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Abstract

Healthcare is an essential component for sustaining life quality as it advances. The adage "health is wealth" emphasizes that healthcare should be accessible to everyone, regardless of race, age, religion, or socioeconomic status. Although the healthcare sector has significantly expanded and improved over the years, it has shifted focus from societal benefit to commercialization, disproportionately affecting the poor and elderly. The Sustainable Development Goals (SDGs) aim to reduce poverty in all its forms by 2030, and addressing healthcare accessibility is an integral part of this objective. Elderly individuals, particularly those over 60 years old, face challenges due to mobility and potential financial constraints. This paper employs Soft Systems Methodology (SSM) to elucidate the relationship between these issues and enhance stakeholder understanding at a local housing area in Petaling Jaya, Selangor, Malaysia as the case study. With smartphones being ubiquitous in urban areas and the COVID-19 pandemic underscoring the need for accessible healthcare applications, mobile technology offers immense potential for expanding healthcare services in developing countries through remote consultations. This study aims to facilitate easy access to healthcare services for the elderly in urban settings by promoting technological literacy while addressing mobility and cost concerns.

Keywords: Urban Poverty, Older Adults, Mobile Health Apps, Soft Systems Methodology, Healthcare Access and Awareness.

Introduction

Residing in an area with high living costs and low household income can result in individuals being classified as urban poor. Urban poverty encompasses various economic and social issues prevalent in industrialized cities, stemming from multiple factors. A 2016 Bank Negara Malaysia (BNM) survey revealed that married couples with two children require approximately RM6,500 per month, while single adults in the Klang Valley need a minimum of RM2,700.

Past pandemics have disproportionately impacted the working poor, and the COVID-19 outbreak is no exception. Unemployment has resulted in insufficient funds for urban poor workers to afford food, as their jobs often require physical presence or provide necessary cash. Furthermore, poor living conditions, overcrowded spaces, and inadequate sanitation in high-density areas exacerbate the risk of virus transmission and negatively impact overall health (Megat & Kunasekaran, 2020). Older individuals should have equal access to healthcare, including care, information, and medical services, addressing barriers related to literacy, language, and disability.

The Klang Valley, a vast area encompassing the Federal Territory of Kuala Lumpur, Gombak, Hulu Langat, Klang, and Petaling, is located on the west coast of Peninsular Malaysia (Saba, 2020). With 2.16 million people, the Petaling district had the largest population in 2020 (Bernama, 2021). A community consists of people who share interests, belong to the same social group, or share a nationality (Cambridge Dictionary, 2022). This project focuses on individuals aged 60 years and above living in a local housing area in Petaling Jaya, Selangor, Malaysia (to represent urban poverty) with a household income of less than RM4,360, falling within the B40 category.

Sustainable Development Goal (SDG) Goal 3: Good Health and Well-Being

If an immediate and drastic change is not taken, the problems of today will worsen rapidly and dangerously. A strategy to address these issues is developed by the Sustainable Development Goals (SDGs). It serves as a warning to hold onto hope and, in reality, serves as justification for stepping up our efforts. The SDGs can help end poverty. In actuality, only 10% of people worldwide live in extreme poverty. Between 1990 and 2015, the percentage of people living in extreme poverty fell from about 36% to barely 10% (Lee, 2019). However, because progress is stalling, more decisive measures must be taken. Instead of doing nothing, the plan is more efficient. Change occurs when there is collaboration across boundaries and racial and ethnic barriers for the common goal of a sustainable future for people and the earth.

A global framework for peace and prosperity for people and the planet, both now and in the future, is provided by the 2030 Agenda for Sustainable Development, which was accepted by all United Nations Member States in 2015. The 17 Sustainable Development Goals (SDGs), which are an immediate call to action for all nations in a global partnership, are at the core of it. They understand that combating poverty and other forms of deprivation requires policies that enhance health and education, lessen inequality, promote economic growth, combat climate change, and fight to protect the oceans and forests. This project will target to achieve Goal 3 on Good Health and Well-Being.

Objectives

The objectives of this project are

- To study the knowledge of health services through digital technology offered in the health sector to the senior citizens in the local housing area in Petaling Jaya, Selangor, Malaysia.
- To study the effectiveness of the use of information technology in the medical field to manage diseases and health among the senior citizens in the local housing area in Petaling Jaya, Selangor, Malaysia.
- To improve health service facilities with the use of digital technology for the elderly in the local housing area in Petaling Jaya, Selangor, Malaysia.

