Asian Journal of Social Science Research (e-ISSN: 2600-9706)
Volume 8, Issue 1, 2026
DOI: https://doi.org/10.5281/zenodo.20822313

FACTORS AFFECTING PROLONGED WAITING TIMES FOR SERVICES OF THE OUTPATIENTS: A PRELIMINARY STUDY IN MALAYSIAN HOSPITAL

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Received Date: 19/01/2026 Accepted Date: 15/06/2026 Published Date: 30/06/2026

ABSTRACT

Long waiting periods for patients, defined as the interval between patient's arrival and provision of healthcare services, in Outpatient Department (OD), has emerged as significant concern in healthcare delivery systems. This study focuses on identifying which of the four major factors: patients' volume, staffing and resources, patient flow and queueing process, and technology used, contribute to extended waiting times in OD of a selected specialist hospital. The data were collected using a random sampling method where 351 respondents were involved. The survey's questionnaire was divided into three components, focusing on patients' sociodemographic characteristics and visit patterns, general perception and satisfaction level on current queueing system, and factors influencing waiting times at OD. For the last two components, respondents have to rate statements using Likert scale representing level of agreement from "1" Strongly Disagree to "5" Strongly Agree. Questionnaires created using Google Form were distributed manually or completed online using given link at the OD. Data collected were analyzed using descriptive quantitative analysis of the IBM SPSS version 29.0. Results indicate that long waiting time occurs at the OD, with factors yielding mean scores ranging from 4.71 to 4.78. It is evident that all factors significantly contribute to prolonged waiting times in OD. Thus, it is imperative for OD management to take appropriate actions to mitigate long outpatients' waiting times by optimizing time and implementing strategies for activities involved which can potentially manage factors that lengthen waiting times. Effective initiatives are crucial for enhancing patients' satisfaction and improving healthcare operational efficiency.

Keywords: hospital's outpatient department, outpatients' waiting times, descriptive analysis contributing factors, healthcare efficiency

INTRODUCTION

The outpatient department (OD) of a hospital plays a vital role in the delivery of healthcare services. The OD history stemmed back to its origins in 1696 at the Hôtel-Dieu hospital with regular sessions were held to treat poor patients who did not require hospitalization, pioneering the outpatient consultation and care outside of hospital wards (Loudon, 1978). In Malaysia, the OD was first established in the Taiping Hospital, initially known as Yeng Wah Hospital, which was established in 1880 and considered the oldest hospital in Malaysia (Lim, 2016). It provided both inpatient and general medical services or "clinics" or the outpatient care, basically for the tin mining workers. The ODs in hospitals in Malaysia, grew significantly after Malaysia's independence through the health care reform aimed at providing a more efficient and equitable health care system for a better quality of life for the population (Merican & Yon, 2022).

Today, the OD is often described as the "Shop Window" of a hospital (Joshi et al., 2023) as it represents the first point of contact for most patients and reflects the efficiency, quality, and overall image of the institution. In Malaysia, the OD provides care to a large number of patients at a relatively low cost, with Malaysian government hospitals charging as little as RM 1 for a general consultation per visit (Ministry of Health, 2024). This affordability ensures widespread access, but it has also contributed to congestion at the OD. One of the most pressing challenges of an OD in public hospital in Malaysian is prolonged waiting times. Waiting time is defined as the interval between a patient's arrival at the OD and their discharge after receiving services (Yadav, 2017), which recognized by the World Health Organization (WHO) as a key indicator of health system responsiveness (Ukizentaburuwe et al., 2021). Long waiting times not only reduce patient satisfaction but also highlight inefficiencies in service delivery and resource management.

Review of past studies reveal that extensive efforts have been made using various methods and approaches to address this issue worldwide. For examples, Amrina et al. (2020) use simulation model to reduce waiting times of outpatients from 97.4 minutes to 8.5 minutes of two hospital clinics in West Sumatra, Indonesia while Fun et al. (2022) apply Discrete Event Simulation (DES) model to reduce patients' wait times and crowding of a Specialist Outpatient Clinic in a public tertiary hospital in Malaysia. Simulation based models (Adiyeloja & Adeosun, 2024; Moura & Pinho, 2025) and DES models (Zamani & Spence, 2022, Alhaider, et al., 2025) were used to reduce patients wait times by implementing some scheduling strategies and optimizing resources' utilizations. In some studies, optimization models specifically the mathematical programming models (Zhao & Gu, 2025; Ahmed, 2025) and queueing models (Mahala et al., 2023; Ogumeyo et al., 2025,) were applied to minimize patients waiting times. In addition, the Lean Six Sigma method was utilized in reducing trauma orthopedic patient waiting times (Pierce et al., 2023).

Despite efforts taken and technology used, Malaysia continues to face persistent delays in its outpatient-related services. A study by Fahrurazi et al. (2022) discovered that the mean waiting time in outpatient pharmacy is 23 minutes, which is caused by various factors including number of medications and number of staff. Meanwhile, it was found that patients waiting time can be more than 2 hours from the study in Kedah, Malaysia by Hassali et al. (2014) which showed that patients waited for less than 2 hours were more satisfied than patients waited for more than 2 hours. Ahmad et al. (2017) found the total mean waiting time from registration to access to a doctor in a primary health care clinic was 41 minutes and 99% of patients waited less than 30 minutes for their medication. Some other study conducted in health clinics in Temerloh also found waiting times between 11.74 and 29.65 minutes (Fong et al., 2021). Some of the reasons for long waiting periods are bottlenecks in the registration process, lack of staff, poor staffing and scheduling. Our study focuses on four (4) identified factors related to waiting time at ODs, which

DOI: https://doi.org/10.5281/zenodo.20822313

are, the high patient volume, staffing and resources allocation, patient flow and queueing process in the OD and the technology used in the OD.

