ORIGINAL ARTICLE

Developing an operational framework for optimizing out patient waiting time in public health facilities

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ABSTRACT

Background: Long outpatient waiting times remain a persistent challenge in many public health facilities, often resulting in patient dissatisfaction, frustration, and reduced trust in the healthcare system. Extended waiting periods not only inconvenience patients but also place additional strain on healthcare providers and service delivery processes.

Methods: A convergent parallel mixed-methods design was employed. Quantitative data were collected from 410 patients using structured questionnaires and analyzed with *Statistical Package for the Social Sciences* (SPSS), version 25. In parallel, qualitative data were obtained through in-depth interviews with 12 healthcare managers and supervisors, and analyzed thematically.

Results: Most patients experienced prolonged waiting times from registration to exit. Nearly half (46.1%, n=189) spent 181–360 minutes, and 17.8% (n=73) waited over 360 minutes. About one-third (32.2%, n=132) waited 61–180 minutes, while only 3.9% (n=16) were attended to in less than 60 minutes. Overall, over 78% of patients waited more than an hour, and almost half waited beyond three hours, indicating significant inefficiencies in service delivery. Commonly cited causes included long queue, poor patient flow, and understaffing. The study highlighted systemic inefficiencies such as inadequate staff during peak hours, reliance on paper-based registration, weak supervision, and limited infrastructure.

Conclusion: Waiting times in Lusaka's outpatient departments are unsatisfactorily long, driven by both systemic and patient-related factors. Addressing them will require practical interventions such as appointment booking systems, stronger triage, additional staff during busy periods, and improved infrastructure. These findings offer a solid basis for an operational framework to enhance efficiency and patient satisfaction in Zambia's public health facilities.

INTRODUCTION

Long stays in queues to get outpatient services are a chronic and ubiquitous problem in public health institution in many low- and middle-income countries including Zambia. These temporal delays have a harmful effect on patient satisfaction, reduce the quality of provided care, and put further pressure on the already stretched health system resources[1].

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With health facilities facing increased patient numbers, limited facilities and insufficient human resources, outpatient waiting times have shifted beyond an inconveniencing operation issue to a debilitating factor relating to equitable and timely patient care delivery[23]. Inefficiency of outpatient care is a critical measure of responsiveness in any health system and long delays destroy patient trust and weaken the overall goals of universal health coverage.

Outpatient departments (OPDs) are the most important point of contact between the community and the formal healthcare system in Zambia. High inflow of patients, deficient consultation areas, and poor flow processes of patients are a common characteristic of these units that in a combination contribute to congestion and prolonged waiting times. To many patients, especially those who have low-income status or are overloaded with demanding social and economic commitments, the waiting period of several hours to access care is a significant burden, and often leads to missing appointments, delayed treatment or even forsaking care altogether[4]. These inefficiencies negatively affect individual health outcomes as well as affect the system in the whole.

Although there is a general recognition of this problem, there is empirical data on the real average waiting times in Zambia, patient perception of these delays and systemic and demographic factors that contribute to it are still limited. According to the currently available international and regional literature, the waiting time is controlled by a network of factors, such as socio-demographic attributes, scheduling system, arrival time, workforce, and facility infrastructure[5]. However, these results tend to be situation-specific, thus, the need to have locally based studies that may be used to make specific and effective interventions.

In this regard, the proposed study was conducted to offer a thorough analysis of the waits on outpatient of the selected public health facilities in the Lusaka District. The research proposed with the help of mixed methods design would help to: (i) determine the mean outpatient waiting time; (ii) measure patient perceptions and experiences related to waiting; (iii) identify the factors underlying delays and hence, develop an effective operational framework. The study also balances quantitative indicators with qualitative interventions of the healthcare providers to put the findings into context of the larger discussion on health system efficiency and provide practical recommendations specific to the situation in Zambia.

Finally, the research adds to the evidence body needed to justify the policy development and managerial actions to minimize the length of the waiting time on the outpatient. By filling this gap that is essential, it is consistent with national health priorities, and the international commitments to promote service delivery, patient-centered care, and health system performance in resource-constrained settings by developing a sound operational framework.

