Intervention groups

The information conveyed in figure 4.22 indicates that the interpersonal manner score of the placebo group is marginally higher than that of the intervention group before the intervention. However, following the intervention, there is minimal change observed in the placebo group's score. In contrast, the intervention group exhibits a substantial improvement after the intervention, surpassing 3.8 points. This suggests that the intervention has proven effective in enhancing the interpersonal manner domain.

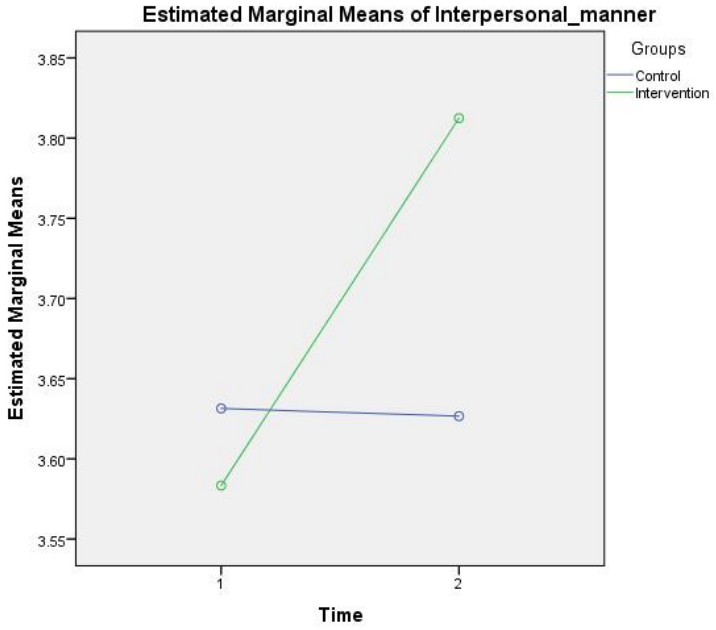


Figure 4.22. Interpersonal Manner Score on pre-test and Post-test for both placebo and Intervention groups

The details presented in figure 4.23 illustrate that the communication scores of the placebo group and the intervention group were comparable before the intervention, with the intervention group slightly outperforming the placebo group. Following the intervention, the placebo group's score experienced a decline, whereas the intervention group demonstrated a substantial improvement, reaching 3.8 points. This suggests that the intervention has a noteworthy impact on communication scores.

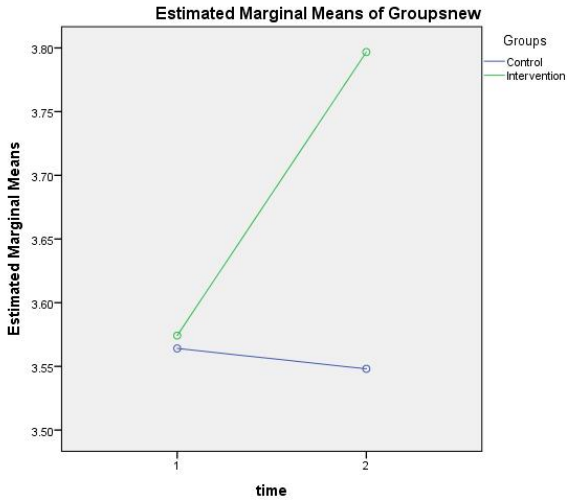


Figure 4.23. Communication Score on pre-test and Post-test for both placebo and Intervention groups

The information depicted in figure 4.24 highlights that prior to the intervention, the financial aspects score of the intervention group was slightly higher than that of the placebo group. Following the intervention, the score of the placebo group decreased, whereas the score of the intervention group exhibited a substantial increase, approaching 3.675 points. This suggests that the intervention has a noteworthy impact on financial aspects scores.

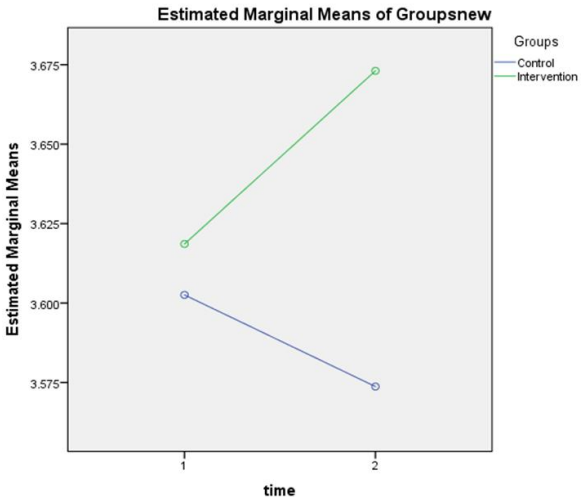


Figure 4.24. Financial Aspects Score on pre-test and Post-test for both placebo and Intervention groups

Figure 4.25 illustrates that the time spent score of the placebo group was higher than that of the intervention group before the intervention. However, after the intervention, the score of the placebo group decreased, whereas the score of the intervention group significantly increased after the intervention, surpassing 3.6 points. This suggests that the intervention has proven effective for the time spent domain.

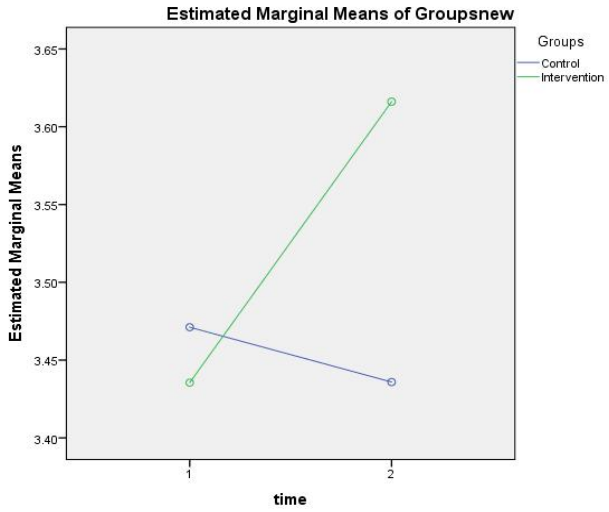


Figure 4.25. Time Spent Score on pre-test and Post-test for both placebo and Intervention groups

Figure 4.26 depicts that the accessibility score of the placebo group was higher than that of the intervention group before the intervention. However, after the intervention, the score of the placebo group decreased, whereas the score of the intervention group exhibited significant improvement after the intervention, surpassing 3.66. This indicates that the intervention has a pronounced influence on the accessibility score.

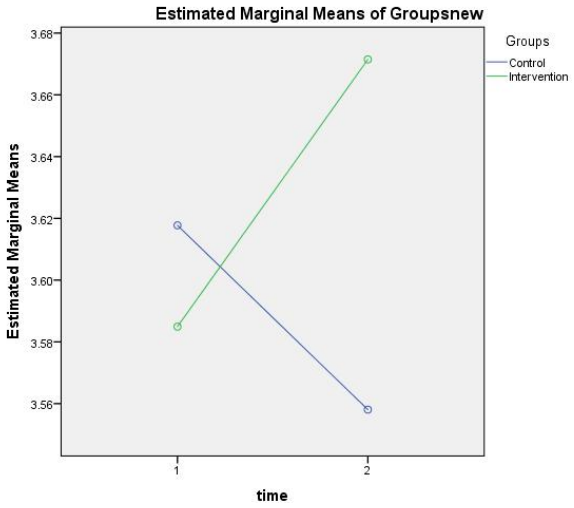
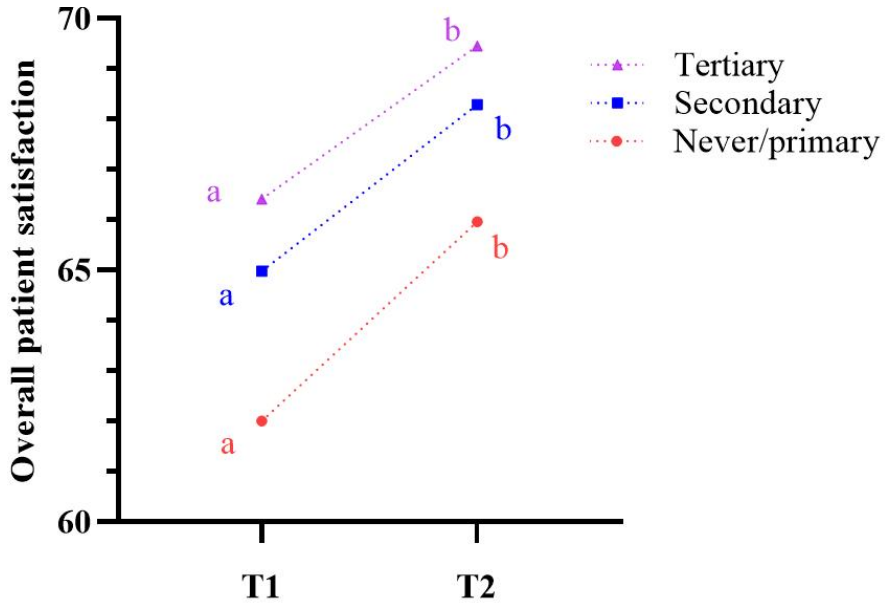


Figure 4.26. Accessibility Score on pre-test and Post-test for both placebo and Intervention groups



Note:'ab' denotes within-group differences at different time points (intra-group comparison)

Figure 4.27. Before and After Intervention Satisfaction Changes in Patients of Different Educational Levels

In the first stage study, it was found that education level had a significant impact on patient satisfaction. Therefore, after the intervention, we compared patients with different education levels and found that there was no significant difference

between secondary and tertiary group and never/primary group. However, the tertiary group significantly differs from never/primary group (between-group comparison). Both pre - and post-intervention education levels were significantly associated with patient satisfaction, in particular, the Never/primary group had a greater improvement in patient satisfaction. See figure 4.27 for details.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Phase 1: Sociodemographic of respondents

In the initial phase of this investigation, the primary objective was to scrutinize patient satisfaction concerning PHC in Xi'an, China, along with an exploration of its associated factors. The participant pool for this segment comprised 315 individuals.

5.1.1 Gender

A notable revelation from the study is the pronounced gender disparity evident within the participant cohort, with approximately two-thirds of respondents being women (63.2%). This observation aligns with broader patterns in healthcare-seeking behavior, wherein women frequently exhibit a greater propensity to avail themselves of healthcare services compared to their male counterparts. These gender differentials hold potential implications for the delivery of healthcare, as the distinctive healthcare needs and preferences of women necessitate thoughtful consideration in the formulation and execution of primary healthcare services (Carretero *et al.*, 2014). Specifically, attention should be given to women's reproductive health requirements, involvement in maternal and child healthcare, and heightened awareness of health-related issues (Alcalde-Rubio *et al.*, 2020).

The delineation of the gender composition within the study populace illuminates a salient facet of healthcare utilization patterns, emphasizing the imperative to tailor primary healthcare services to accommodate the diverse needs of both genders, particularly in the context of the COVID-19 pandemic (Azad *et al.*, 2020).

5.1.2 Age

The age distribution of the study cohort underscores a discernible inclination towards relative youth, as evidenced by 46.4% of participants falling within the 18-47 age bracket. This demographic pattern, beyond its relevance to our predetermined inclusion and exclusion criteria, also mirrors the proclivity of younger individuals to seek healthcare services tailored to their distinct health concerns. Younger patients, often characterized by distinctive healthcare expectations, may exhibit a preference for streamlined, technology-driven solutions with a particular emphasis on preventive care (Alcalde-Rubio *et al.*, 2020). The prominence of the youth demographic within the age distribution accentuates the imperative for healthcare systems to adapt to and accommodate the preferences of different age cohorts. Such adaptation is vital to ensuring the provision of comprehensive and patient-centered care that aligns with the evolving expectations of diverse age groups (Azad *et al.*, 2020).