Long waiting time in an OD was concluded that it is related to high patient volume based on a study conducted by Hemmati et al. (2018) in one of the hospitals in Iran. In the meantime, Isaruk et al. (2024) noted that two of the most important factors responsible for long waiting times in OD were staff capacity (low staffing levels) and resources (potential resources were inadequate). A study by Mijailovic et al. (2014) found that enhanced staffing done by adjustments in previously understaffed areas in a phlebotomy clinic resulted in 88%-100% of patients waiting times reduced to under ten minutes. This underlines the importance of the optimal allocation of staff and resources to enhance the patients' experience in OD. In addition, according to Morales et al. (2024), factors such as increasing staff during peak hours, improving workflows, and automating tasks can optimize waiting and processing times Patient flow and queueing process can also affect waiting time of patients.

Appointment systems and triage processes can successfully manage patient entry points and flow which significantly reduce waiting times (Cho et al., 2017) whereas efficient patient flow management is crucial in minimizing waiting times (Moura & Pinho, 2025). Besides efficient processes and staffing, technologies used in patients' registration, appointments scheduling and in medical services also influence waiting times in OD (Abrahams, 2022). Meanwhile, online self-scheduling of medical appointments (North et al., 2025) and multi-server appointment scheduling (Pourmohsen & Shi, 2025) have been proven to reduce waiting times of patients. Telemedicine can also substantially improve wait times by providing efficient and equitable healthcare systems (Capodici et al., 2025). Nevertheless, a study conducted by Nemari and Waterson (2022) indicated that the use of robotic technology in an outpatient pharmacy in a university hospital had a positive impact on the quality of patient service by reducing waiting times, medication management systems safety and efficiency.

Table 1. Studies on outpatients' waiting time in Malaysian hospitals

Author and Year	**Location**	**Waiting time at OD**	**Factors contributing to long waiting time**
Fahrurazi et al. (2022)	Outpatient Pharmacy at Hospital Raja Perempuan Zainab II (HPRZII)	The study indicated that the average waiting time was 23.0 ± 11 minutes.	• The number of medications in the prescription • The number of hospital staff • Prescriptions that required intervention • Filling procedure
Fong et al. (2021)	Outpatient Pharmacy Unit of Bandar Mentakab Health Clinic (KKBM), Temerloh Health Clinic (KKT) and Tanjung Lalang Health Clinic (KKTL)	i. Bandar Mentakab Health Clinic; total mean waiting time was 29.65 min. ii. Temerloh Health Clinic; total mean waiting time was 28.43 min. iii. Tanjung Lalang Health Clinic; total mean waiting time was 11.74 min.	• Greeting phase • Screening/Data entry phase • Filling phase • Dispensing phase

Ahmad et al. (2017)	Specialist Outpatient Clinic	The average waiting time from registration counter to pharmacy observed in the study was found to be 76.92 minutes	• Registration counter process • Insufficient staffing • Patients show up before their appointed times

Based on Tabe 1, in Malaysia, the problem of outpatients prolonged waiting times is underexplored whilst there exist gaps and differences, particularly in hospitals' ODs where number of patients is higher and processes are more complex than in smaller health clinics. Only Fahrurazi et al. (2022), Fong et al. (2021) and Ahmad et al. (2017) carried out studies about the waiting times for patients in outpatient departments, but they did not focus on general OD and did not include the four factors studied in this study. The factors which contribute to the high waiting time in OD of Hospital Pakar Universiti Sains Malaysia (HPUSM) or USM Specialist Hospital are mainly examined in this study. By investigating on four (4) key factors causing long waiting times in OD, which are high patient volume, staffing and resources allocation, patient flow and queueing process, and technologies used in ODs, this study offers a better understanding towards reducing wait times, improving patients' satisfaction, and enhancing public healthcare services. This study aims to identifying which of the four (4) major factors: patients' volume, staffing and resources, patient flow and queueing process, and technology used, contribute to extended waiting times in OD of a selected specialist hospital.

METHODOLOGY

STUDY DESIGN

The study was conducted as a cross-sectional study for two weeks from February 2025 at the OD which is *Klinik Rawatan Keluarga (KRK)* of the *Hospital Pakar Universiti Sains Malaysia (HPUSM)* / USM Specialist Hospital in Kubang Kerian, Kelantan Malaysia. This study was conducted during the weekdays (Sunday to Thursday) and data was systematically gathered from the OD of HPUSM during these days. Data collection hours were 07.00 AM to 5.00 PM.

POPULATION AND SAMPLE

The inclusion criteria for this study included all patients who were waiting in queue to receive treatment or services at the OD. Furthermore, this investigation was mainly aimed at collecting the demographic data of the respondents through a structured questionnaire. The study included outpatients, aged 18 years and above, both scheduled appointment holders and walk-in patients. The exclusion criteria, on the other hand, suggested that this study was limited to the OD and excluded other departments of the hospital. Furthermore, it did not entail gathering any confidential medical data or information about the types of illnesses. Patients were also excluded if they were considered inpatients or required immediate emergency treatment.