Problem Statement

The problem statements for this project

- A critical aspect of living is health. The numerous organs in the body work together to function. The health of the organs is key to their optimal operation. Having good health is significant since it refers to the state of being physically, mentally, and socially healthy.
- The tendency of experiencing many health issues concurrently increases with age. Opportunities come with living longer, not just for older people and their families but also for entire societies. Older individuals aged 60 years and above give back to their families and communities in a variety of ways. It's common to think that older people are helpless, fragile, and a burden on society.
- Poor urban families' health can be considerably worse than rural residents. The urban poor in Malaysia is the B40 households with income below RM4,360 (Haron, 2020). Urban poor people have difficulty accessing high-quality healthcare because it is not widely available there. The poor endure significant out-of-pocket costs for high-quality healthcare, which they believe is provided by private as opposed to public healthcare providers.

By utilizing Soft Systems Methodology (SSM) and integrating digital technology within the healthcare sector, this project aims to address the aforementioned problems and improve healthcare services for the elderly in the local housing area in Petaling Jaya, Selangor, Malaysia. The study will focus on understanding the current knowledge and usage of digital technology in healthcare among senior citizens and identifying ways to enhance healthcare facilities and services for this population group. This project aligns with the Sustainable Development Goals, specifically Goal 3.8, to achieve universal health coverage and provide quality essential healthcare services for all, including the elderly.

Technologies in Healthcare Sector

- Electronic Health Records (EHRs)

EHRs are digital versions of a patient's medical history, including information about diagnoses, treatments, medications, and test results. They provide healthcare professionals with a comprehensive view of a patient's health, enabling better decision-making and coordination of care (Menachemi & Collum, 2011). EHRs have been shown to improve patient safety, reduce medical errors, and enhance the overall quality of care (Amarasingham et al., 2009).

- Telemedicine

Telemedicine is the use of technology to deliver healthcare services remotely, allowing patients to consult with healthcare providers without being physically present. Telemedicine has been effective in providing access to care for patients in rural or underserved areas, managing chronic conditions, and delivering mental health services (Kruse et al., 2017). Telemedicine has also demonstrated the potential in reducing healthcare costs and improving patient outcomes (Bashshur et al., 2016).

- MHealth and Wearable Devices

MHealth refers to the use of mobile devices and applications in healthcare, while wearable devices are technologies worn on the body, such as fitness trackers and smartwatches. These technologies allow for continuous monitoring of the patient's vital signs and other health indicators, providing healthcare professionals with real-time data to inform treatment decisions (Steinhubl et al., 2015). mHealth and wearable devices have shown promise in improving chronic disease management, promoting healthy behaviors, and facilitating patient-provider communication (Kumar et al., 2013).

- Robotics and Artificial Intelligence (AI) in Healthcare

Robotics and AI have been increasingly integrated into healthcare, with applications ranging from surgical robots and rehabilitation devices to AI-driven diagnostic tools and personalized treatment plans (Bini et al., 2018). These technologies have the potential to enhance the precision and efficiency of healthcare services, reduce human error, and improve patient outcomes (Topol, 2019).

- 3D Printing in Healthcare

3D printing has emerged as a transformative technology in healthcare, enabling the creation of patient-specific medical devices, prosthetics, and even tissue and organ structures (Ventola, 2014). The use of 3D printing has shown the potential in reducing surgical complications, decreasing costs, and improving patient outcomes (Kamali et al., 2018).

In conclusion, the integration of digital technologies in the healthcare sector has the potential to improve the quality, accessibility, and efficiency of care. While challenges remain, such as data security, privacy concerns, and the digital divide, the continued development and implementation of these technologies hold promise for transforming healthcare and improving the well-being of patients globally.

Soft System Methodology (SSM)

Soft Systems Methodology (SSM) is an approach for analyzing and solving complex, ill-structured, or "soft" problems, particularly those involving human and organizational aspects. Developed by Peter Checkland and colleagues in the late 1960s and early 1970s, SSM has been widely applied in various fields such as information systems, management, and healthcare (Checkland, 1981; Checkland & Poulter, 2006).

Key Concepts in SSM

- **Problem Situation**

The problem situation refers to the complex and messy real-world scenario in which stakeholders experience difficulties or challenges that need to be addressed. SSM aims to develop a shared understanding of the problem situation among stakeholders, which is vital for finding solutions and facilitating change (Wilson, 2001).

- **Rich Pictures**

Rich pictures are visual representations of the problem situation, capturing the different elements, relationships, and perspectives of stakeholders involved. These diagrams help stakeholders to grasp the complexity of the situation and identify potential areas for intervention (Bell & Morse, 2013).