5.1.3 Marital Status and Family Dynamics

The notable prevalence of married individuals within the study cohort, accounting for 88.3% of participants, emphasizes the consequential role of family dynamics in shaping healthcare utilization patterns. Marital status emerges as a potentially influential factor in healthcare decision-making, with married individuals often weighing the health and well-being of their families as integral considerations (Lin *et al.*, 2021). The significance of family support networks in influencing healthcare choices and, consequently, patient satisfaction should not be understated. This observation underscores the critical importance for healthcare providers to possess a nuanced understanding of and active engagement with patients' familial contexts when delivering care (Menon *et al.*, 2020). Acknowledging and incorporating the influence of family dynamics in healthcare decision processes is imperative for ensuring a comprehensive and tailored approach to patient care that resonates with the broader familial context of the individuals under consideration (Dijkman *et al.*, 2022).

5.1.4 Income

Within the study population, a predominant proportion of individuals reported an annual income falling within the range of 60,000 yuan to 150,000 yuan (40%) and 24,000 yuan to 60,000 yuan (38%). This income distribution trend may be intricately linked to urban welfare policies targeting low-income individuals. Notably, the presence of governmental assistance for low-income groups is evident in the relatively low representation of individuals with lower income levels in the survey population (Filc *et al.*, 2014). Additionally, individuals with higher

incomes may exhibit a reduced propensity to seek community health services, potentially driven by elevated healthcare needs and preferences that align with more specialized and comprehensive healthcare offerings (Cameron *et al.*, 2010). The study findings further imply that income differentials can influence access to healthcare services, with those possessing higher incomes potentially enjoying greater financial resources for healthcare expenses (Recchia *et al.*, 2022). The intricate relationship between income, healthcare utilization patterns, and patient satisfaction merits exploration (Recchia *et al.*, 2022). This investigation holds the potential to inform policies designed to address healthcare disparities, ensuring equitable access to healthcare services across diverse income groups. Such insights are invaluable for the formulation of policies that prioritize health equity and inclusivity (Dijkman *et al.*, 2022).

5.1.5 Number of Household Members

A significant majority of the study participants, comprising 54.9%, reported having families with three members or fewer. This observation is grounded in the prevalent trend of smaller family sizes within urban living contexts, a phenomenon closely intertwined with contemporary social structures. The analysis acknowledges that the size of families can exert a noteworthy influence on caregiving responsibilities and healthcare utilization patterns (Lin *et al.*, 2021). The rationale behind this examination lies in the understanding that smaller families may encounter distinct healthcare needs and care dynamics compared to larger families (Menon *et al.*, 2020). As such, healthcare providers are urged to

adapt to these evolving familial structures and offer personalized care solutions that cater to the unique circumstances and challenges faced by individuals within smaller family units(Azad *et al.*, 2020). Recognizing and addressing the nuanced healthcare requirements associated with varying family sizes is instrumental in ensuring that healthcare services remain responsive and tailored to the diverse familial contexts of the study population.

5.1.6 Education

An examination of the educational attainment within the study population indicates that almost half of the patients (47%) had attained tertiary education. This finding underscores the close association between education and health literacy, wherein educational levels impact individuals' capacities to comprehend health information, make informed decisions, and navigate the healthcare system adeptly. Notably, patients with higher education levels may harbor unique healthcare preferences and expectations (Jansen *et al.*, 2018). Recognizing the implications of varying educational backgrounds on health-related decision-making, it becomes imperative to tailor communication and healthcare services to accommodate the diverse needs of patients across different educational strata. This strategic approach is pivotal for enhancing patient satisfaction and optimizing healthcare outcomes (Mohebi *et al.*, 2018). By acknowledging and addressing the distinct health literacy and communication requirements associated with varying educational levels, healthcare providers can contribute significantly to the overall effectiveness and responsiveness of healthcare delivery within the study

population(Cameron *et al.*, 2010).

5.1.7 Universal Health Insurance Coverage

A universally positive facet of the study is the unequivocal presence of health insurance coverage among all participants, with the majority (87%) being covered by basic health insurance. The ubiquity of health insurance coverage represents a fundamental pillar of equitable healthcare access, a significance that is accentuated during public health crises such as the COVID-19 pandemic (Silvera *et al.*, 2021). The assurance of universal health insurance coverage serves to mitigate financial barriers to healthcare within the study population, thereby enhancing their capacity to access timely and appropriate healthcare services (Mandal *et al.*, 2023). This comprehensive health insurance coverage not only signifies a protective mechanism for individual participants but also contributes to the overall resilience of the healthcare system in addressing public health challenges (Van Weel and Kidd, 2018). The study's positive findings in this regard underscore the importance of continued efforts to uphold and expand health insurance coverage as a critical component of fostering equitable and accessible healthcare, particularly in the context of global health crises.

5.1.8. Occupation

The notable representation of blue-collar workers, accounting for 45.4% of those visiting community health service centers, underscores the occupational diversity within the patient population. Occupational considerations, encompassing factors

such as work-related health risks and time constraints, wield substantial influence over healthcare utilization patterns and patient satisfaction (Zhang, Chen and Zhang, 2019). A nuanced understanding of the distinct healthcare needs and challenges encountered by various occupational groups is imperative for the effective tailoring of healthcare services (Jansen *et al.*, 2018).

In summation, the demographic composition of the study population provides valuable insights into healthcare utilization and access dynamics during the COVID-19 pandemic in China (Liang, Xue and Zhang, 2021). The intersection of demographic factors—namely, gender, age, marital status, income, household size, education, insurance coverage, and occupation—contributes to the formulation of patient preferences, expectations, and satisfaction levels (Mandal *et al.*, 2023). Recognition of these intricacies assumes paramount importance in the strategic planning and delivery of patient-centered primary healthcare services that adeptly cater to the diverse needs of the population.

5.2 Patient Satisfaction with Primary healthcare

Patient satisfaction with primary healthcare is a pivotal determinant of healthcare quality and patient-centered care (Liang, Xue and Zhang, 2021). Positive patient experiences contribute to several desirable outcomes, including enhanced health results, increased adherence to treatment plans, and improved patient-provider relationships. The utilization of standardized tools such as the PSQ-18 (Patient Satisfaction Questionnaire-18) facilitates the systematic assessment of patient

satisfaction across various dimensions of healthcare delivery(Mandal *et al.*, 2023). In this study, the patient satisfaction scores align with those obtained in a comparable investigation conducted in 2018 at another primary healthcare center (Huang *et al.*, 2018). Notably, both studies reveal that patients consistently rate interpersonal communication skills and doctor-patient communication as the highest satisfaction determinants (Huan Li, 2023). Conversely, service accessibility, while improved in our data, still mirrors the lower satisfaction scores observed in the Shenzhen study. The enhanced performance can be credited to the swift growth of community healthcare service centers in China over the past few years.

Contrasting findings with a study carried out in a Malaysian outpatient clinic emphasize the diverse factors influencing patient satisfaction (Ganasegeran *et al.*, 2015). In the Malaysian setting, the top-rated aspect was technical quality, with accessibility and the convenience of medical services following closely behind. On the flip side, the time allocated for doctor consultations garnered the least favorable rating. These cross-study variations highlight the importance of considering cultural and regional differences in assessing patient satisfaction (Xiong *et al.*, 2018).

Significantly, during the challenging backdrop of the COVID-19 pandemic, characterized by public anxiety and limited understanding of the crisis, medical workers' efforts to safeguard lives have been widely acknowledged by patients (Kaur *et al.*, 2022). Consequently, The satisfaction of patients with the services

provided by doctors has experienced enhancement (Chowdhury and Chakraborty, 2017). This attests to the resilience and dedication of healthcare providers in navigating unprecedented circumstances, reinforcing the pivotal role of effective communication and quality service delivery in fostering positive patient experiences, even in times of crisis (Huan Li, 2023).

5.3 Relationship between the demographic characteristics and primary healthcare satisfaction

Univariate linear regression analysis(table 4.22) showed that education level was significantly associated with patient satisfaction (beta unadjusted = 1.138; (p=0.026)), Using the multiple regression analysis (table 4.23), a significant association was identified between educational level and patient satisfaction with healthcare services (Beta 0.144 (CI 0.041 0.439) p=0.018*). Notably, patients with higher educational levels demonstrated higher satisfaction scores compared to their counterparts. This aligns with findings from Gao et al., where patients with university-level education exhibited greater satisfaction with patient communication than those with middle and high school education (p=0.048) (Gao *et al.*, 2022). The rationale suggested is that individuals with higher educational levels may find it easier to communicate with physicians. Bu-Alayyan et al. also reported a positive correlation between higher education levels and increased satisfaction with primary healthcare (Huan Li, 2023).

These recent findings contrast with those of Jafari et al., who reported that patients with higher education levels had lower satisfaction levels, potentially due to higher social expectations (Dewi, Yanti and Saputra, 2020). Other studies suggested that patients with lower educational attainment were more satisfied, possibly owing to lower expectations (Wan *et al.*, 2021).

In multiple linear regression analysis, other sociodemographic characteristics, including age, gender, income, occupation, physical condition, and mental health, did not show a significant association with patient satisfaction. There was no significant relationship between patient satisfaction and age, consistent with the findings of Baltaci et al (Thayaparan and Mahdi, 2013). and contrary to the general trend observed in many studies where older patients tended to be more satisfied (Huan Li, 2023). The explanation proposed is that older age groups may have lower expectations of their physicians.

Gender exhibited no significant association with patient satisfaction in this study, consistent with the findings of Weisman et al., although Chandra reported that women were more likely to be completely satisfied with their consultations than men. Annual income also did not demonstrate a significant association with satisfaction with healthcare services in the current study. While Hu found a positive correlation between higher monthly household income and satisfaction with healthcare management and doctor–patient communication (F Manzoor *et al.*, 2019), other studies reported that patients with high income levels had higher satisfaction levels (Huan Li, 2023). In contrast, Ganasegeran et al. and Yan et al.

found that lower-income patients experienced higher service satisfaction levels than their higher-income counterparts (Ganasegeran *et al.*, 2015). These divergent findings highlight the complexity of the relationship between income and patient satisfaction, suggesting that this association may be context-specific.

5.4 Phase II: Sociodemographic of respondents

The primary objective of this study was to enhance patients' satisfaction with community health services by implementing health promotion interventions. In this randomized controlled trial, 312 patients were involved, with 156 individuals allocated to the intervention group and an equal number, 156, assigned to the placebo group. The intervention group underwent a series of 9 health promotion interventions, each designed to improve their understanding and experience of community health services. The results of the chi-square test provide compelling evidence that there are no statistically significant differences between the placebo and intervention groups across all ten items in the sociological questionnaire. The p-values for age, sex, education level, marital status, the number of households, occupation, per capita annual income, health insurance, mental health, and physical status were all greater than 0.005. This suggests a robust matching between the two groups, as per the criteria specified in the sociological questionnaire. These findings, in line with the methodology outlined by Kangovi et al. (2014), affirm the comparability of the placebo and intervention groups, bolstering the validity and reliability of subsequent analyses and ensuring that any observed effects of the health promotion interventions can be attributed to the

interventions themselves rather than pre-existing sociodemographic differences. The detailed descriptions for each sociodemographic factor are as follows:

5.4.1 Age

The survey results indicate a predominant representation of patients aged between 18 and 47 years in the community health service center, aligning with the study's inclusion criteria targeting individuals over 18 years old willing to participate and capable of understanding and responding to the questionnaire. Challenges faced by elderly patients in terms of hearing and comprehension may have led to their under representation in the survey. Previous research provides additional context, showing that a significant percentage of community hospital visitors fall within the 19 to 44 age range, with variations in age distribution across studies; X. Li, Harlan M Krumholz, *et al.*, 2020).

5.4.2 Gender

The survey reveals a notable gender disparity, with more women participating. Female patients demonstrated a high degree of cooperation and willingness to engage in the survey. This pattern is attributed, in part, to men often deferring questionnaire completion to their wives during joint survey situations. Some studies support these findings, reporting a higher proportion of female patients in community health service centers (Alsayali *et al.*, 2019). However, it is noteworthy that studies in 2017, including one by Hu Jiangli (X. Li, Harlan M Krumholz, *et al.*, 2020), presented contrasting results, indicating a higher

percentage of male patients in community health service centers during that period.