The sample size was set to 350 respondents, based on an estimated of 3000 outpatients visiting the OD over two-week period. The number of samples was calculated with Raosoft sample size calculator (http://www.raosoft.com/samplesize.html). The number of respondents who filled in the questionnaire is 351. This study utilizes a non-probability, convenience sampling approach, to generalize findings about a population. It is used because of its simplicity, cost effectiveness and ease of implementation, especially when researchers are faced with constraints on time and resources (Stratton, 2021). This approach involves selecting participants based on ease or convenience of access rather than through structured or probabilistic methods (Saunders et al.,

DOI: https://doi.org/10.5281/zenodo.20822313

2023). In practice, this often means the selection of respondents who are readily available (Sarstedt et al., 2018). This is a method that is representative, and thus the findings can be generalized to a wider outpatient population seen in the OD.

SAMPLING AND DATA COLLECTION

This study's questionnaire was structured into three main parts, all of which consisted of closed-ended questions. Part A gathered respondents' sociodemographic data, including age, gender, ethnicity, types of occupation, and education level for profiling purposes. Part B examined patient visit patterns at the OD, such as session timing, day of the week, frequency of visits, and reason for seeking care, with all items presented as multiple choice questions. Part C investigated factors contributing to waiting times at the OD, categorized into four subsections: (C1) the High Patient Volume in the OD, (C2) the Staffing and Resources Allocation (C3) the Patient Flow and Queueing Process in the OD, and (C4) the Technologies Used in the OD. Each item in Part C was rated on a 5-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). The survey questionnaires were distributed to respondents in both paper-based form (for those preferring a traditional method) and digital format, via a QR code linked to a Google Form, to enhance accessibility and to suit outpatients of various ages. This approach ensured convenience and encouraged higher participation. Data collection was conducted at HPUSM over two weeks in February, after which completed responses were compiled and analyzed.

STATISTICAL ANALYSIS

This study examines some characteristics and contributions of selected underlying factors towards the prolonged waiting times of outpatients. Data analysis in this study was conducted using the *Statistical Package for Social Sciences* (SPSS) version 29.0 and Microsoft Excel 2021. In many studies, the construction and validation of psychometric scales heavily rely on the coefficient alpha (Cronbach, 1951) in which the alpha coefficients are used to evaluate the internal consistency and reliability of the scales. Based on Hair et al (2023), the reliability based on alpha coefficient range can be interpreted using the Rule of Thumb as shown in Table 2. Most commonly applied guidelines classify Cronbach's alpha as "moderate" if it exceeds 0.70, "good" for research purposes if it exceeds 0.80, and "sufficient for diagnostic purposes" if it exceeds 0.90. Cronbach's alpha coefficient of 0.70 or higher is generally acceptable for basic research, demonstrating satisfactory reliability (Nunnally and Bernstein, 1994) and sufficient internal consistency of scale. Nevertheless, the Cronbach's Alpha value must exceed 0.6 for the questionnaire to be considered reliable and valid (Daud et al., 2018).

Table 2. Cronbach's Alpha ranges, reliability levels, and interpretations (Hair et al., 2016)

Alpha Coefficient Range	Reliability Level	Interpretation
0.9 >	Excellent	Indicates very high internal consistency
0.8 to < 0.9	Very Good	Reflects strong internal consistency
0.7 to < 0.8	Good	Indicates acceptable internal consistency
0.6 to < 0.7	Moderate	Reflects questionable internal consistency
< 0.6	Poor	Indicates poor internal consistency

DOI: https://doi.org/10.5281/zenodo.20822313

Table 3. Mean score interpretation (Nunnally & Berstein, 1994)

Mean Scale	Level
4.01 – 5.00	High
3.01 – 4.00	Medium High
2.01 – 3.00	Medium Low
1.00 – 2.00	Low

For data gathered through the questionnaire in our study, descriptive analysis was performed for all variables involved. For questionnaire data, categorical variables (nominal and ordinal, including Likert-type items) are typically presented using frequencies (counts) and percentages to illustrate the distribution of responses. Data extraction from the software ensured the absence of bias in this study. For most purposes, the mean is usually preferred as the measure of central tendency since it uses every value in the data from the sample for its calculation. This research performs a descriptive analysis utilizing mean score values to assess all variables including those concerns with waiting times at OD and the contributing factors. Table 3 presents the mean score interpretation developed by Nunnally and Bernstein (1994).

ETHICS APPROVAL

This study follows the research ethics requirements to protect the confidentiality and privacy of participants. All aspects of this study were reviewed and approved by the Research Ethics Committee of the Universiti Teknologi MARA (UiTM) (REC/07/2024).

RESULTS AND DISCUSSION

ODs are crucial for delivering accessible, non-emergency medical care across multiple specialties, overseeing routine consultations, diagnostics, and treatments without necessitating hospital admission. Currently, in the OD, several factors contribute to delays in the timely provision of services. Long waiting times encountered by outpatients present a prevalent issue in OD, negatively impacting patient satisfaction, health outcomes, and trust in healthcare systems and consistently pose challenges, particularly hindering the efforts to enhance efficiency and efficacy of treatment delivery. As stated by the World Health Organization (WHO), the responsiveness of a health system depends on patient waiting times (Sarwat, 2021). The waiting times of patients for OD services is an important indicator for assessing the quality of hospital services. Waiting experience significantly impacts patient satisfaction towards the healthcare services provided. The cross-sectional study which results presented in this paper, was conducted at the OD of the HPUSM in February 2025. Results presented include the sociodemographic profiles of respondents. This paper also discusses results concerning the four main factors that contribute to waiting times for the OD services of outpatients at HPUSM.

SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The sociodemographic characteristic presents a comprehensive analysis of patterns and features associated with patients' visits to the ODs, indicating trends that influence healthcare service utilization. An in-depth investigation with 351 respondents provides important information about the sociodemographic profiles of outpatients in HPUSM OD, shown in Table 4. The sample consists of males (64.7%, n=227), while females represent 35.3% (n=124) where number of male outpatients outnumbered the number of female outpatients. Similar finding has also been reported in a study

DOI: https://doi.org/10.5281/zenodo.20822313

involving an OD of a hospital in India by Saxena et al. (2020) in which the number of male patients attending OD was higher than that of female patients. However, previous studies concerning ODs by Mina et al. (2024) in the Philippines and a study by Fahrurazi et al. (2022) in Malaysia indicate that the number of female patients is higher than male patients. In the context of Malaysia, outpatients' gender does not usually reflect the gender in Malaysia's population in which out of 34.2 million, 17.9 million (52.3%) are male and 16.3 million (47.7%) are female (BERNAMA, 2025).

Regarding the marital status, results show that more than half of the respondents (182 out of 351 or 51.9%,) are married followed by 103 respondents single (29.3%), 34 (9.7%) divorced, and 32 (9.1%) are widows. Hence, this study found that the HPUSM's OD is mostly attended by people who are married. Age-wise, the respondents were fairly evenly distributed across age groups where 110 respondents (31.3%) are in the 30–49 years old age group, 111 (31.6%) are 50–69 years old, 94 (26.8%) are in younger adults age group of 18–29 years old, and 36 (10.3%) of the respondents were recorded as in 70 years old and above. The average age of respondents in this study is 45 years old. Furthermore, studies related to OD in Malaysia as by Fahrurazi et al. (2022) and Ahmad et al. (2017) reported an average age of over 40 years, in particular, around 42 years old and 49 years old, respectively. Results of our study are in line with these studies, indicating that patients visiting the OD are generally middle age adults, who come for managing emerging or existing chronic conditions, attaining treatments for a variety of general health problems and preventive care. Based on the analysis of data shown in Table 3 also, majority of the respondents (249 out of 351 or 70.9%) are Malays, whereas 62 (17.7%) respondents are Chinese, 37 (10.5%) Indians, and 3 (0.9%) Orang Asli, which reflect the multi-ethnic society in Malaysia.

Table 4. Sociodemographic characteristics of respondents

Sociodemographic characteristics	**Total (n = 351)**	
	n	**%**
Gender		
Male	227	64.7
Female	124	35.3
Marital Status		
Single	103	29.3
Married	182	51.9
Divorced	34	9.7
Widow	32	9.1
Age		
18 – 29 years old	94	26.8
30 – 49 years old	110	31.3
50 – 69 years old	111	31.6
70 years and above	36	10.3
Ethnic		
Malay	249	70.9
Chinese	62	17.7
India	37	10.5
Orang Asli	3	0.9
Type of Occupation		
Civil Servant	96	27.4
Private Sector Employee	59	16.8
Self-Employed	122	34.8
Housewife	27	7.7
Unemployed	47	13.4

DOI: https://doi.org/10.5281/zenodo.20822313

Educational level		
Doctor of Philosophy (PhD)	0	0.0
Master's Degree	14	4.0
Bachelor's Degree	109	31.1
STPM/Diploma/Matriculation or Foundation Certificate	38	10.8
SPM (Sijil Pelajaran Malaysia)	148	42.2
PMR/PT3 (Penilaian Menengah Rendah/ Pentaksiran Tingkatan 3)	10	2.8
Others, e.g., certificate	16	4.6
No formal education	16	4.6

Analysis on respondent's occupation indicates that the largest group (122 out of 351 or 34.8%) comprises of those self-employed individuals. This is followed by 96 (27.4%) respondents who are civil servants, 59 (16.8%) from private sector employees, 47 (13.4%) unemployed individuals and 27 (7.7%) housewives. Analysis of data also include the educational levels of the respondents where majority (148 out of 351 or 42.2%,) have the Sijil Pelajaran Malaysia (SPM), followed by 109 (31.1%) respondents with bachelor's degree. 38 respondents (10.8%,) have STPM/Diploma/Matriculation or Foundation qualifications, while 16 (4.6%) have other certificates or qualifications. It is also recorded that 14 (4.0%) respondents have master's degree while only 10 (2.8%) respondents have Penilaian Meenah Rendah (PMR) or Pentaksiran Tingkatan Tiga (PT3) certificates. Finally, 16 (4.6%) respondents declared they have no formal education and none of respondents holds a Doctor of Philosophy (PhD) degree. Overall, the data have shown that the composition of outpatients visiting the OD of HPUSM are mostly Male, married individuals, those of age 50 – 69 years old, Malay, self-employed and have the educational background of SPM (Sijil Pelajaran Malaysia).

PATIENT VISIT PATTERNS TO THE OUTPATIENT DEPARTMENT (OD)

This study also found that patient visit patterns to the OD are influenced by various aspects such as session time (either morning or afternoon), day of the week, frequency of visits, and purpose for seeking care. Patients visiting the OD for treatment demonstrate distinct periods and objectives. Table 4 shows a detailed analysis of patient visit patterns to the OD, with visits classified by session time, day of the week, frequency of visits, and purpose for seeking care. Table 5 displays that majority of respondents, in this case, 82.9% (291 out of 351 respondents) visited the OD during the morning session (8:00 a.m. to 1:00 p.m.) whereas only 17.1% (60 respondents) attend the afternoon session (2:00 to 5:00 p.m.). This indicates respondents' strong preference towards for morning session, possibly attributed by convenience, certain service availability, or personal preferences. This result aligns with studies by Hemmati et al. (2018), Wafula and Ayah (2021), Magesa et al. (2021), and Abrahams (2022), where morning shift attendances at OD accounted for 72%, 90%, 42.7%, and 62.5% of the respondents, respectively.