- **Root Definitions**

Root definitions are concise statements that describe the purpose, function, or nature of a particular system or subsystem within the problem situation. They are formulated using the CATWOE mnemonic, which stands for Clients, Actors, Transformation, Weltanschauung (worldview), Owners, and Environment (Checkland, 2000).

- **Conceptual Models**

Conceptual models are graphical representations of the activities required to achieve the objectives outlined in the root definitions. They serve as a tool for comparing different perspectives and evaluating the feasibility and desirability of potential interventions (Probert, 1998).

SSM's Seven-stage Process

- SSM is commonly organized into a seven-stage process (Checkland, 2000)
- Problem situation unstructured: Identify and describe the problem situation through interviews, observations, and document analysis.
- Problem situation expressed: Develop rich pictures to represent the main aspects and relationships within the problem situation.
- Root definitions of relevant systems: Formulate root definitions using the CATWOE mnemonic to identify the key systems or subsystems involved in the problem situation.
- Conceptual models of the systems named in root definitions: Create conceptual models that outline the activities needed to achieve the objectives specified in the root definitions.
- Comparison of models with real-world situations: Compare the conceptual models with the actual problem situation to identify gaps, inconsistencies, or opportunities for improvement.
- Changes: Propose feasible and desirable changes based on the insights gained from the comparison of models and real-world situations.
- Action to improve the problem situation: Implement the proposed changes and monitor their effects on the problem situation.

In conclusion, Soft Systems Methodology offers a structured approach for analyzing and addressing complex, ill-structured problems that involve human and organizational aspects. By facilitating learning and appreciation of the problem situation among stakeholders, SSM enables the identification and implementation of effective and sustainable solutions.

Methodology

The Soft System Methodology (SSM) has been used to identify and solve the problem of this project. SSM is the best option because it is a technique used to solve ambiguous, complex problems. Besides, SSM aims to help complex organisations, enabling users to deal with problems in an organised way and driving them to look for solutions that go beyond purely technical issues.

Moreover, the data collection method used is the distribution of questionnaires through Google Forms to residents of the local housing area in Petaling Jaya, Selangor, Malaysia. There are a total of 20 respondents where most of them aged between 61 and 75 years old. Most of the respondents are government pensioners followed by those working in the private sector and some of them are working on their own. Most of them are not working but for those who are working, the most they could earn is between RM2000 to RM4000 in a month. In addition, most respondents have future savings, and they could save up to RM1000 a month for those who have pensions.

SSM Stages for Data Collection

- Stage 1: Problem Situation Unstructured

A local housing area in Petaling Jaya, Selangor, Malaysia was chosen for this project and a Google Form link was shared with the residents. At this first stage, the group wants to understand their situation and identify the problems or challenges that they are facing. Usually, the problems are still unstructured and cannot be categorised easily. The group has created a set of questions to have a better understanding of the resident's challenges. The questions are as follows:

- What is the main challenge that the residents are facing now?
- Who are the key players?
- What is the early perception of this situation?
- What is the current initiative taken by the residents?

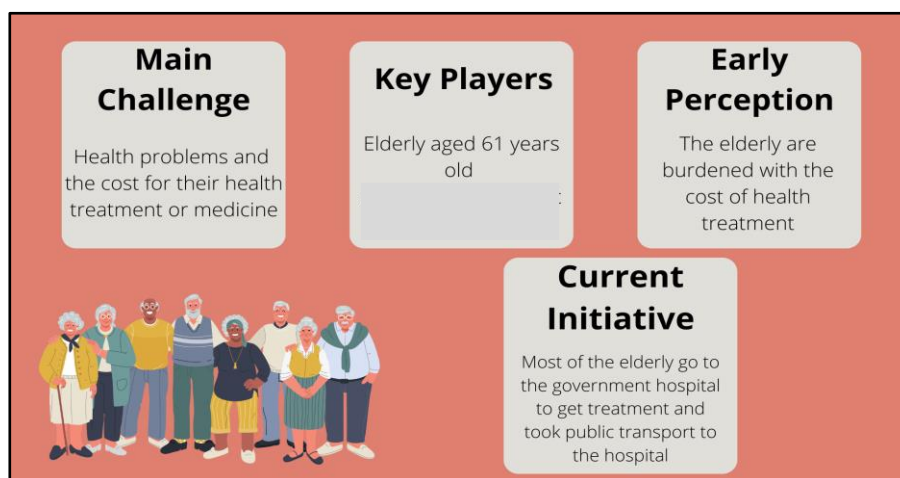


Fig. 1: Problem Situation for Elderly Living in a local housing area in Petaling Jaya, Selangor, Malaysia

Fig. 1 shows the summary of the problem situation for the elderly Living in the local housing area in Petaling Jaya, Selangor, Malaysia.