METHODS AND MATERIALS

Philosophical Underpinnings

The study was underpinned by several philosophical orientations. From an ontological perspective, it adopted critical realism, which acknowledged both objective realities, such as measurable waiting times, and subjective perceptions, such as patient experiences. With regard to epistemology, the research was informed by social constructivism, recognizing that knowledge was shaped by social interactions and context, and that patients, providers, and administrators interpreted waiting times differently. The pragmatic paradigm was central to the study, prioritizing practical, problem-solving approaches and allowing flexible use of methods to generate real-world interventions. Finally, the axiological stance was guided by instrumental axiology, emphasizing values such as efficiency, equity, and patient dignity. Here, research was judged by its capacity to improve service delivery and healthcare outcomes.

Study Design

The study employed a convergent parallel mixed-methods design. Quantitative and qualitative data were collected simultaneously and analysed to provide complementary insights.

At the same time, qualitative methods in particular in-depth interviews were used to capture contextual insights into the experiences of healthcare staff managers. This concurrent integration ensured both breadth and depth in understanding the dynamics of waiting times in outpatient departments.

Study Setting: The research was conducted at Kanyama First Level Hospital and Chilenje First Level Hospital in Lusaka. Kanyama Hospital served one of the city's largest low-income informal settlements, marked by overcrowding, scarce resources, and high patient volumes. Chilenje Hospital, meanwhile, served a more socio-economically diverse population but faced similar challenges of resource constraints and high demand. These two hospitals were considered well-suited as case studies, as they reflected broader systemic issues within Zambia's public healthcare system.

Population and Sampling

The target population comprised patients seeking outpatient services and administrators managing outpatient departments at the two hospitals. The accessible population was limited to those present at Kanyama and Chilenje during the data collection period. Inclusion criteria covered patients aged 18 years and above or minors accompanied by caregivers, as well as administrators directly involved in outpatient management. Exclusion criteria included emergency cases, duplicate patients, and administrators not involved in outpatient operations.

The sample size for the quantitative portion of the study was calculated using the following formula:

$$n = z^2 \cdot p(1-p)/d^2,$$

Where:

n = sample size

z = Z score at a confidence level of 95% (equal to 1.96)

p = estimated proportion of the population with the characteristic of interest (assumed to be 0.5 for maximum variability, as the true proportion was unknown)

d = margin of error (set at ±5%) Substituting the values into the formula: $n = (1.96)^2 \times 0.5 \times (1-0.5) / (0.05)^2$

n = 384.16 *0.1 (Provision for non-response)

384.6+38.5

=423 sample size

On the other hand, the qualitative side of the story used the saturation theory which was arrived at 12 participants

Data Collection

Quantitative data were gathered through Sstructured questionnaires with translation into local languages where necessary. Qualitative data were collected through in-depth interviews and focus group discussions with patients, providers, and administrators to explore perceptions and barriers related to waiting times. To ensure quality, the instruments underwent pre-testing, with reliability assessed using methods such as Cronbach's alpha, and validity confirmed through expert review.

Data Management and Analysis

Collected data were digitized into a secure, password-protected database, with participants identified only by study codes to maintain confidentiality. Paper copies were securely stored for five years. Quantitative data were analyzed using SPSS, employing descriptive statistics such as mean, median, and range, alongside inferential techniques such as regression analysis to identify factors associated with waiting times. Qualitative data were analyzed thematically using Braun and Clarke's six-step framework to identify recurring themes. Integration of findings from both strands provided a holistic understanding of outpatient waiting time determinants and informed practical interventions.

Ethical Considerations

The University of Zambia Biomedical Research Ethics Committee (UNZABREC, Ref. 6532-2025), the National Health Research Authority (NHRA, Ref. NHRA-2222/13/05/2025), and the local authorities, such as the Lusaka District Health Office (DHO) and the Provincial Health Office, gave the study ethical approval. Informed consent form was provided to the participants who have signed and voluntarily participated in the study.

All audio records and transcripts were kept as a secret in unique study codes and confidentiality was ensured. Minor participants were given the consent by care givers. The research was conducted in compliance with the ethical considerations and requirements provided by the World Health Organization (WHO) and the Council of International Organizations of Medical Sciences (CIOMS), and any possible conflict of interest was proactively addressed to guarantee the integrity of the research.

QUANTITATIVE RESULTS

A total of 410 patients were recruited from Kanyama and Chilenje first level hospitals.