5.4.3 Education

The observed higher overall education level of patients in community health service centers may be attributed to the broader trends in China's educational development, wherein an increasing number of individuals attain advanced degrees (Wu *et al.*, 2016). The relatively recent establishment of community health service centers in China could contribute to some individuals not fully embracing the concept, potentially affecting the composition of the patient population (Kang *et al.*, 2023). It is plausible that individuals with higher education levels exhibit a greater ability to accept new ideas, including seeking healthcare services in community settings(Wu *et al.*, 2016).

However, there are variations in educational patterns among different studies conducted. For instance, a study by Hu JL in the same year demonstrated that 36.3% of patients with a bachelor's degree or above sought care in community hospitals (X. Li, Harlan M Krumholz, *et al.*, 2020). Conversely, findings from a study presented a contrasting picture, indicating a prevalence of lower education levels among patients treated in community hospitals, with 66.33% having graduated from junior middle school (Jansen *et al.*, 2018). Similarly, the study by Yao Hong (2017) revealed that junior middle school students constituted the majority with the highest level of education, accounting for 48.46% (Yao H, 2017). These disparities highlight the complexity of educational trends within the context of community health service utilization and underscore the need for nuanced

considerations in healthcare planning and policy (Tong *et al.*, 2022).

5.4.4 Marital Status

The majority of patients in the study were married, reflecting the predominant age group eligible for marriage, and suggesting that most participants maintained stable and healthy marital lives. This observation aligns with the findings of a 2017 study conducted by Hu Jiangli, which reported that married patients constituted a significant proportion, accounting for 78.7% of the total number of patients treated in community hospitals (X. Li, Harlan M Krumholz, *et al.*, 2020). Similarly, another study by Yao Hong in 2017 corroborates these findings, indicating that the majority of patients were married, with a prevalence of 84.58% (Yao H, 2017). These consistent results emphasize the significant representation of married individuals within the community health service center patient population, underscoring the relevance of marital status as a demographic characteristic in understanding healthcare.

5.4.5 Number of Household members

The survey reveals that a significant portion of the patients in the study reside in small families, defined as households with three people or fewer. This pattern indicates a relatively simple family structure. The primary contributing factor to this phenomenon is likely the prevalent housing situation in urban areas, where most residences feature two or three bedrooms(Jansen *et al.*, 2018).

5.4.6 Occupation

The study's participant demographics indicate a notable presence of white-collar workers among the patient population. This observation contrasts with the findings from the first phase of the study, suggesting a potential shift that could be attributed to changes in epidemic prevention policies and evolving public attitudes(Golden, Jorgenson and Williams, 2023; Mandal *et al.*, 2023).

5.4.7 Income

The study's findings reveal that a substantial majority of patients fall within the middle and low-income brackets. This economic distribution may be correlated with the comparatively lower medical expenses associated with community healthcare service centers and the preferential policies established by the state, encouraging patients to seek treatment within these community-based facilities (Yang and Erreygers, 2022). This pattern is consistent with the observations of Kangovi et al., emphasizing the potential impact of policy structures on healthcare accessibility (Filc *et al.*, 2014). Further supporting this trend, a study by Yu reported that a significant proportion of patients had an average income, accounting for 79.93% of the population (X. Li, Harlan M Krumholz, *et al.*, 2020). Additionally, insights from Yao Hong (2017) indicate that individuals with annual incomes ranging from 36,000 to 110,000 yuan represent a substantial segment, constituting 44.95% of the total (Yao H, 2017).

5.4.8 Universal Health Insurance

The study highlights the prevalence of basic medical insurance among the majority of patients, with community hospitals offering more favorable treatment policies. However, some patients are insured elsewhere, leading to complex reimbursement procedures. Notably, Yao Hong's (2017) study underscores that a significant proportion of patients, constituting 36.3%, are migrant workers, shedding light on the diverse insurance scenarios within the patient population (Yao H, 2017).

5.5 Changes of satisfaction perception in the placebo group and intervention group before and after the intervention

The three-week health promotion intervention conducted through Wechat for patients in community health service centers has demonstrated a significant enhancement in various domains of patient satisfaction, including general satisfaction, technical quality, communication, time spent, and accessibility convenience. A study by Yuqing Song (2021) further corroborates the efficacy of Wechat as a convenient, timely, and cost-effective platform for patient education (Liao *et al.*, 2021). Marshall Godwin's (2016) research supports the notion that health promotion interventions can effectively influence participants' thoughts, understanding, and behaviors (Godwin *et al.*, 2016).

Post-intervention, the most substantial increase occurred in the general satisfaction domain within the intervention group (3.474(0.060) to 3.994(0.045)).

This may be attributed to the relative novelty of community health service centers in China, as patients are accustomed to seeking care in larger hospitals (Wu *et al.*, 2016). The interventions, encompassing an introduction to the community health service center, its essential medical services, departmental settings, China's medical system, and more, aimed to foster understanding and trust. By elucidating the center's role as a cornerstone in the healthcare system, patients are better equipped to navigate and utilize community health services (Li and Chen, 2023).

In the technical quality domain, patient satisfaction also significantly improved (Mean (SD) from 3.582(0.045) to 3.582(0.045)). This enhancement is likely linked to the intervention's role in clarifying community health services' responsibilities and status in the medical system, allowing patients to form more realistic expectations and evaluations (Xiong *et al.*, 2018).

While the interpersonal manner domain exhibited an increase in patient satisfaction (Mean (SD) from 4.045(0.050) to 4.174(0.043)), the change was not statistically significant (Fahad Tanveer, Sana Shahid and Muhammad Mansoor Hafeez, 2018). This modest improvement could be attributed to the domain's already high baseline satisfaction levels and the limited impact of unilateral interventions on patients without simultaneous efforts from medical workers (Su *et al.*, 2023).

Communication domain improvements are notable (Mean (SD) from 3.577(0.057) to 3.797(0.490)), as the intervention facilitates a better understanding of community health service centers and their medical staff. Patients, post-intervention, are more receptive to medical staff suggestions, comprehend medical staff behaviors, and grasp the significance of examinations, resulting in smoother communication (Buljac-Samardzic, Doekhie and Van Wijngaarden, 2020). This aligns with the findings of Yuqing Song's study, indicating that education delivered through the Wechat platform can optimize communication between patients and healthcare professionals (Song *et al.*, 2021).

The financial aspects domain did not exhibit significant improvement (Mean (SD) from 3.626(0.060) to 3.671(0.057)), possibly due to objective reasons (Torres *et al.*, 2019). Despite community health service centers providing preferential policies, primarily targeted at basic diseases, economically disadvantaged patients still face financial challenges associated with treatment (Appiah, 2020).

In the time spent domain, improvements were evident (Mean (SD) from 3.436(0.063) to 3.623(0.056)), although not as pronounced as in general satisfaction, technical quality, and communication (Wang *et al.*, 2018). The intervention facilitated a clearer understanding of medical staff operations and expressions, leading to more efficient communication. However, the relatively swift working pace of some doctors may have limited the overall impact (Li and Chen, 2023).

The accessibility convenience domain exhibited less noticeable improvement (Mean (SD) from 3.587(0.045) to 3.671(0.041)), possibly because the intervention did not address factors such as patients' proximity to community health service centers and transportation issues (Huang *et al.*, 2018). While community hospitals offer expert clinics, meeting patients' needs remains a concern, especially in terms of appointment scheduling and waiting times. The intervention focused on the patient perspective, leaving other factors unaddressed (Hu JL, 2017).

5.6 The results of the two-way repeated measures ANOVA test

The two-way repeated measures ANOVA indicates that patient satisfaction with primary health care services is influenced both by time and group differences. Specific dimensions such as general satisfaction, technical quality, communication, and time spent in services show significant variability over time, while all dimensions show significant differences between groups. These insights are crucial for healthcare providers to tailor strategies for improving patient satisfaction based on temporal trends and group-specific needs.

The outcomes of the two-way repeated measures ANOVA test for the domains of general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent, and accessibility convenience are detailed below. In terms of general satisfaction, the main effect of time (within-subjects test) revealed a statistically significant difference in the mean general satisfaction before and after the intervention, as evidenced by $F(1, 310) = 50.571$, $p < 0.001$.

Simultaneously, there was a significant effect of the groups (between-subjects test) on the general satisfaction mean, indicated by $F(1,310) = 57.143$, $p < 0.001$ (Lara-Cabrera et al., 2016).

Conversely, there was a significant effect of time (within-subjects test) on the mean of technical quality at different pre- and post-intervention time points, as reflected by $F(1,310) = 72.976$, $p < 0.001$. Moreover, there was a notable effect of the groups (between-subjects test) on the technical quality mean, with $F(1, 310) = 79.365$, $p < 0.001$.

For the interpersonal manner score, there was no effect of times of measurements (pre-test and post-test) on the score, as evidenced by $F(1,310) = 2.781$, $p = 0.096$. However, a significant effect of the groups (between-subjects test) on the interpersonal manner mean was observed, with $F(1, 310) = 53.224$, $p < 0.001$.

The effect of time was significant on the mean of communication, as indicated by $F(1,309) = 34.418$, $p < 0.001$. Simultaneously, the intervention and placebo groups had a significant effect on the mean of communication, with $F(1,309) = 45.928$, $p < 0.001$.

Concerning the financial aspects score, there was no effect of times of measurements (pre-test and post-test), with $F(1,310) = 0.819$, $p = 0.366$. However, the groups (intervention and placebo) had a significant effect on the financial aspects score, as denoted by $F(1,310) = 8.652$, $p = 0.004$.

A statistically significant difference in the mean of time spent at different pre- and post-intervention levels was observed, with $F(1,309) = 14.107$, $p = 0.0441$. Simultaneously, there was a significant effect of the groups (between-subjects test) on the time spent mean, indicated by $F(1,309) = 31.109$, $p < 0.001$.

The effect of time was insignificant on the mean of accessibility convenience, with $F(1, 309) = 1.528$, $p = 0.217$. However, the intervention and placebo groups had a significant effect on the mean of accessibility convenience, with $F(1, 309) = 45.284$, $p < 0.001$ (Lara-Cabrera et al., 2016).

5.7 Conclusion

Notably, those with higher educational levels expressed a higher level of satisfaction compared to individuals with lower educational backgrounds. The difficulties encountered amid the COVID-19 pandemic increased patients' comprehension and gratitude toward their healthcare providers. (Deriba *et al.*, 2020).

The study revealed that the p-values for both the placebo and intervention groups were greater than 0.05 across the 10 aspects of the sociological questionnaire, including age, gender, education level, marital status, family population, occupation, income, health insurance, patients' self-awareness of mental health, and physical health. This indicated a strong match between the two groups. Health

promotion measures were effective in significantly improving patient satisfaction with community hospitals, particularly in general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent, and accessibility convenience. The intervention group exhibited a notable increase in patient satisfaction before and after the intervention, with general satisfaction, technical quality, communication, and time spent being the major influencers (test within subjects) that showed statistically significant differences in mean values before and after the intervention, as well as significant differences in mean values across groups (test between subjects). The analysis suggested that areas with less apparent intervention effects, such as interpersonal manner and financial aspects, may be influenced by external factors. Improving patient satisfaction requires multi-party cooperation, including health education for medical workers, community hospital engagement, and alignment with national policy objectives.

Currently, there is a lack of intervention studies on patient satisfaction in community health service centers (Dewi *et al.*, 2023). While existing studies analyze factors affecting patient satisfaction, this research contributes by evaluating the impact of health promotion interventions based on cognitive-behavioral principles and empirical evidence (Wang, Liu and Wang, 2023). It acknowledges potential bias factors and encourages participant communication to address understanding variations (Li and Chen, 2023). The study underscores the importance of simplicity and attractiveness in intervention materials. Notably, the placebo group showed a decrease in satisfaction in the PSQ-18 domains, indicating limited positive gains and lower participation enthusiasm during the intervention

(Falzon *et al.*, 2018).