In terms of day of visit, for weekdays, Monday is the top choice (85 respondents, 24.2%), followed by Sunday (85 respondents, 22.8%) and Thursday being less preferred (56 respondents, 16%). The HPUSM is closed on Friday and Saturday. These results show that patient visits to the OD are quite consistent from Sunday to Thursday. However, it is observed that attendance on Mondays was recorded higher, suggesting a trend that worths further investigation. In contrast, previous studies reported that majority of outpatients visited the OD on different days, such as on Wednesday, as described by Fahrurazi et al. (2022) for an OD in Malaysia, on Sunday as reported by Abrahams (2022) for an OD in Saudi Arabia, and on Tuesday, as stated in Nguyen (2018) for an OD in Vietnam.

DOI: https://doi.org/10.5281/zenodo.20822313

Based on frequency of visits, a significant number of respondents, which is 127 out of 351(36.2%,), visit the OD once every three months whereas 105 (29.9%,) respondents come once every six months. This implies that a significant number of patients may be managing chronic conditions such as hypertension and diabetes that require regular check-ups but non-urgent health requirements that do not necessitate more frequent visits such as monthly visits. A group of 61 respondents (17.4%) visits the OD once a month whereas 30 respondents (8,5%) visit the OD annually. Finally, 16 (4.6%) of the respondents chose the option "Others / By Appointment" as the respond to the question "How often do you visit the Outpatient Department (OD)?"

The most common reason for visiting the OD was for doctor or specialist consultations, as recorded by 54.4% (191) of respondents, emphasizing the OD's major role in providing professional medical advice. This suggests that consultations with doctors or specialists primarily drive the outpatient visits to the OD. 47 (13.4%) respondents and 42 (12.9%) respondents selected medication matters and follow-up appointments, respectively, thus highlighting that some outpatients require ongoing treatment or medication refills. Other responses include routine check-ups (6.8%, n=24) and rehabilitation or physical therapy (5.7%, n=20) that were less common but still significant, likely reflecting preventative treatment or recovery requirements. Some respondents visit the OD for triage screening or diagnostic test (13, 3.7%) and for vaccination or preventive care (11, 3.1%). Interestingly, only 3 (0.9%) respondents visit the OD for management of chronic conditions, implying that people with chronic conditions may be attending the specialist clinics or that they are under-represented in this sample.

Table 5. Patient visit patterns to the outpatient department (OD)

	Total (n = 351)	
	n	**%**
Which session did you come to the OD		
Morning (8:00am-1:00pm)	291	82.9
Afternoon (2:00pm-5:00pm)	60	17.1
What day did you come to the OD		
Sunday	80	22.8
Monday	85	24.2
Tuesday	66	18.8
Wednesday	64	18.2
Thursday	56	16.0
How often do you visit the OD		
Once a week	1	0.3
Once every two weeks	11	3.1
Once a month	61	17.4
Once every three months	127	36.2
Once every six months	105	29.9
Once a year	30	8.5
Others / by appointment	16	4.6
What is your purpose for coming to the OD		
Routine check-up	24	6.8
Follow-up appointment	42	12.0
Management of a chronic condition	3	0.9
Triage Screening or Diagnostic Test	13	3.7

DOI: https://doi.org/10.5281/zenodo.20822313

Doctor / specialist consultation	191	54.4
Medication matters	47	13.4
Rehabilitation or physical therapy	20	5.7
Vaccination or preventive care	11	3.1

RELIABILITY TEST BY CRONBACH'S ALPHA

To check the reliability of a measurement scale or survey questionnaire, it is tested for internal consistency reliability. Table 6 shows the detailed reliability analysis of questionnaire for the survey in our study using the Cronbach's alpha. The constructs for Patient Volume of the OD, containing five (5) items have resulted in a Cronbach's alpha of 0.880, which is signifying very good reliability (see Table 2). Staffing and Resources Allocation of the OD, had a Cronbach's alpha of 0.878 (very good reliability) evaluated with four (4) items which showed good internal consistency. The Patient Flow and Queueing Process of the queueing system in the OD has five (5) items and has a Cronbach's alpha of 0.903, signifying excellent reliability. The five (5) items used in the assessment of the Technology Used for the Queueing System in the OD are shown to have very good reliability (Cronbach's alpha = 0.873). The findings show that Cronbach's alphas are greater than 0.8 (> 0.8), showing that the items in the questionnaire measure the same concept or construct, and thus are reliable.

Table 6. Cronbach's alpha on items corresponding to factors affecting waiting time at the OD

Constructs	Number of Items	Cronbach's Alpha	Strength of Scale
1. High Patient Volume of the OD	5	0.880	Very Good
2. Staffing and Resources Allocation of the OD	4	0.878	Very Good
3. Patient Flow and Queueing Process of Queueing System in the OD	5	0.903	Excellent
4. Technologies Used for Queueing System in the OD	5	0.873	Very Good

FACTORS INFLUENCING WAITING TIMES IN THE OUTPATIENT DEPARTMENT (OD)

This section is concerned with the main operational and systemic factors that generate the waiting time in the OD. It examines at the selected factors: high patient volume, staffing and resource allocation, patient flow and processes, and technology utilization to identify the main drivers of delays in the OD. The results given in Table 7 to 10 show the descriptive statistical analysis on contributing factors to prolonged OD's outpatients waiting times.