Table 1: Socio-Demographic Characteristics of patients

Variable	Category	N	%
Age	Below 18 Years	79	19.3
	18–25 Years	104	25.4
	26–35 Years	140	34.1
	36–45 Years	40	9.8
	46–55 Years	36	8.8
	Above 56 Years	11	2.7
	Total	410	100.0
Marital Status	Married	159	38.8
	Single	179	43.7
	Divorced	26	6.3
	Separated	46	11.2
	Total	410	100.0
Education Level	Secondary Education	194	47.3
	No Education	15	3.7
	Postgraduate Education	37	9.0
	Tertiary Education (College/University)	143	34.9
	Primary Education	21	5.1
	Total	410	100.0
Employment Status	Unemployed	96	23.4
	Self-employed (Informal)	149	36.3
	Employed (Formal)	129	31.5
	Student	25	6.1
	Retired	11	2.7
	Total	410	100.0

The study included 410 participants, most of whom were aged 26–35 years (34.1%) and 18–25 years (25.4%), with very few above 66 years (2.7%). A large proportion were single (43.7%) or married (38.8%), while fewer were separated (11.2%) or divorced (6.3%).

In terms of education, nearly half had secondary education (47.3%), over a third had tertiary education (34.9%), and only 9.0% held postgraduate qualifications. Very few had no education (3.7%) or primary education (5.1%).

Employment status showed that self-employment in the informal sector (36.3%) was most common, followed by formal employment (31.5%) and unemployment (23.4%). Students (6.1%) and retirees (2.7%) formed the minority.

Table 2: Total Average waiting time from reception to exit

Waiting Time	N	(%)
Less 60 Minutes	16	3.9
61–180 Minutes	132	32.2
181–360 minutes	189	46.1
Above 360 Minutes	73	17.8
Total	410	100.0

The majority of patients experienced long waiting times from registration, consulation, and other services until exit. Specifically, 46.1% (n=189) waited between 181 and 360 minutes, and 17.8% (n=73) waited more than 360 minutes. About 32.2% (n=132) reported waiting 61–180 minutes, while only 3.9% (n=16) were attended to in less than 60 minutes.

Table 3: Causes of Delays

Cause of Delay (Perception)	Yes N (%)	No N (%)
Long queues at reception	376 (91.7)	34 (8.3)
Lab/Pharmacy delays	370 (90.2)	40 (9.8)
Inefficient flow/procedures	367 (89.5)	43 (10.5)
Many staff on break	350 (85.4)	60 (14.6)
Poor supervision/coordination	347 (84.6)	63 (15.4)
Slow consultation	345 (84.1)	65 (15.9)
Overcrowded waiting lounge	341 (83.2)	69 (16.8)
Understaffing	336 (82.0)	74 (18.0)
Few consultation rooms	335 (81.7)	75 (18.3)
Poorly designed patient flow	330 (80.5)	80 (19.5)
Too many registration steps/forms	300 (73.2)	110 (26.8)
Computer delays/errors	233 (56.8)	177 (43.2)
Other causes	210 (51.2)	200 (48.8)
Staff working slowly	59 (14.4)	351 (85.6)

Table 3 above indicates that is, most respondents attributed long waiting times to long queues at reception (91.7%), delays in the laboratory or pharmacy (90.2%), and inefficient patient flow or unclear procedures (89.5%). Other major factors highlighted included too many staff taking breaks simultaneously (85.4%), poor supervision and coordination (84.6%), and slow consultation services (84.1%).

Additionally, overcrowding in the waiting lounge (83.2%), understaffing (82.0%), and too few consultation rooms (81.7%) were considered significant contributors. About 73.2% pointed to excessive registration steps, while 56.8% noted computer system delays or errors. Just over half (51.2%) mentioned other unspecified causes.

Table 4: Independent-Samples Kruskal-Wallis Test-Outpatient waiting time by day of the week category

Total Number	410
Test Statistic	13.227[a]
Degree of Freedom	6
Asymptotic Sig. (2-sided test)	.040

a. The test statistic is adjusted for ties.

Normality of outpatient waiting times was assessed for each day of the week using both the Kolmogorov–Smirnov and Shapiro–Wilk tests. For all days, the p-values were less than 0.05, indicating statistically significant deviations from a normal distribution.