- Stage 2: Rich Picture

Based on the problem situation identified in Stage 1, a rich picture (Fig. 2) was sketched to show the important elements to make the challenge faced by the elderly at the local housing area in Petaling Jaya, Selangor, Malaysia a bit better than before. As a result, at this stage, the group found out that most of the elderly are facing chronic health problems and do not have a stable income to afford their health treatments, medicine, and the cost to visit the hospitals. These issues have forced them to spend their future savings on treatment and medicine costs.



Fig. 2: Proposed Rich Picture

- Stage 3: Root Decision

A root definition is a transformation process that takes an entity as input, changes or transforms it, and outputs a new form of the entity. The significant issues are this key player is dealing with health issues, and they do not have a stable income, forcing them to spend their future savings on treatment and medicine costs.

The following statement is written based on the Root Definition:

“A system has to do P by (means of Q) to do R”

P: What does the system do

- It provides a platform for key players to monitor their health in the comfort of their homes.

Q: How does it work

- To be able to schedule an online consultation with selected doctors for mild disease.
- To be able to make a quick call to the nearest hospitals if there is any emergency with just one tab on the screen.
- To be able to order a monthly medicine delivery to their home as per subscribed by doctors.

R: Why it is being done

- To provide an efficient and quick solution to the key player.

The following statement (Table 1) shows the CATWOE Analysis:

Table 1

Project's CATWOE Analysis

COMPONENTS	MEANING
Customers	The elderly community at a local housing area in Petaling Jaya, Selangor, Malaysia
Actors	Elderly community, Healthcare Workers.
Transformation	Elderly communities get to monitor their health in the comfort of their home.
World View	The elderly community can get an early diagnosis of their health problems through online consultation and save their travel cost to the hospital for mild diseases.
Owner	Government ministry which is the Ministry of Health and Department of Social Welfare.
Environment	Public and Health Sector

• Stage 4: Conceptual Model

The next stage is a conceptual model which is constructed based on the Root Definition and CATWOE Analysis to make a match with the human activity involved in the health problems and the treatment and medicine cost.

Fig. 3 shows the Conceptual Model for the Elderly Community at a local housing area in Petaling Jaya, Selangor, Malaysia

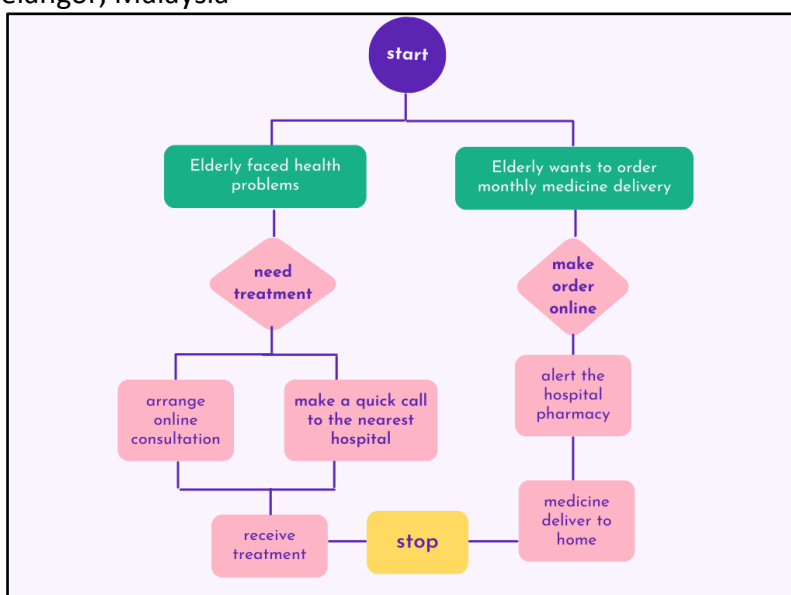


Fig. 3: Conceptual Model for the Elderly Community

In addition, to measure the performance of the problem solution. The 3Es concept was used whereby **E1** represents *Efficacy* while **E2** represents *Efficiency* and **E3** is *Effectiveness*.

The following statement shows the Measure of Performance using the 3Es Concept:

E1: Does the solution provide enough help to improve or overcome the health problems and the treatment and medicine cost issues?