This research offers insights into the issues affecting patient satisfaction with community health service centers, providing a basis for responsibility assignment and identifying areas for improvement. The evaluation work extends to comprehensive management, covering environmental equipment, technology, quality, price, and efficacy (Wartiningsih *et al.*, 2020). Recommendations include infrastructure enhancement, environmental beautification, strict adherence to medical standards, provision of high-quality medical services, implementation of new medical science and technology projects, understanding patient needs, improving logistics systems, and ensuring satisfactory life services. Regular communication with patients and practical convenience in healthcare access are emphasized (Girdhari *et al.*, 2021). The study highlights the need for health promotion intervention not only from the patient's perspective but also involving medical workers, community health service centers, government departments, and other stakeholders for optimal results.

5.8 Limitation

The study's findings is specific to the local context of Xian, China, and may not be easily applicable to other regions or countries. Cultural, socioeconomic, and healthcare system differences can limit the generalizability of the results.

Unavoidable biases include the following:

Uncertainty in Random Grouping. The coin toss may be influenced by factors such

as the environment and force, leading to groups that are not entirely random.

Volunteer Patient Bias. Due to the voluntary nature of participant involvement in the study, there may be a bias in the characteristics of participating patients. This could limit the generalizability of the study results to the entire patient population.

Cross contamination. Cross-contamination of patients in the same institution. Although we have trained patients before intervention and reminded them not to share intervention data with others before the end of intervention, it is difficult to avoid patients in the intervention group and placebo group from knowing each other and communicating privately, resulting in bias.

Measurement Bias. Since satisfaction is assessed through a survey questionnaire, patient responses may be influenced by subjective factors. Some patients might be inclined to provide socially desirable answers rather than genuine evaluations of satisfaction.

Sample Selection Bias. In the second part of the study, despite using multi-stage sampling, there is still some selection bias when randomly selecting 12 primary healthcare institutions. Certain institutions may disproportionately contribute to the sample due to their specific characteristics, raising concerns about the representativeness of the sample.

There are limitations and potential biases associated with utilizing Wechat for health promotion interventions. Participants engaging in interventions may already possess a higher awareness or motivation toward health, potentially leading to an overly optimistic outcome. Conducting interventions on social media platforms like Wechat may raise issues regarding personal privacy protection, which if not addressed properly, could evoke resistance from users.moreover, Despite being a widely used platform, users may lack the sustained motivation to participate, thereby potentially diminishing the effectiveness of the intervention.

Awareness of Intervention Effects. Even with a single-blind design, in practical implementation, it's possible that patients or healthcare providers become aware of the group to which they belong. This awareness might introduce bias into the study results as patient expectations and awareness of the intervention can influence their satisfaction assessments.

We did not conduct investigations at 6 months after the intervention, so we do not know the long-term effects of health education intervention. We did not carry out assessments six months post-intervention, hence lacking information on the sustained impact of health education interventions.

5.9 Strengths

Rigorous study design:

Randomized controlled studies are considered the gold standard in research as they help establish a cause-and-effect relationship between interventions and outcomes. By randomly assigning participants to different groups, the study can minimize biases and confounding factors.

Multi-stage sampling:

Efficiency: Multi-stage sampling allows for the efficient selection of samples within large populations without the need to sample the entire population directly. By sampling in stages, representative samples can be obtained at lower costs and in less time.

Reduction of Bias: By selecting samples at different stages, multi-stage sampling can reduce potential sampling biases. Each stage's sampling process can correct biases introduced in the previous stage, thereby improving the sample's representativeness.

Increased Manageability: Multi-stage sampling enhances the flexibility of the sampling process, allowing researchers to adjust at each stage as needed to ensure the quality and representativeness of the sample.

Easy accessible information due to health promotion delivered via Wechat: Health promotion materials delivered through Wechat are easily accessible to a wide

audience, reaching individuals who may not have access to traditional healthcare channels.

Cost-effectiveness: Utilizing Wechat for health promotion can be cost-effective compared to traditional methods, as it requires minimal resources to disseminate information to large numbers of users.

Real-time engagement: Wechat allows for immediate communication and interaction between healthcare providers and users, facilitating real-time feedback, inquiries, and discussions about health-related topics.

Solutions for special situations: During the COVID-19 pandemic, reduce the risk of infection and improve the feasibility of research.

5.10 Future direction

In the future, we can undertake follow-up studies to comprehensively gauge the long-term effects of health education interventions.

In the future, it can be extended to other regional studies, expand the sample size, increase the diversity of research fields, and improve the reliability of research results.

Research reports was submitted to government departments, and more experts in related research fields will be communicated to establish and improve the basic medical and health system, and make a contribution to realizing everyone's access to basic medical and health services.

The primary medical service is the keeper of people's health. We should pay attention to the urban community health service system, and also attach great importance to the rural health service system centered on the township. In the future, we can carry out relevant research on township health centers.

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APPENDIX A （Questionnaire in English）

QUESTIONNAIRES

1. SOCIODEMOGRAPHIC DATA OF THE PARTICIPANTS

Hello! In order to gain an in-depth understanding of patients' satisfaction with primary healthcare services during the COVID-19 epidemic, we hereby conduct a survey. There is no right or wrong answer to the question. The results of the survey will be treated confidentially. Thank you !

No.	Question	Answer	Office use
1	Completed Age	（ ） years	
2	Gender	1. Male 2.female 3. Others	
3	Education	1. Never gone to school 2. Primary school (until UPSR) 3. Lower secondary school (LCE/SRP/PMR) 4. Higher secondary school (PM/ MCE) 5. Diploma/ Pre-University (STPM/ Matriculation/ Foundation/ A-level) 6. Tertiary Education (Degree/Master/ PhD) 7. Others	
4	Marital status	Married 2.Not to marry 3.Divorced/widow	
5	Employment status	1. Have a very good job 2. Have a good job 3. job satisfaction is average 4. not satisfied 5. no job	
6	Health insurance	full coverage, basic health insurance .no health insurance	
7	Socioeconomic status	High social status average low social status	
8	social relations	Good social relations average poor	

2. SHORT-FORM PATIENT SATISFACTION QUESTIONNAIRE

These next questions are about how you feel about the medical care you receive.On the following pages are some things people say about medical care. Please read each one carefully, keeping in mind the medical care you are receiving now. (If you have not received care recently, think about what you would expect if you needed care today.) We are interested in your feelings, good and bad, about the medical care you have received.

How strongly do you AGREE or DISAGREE with each of the following statements? (Circle One Number on Each Line)

	Strongly Agree	Ag ree	Unce rtain	Disa gree	Strongly Disagree
1.Doctors are good about explaining the reason for medical tests	1	2	3	4	5
2. I think my doctor's office has everything needed to provide complete medical care	1	2	3	4	5
3. The medical care I have been receiving is just about perfect	1	2	3	4	5
4.Sometimes doctors make me wonder if their diagnosis is correct	1	2	3	4	5
5. I feel confident that I can get the medical care I need without being setback financially	1	2	3	4	5
6.When I go for medical care, they are careful to check everything when treating and examining me	1	2	3	4	5
7.I have to pay for more of my medical care than I can afford	1	2	3	4	5
8.I have easy access to the medical specialists I need	1	2	3	4	5
9.Where I get medical care, people have to wait too long for emergency treatment	1	2	3	4	5
10. Doctors act too businesslike and impersonal toward me	1	2	3	4	5
11. My doctors treat me in a very friendly and courteous manner	1	2	3	4	5
12.Those who provide my medical care sometimes hurry too much when they treat me	1	2	3	4	5
13.Doctors sometimes ignore what I tell them	1	2	3	4	5
14. I have some doubts about the ability of the doctors who treat me	1	2	3	4	5
1 5.Doctors usually spend plenty of time with me	1	2	3	4	5
16. I find it hard to get an appointment for medical care right away	1	2	3	4	5
17. I am dissatisfied with some things about the medical care I receive	1	2	3	4	5
18. l am able to get medical care whenever I need it	1	2	3	4	5

APPENDIX B (Chinese version of questionnaire)

社会人口学调查问卷

1. 参与者的社会人口数据

你好!为了深入了解新冠肺炎疫情期间患者对初级卫生保健服务的满意度，我们进行了调查。这个问题的答案没有对错之分。调查结果将被保密。谢谢你！

序号	问题	答案	备注
1	年龄	（ ）岁	
2	性别	1. 男 3. 其他 2. 女	
3	教育	1. 没上过学 2. 小学 3. 初中 4. 高中 5. 大专，本科没毕业 6. 高等教育(学士/硕士/博士) 7. 其他	
4	婚姻状况	1.已婚 2.单身 3.离婚/丧偶 4. 寡妇 5. 其他	
5	家庭人数	（ ）人	
6	职业	（ ）	
7	年收入	1.> 15万每年 2. 每年在15万 - 6万元之间 3.在每年6万到2.4万元之间 4.每年不到24000元	
8	健康保险	1. 完善的保险 2. 基本医疗保险 3.没有医疗保险	

2.简短的病人满意度问卷

这个问卷是关于您对您所接受的医疗服务的感受。请您仔细阅读每一份，并记住您现在接受的医疗服务。(如果您最近没有得到照顾，想想如果您今天需要照顾，您会期待什么。)我们感兴趣的是您对您所接受的医疗服务的感觉，好的和坏的。

你在多大程度上同意或不同意下面的陈述?(在每一行圈出一个数字)

	非常同意	同意	不确定	不同意	非常不同意	备注
1.医生很善于解释做医学检查的原因	1	2	3	4	5	
原因：						
2.我认为我这社区医院构拥有提供全面医疗护理所需的一切条件	1	2	3	4	5	
原因：						
3. 我对接受的医疗服务很满意	1	2	3	4	5	
原因：						
4.有时我怀疑医生的诊断是否正确	1	2	3	4	5	
原因：						
5.我不会因为经济原因而拒绝我所需要的医疗服务	1	2	3	4	5	
原因：						
6.当我去社区医院看病时，他们能很仔细的治疗并检查一切应该检查的	1	2	3	4	5	
原因：						
7.我需要支付超出我所能负担的医疗费用	1	2	3	4	5	
原因：						
8.我很容易找到我需要的医疗专家	1	2	3	4	5	
原因：						
9.在我得到医疗护理的地方，人们要	1	2	3	4	5	

等很长时间才能看到医生并得到治疗						
原因：						
10.医生对我的态度太公事公办，没有人情味	1	2	3	4	5	
原因：						
11.我的医生对我非常友好和礼貌	1	2	3	4	5	
原因：						
12.那些为我提供医疗服务的人在治疗我的时候有时会过于匆忙	1	2	3	4	5	
原因：						
13.医生有时会忽略我说的话	1	2	3	4	5	
原因：						
14.我怀疑治疗我的医生的能力	1	2	3	4	5	
原因：						
15.医生通常会花很多时间给我	1	2	3	4	5	
原因：						
16.我发现很难马上预约到医疗服务	1	2	3	4	5	
原因：						
17.我对我所接受的医疗服务的某些方面不满意	1	2	3	4	5	
原因：						
18. 我可以在任何需要的时候得到医疗照顾	1	2	3	4	5	
原因：						

谢谢您的参与!

APPENDIX C

ETHIC APPROVAL

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/02/2021

5 January 2021

Dr Kye Mon Min Swe
Department of Population Medicine
Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Dr Kye,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your research project (PhD student's project) and are pleased to inform you that your application has been approved under expedited review.

The details of your research project are as follows:

Research Title	Factors Influencing Patient Satisfaction and Effectiveness of Health Promotion Intervention on Patients' Satisfaction with Primary Health Care Services in Xi'an China During COVID-19 Pandemic
Investigator(s)	Dr Kye Mon Min Swe Dr Mohammed Abdulrazzaq Jabbar Dr Ching Siew Mooi (UPM) Li Huan (UTAR Postgraduate Student)
Research Area	Science
Research Location	Xi'an (China)
No of Participants	300 participants (Age: 18 and above)
Research Costs	Self-funded
Approval Validity	5 January 2021 - 4 January 2022

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research;

(2) Confidentiality of participants' personal data must be maintained; and

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 Fax: (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 Fax: (603) 9019 8868
Website: www.utar.edu.my

Should you collect personal data of participants in your study, please have the participants sign the attached Personal Data Protection Statement for your records.