A Kruskal Wallis test was used to ascertain whether there is waiting time different among group days and it was established that there is a difference with a sig of 0.04

Waiting time across days of the week

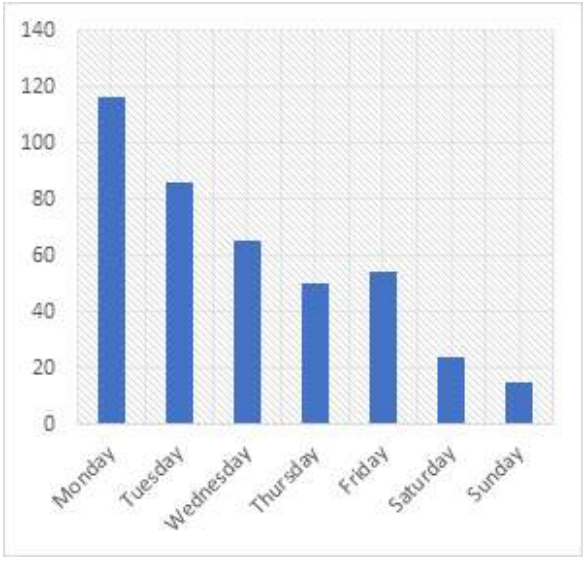


Figure 1: Waiting time Week Day

The figure above illustrates that waiting times are highest on Mondays and gradually decrease as the week progresses.

Pairwise comparisons of outpatient waiting times across days of the week showed a few statistically significant differences before adjustment for multiple comparisons. Specifically, Sunday–Tuesday ($p = 0.039$), Sunday–Saturday ($p = 0.016$), Friday–Tuesday ($p = 0.012$), Friday–Saturday ($p = 0.005$), Thursday–Saturday ($p = 0.038$), and Monday–Saturday ($p = 0.026$) pairs exhibited significant differences in mean waiting times at the 0.05 level. However, after applying the adjustment for multiple testing (Adjusted Sig.), none of these differences remained statistically significant (all adjusted $p > 0.05$).

Table 5 Pairwise comparisons of outpatient waiting times across days of the week

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
Sunday-Frinday	10.737	32.129	.334	.738	1.000
Sunday-Thursday	30.220	32.408	.932	.351	1.000
Sunday-Monday	34.047	29.491	1.154	.248	1.000
Sunday-Wednesday	-36.171	33.972	-1.065	.287	1.000
Sunday-Tuesday	-69.950	33.831	-2.068	.039	.812
Sunday-Saturday	-87.033	36.233	-2.402	.016	.342
Frinday-Thursday	-19.483	21.605	-.902	.367	1.000
Frinday-Monday	23.310	16.919	1.378	.168	1.000

Frinday-Wednesday	-25.434	23.888	-1.065	.287	1.000
Frinday-Tuesday	-59.213	23.686	-2.500	.012	.261
Frinday-Saturday	-76.296	27.006	-2.825	.005	.099
Thursday-Monday	3.827	17.441	.219	.826	1.000
Thursday-Wednesday	-5.951	24.261	-.245	.806	1.000
Thursday-Tuesday	-39.730	24.062	-1.651	.099	1.000
Thursday-Saturday	-56.813	27.337	-2.078	.038	.791
Monday-Wednesday	-2.124	20.201	-.105	.916	1.000
Monday-Tuesday	-35.903	19.961	-1.799	.072	1.000
Monday-Saturday	-52.986	23.807	-2.226	.026	.547
Wednesday-Tuesday	33.779	26.132	1.293	.196	1.000
Wednesday-Saturday	-50.862	29.175	-1.743	.081	1.000
Tuesday-Saturday	-17.083	29.009	-.589	.556	1.000

Table : Multiple Linear regression Analysis

Predictor	Error	Beta	t-value	p-value
Socio-Demographic Factors				
Age	-0.034	-0.045	-0.877	0.381
Education Level	0.026	0.040	0.787	0.432
Employment Status	0.067	0.067	1.225	0.041
Income Level	-0.039	-0.063	-1.179	0.239
Marital Status	0.116	0.113	2.187	0.029
Facility & Visit-Related Factors				
Facility Visited	0.004	0.004	0.088	0.930
Day of the Week	0.059	0.122	2.428	0.016
First Visit	0.246	0.119	2.348	0.019
Mode of Transport	0.010	0.008	0.169	0.866
Distance Covered	0.051	0.074	1.491	0.137
Type of Visit	-0.259	-0.195	-3.918	0.000
Arrival Time	0.063	0.091	1.834	0.067

QUALITATIVE RESULTS-HEALTH CARE MANAGERS

The study included a total of twelve participants drawn from various professional roles within the public health facilities. Table 47 presents a summary of their socio-demographic characteristics, including designation, gender, age range, highest academic qualification, and representation as a percentage of the total sample.