E2: How does the elderly community get better health and health treatment while lowering the medicine cost?

E3: Can the elderly community avoid health problems and treatment and medicine cost issues?

- Stage 5: Compare the Model with the Real World

In stage 5, the constructed conceptual model is compared to the real-world aspects to see if it is suitable to be implemented. This stage aims to investigate the conceptual model if it has a user-friendly element that is suitable for human activity. The proposed solution is named X whereby it is a formal system if and only if it meets the following requirements:

- X can help to improve the health problems faced by the key player through regular online consultation.
- X can give a quick call button to the nearest hospital in case any emergency occurs.
- X can make an order for the monthly medicine supply to be delivered to their home.

- Stage 6: Define Possible Changes

A proposed solution was created and named "Doctor-Care". This solution is a mobile-based application that was designed to be a simple function to adjust with its main users which is the elderly community. Moreover, Doctor-Care apps hope to ease the travel cost for the elderly community to the hospital just to get a consultation on a mild disease. This app also could be able to save more lives as the key player can make a single touch to alert the nearest hospital of the emergency.

- Stage 7: Recommended Actions

The group has decided to suggest a mobile application that will have features like identifying a health facility, finding a doctor, requesting medication, and making clinic appointments after taking user backgrounds into account. The suggested app is in Malay because the users are older and have a stronger grasp of that language than they do of English. The interface of this application is easy to comprehend, minimal, and complex.

The summary of the explanations for the application is as follows:

Welcome Page: All users will be greeted by this page when they open the app. This page gives an overview of the application such as what it does and how it benefits the user. Users can see the information in the image in the carousel.

Last Interface of Welcome Page: This is the last page user will see on the welcome page. On this page, users were given an overview of the application's function. They are assumed to understand the application function and will finally have a chance to try it out themselves by logging in. If the "Log Masuk" button is clicked, they are brought to the login page.

Login Page: This is the login page of the Doctor-Care mobile app, which requires the user to enter their name and password. If they do not have an account yet, they can register for a new one.

Home Page: On this page, users will see some brief content involving health. There are four other tab buttons for users to click on to.

Main Menu Page: This is the main menu page where there are six options for users to choose from. Search for health centers, call a doctor, purchase medications, and individual profiles, make medical appointments, and ask questions.

Search for Health Centres Page: Since health facilities can be limited, users can search for any health centers through this app. It automatically detects the location and displays nearby health centers, including some information regarding them.

Call Screen: This page appears right after the user clicks the button to call a certain doctor.

Medications Purchase Page: Users can buy medicines without having to go to physical health centers. Some medicines can only be purchased with a doctor's prescription, so users need to upload a doctor's prescription note or letter to buy those medicines.

Profile Page: There is the user's information that can be edited by the user if needed.

Medical Appointment Page: It is somehow tricky to book an appointment, so this mobile app helps users to make an appointment by choosing which clinic they want to go, to and their health problem category.

Ask Questions Page: Users can ask health questions, and the answer will be sent to their email. To do this, users must enter their email address, title, and the questions they have in mind.

Results and Discussions

- Improved Rich Picture Poster

Following the application of the Soft Systems Methodology, the upgraded rich picture poster is shown in **Fig. 4**. The application is free to download and can be used by seniors to access healthcare services. Given their advanced age, limited financial resources, and mobility issues, it is much more practical. As an alternative, it is advised that elderly people's relatives frequently check on them. It is the responsibility of society, the government, or non-governmental organisations to periodically check on the elderly if they live alone and have no close family that resides nearby, especially during these difficult and trying times.



Fig. 4: Improved Rich Picture

Conclusion

The survey conducted among B40 elderly residents at a local housing area in Petaling Jaya, Selangor, Malaysia to represent urban poverty, revealed that a majority of them face health challenges and require medication. Unfortunately, more than half of them experience delays in receiving treatment due to time constraints, limited access to healthcare facilities, and the ongoing COVID-19 pandemic. To address these issues, the Soft Systems Methodology (SSM) was employed to develop a user-friendly mobile application called Doctor-Care.

Doctor-Care provides a comprehensive solution to the problems identified by offering a range of essential healthcare services through a single platform. Consequently, senior citizens can access these services without the need for physical exertion, saving both time and energy. Aligned with Sustainable Development Goal (SDG) 3, which aims to ensure healthy lives and promote well-being for all at all ages, the Doctor-Care project offers a valuable contribution towards achieving community health objectives.

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