The University wishes you all the best in your research.

Thank you.

Yours sincerely,

Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Medicine and Health Sciences
Director, Institute of Postgraduate Studies and Research

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 Fax: (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
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Website: www.utar.edu.my

陕西能源职业技术学院

科研课题伦理论证表

<table>
<tr><td>项目名称</td><td colspan="5">中国西安市COVID-19大流行期间影响患者对社区卫生服务满意度的
因素及健康促进干预效果研究</td></tr>
<tr><td>项目负责人</td><td>李欢</td><td>联系电话</td><td>18161988668</td><td>邮箱</td><td>3592086880@qq.com</td></tr>
<tr><td>课题时间</td><td colspan="2">2021 年 5 月-2022 年 5 月</td><td>研究场所</td><td colspan="2">中国陕西省西安市社区医院</td></tr>
<tr><td>课题简介</td><td colspan="5">2019 年末，新冠肺炎(COVID-19)突然爆发，引发了一场严重的公共卫生事件，在世界各地引起了巨大恐慌。对于绝大多数人来说，居家隔离是抗击疫情的主要方式，疫情防控的重要战场落户到了社区。社区医疗卫生机构处于疫情防控的第一线，关系着疫情防控工作的成败，关系到人民群众的生命健康，是疫情防控工作的重中之重。新冠肺炎疫情期间，评估患者满意度是大流行期间改善初级保健服务的重要工具。
患者满意度是指患者将自己对医疗服务的期望与实际体验进行比较时所产生的主观感受和评价。目前，对患者满意度的研究越来越多，而对重大医疗卫生突发事件中初级卫生机构满意度的研究仍很少。西安市基层卫生服务发展状况和患者满意度尚无调查数据和客观依据。健康教育是预防疾病、促进健康、消除或减少影响健康的危险因素的最有效途径。
本研究旨在了解中国西安市患者对社区卫生保健服务的满意度状况，确定与患者满意度相关的因素，并确定健康促进干预对西安市患者初级卫生保健服务满意度的效果。
为实现研究目标，将进行横断面研究(I 期)和随机对照试验设计(II 期)，具体比较西安市患者对初级卫生保健服务满意度的相关因素。
一、研究问题
第一阶段：
1. COVID-19 期间，中国西安的患者对初级卫生保健服务的满意度如何?
2. COVID-19 期间，影响西安市患者对社区医疗服务满意度的因素有哪些?
第二阶段：
3. COVID-19 期间，提出的健康促进干预对提高西安市患者对社区卫生保健</td></tr>
</table>

	服务的满意度是否有效? **二、研究目标** 1. 总体目标 第一阶段:确定新冠肺炎流行期间中国西安地区患者对社区卫生保健服务的满意度及相关因素。 第二阶段:确定西安市 COVID-19 流行期间健康促进干预对基层卫生保健服务满意度的有效性。 2. 具体目标 第一阶段: 1. 目的了解西安市基层卫生服务满意度现状。 2. 确定患者满意度与患者的社会人口学特征之间的关系。 3. 确定患者满意度与患者心理健康状况之间的关系。 4. 确定患者满意度与患者健康保险状况之间的关系。 5. 确定患者满意度与患者社会经济地位之间的关系。 6. 确定患者满意度与患者社会支持状况之间的关系。 第二阶段: 探讨健康促进干预对西安市基层卫生服务满意度的影响。
专家组论证意见	2021 年 5 月 19 日学术委员会专家组对“中国西安市 COVID-19 大流行期间影响患者对社区卫生服务满意度的因素及健康促进干预效果研究”进行了论理论证。专家组通过认真审阅课题研究相关资料并听取了项目负责人的汇报,经讨论,形成如下论证意见: 一、课题研究立足基层医疗,通过调查医疗服务主体,了解患者真实需求,为我国基层医疗服务发展完善提供客观依据,为社区医院发展提供真实数据研究参考。 二、课题研究可以科学有效地衡量现阶段初级医疗机构存在的问题和薄弱环节,找出影响和制约患者满意度的关键因素,为继续推进医疗改革提供有效对策,

	提高患者就医满意度。 三、该课题以患者的健康为首要考虑，维护患者健康和权力的伦理标准，注重保护患者隐私和个人信息。研究符合伦理、法律和法规条例标准，并适用于国际规范和标准。 经专家组论证，该课题研究所有程序符合医学伦理准则，同意开展研究。 专家组共（5）人，通过（5）人，暂缓通过（0）人。 专家组签名： 2021 年 5 月 19 日
学术委员会审批意见	学术委员会（签章）： 2021 年 5 月 19 日

Shaanxi Energy Vocational and Technical College

Ethical demonstration form of scientific research project

<table>
<tr><td>The project name</td><td colspan="5">Factors influencing Patient Satisfaction and Effectiveness of health promotion intervention on patients' satisfaction with primary healthcare services in Xi’an China during COVID- 19 pandemic</td></tr>
<tr><td>Project leader</td><td>Li Huan</td><td>Contact phone number</td><td>18161988668</td><td>Email</td><td>359208680@qq.com</td></tr>
<tr><td>Project time</td><td colspan="2">2021.05-2022.06</td><td>Study place</td><td colspan="2">Xi 'an Community Hospital, Shaanxi Province, China</td></tr>
<tr><td>Project introduction</td><td colspan="5">The sudden outbreak of COVID-19 (COVID-19) in late 2019 has triggered a serious public health event that has caused great panic around the world. For the vast majority of people, home quarantine is the main way to combat the epidemic, and the important battle field of epidemic prevention and control has been settled in the community. Community prevention and control work bears on the success of the epidemic prevention and control campaign, directly affects the lives and health of the people, and is the top priority for epidemic prevention and control. Assessing patient satisfaction during COVID-19 is an important tool for improving primary healthcare services during the pandemic.
Patient satisfaction refers to patients' subjective feelings and evaluations when they compare their expectations of medical services with their actual experience. At present, there are more and more research on the satisfaction of patients, but there is still few research on the satisfaction of primary healthcare institutions in major medical and health emergencies. There is no investigation data and objective basis for the development of primary health service and patient satisfaction in Xi 'an. Health education is the most effective way to prevent diseases, promote health, eliminate, or reduce risk factors affecting health.
This study aims to understand patients' satisfaction with community healthcare services in Xi 'an, China, identify the factors related to patient satisfaction, and determine the effect of health promotion intervention on patients' satisfaction with primary healthcare services in Xi 'an.
To achieve the research objectives, a cross-sectional study (phase I) and a randomized controlled trial design (Phase II) will be conducted to specifically compare the factors related to patients' satisfaction with primary healthcare services in Xi 'an city.
Research questions
Phase I:</td></tr>
</table>

	What is the level of satisfaction are patients with primary healthcare services in Xi'an, China during the COVID-19 pandemic? What are the factors associated with patients' satisfaction level towards primary care service in Xi'an, China during the COVID-19 pandemic? **Phase II:** Is the proposed health promotion intervention effective in improving the patients' satisfaction toward primary healthcare services in Xi'an China during the COVID-19 pandemic? **Research Objectives** **General Objectives:** Phase I: To determine patients' satisfaction with primary healthcare services and the associated factors in Xi 'an (China) during the COVID-19 pandemic. Phase II: To determine the effectiveness of the health promotion intervention on patient satisfaction towards primary healthcare services during pandemic COVID-19 in Xi'an. **Specific Objectives:** Phase I: 1 To determine the patient satisfaction status towards primary healthcare services in Xi'an China. 2 To determine the association between the patients' satisfaction and socio-demographic characteristics of the patients (Age, gender). 3 To determine the association between the patients' satisfaction and patients' mental health status. 4 To determine the association between the patients' satisfaction and patients' health insurance status. 5 To determine the association between the patients' satisfaction and patients' socioeconomic status. 6 To determine the association between the patients' satisfaction and patients' social support status. Phase II: To determine the effectiveness of the health promotion intervention on patient satisfaction towards primary healthcare services in Xi'an City, China.
Argumentation opinions of the expert group	On May 19, 2021, the expert group of the academic committee conducted an ethical demonstration on the "Factors influencing Patient Satisfaction and Effectiveness of health promotion intervention on patients' satisfaction with primary healthcare services in Xi'an China during COVID- 19 pandemic". The expert group carefully reviewed the

	relevant materials of the subject research and listened to the report of the project leader. After discussion, the expert group formed the following argumentation opinions: Based on primary medical care, this research investigated medical service subjects to understand the real needs of patients, so as to provide objective basis for the development and improvement of primary medical services in China and provide real data research reference for the development of community hospitals. The subject research can scientifically and effectively measure the problems and weak links existing in primary medical institutions at the present stage, find out the key factors affecting and restricting patient satisfaction, provide effective countermeasures for continuing to promote medical reform and improve patient satisfaction. This project takes the health of patients as the primary consideration, maintains the ethical standards of patients' health and rights, and pays attention to the protection of patients' privacy and personal information. The research complies with ethical, legal and regulatory standards and applies to international norms and standards. After verification by the expert group, all procedures of the research subject conform to the medical ethics standards, and agreed to carry out the research. **There are ( ) experts in the expert group, of whom ( ) have passed and ( ) have been suspended.** **Signature of expert group:** Date
The academic committee shall examine and approve opinions	Academic Committee (Signature and seal)： Date

Translation: Chen Min Chen Min

APPENDIX D

PUBLICATIONS

Journal Publications:

LI HUAN, Kye Mon Min Swe, Mohammed Abdulrazzaq Jabbar, Siew Mooi Ching. Patients' satisfaction on primary healthcare services in China and its associated factors during COVID-19 pandemic: A cross-sectional study.Malaysian Family Physician (Jan 2023).

Conference : 9th ASIA PACIFIC PRIMARY CARE RESEARCH CONFERENCE

Give an oral lecture and present an abstract: "A Randomized Controlled Study Of Improving Patient Satisfaction With Community Health Services Through Health Promotion Interventions In Xian, China"

LI HUAN, Kye Mon Min Swe, Mohammed Abdulrazzaq Jabbar, Siew Mooi Ching, Foo Chai Nien. A randomized controlled study of improving patient satisfaction with community health services through health promotion interventions in Xian, China (Dec 2023).

LI HUAN, Kye Mon Min Swe, Mohammed Abdulrazzaq Jabbar, Siew Mooi Ching. Effectiveness of health promotion interventions via Wechat in improving patient satisfaction with primary health services in Xi'an China:

Protocol of randomised controlled trial. Malaysian Journal of Medicine and Health Sciences Journal (March 2024).

APPENDIX E

RESULTS OF NORMAL DISTRIBUTION

The results of the normal distribution test indicate that seven domains of patient satisfaction within the PSQ-18 namely, General Satisfaction, Technical Quality, Interpersonal Manner, Communication, Financial Aspects, Time Spent, and Accessibility Convenience conform to a normal distribution.

1. General Satisfaction

The histogram as presented in Figure 1 depicting changes in General Satisfaction within the Intervention group before and after the intervention illustrates a distribution pattern consistent with normal distribution.