Among the participants, the highest representation (16.7% each) was observed in six categories: Principal Clinical Officers, Nursing Officers, OPD Nurses In-Charge, Hospital Administrators, and Planners, with two participants in each role. There was a balanced distribution of gender across these roles, although certain positions, such as Nursing Officers and OPD Nurses In-Charge, were exclusively female. The age range of participants spanned from 30 to 50 years, indicating the involvement of professionals with varied levels of experience in clinical and administrative functions.

Theme 1: Outpatient Waiting Time

Participants consistently reported that outpatient waiting times were excessively long, creating frustration for patients and straining service delivery. The waiting duration commonly ranged between three and five hours from registration to consultation and eventual exit. For many, these prolonged waits were seen as part of the normal experience of visiting a public facility.

"On average, it takes about 3 to 4 hours from registration to consultation and leaving the facility." (P10)

"If you come here after 9 a.m., you should expect to leave in the afternoon because the queues move slowly." (P12)

Theme 2: Factors Associated with Outpatient Waiting Time

Several interrelated factors were identified as drivers of long outpatient waiting times. These included inadequate staffing levels, reliance on manual registration systems, insufficient consultation rooms, and frequent interruptions caused by emergency cases. Each of these challenges compounded delays and slowed patient flow through the system.

"The registration process is slow because everything is manual, and we only have two desks handling all patients." (P01)

"Emergencies disrupt the normal flow. When a critical case comes in, everyone else has to wait." (P03)

"Filing and searching for patient records manually takes a lot of time. Sometimes files get misplaced." (P06)

Theme 3: Service Delivery and Process

Service delivery processes, particularly registration and triage, were described as inefficient and slow. Participants emphasized that manual systems dominated most stages of the outpatient journey, from intake to consultation, creating bottlenecks that delayed care. These inefficiencies contributed significantly to the overall time patients spent at the facilities.

"We are still using paper files; there's no electronic system. This creates long queues." (P01)

"The registration process takes a lot of time because everything has to be written by hand." (P12)

Theme 5: Staff Availability

Chronic staff shortages were reported across all facilities, with doctors, nurses, and support staff insufficient to meet patient demand. Limited personnel meant that available staff often faced overwhelming caseloads, particularly during peak hours, leading to prolonged delays in patient care. Absenteeism and rotations further worsened the situation.

"We have only two doctors in the morning, sometimes just one after lunch." (P3)

"There are only a few clinicians attending to hundreds of patients daily." (P1)

"On many days, we have just three or four nurses to attend to a waiting area full of patients." (P5)

Theme 6: Digital Systems and Appointment Scheduling

Participants agreed that the absence of digital health systems and structured appointment scheduling significantly worsened patient congestion. Manual processes dominated, leaving facilities unable to manage patient flow effectively. Attempts to introduce appointment slots often failed due to unpredictable health needs and non-adherence by patients.

"Most patients are walk-ins; appointments don't really work because people can't predict illness." (P3)

"We tried to have appointment slots, but many patients do not adhere to the scheduled times." (P1)

"Everything is done manually, from registration to consultation scheduling." (P7)

Theme 7: Infrastructure and Facility Environment

The physical environment of outpatient departments was repeatedly highlighted as inadequate for the patient load. Limited seating, poor ventilation, and overcrowded waiting areas left patients uncomfortable and contributed to disorderly queues. A shortage of consultation rooms further created bottlenecks that slowed down patient flow.

"There is very limited seating space in the waiting area. When the facility is crowded, many patients have no choice but to stand." (P3)

"The waiting areas are poorly ventilated, making it uncomfortable, especially during hot days." (P5)

"With only a few consultation rooms available, patients have to queue longer." (P6)

Theme 8: Time of Day and Week

The time patients arrived, as well as the day of the week, strongly influenced waiting times. Most participants noted that mornings and Mondays were peak periods, with patients crowding facilities in an attempt to be served earlier. However, this often backfired, as staff and systems became overwhelmed during these times, resulting in slower service.