High Patient Volume in the OD

A high patient volume has been reported as one of many factors which can affect outpatients' waiting time (Fun et al., 2022; Thakuri & Shrestha, 2024). As shown in Table 7, 293 out of 351 (83.5%) respondents have chosen scale 5 ('Strongly Agree') to each of the five statements asked. The overall mean score for all items related to the High Patient Volume in the OD is 4.78, signifying a high score level of the factor being measured. This indicates respondents' strong agreement or perception towards the likeliness of high patient volume affecting the waiting times at the OD. Overall, the high patient volume at OD poses as a critical factor influencing OD efficiency,

DOI: https://doi.org/10.5281/zenodo.20822313

implying the difficulties associated with handling large and unpredictable patient influxes, which lead to prolonged waiting periods and require flexible measures to enhance the service delivery.

Our finding that high patient volume has possible impact on OD outpatients' waiting time is aligned with past studies by Hemmati et al. (2018) and Sarwat (2021), which show that a large number of patients causes waiting times in the OD. This is not surprising considering the world population has increased significantly over the years and reached 8.26 billion in 2025 (Worldomweter, 2025). The respondents also strongly agree that time of visit of patients to OD and number of patients at the OD at certain time are unpredictable. This implies that at certain times the number of patients at OD can experience sudden surge, which make it challenging to manage the demand for medical services at OD during this time.

Table 7. Frequency, percentage, mean score, and standard deviation of items on the high patient volume in the OD

No.	Statement	N (%)					Mean (Std Deviation)	Mean Score Level
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
1.	Large number of patients visit the Outpatient Department (OD) throughout the day.	3 (0.9)	6 (1.7)	5 (1.4)	40 (11.4)	297 (84.6)	4.77 (0.641)	High
2.	Large number of patients has an impact on long waiting times.	2 (0.6)	4 (1.1)	6 (1.7)	46 (13.1)	293 (83.5)	4.78 (0.587)	High
3.	The patients' time of visit to the Outpatient Department (OD) is unpredictable.	3 (0.9)	6 (1.7)	2 (0.6)	45 (12.8)	295 (84.0)	4.77 (0.626)	High
4.	The number of patients visiting the Outpatient Department (OD) at certain time is unpredictable.	3 (0.9)	4 (1.1)	4 (1.1)	41 (11.7)	299 (85.2)	4.79 (0.600)	High
5.	The purposes of visit of patients to the Outpatient Department (OD) vary.	3 (0.9)	3 (0.9)	2 (0.6)	50 (14.2)	293 (83.5)	4.79 (0.578)	High
				Total Mean and Standard Deviation			4.78 (0.606)	High

Table 8. Frequency, percentage, mean score, and standard deviation of items on the staffing and resources allocation in the OD

No.	Statement	N (%)					Mean (Std Deviation)	Mean Score Level
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
1.	Inadequate staffing in the OD causes long waiting times for patients.	4 (1.1)	6 (1.7)	1 (0.3)	29 (8.3)	311 (88.6)	4.81 (0.630)	High
2.	Incompetent staff in the OD in providing services contributes toward long waiting times.	4 (1.1)	9 (2.6)	0 (00)	51 (14.5)	287 (81.8)	4.73 (0.699)	High
3.	Unclear or miscommunication by staff in the OD to patients causes confusion and long waiting times.	3 (0.9)	11 (3.1)	1 (0.3)	44 (12.5)	292 (83.2)	4.74 (0.700)	High
4.	Inadequate or lack of resources in the OD such as consultation rooms, medical equipment, computers or software contributes towards delays in services for patients.	6 (1.7)	4 (1.1)	5 (1.4)	73 (20.8)	263 (74.9)	4.66 (0.722)	High
				Total Mean and Standard Deviation			4.74 (0.688)	High

Staffing and Resources Allocation in the OD

Staffing and resources allocation are critical elements which can contribute to prolonged waiting times that impact the efficiency of the OD. Based on Table 8, majority of the respondents, in this case 263 respondent or more (74.9% or greater) have selected 'Strongly Agree' (scale 5) to each of the four respective statements concerning the staffing and resources allocation in the OD. As indicated in Table 7, the overall mean score for items concerning staffing and resources allocation in the OD is 4.74, a high" level of the measured construct or opinion. Thus, these results suggest a strong consensus among respondents toward issues of inadequate staffing, incompetent staff, unclear or miscommunication by staff and inadequate or lack of resource as contributors to long outpatients waiting times in the OD. Thus, overcoming these issues may potentially minimize the outpatients waiting times and improve service delivery in the OD.

Staffing and resources allocation dictates the operational efficacy of the department. For instance, the unavailability of essential resources such as medical equipment or medication might cause delays, even when sufficient staff members are available. Likewise, even with adequate resources, inadequate staffing may hinder effective workload management, resulting in inefficiencies which relate to long waiting times of patients. Isaruk et al. (2024) reported that staffing factor such as "inadequate manpower levels," and resource factors such as "lack of record filing space," were among the factors that contributed to long waiting times in the OD. A study by Sarwat (2021) found that the lengthy waiting time was the result of a lack of examination equipment, space, and rooms, as well as shortage of doctors. In our study, 88.6% of the respondents strongly agree that inadequate staffing causes long waiting times for patients. Other studies (Alsharqi et al., 2017; Ahmad et al., 2017; Wafula & Ayah, 2021; Abrahams, 2022; Fahrurazi et al., 2022;) also indicated that lack of staffing is a significant factor contributing to prolonged wait times in public health clinics and OD.