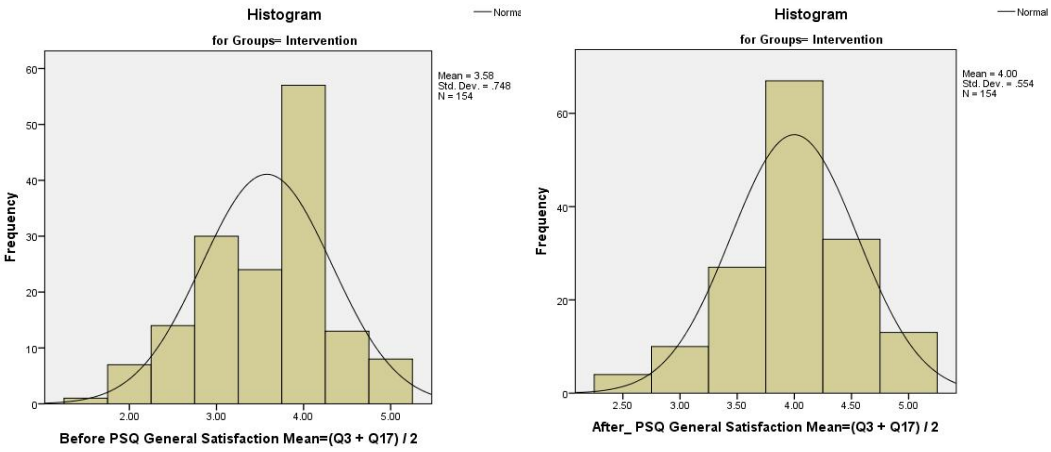

Figure 1. Histogram of the General Satisfaction Domain for Before and After Intervention

The normality of the data for General Satisfaction before and after the intervention was assessed using Skewness Z score and Kurtosis Z score.

For General Satisfaction Before Intervention:

Skewness Z score: 1.69

Kurtosis Z score: 0.75

Both Z scores, 1.69 and 0.75, are less than 3.29, as suggested by Kim H Y (2013), indicating that the data is normally distributed.

For General Satisfaction After Intervention:

Skewness Z score: 1.90

Kurtosis Z score: 0.67

Similarly, both Z scores, 1.90 and 0.67, are less than 3.29, as per Kim H Y (2013), indicating that the data for General Satisfaction after the intervention is normally distributed as well.

Table 1. The normal distribution test results of the General Satisfaction Domain for the Intervention Group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-General Satisfaction	Skewness	-.340	.195	1.69
		Kurtosis	-.282	.387	0.75
	After-General Satisfaction	Skewness	-.371	.195	1.90
		Kurtosis	.259	.387	0.67

The histogram presented in Figure 2 depicting changes in General Satisfaction within the placebo group before and after the intervention suggests that the distribution of changes aligns with a normal distribution.

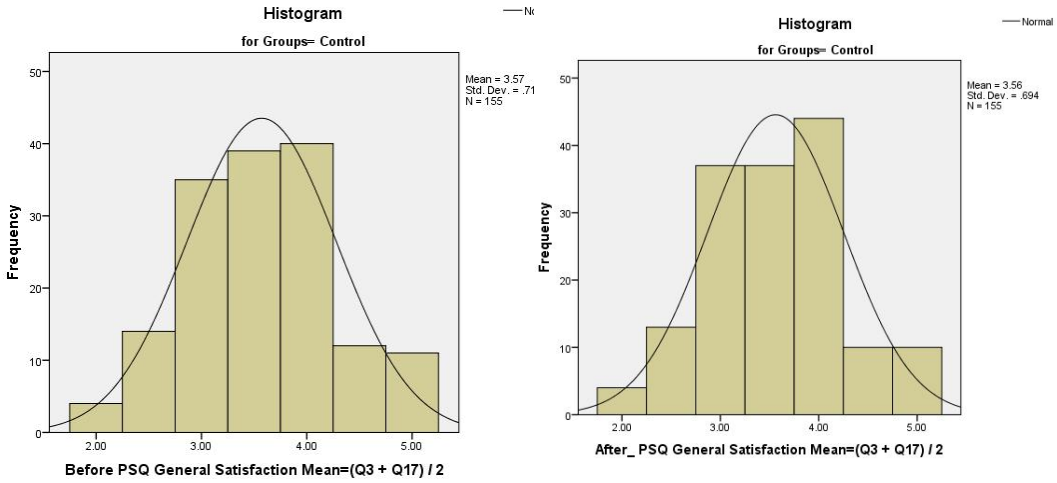

Figure 2. Histogram of the General Satisfaction Domain for placebo group Before and After the intervention

The normality of the data for General Satisfaction within the placebo group before and after the intervention was evaluated using Skewness Z scores and Kurtosis Z scores.

For General Satisfaction Before Intervention:

Skewness Z score: 0.58

Kurtosis Z score: 0.93

Both Z scores (0.58 and 0.93) are less than 3.29, as suggested by Kim H Y (2013), indicating that the data is normally distributed.

For General Satisfaction After Intervention:

Skewness Z score: 0.45

Kurtosis Z score: 0.67

Similarly, both Z scores (0.45 and 0.67) are less than 3.29, according to Kim H Y (2013), confirming that the data for General Satisfaction after the intervention is normally distributed.

Table 2. The normal distribution test results of the General Satisfaction Domain for placebo group

Group	Time	Index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	.113	.194	0.58
		Kurtosis	-.359	.386	0.93
	After-General Satisfaction	Skewness	.088	.195	0.45
		Kurtosis	-.260	.387	0.67

2. Technical Quality

The histogram demonstrated in Figure 3 depicting the variation of Technical Quality within the Intervention group before and after the intervention indicates that the distribution of variation aligns with a normal distribution.

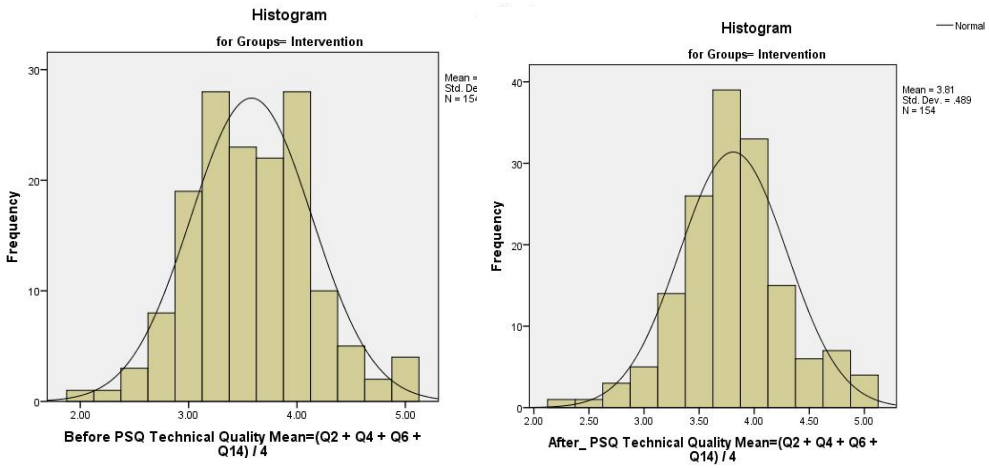

Figure 3. Histogram of the Technical Quality Domain for Intervention Group Before and After the intervention

The normality of the data for Technical Quality within the Intervention group before and after the intervention was assessed using Skewness Z scores and Kurtosis Z scores.

For Technical Quality Before Intervention:

Skewness Z score: 0.79

Kurtosis Z score: 0.35

Both Z scores (0.79 and 0.35) are less than 3.29, as suggested by Kim H Y (2013), indicating that the data is normally distributed.

For Technical Quality After Intervention:

Skewness Z score: 0.11

Kurtosis Z score: 1.90

Similarly, both Z scores (0.11 and 1.90) are less than 3.29, as per Kim H Y (2013), confirming that the data for Technical Quality after the intervention is normally distributed.

Table 3. The normal distribution test results of the Technical Quality Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-Technical Quality	Skewness	.155	.195	0.79
		Kurtosis	.134	.387	0.35
	After-Technical Quality	Skewness	.021	.195	0.11
		Kurtosis	.737	.387	1.90

The Histogram of Technical Quality (Figure 3) changes in the placebo group before and after the intervention reveals that the alterations in Technical Quality before and after the intervention adhere to a normal distribution.

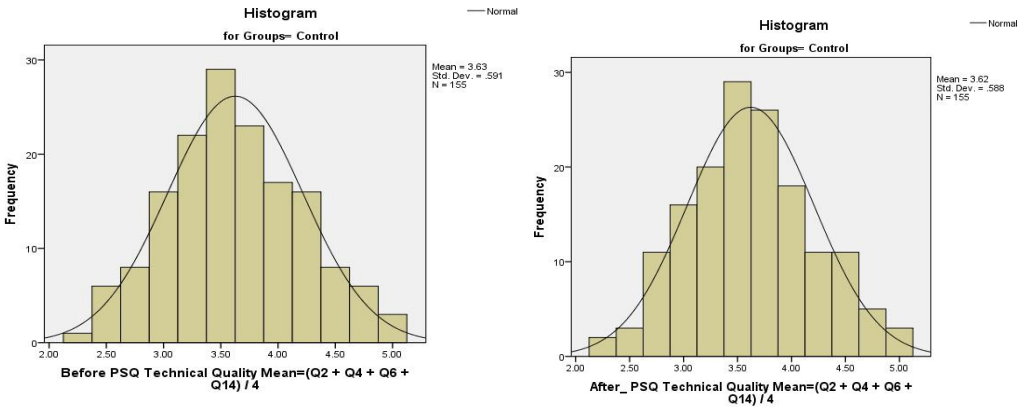

Figure 4. Histogram of the Technical Quality Domain for placebo group Before and After the intervention

Using the Skewness Z score and Kurtosis Z score to assess the normality of the data, the results are as follows:

Before – Technical Quality:

Skewness Z score = 0.73

Kurtosis Z score = 1.05

The results are less than 3.29 following Kim H Y (2013), signifying that the data is normally distributed.

After – Technical Quality:

Skewness Z score = 0.79

Kurtosis Z score = 0.80

Again, the results are less than 3.29 according to Kim H Y (2013), indicating that the data is normally distributed.

Table 4. The normal distribution test results of the Technical Quality Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	0.142	0.194	0.73
		Kurtosis	-0.405	0.386	1.05
	After-General Satisfaction	Skewness	.154	.195	0.79
		Kurtosis	-.310	.387	0.80

3. Interpersonal manner

The Histogram of Interpersonal Manner (Figure 5) changes for the Intervention group before and after the intervention demonstrates that the variation of Interpersonal Manner before and after the intervention conforms to a normal distribution.

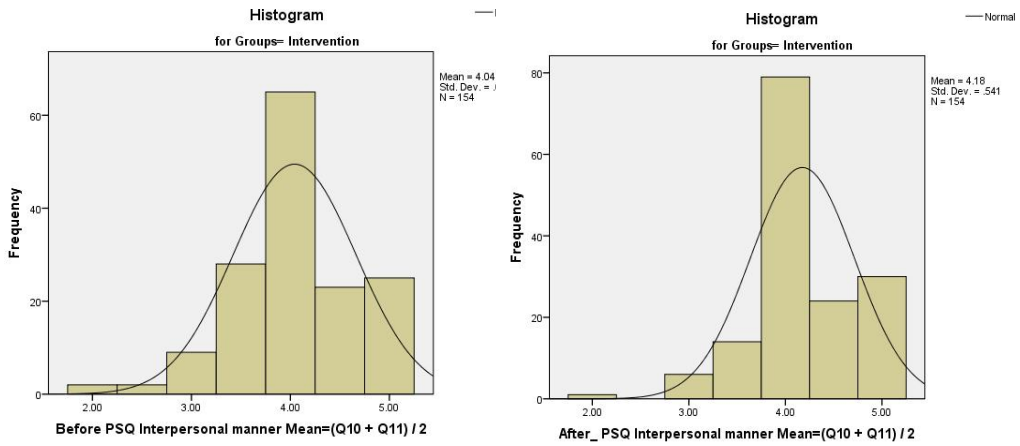

Figure 5. Histogram of the Interpersonal Manner Domain for Intervention Group Before and After the intervention

Using the Skewness Z score and Kurtosis Z score to verify the normality of the data:

Before – Interpersonal Manner:

Skewness Z score = 2.16 (Skewness/S.E. = 0.422/0.195)

Kurtosis Z score = 1.71 (Kurtosis/S.E. = 0.662/0.387)

After – Interpersonal Manner:

Skewness Z score = 1.50 (Skewness/S.E. = 0.293/0.195)

Kurtosis Z score = 2.60 (Kurtosis/S.E. = 1.005/0.387)

In both cases, the Z scores are less than 3.29 (Kim H Y, 2013), indicating that the data is normally distributed.