"Most patients prefer to come early, thinking they will be served faster. However, this causes everyone to crowd the facility at the same time." (P4)

"During certain days like Mondays, the patient influx is noticeably larger than usual." (P7)

Theme 9: Emergency Cases

Emergency cases were consistently described as a major source of disruption in outpatient flow. While prioritizing emergencies was seen as appropriate, participants explained that it often delayed routine care for other patients, causing frustrations and longer waits.

"When emergencies arrive, they are prioritized, which is appropriate, but this means routine patients wait longer." (P5)

Theme 10: Waiting Time Policies and/or Legislative Framework

Participants indicated that Zambia lacks a specific national policy dedicated to outpatient waiting times. Instead, waiting time is only indirectly mentioned within broader health policy documents and quality improvement strategies. This absence of a clear framework has left facilities to manage the issue individually, resulting in inconsistency across the system.

"I am not aware of a specific policy that addresses outpatient waiting times. What we have are general quality improvement strategies."

"The Health Services Quality Improvement Framework mentions patient satisfaction, which includes waiting time, but it is not a standalone guideline."

DISCUSSION

The findings reveal that outpatient services in Lusaka's public health facilities are constrained by prolonged waiting times, symptomatic of deeper structural and organizational weaknesses within the health system[6,7]. Patients commonly spend between three- and five-hours navigating registration, consultation, and discharge, a pattern that reflects not only inefficiency but also inequities in access and quality of care. Interpreted through Donabedian's quality-of-care model, these delays signal deficiencies across all three domains structure (resources and infrastructure), process (workflow and service delivery), and outcome (patient satisfaction and experience). Similarly, within the WHO service delivery building blocks, the observed challenges span health workforce, service delivery, information systems, and leadership and governance, illustrating how systemic fragmentation drives inefficiency[8,8].

Staffing constraints emerged as a central determinant of long waiting times, yet their influence extends beyond mere shortage. The findings show that uneven staff distribution, absenteeism, and poorly coordinated break schedules create cascading delays throughout the patient flow[10,10]. Evidence from the Lusaka primary care integration pilot, which found longer waiting times after merging HIV and outpatient services due to staff shortages and extended breaks, reinforces this interconnection between human resource management and operational efficiency. The lack of adaptive micro-rostering and poor peak-time coverage hinder service continuity, particularly during morning surges[12,12]. This suggests that waiting time problems are not purely numerical but structural, rooted in weak workforce governance and poor alignment of staffing with patient demand. Task-shifting and structured break management therefore represent not only operational remedies but strategic workforce reforms that could improve both efficiency and continuity of care.

Operational inefficiencies further magnify these staffing challenges. Manual registration and triage systems generate bottlenecks that amplify delays created by limited personnel[14]. Inadequate triage procedures where emergencies are prioritized and routine patients wait excessively demonstrate a misalignment between clinical and administrative processes[15]. These operational failures illustrate how interdependent weaknesses compound each other: insufficient staffing slows manual systems, while manual systems in turn prevent efficient use of available staff time. This cyclical interaction supports findings from LMIC syntheses, which highlight that sustainable improvements in waiting time require simultaneous interventions across administrative systems, workforce management, and patient flow design[11].

Digitalization represents a critical opportunity to break this cycle. Although most Lusaka facilities continue to rely on paper-based systems, Zambia's SmartCare Pro platform provides untapped potential. However, for digital innovations to deliver meaningful change, they must be embedded within broader governance and accountability mechanisms that ensure adoption, maintenance, and data-driven supervision[2,12].

The physical environment of care also interacts with these operational constraints. Inadequate space, insufficient consultation rooms, poor ventilation, and limited seating not only hinder patient comfort but reduce throughput by constraining staff workflow. According to the Donabedian model's structural dimension, such deficiencies in physical infrastructure indirectly degrade process efficiency and patient experience[18,14]. Investing in better-designed waiting and consultation areas, coupled with multilingual signage and improved wayfinding, would enhance both accessibility and service flow.