Patient Flow and Queueing Process in the OD

Patient flow and queueing processes are essential factors that could affect waiting times and influence the OD operational efficiency. As presented in Table 9, 271 of 351 respondents (77.2%) indicate 'Strongly Agree' to the statement, "The OD has clear information regarding patient flow which are displayed to make it easy for patients to follow", 276 (78.6%) respondents reacted similarly to "Patient flow inefficiencies causes congestion and delays in waiting for services for patients", and 278 (79.2%) respondents for the statement, "Signages for information and direction can be found throughout the OD to guide patients". Similar rating ('Strongly Agree') has also been given by 299 (85.2%) respondents and 284 (80.9%) respondents to the statements "Incompetency of any unit within the OD can contribute towards the long waiting time" and "Appointment overbooking contributes to long waiting time", respectively. The overall mean score for the factor, Patient flow and queueing process in the OD is 4.71, which indicates a high level of score, thus implying that this factor plays crucial roles in determining the overall waiting times or specifically the prolonged waiting times of the outpatients. Patient flow and queueing processes are essential metrics of the department performance in which enhancing flows and operations, and improved appointment management can potentially alleviate congestion and minimize waiting times.

This study has shown that patient flow and the queueing process can be the plausible reasons for waiting times in the OD. The interaction between issues triggered by patient flow and the queueing processes generates bottlenecks and inefficiencies that directly lead to the prolonged waiting times observed in the OD. For example, based on Table 8, 299 (85.2%) of respondents indicated 'Strongly Agree' that "lincompetency of any unit within the OD) can contribute towards the long waiting time". The study done by Mardiah and Hassan Basri (2013) has emphasized that

Table 9. Frequency, percentage, mean score, and standard deviation of items on the patient flow and queueing process in the OD

No.	Statement	N (%)					Mean (Std Deviation)	Mean Score Level
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
1.	The OD has clear information regarding patient flow which are displayed to make it easy for patients to follow.	5 (1.4)	8 (2.3)	3 (0.9)	64 (18.2)	271 (77.2)	4.68 (0.739)	High
2.	Patient flow inefficiencies cause congestion and delays in waiting for services for patients.	4 (1.1)	7 (2.0)	3 (0.9)	61 (17.4)	276 (78.6)	4.70 (0.695)	High
3.	Signages for information and direction can be found throughout the OD to guide patients.	5 (1.4)	6 (1.7)	6 (1.7)	56 (16.0)	278 (79.2)	4.70 (0.721)	High
4.	Incompetency of any unit within the Outpatient Department (OD) can contribute towards the long waiting time.	3 (0.9)	10 (2.8)	0 (0.0)	39 (11.1)	299 (85.2)	4.77 (0.673)	High
5.	Appointment overbooking contributes to long waiting times.	6 (1.7)	4 (1.1)	6 (1.7)	51 (14.5)	284 (80.9)	4.72 (0.715)	High
					Total Mean and Standard Deviation		4.71 (0.709)	High

Table 10. Frequency, percentage, mean score, and standard deviation of items on technologies used for queueing system in the OD

No.	Statement	N (%)					Mean (Std Deviation)	Mean Score Level
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
1.	Inefficient queueing system causes long waiting time.	3 (0.9)	6 (1.7)	1 (0.3)	44 (12.5)	297 (84.6)	4.78 (0.618)	High
2.	The queuing system provides unclear instructions or information about queuing causing long waiting times.	3 (0.9)	7 (2.0)	3 (0.9)	48 (13.7)	290 (82.6)	4.75 (0.653)	High
3.	Technical issues such as computer or computer systems break down or medical equipment failures cause long waiting times.	3 (0.9)	6 (1.7)	3 (0.9)	58 (16.5)	281 (80.1)	4.73 (0.648)	High
4.	Insufficient or frequent malfunction of digital or television screens to display the information regarding queues causes long waiting time for patients.	3 (0.9)	5 (1.4)	4 (1.1)	67 (19.1)	272 (77.5)	4.71 (0.647)	High
5.	Incompetencies of staff in using the technology (system or equipment) cause delay for services and subsequently long waiting time.	5 (1.4)	6 (1.7)	6 (1.7)	52 (14.8)	282 (80.3)	4.71 (0.718)	High
					Total Mean and Standard Deviation		4.74 (0.657)	High

one of the most crucial elements in enhancing the efficiency in the healthcare services delivery is the patient flow. From a clinical perspective in their study, patient flow management requires addressing three aspects of an outpatient unit: arrival of patients, service process, and queuing process. Ultimately, efficiently monitoring patient flow and the queueing process in an outpatient unit is essential for attaining operational excellence and maintaining clinical quality (Mohseni et al., 2014). Meanwhile, Baron and Kaura (2021) stated that patient flow prolong waiting times, and this is caused by a poor queuing system, lack of signage, and ineffective orientation of patients within healthcare facilities.

Technologies Used for Queueing System in the OD

The technologies used in the queueing system and also the services provided for the outpatients is an important factor that could contribute towards long waiting times for the outpatients. Based on analysis presented in Table 10, similar findings to the previous factors have been found for the factor 'Technologies Used the OD' where majority, at least 272 respondents (77.5%), have responded 'Strongly Agree' (scale 5) to each of the statements included in the questionnaire concerning this factor. The highest number of respondents selecting 'Strongly Agree' is 297 respondents (84.6%) for the statement "Inefficient queueing system causes long waiting time". The overall mean score is 4.74, signifying a high score level for this factor. In other words, this factor has been rated as high level factor. The technologies employed for queue management and in all aspects of services offered under the OD is a crucial standard for operational efficiency of the OD, highlighting the necessity for effective and reliable systems, transparent and accessible information displays, and staff's expertise in utilizing the technologies, to reduce delays and improve patients' flow, which can lead to minimum possible waiting times for the outpatients.