Table 5. The normal distribution test results of the Interpersonal Manner Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-General Satisfaction	Skewness	-.422	.195	2.16
		Kurtosis	.662	.387	1.71
	After-General Satisfaction	Skewness	-.293	.195	1.50
		Kurtosis	1.005	.387	2.60

The histogram analysis for changes in Interpersonal Manner of the placebo group before and after the intervention reveals a distribution consistent with normality (see Figure 5).

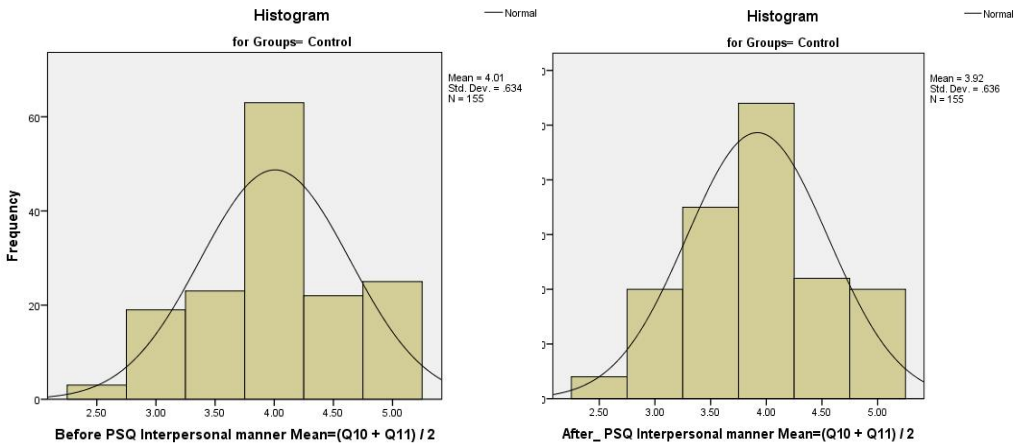

Figure 6. Histogram of the Interpersonal Manner Domain for placebo group Before and After the intervention

The normality assessment using Skewness Z score and Kurtosis Z score for data related to Interpersonal Manner before and after the intervention is as follows:

Before – Interpersonal Manner:

Skewness Z score = 0.74

Kurtosis Z score = 1.27

After – Interpersonal Manner:

Skewness Z score = 0

Kurtosis Z score = 1.35

The results, being less than 3.29 following Kim H Y (2013), indicate that the data for Interpersonal Manner before and after the intervention is normally distributed.

Table 6. The normal distribution test results of the Interpersonal Manner Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	-.143	.194	0.74
		Kurtosis	-.490	.386	1.27
	After-General Satisfaction	Skewness	.000	.195	0
		Kurtosis	-.522	.387	1.35

4. Communication

According to the Histogram showed in Figure 7, changes in Communication of the Intervention group before and after the intervention, the variation of Communication before and after the intervention was consistent with a normal distribution.

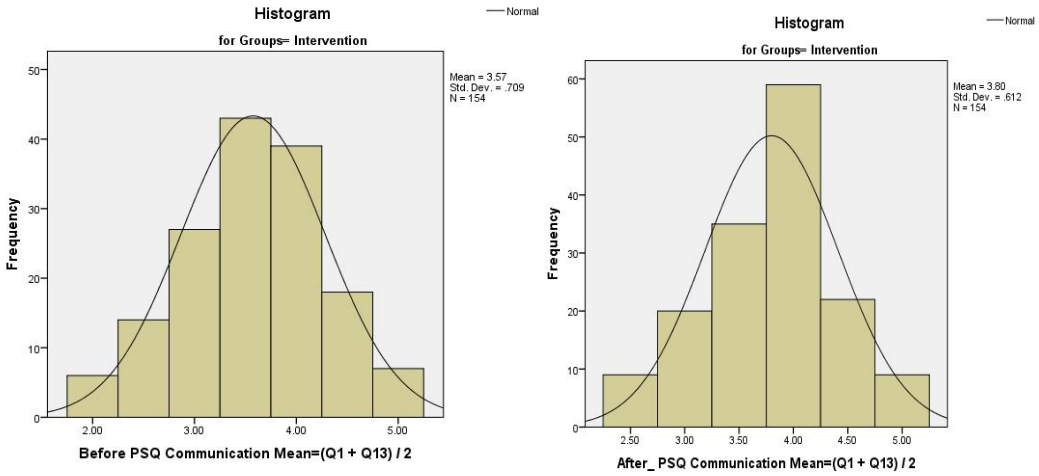

Figure 7. Histogram of the Communication for Intervention Group Before and After the intervention

The normality assessment using Skewness Z score and Kurtosis Z score for data related to Communication before and after the intervention is as follows:

Before – Communication:

Skewness Z score = 0.86

Kurtosis Z score = 0.80

After – Communication:

Skewness Z score = 1.02

Kurtosis Z score = 0.59

The results, being less than 3.29 following Kim H Y (2013), indicate that the data for Communication before and after the intervention is normally distributed.

Table 7. The normal distribution test results of the Communication Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-General Satisfaction	Skewness	-.167	.195	0.86
		Kurtosis	-.310	.387	0.80
	After-General Satisfaction	Skewness	-.199	.195	1.02
		Kurtosis	-.229	.387	0.59

According to the Histogram of changes in Communication of the placebo group before and after the intervention, the changes in Communication before and after the intervention are consistent with a normal distribution (see Figure 7).

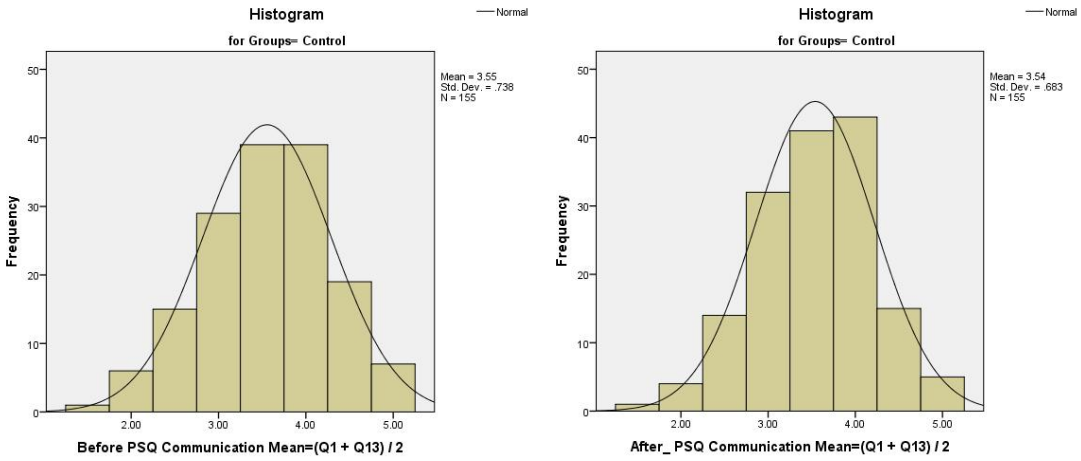

Figure 8. Histogram of the Communication Domain for placebo group Before and After the intervention

According to the Skewness Z score and Kurtosis Z score for the Communication data:

Before – Communication:

Skewness Z score = 1.03

Kurtosis Z score = 0.78

After – Communication:

Skewness Z score = 1.12

Kurtosis Z score = 0.17

The results are less than 3.29 following Kim H Y (2013), indicating that the data for Communication is normally distributed.

Table 8. The normal distribution test results of the Communication Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	-.199	.194	1.03
		Kurtosis	-.300	.386	0.78
	After-General Satisfaction	Skewness	-.219	.195	1.12
		Kurtosis	.067	.387	0.17

5. Financial aspects

According to the Histogram of changes in Financial aspects of the Intervention group before and after the intervention, the changes in Financial aspects before and after the intervention are consistent with a normal distribution (see Figure 9).

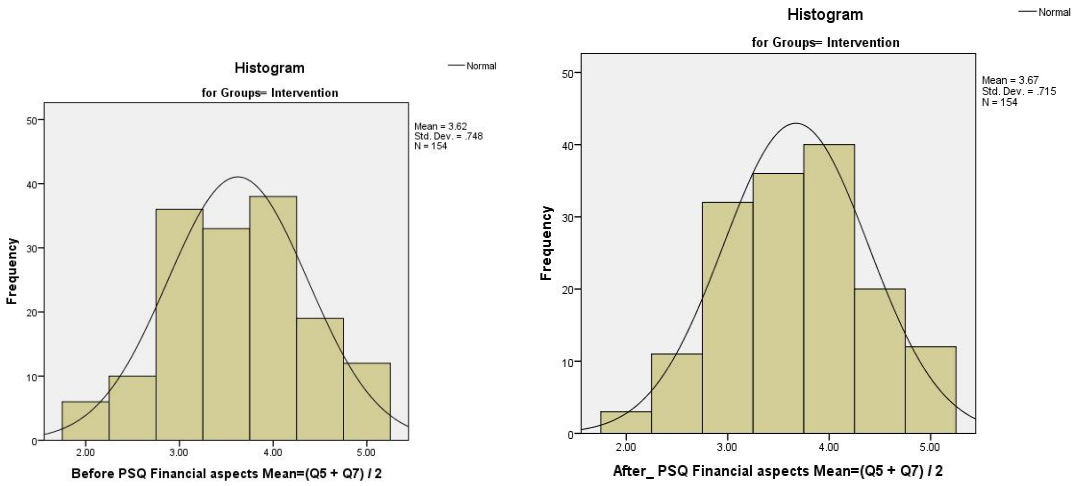

Figure 9. Histogram of the Financial Aspect Domain for Intervention Group Before and After the intervention

Using the Skewness Z score and Kurtosis Z score to assess the normality of the data:

Before – Financial Aspect

Skewness Z score = Skewness/S.E. = 0.048/0.195 = 0.25

Kurtosis Z score = Kurtosis/S.E. = 0.489/0.387 = 1.26

After – Financial Aspect

Skewness Z score = Skewness/S.E = 0.009/0.195 = 0.05

Kurtosis Z score = Kurtosis/S.E = 0.496/0.387 = 1.28

Once again, the results are below 3.29 according to Kim H Y (2013), confirming that the data is normally distributed.

Table 9. The normal distribution test results of the Financial Aspect Domain for the placebo group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-General Satisfaction	Skewness	-.048	.195	0.25
		Kurtosis	-.489	.387	1.26
	After-General Satisfaction	Skewness	-.009	.195	0.05
		Kurtosis	-.496	.387	1.28

The histogram depicting changes in Financial Aspects within the placebo group before and after the intervention reveals that the alterations in Financial Aspects before and after the intervention adhere to a normal distribution pattern (see Figure 9).

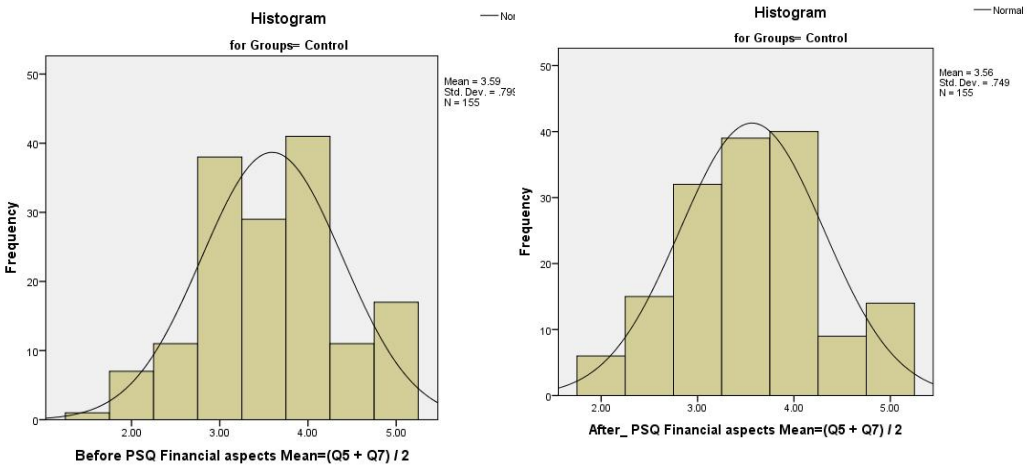

Figure 10. Histogram of the Financial Aspect Domain for placebo group Before and After the intervention

The normality assessment using Skewness Z score and Kurtosis Z score for Financial Aspects data reveals the following:

Before – Financial Aspect

Skewness Z score = Skewness/S.E. = 0.019/0.194= 0.10

Kurtosis Z score = Kurtosis/S.E. = 0.439/0.386 = 1.14

After – Financial Aspect

Skewness Z score = Skewness/S.E = 0.082/0.195 = 0.42

Kurtosis Z score = Kurtosis/S.E = 0.349/0.387 = 0.90

The results are less than 3.29 following Kim H Y (2013), affirming that the data is normally distributed.