Temporal and behavioral factors, such as patient arrival patterns and emergency loads, also interact dynamically with operational capacity. The concentration of patient arrivals on Mondays and mornings exacerbates congestion, overwhelming existing staff and infrastructure. Without mechanisms such as peak smoothing, staggered

appointments, or dynamic rostering, facilities remain reactive rather than proactive. Integrating real-time data from SmartCare dashboards into staffing and scheduling decisions could allow facilities to anticipate and redistribute workload based on demand fluctuations an application of systems thinking that shifts management from static scheduling to adaptive service delivery.

From a policy perspective, the absence of a national outpatient waiting-time standard in Zambia represents a governance gap that limits accountability and performance benchmarking. While the Zambia Health Sector Monitoring and Evaluation Framework (2022–2026) provides broad service quality indicators, it omits explicit waiting-time metrics. By contrast, South Africa's 2024 National Guideline on Waiting Times stipulates maximum targets 180 minutes for clinics and district hospitals, and 320 minutes for tertiary facilities. Adopting similar national benchmarks would align Zambia with regional best practices and institutionalize waiting-time monitoring within the quality-of-care framework. Establishing such standards could strengthen stewardship, guide resource allocation, and integrate waiting-time performance into facility-level quality improvement systems.

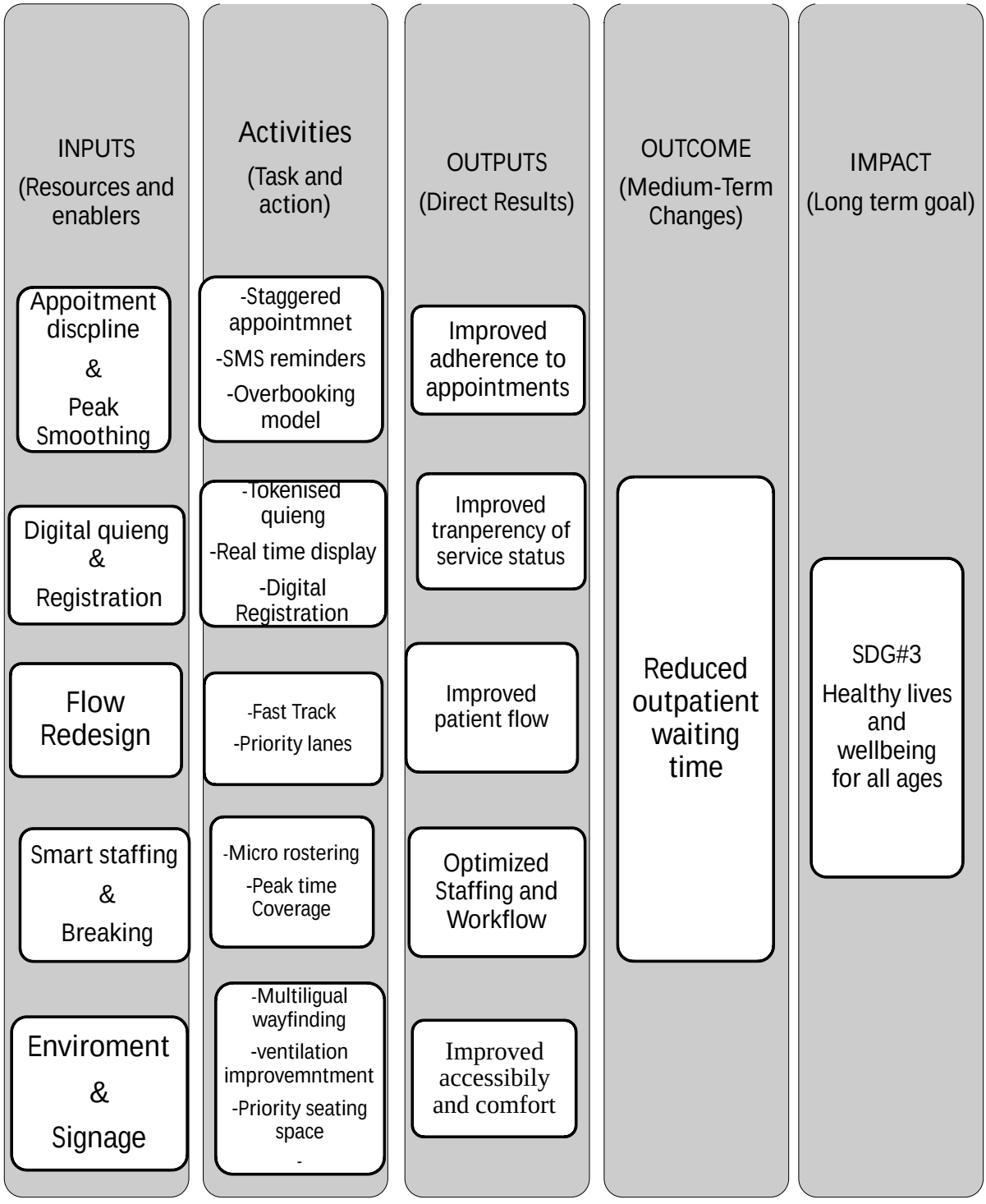
The present study contributes to this body of evidence by developing an operational framework that integrates these dimensions human resource optimization, digital innovation, patient flow redesign, and environmental enhancement within a systems-oriented structure tailored to the Zambian context.