In this study, technologies used for the queueing system in OD has been identified as a contributing factor to wait times duration experienced by outpatients. More advanced and efficient technologies used can reduce the waiting time significantly. Highly intelligent digital queue management system can reduce waiting room congestion or overcrowding, keep patients at ease by streamlining flow, sending real-time updates and shortens delays, enhance information sharing, enable intelligent decision making, and allow patient insights and feedback collected (NZCares, 2025). In a study by Mochammad Naufal et al. (2024), implementation of a web-based queuing system (internet-based queue management system) has been able to optimize resource allocation, minimize patient waiting periods, and improve patient contentment, thus resulting in substantial advantages in enhancing efficiency, precision, and patient satisfaction.

Table 11 presents the overall means of outpatients' waiting times at the OD in HPUSM Malaysia based on the identified main factors that potentially contribute to long waiting times of the outpatients. The results show that the ranking of the factors was analysed descriptively using mean score index and standard deviation. Ranked first is the factor High Patient Volume, with mean score of 4.78, which is followed by Technology Used for Queueing System, ranked second, with overall mean of 4.74. The third is Staffing and Resources Allocation, despite having a mean score of 4.74 similar to the factor which is ranked second, it has higher standard deviation. Lastly, ranked fourth is the Patient Flow and Queueing Process with mean score of 4.71. Nevertheless, all four factors are considered as high level factors with overall means between 4.71 to 4.78. The four factors indicate no significant difference in their mean score values, thus suggesting they share similar characteristics with equal impact on the duration of waiting times in the OD. The closely aligned means suggest that all factors collectively and significantly affect outpatients wait times. The findings indicate that each factor is crucial, necessitating a comprehensive strategy for addressing the root causes of prolonged waiting times and improving OD's operational efficiency.

Table 11. Comparison and ranking of the factors affecting the waiting time of patients in the OD

Factors	Mean (Std. Deviation)	Ranking
Patient volume	4.78 (0.606)	1
Technology Used for Queueing System	4.74 (0.657)	2
Staffing and resources	4.74 (0.688)	3
Patient flow and queueing process	4.71 (0.709)	4

LIMITATIONS OF THE STUDY

The findings of this study are limited to data gathered from the OD of HPUSM involving a sample size of 351. Thus, this study has limitations that should be acknowledged. Firstly, the data collection was limited to a single hospital setting, hence constraining the generalizability of the findings to other institutions with varying operational contexts. Although this study considered common factors affecting waiting time of patients of the OD in a hospital, the results and findings may not fully reflect the patients' waiting times real situations that can appear in OD of other hospitals in Malaysia. This study's limitation may affect the interpretation and generalizability of its results. Further studies involving ODs of various other hospitals are recommended for verification and comparison. Secondly, data were collected within a specific timeframe or duration (weeks, month and year), thus, potentially overlooking fluctuations in waiting times due to seasonal trends, special events, or policy alterations occurring outside the study period. Thirdly, the results from descriptive analysis presented in this paper limits the capability of this paper to reveal the correlations and cause-and-effect relationship between variables (high patient volume, staffing and resource allocation, patient flow and processes, and technology utilization) and the extended waiting times in outpatient services. This analysis can only describe relationships, without elucidating their reasons or forecasting future patterns.

CONCLUSION

Our study concerns with the development of model and approaches which can minimize waiting times and improve patients care in hospital outpatient facilities. This is due to long waiting times have detrimental effects on patients' satisfaction towards their medical care and negative perception on the service delivery quality of the respective department. This paper discusses on four factors, namely, the high patient volume, the staffing and resources allocation, the patient flow and queueing process and the technology used in the OD which can affect waiting times at the OD of HPUSM in Malaysia. Based on analysis of data gathered using survey questionnaire, this study found that the respondents perceive these factors as contributing factors to prolonged waiting times of outpatients in the OD. The results indicate the occurrence of long waiting times encountered by outpatients at the OD with all factors recording mean scores ranging from 4.71 to 4.78 or strong agreement on statements which reflect the contribution of these factors towards the prolonged waiting times. Thus, it is imperative for OD management of the hospital to take appropriate actions to mitigate long outpatients' waiting times by optimizing time and implementing strategies for activities involved which can potentially manage factors that lengthen waiting times. Effective initiatives are crucial for enhancing patients' satisfaction and improving healthcare operational efficiency. The findings presented in this paper contribute to the current literature on healthcare operations, providing new insights into the impact of operational inefficiencies on service delivery in healthcare settings. This study contributes to a deeper understanding of the main causes of waiting times in healthcare institutions, particularly the OD. Furthermore, the findings offer helpful suggestions by pointing the potential areas for

action that could minimize the waiting times and maximize the operational efficiency. This research not only contributes to academic discourse, but it also has real-world implications that could improve patient experience and hospital management approaches. Future research should encompass multiple OD across various regions, particularly in Malaysia. Utilizing qualitative methods, including interviews and focus groups, enhances understanding of patient experiences. This approach complements quantitative data and facilitates more effective, patient-centered enhancements in outpatient service delivery. By implementing these steps, healthcare professionals may achieve a comprehensive understanding of the factors influencing waiting times and design effective strategies to enhance patient experience and optimize OD operations.

ACKNOWLEDGEMENT

The authors would like to acknowledge all the support that have been given by the Universiti Teknologi MARA (UiTM), particularly the Faculty of Computer Science and Mathematics (FSKM), to this study.

CONFLICT OF INTEREST

The authors declare no conflict of interest in publishing this paper.

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