Table 10. The normal distribution test results of the Financial Aspect Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	-.019	.194	0.10
		Kurtosis	-.439	.386	1.14
	After-General Satisfaction	Skewness	.082	.195	0.42
		Kurtosis	-.349	.387	0.90

6. Time spent

According to the Histogram of changes in time spent of the Intervention group before and after the intervention, the changes in time spent before and after the intervention are consistent with a normal distribution (see Figure 6).

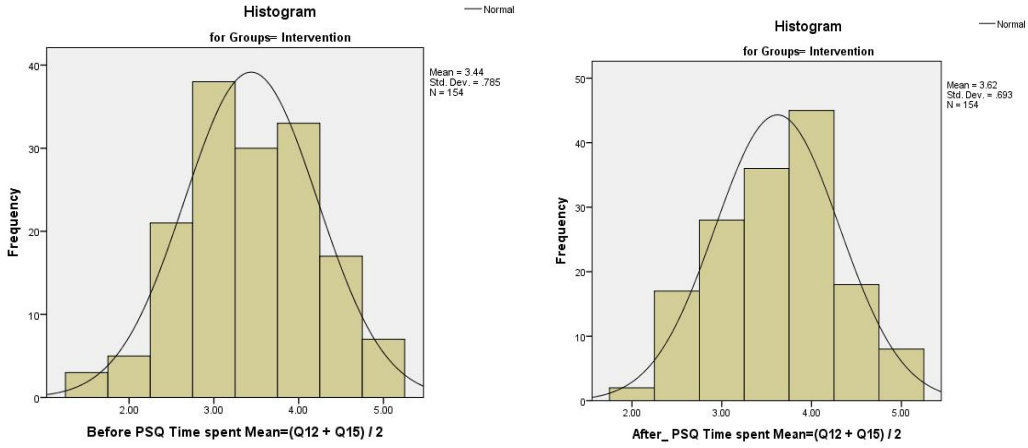

Figure 11. Histogram of the Time Spent Domain for Intervention Group Before and After the intervention

The normality assessment for the variation of Time Spent in the Intervention group before and after the intervention is as follows:

Before – Time Spent

Skewness Z score = Skewness/S.E. = 0.051/0.195= 0.26

Kurtosis Z score = Kurtosis/S.E. = 0.399/0.387 = 1.03

After – Time Spent

Skewness Z score = Skewness/S.E = 0.077/0.195 = 0.39

Kurtosis Z score = Kurtosis/S.E = 0.538/0.387 = 1.39

The results are less than 3.29 following Kim H Y (2013), affirming that the data is normally distributed.

Table 11. The normal distribution test results of the Time Spent Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-General Satisfaction	Skewness	-.051	.195	0.26
		Kurtosis	-.399	.387	1.03
	After-General Satisfaction	Skewness	-.077	.195	0.39
		Kurtosis	-.538	.387	1.39

A histogram of changes in Time spent by the placebo group before and after intervention shows that changes in Time spent before and after intervention are consistent with normal distribution.

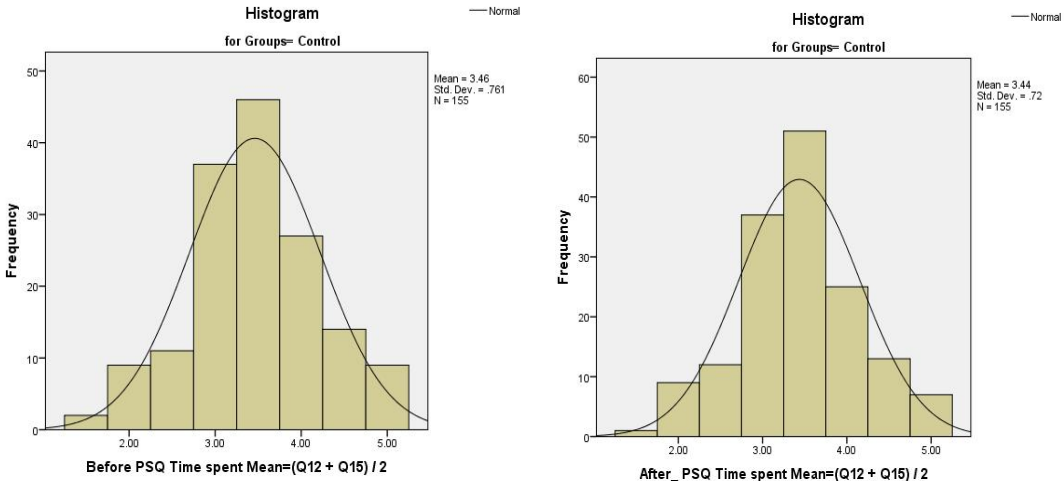

Figure 12. Histogram of the Time Spent Domain for placebo group Before and After the intervention

The normality assessment for the Time Spent data in the placebo group before and after the intervention is as follows:

Before – Time Spent

Skewness Z score = Skewness/S.E. = 0.042/0.194= 0.22

Kurtosis Z score = Kurtosis/S.E. = 0.057/0.386 = 0.15

After – Time Spent

Skewness Z score = Skewness/S.E = 0.004/0.195 = 0.02

Kurtosis Z score = Kurtosis/S.E = 0.053/0.387 = 0.14

The results are less than 3.29 following Kim H Y (2013), affirming that the data is normally distributed.

Table 12. The normal distribution test results of the Time Spent Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	-.042	.194	0.22
		Kurtosis	-.057	.386	0.15
	After-General Satisfaction	Skewness	.004	.195	0.02
		Kurtosis	.053	.387	0.14

4.7.7 Accessibility Convenience

The histogram of Accessibility Convenience changes before and after the intervention in the Intervention group indicates that the variation in Accessibility Convenience before and after the intervention aligns with a normal distribution (see Figure 13).

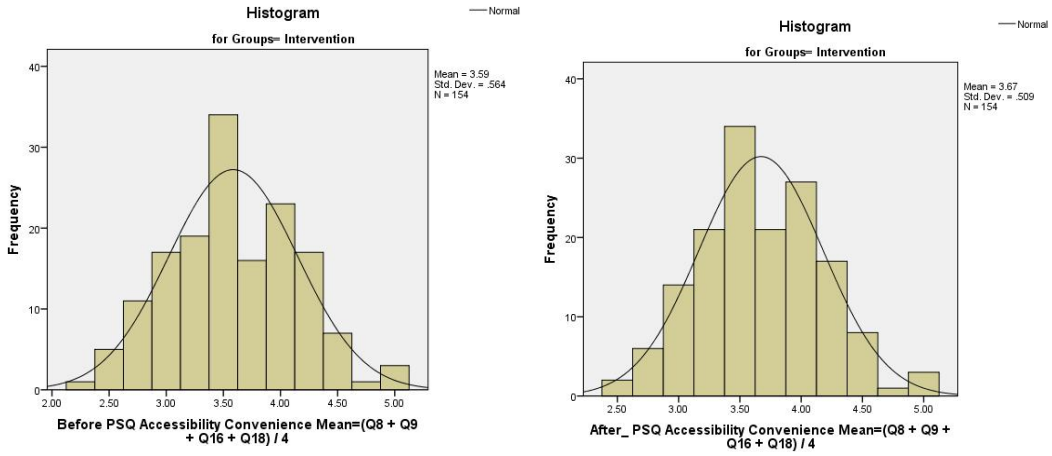

Figure 13. Histogram of the Accessibility Convenience Domain for Intervention Group Before and After the intervention

The Skewness Z score and Kurtosis Z score were utilized to assess the normality of the data for Accessibility Convenience.

Before – Accessibility Convenience:

Skewness Z score = Skewness/S.E. = 0.094/0.195 = 0.48

Kurtosis Z score = Kurtosis/S.E. = 0.328/0.387 = 0.85

After – Accessibility Convenience:

Skewness Z score = Skewness/S.E = 0.165/0.195 = 0.85

Kurtosis Z score = Kurtosis/S.E = 0.166/0.387 = 0.43

The results are less than 3.29, following Kim H Y (2013), suggesting that the data is normally distributed.

Table 13. The normal distribution test results of the Accessibility Convenience Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Intervention Group	Before-General Satisfaction	Skewness	-.094	.195	0.48
		Kurtosis	-.328	.387	0.85
	After-General Satisfaction	Skewness	.165	.195	0.85
		Kurtosis	-.166	.387	0.43

The histogram of changes in Accessibility Convenience of the placebo group before and after intervention indicates that the changes in Accessibility Convenience before and after intervention conform to a normal distribution (see Figure 13).

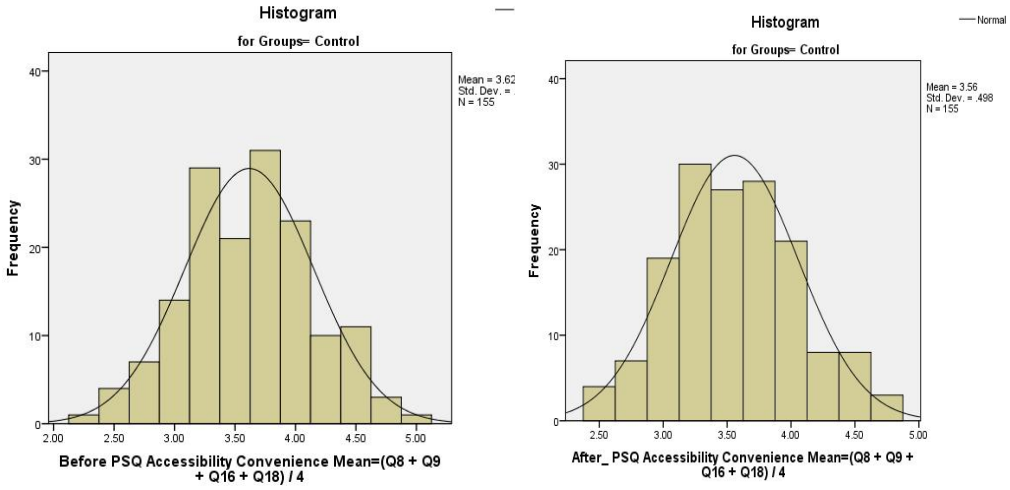

Figure 14. Histogram of the Accessibility Convenience Domain for placebo group Before and After the intervention

The results of the Skewness Z score and Kurtosis Z score for Accessibility Convenience before and after intervention in the placebo group are as follows:

Before – Accessibility Convenience

Skewness Z score = 0.058/0.194 = 0.30

Kurtosis Z score = 0.280/0.386 = 0.73

After – Accessibility Convenience

Skewness Z score = 0.203/0.195 = 1.04

Kurtosis Z score = 0.305/0.387 = 0.79

The results are less than 3.29 following Kim H Y (2013), suggesting that the data is normally distributed.

Table 14. The normal distribution test results of the Accessibility Convenience Domain for placebo group

Group	Time	index	Statistic	Std. Error	Z score
Placebo group	Before-General Satisfaction	Skewness	.058	.194	0.30
		Kurtosis	-.280	.386	0.73
	After-General Satisfaction	Skewness	.203	.195	1.04
		Kurtosis	-.302	.387	0.79