In essence, prolonged outpatient waiting in Lusaka reflects the cumulative effect of interconnected structural and process inefficiencies within the health system[20,18]. Interpreting the findings through systems thinking underscores that no single intervention can achieve sustainable improvement without addressing the reinforcing links between workforce, digital systems, infrastructure, and governance[21,22]. The novelty of this study lies in proposing a comprehensive operational framework that bridges these domains, offering actionable strategies grounded in real-world facility experiences. By informing the Ministry of Health's policy agenda toward a standardized waiting-time guideline and integrated digital operations, the framework contributes both practical and theoretical value advancing Zambia's commitment to Sustainable Development Goal 3 on ensuring healthy lives and well-being for all ages

Emerging operational framework for optimizing outpatient waiting time in public health facilities

Improving outpatient waiting times is a critical challenge, particularly in resource-constrained healthcare systems where inefficiencies can negatively affect patient outcomes and satisfaction[23]. The presented operational framework addresses this issue through four interlinked components inputs, outputs, outcomes, and long-term impact emphasizing coordinated interventions across staffing, infrastructure, management, and patient engagement. Long waiting times often reflect systemic inefficiencies, including limited resources, poor management, and inadequate facilities, which contribute to delays in diagnosis and treatment and lower patient satisfaction. In sub-Saharan Africa, including Zambia, these challenges are amplified by high patient volumes and insufficient staffing. By linking immediate improvements, such as optimized workflows and better communication, to long-term goals like equitable access and higher patient satisfaction, the framework provides a structured approach to strengthening health systems and advancing Sustainable Development Goal #3 on health and well-being.

NANG'AMA OPERATION FRAMEWORK FOR OPTIMIZING OUTPATIENT WAITING TIME IN PUBLIC HEALTH FACILITIES



The framework outlines a model of operation to reduce the waiting time in outpatients of the health facilities that are publicly owned by demonstrating a logical sequence of events starting with the inputs and ending with impact. It foreshadows formal improvements in various fields to multiply the effectiveness of the services provided. The enablers include appointment discipline, digital queuing, flow redesign, smart staffing, and a better system of environment and signage. Some of the practical interventions that can be made include staggered booking, tokenized queues, fast track lanes, micro-rostering, and improved wayfinding; all aimed at simplifying patient movement and service delivery. Among the short-term outputs of these interventions, there are increased adherence to appointments, increased transparency of services, a better flow of patients, an improved level of staffing, and a better patient experience. It is expected that there will be a significant reduction in the outpatient waiting times. Finally, the impact is consistent with Sustainable Development Goal 3, that defines the promotion of healthy lives and well-being among all age groups. Altogether, the framework represents a systematic, evidence-based plan which connects operational activities and measurable transformations in service effectiveness and long-term health outcomes.

CONCLUSION

Outpatient waiting times in Lusaka's public health facilities remain a major challenge, driven by systemic inefficiencies, limited resources, and patient-related factors. This study proposes an operational framework that integrates workforce optimization, patient management, and technology driven solutions to enhance service efficiency. The framework serves as a practical guide for policymakers and healthcare managers to improve patient flow, satisfaction, and equitable access to care contributing to stronger health systems and progress toward Sustainable Development Goal 3.

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