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Assessment of Client Perceived Quality of Nutrition Services Delivered for Under Five Children in Nuwaraeliya District, Sri Lanka

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Abstract

The present study evaluates the service quality of nutrition services delivered to children under five in the Nuwaraeliya district using the SERVQUAL model which is extensively used to assess the functional quality of service provision.

A descriptive cross-sectional study was carried out, including 20 PHM areas (6 MOH divisions) in Nuwara Eliya district. Multistage cluster sampling was used to identify 600 clients (mothers/guardians) and were interviewed on their expectations and perceptions separately using a 29-item scale (Cronbach's alpha 0.884, 0.917 respectively) based on the primary dimensions of Service Quality (SERVQUAL) namely- Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Mean scores for 29 items were calculated separately for expectations and perceptions. Client-perceived quality scores (perception–expectation) were also calculated for each item and primary dimension. A paired t-test assessed the statistical significance between expectations and perceptions for each item. Data analysis was conducted using EPI-Info and SPSS V26 (2018).

Except for the neat appearance of staff in uniform and the distance to the weighing post, all other individual items yielded a negative perceived quality score. Except for respect and dignity towards clients and distance to weighing post, the rest had a significant difference ($p<0.05$) between the level of expectation and the clients' perception. The maximum mean gap score was from tangibles (Mean = -0.79, SD=0.71) and reliability (Mean= -0.40, SD=0.68) respectively.

The identified negative service quality gaps indicate that clients' expectations are unfulfilled during the service delivery. Positively catering the identified gaps will improve the effective service delivery; service quality thus better outcomes for child nutrition services in the district.

Introduction

Proper nutrition is fundamental for healthy growth, cognitive development, and overall quality of life, particularly in children under five in which the burden of malnutrition is most acute. A child's nutritional status is a pivotal determinant of future human resource development [1]. Sri Lanka has historically achieved commendable public health outcomes; however, malnutrition remains a significant challenge [2]. Despite nationwide implementation of evidence-based nutrition programs, the prevalence of stunting among children under five was stagnant between 2006 and 2016, and approximately one in five children remained underweight [3]. These national figures mask critical regional disparities, especially in the estate sector [3].

The Nuwaraeliya District (NED) is a focal point of this public health challenge. Despite having antenatal and postpartum care coverage comparable to national levels, the district has persistently reported high rates of underweight and stunting among under-five children for five consecutive years [4]. Previous research has consistently identified shortcomings in the operational aspects of service delivery, including inadequate maternal knowledge of feeding practices [5], low adherence to domiciliary care guidelines by Public Health Midwives (PHMs) [6, 7], and the need to improve the domiciliary care component of nutrition programs in this district [8]. Furthermore, studies have suggested that issues such as heavy workload, insufficient training, and low job satisfaction among PHMs may hinder their performance, affecting the quality of services delivered [9, 10].

Given that social, cultural, and economic barriers have been widely investigated [11, 12], the crucial next step is to examine the quality of the service delivery mechanism itself from the perspective of the clients. Clients are the best judges of service

quality, and understanding their expectations and perceptions is essential to overcome administrative or operational barriers and achieve national health standards. While the effectiveness of nutrition initiatives has been called into question due to a scarcity of systematic evaluations [7], similar client-centered quality assessment studies are scarce in the Sri Lankan context.

Therefore, this study aims to assess the service quality of nutrition services delivered to children under five in the NED by quantifying the gap between clients' expectations and their perceptions, utilizing the established SERVQUAL model (Figure 01). The findings will provide crucial, client-validated evidence to guide rational planning, policy development, and the implementation of targeted interventions necessary to enhance the effectiveness and equity of nutrition service delivery in the district.

The concept of quality is fundamental across all sectors, including healthcare, business, and service industries, as it is integral for maintaining competitiveness, enhancing customer loyalty, and achieving sustainable success [13]. Service quality evaluation hinges on two critical components: technical quality (what is delivered, e.g., accurate diagnosis or treatment) and functional quality (how it is delivered, e.g., courtesy and responsiveness of staff) [14]. Achieving a satisfactory balance between these two aspects is essential for maximizing customer satisfaction and loyalty [15]. In healthcare, patients often indirectly assess technical quality through functional quality due to their limited medical expertise, emphasizing the critical importance of both aspects of care [13].

However, measuring healthcare quality poses unique challenges, leading to the development and utilization of various assessment models, such as the SERVQUAL instrument [16,17]. The SERVQUAL model, developed by Parasuraman et al. [17] and subsequently refined [18], is a widely used, robust tool for assessing customer satisfaction across diverse industries by quantifying deficiencies in service delivery. The model delineates five gaps in service delivery, ranging from management's understanding of customer expectations to external communication about service quality [17].

Crucially for this research, the model's Gap 5 reflects the disparity between a customer's expectations and their perceptions of the service received. This perception-expectation gap is the fundamental parameter used to evaluate service quality [17]. The five primary dimensions through which this gap is measured are: Tangibles, Reliability, Responsiveness, Assurance, and Empathy.

The SERVQUAL model has found wide application in Sri Lanka across various private sectors (banking, airlines, insurance) and the curative health sector (e.g., accident and emergency departments) [15,19,20,21,22]. However, its application within the public health and preventive care sectors, particularly in evaluating field-based maternal and child health services, remains relatively limited [15]. Given its established methodology for measuring client-centred quality, SERVQUAL was selected as the appropriate theoretical framework for this study to assess the perceived quality of nutrition services delivered for under-five children in the NED.

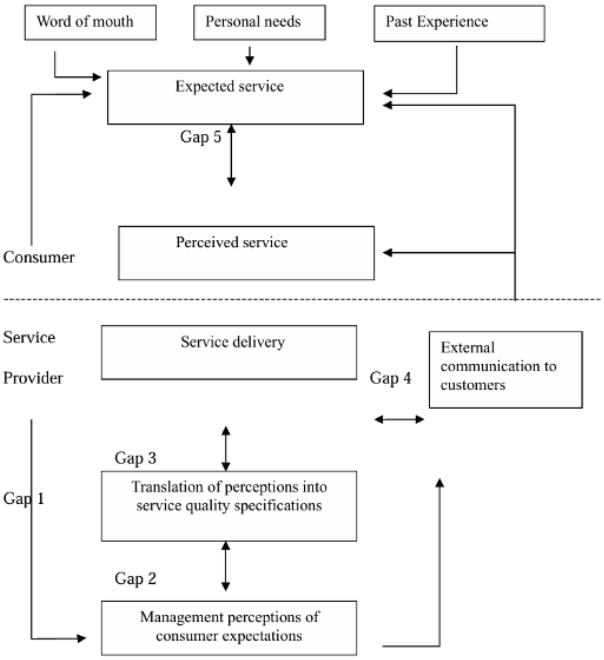


Figure 1: SERVQUAL Model

Methodology

The study employed a descriptive cross-sectional design and was conducted between September 2023, and January 2024, across six randomly selected Medical Officer of Health (MOH) areas, which included twenty Public Health Midwife (PHM) areas in total.

The research was executed in two distinct phases. Phase I- the Conceptualization Phase, involved an extensive literature review of national, regional, and international research to adapt the widely used SERVQUAL instrument [23]. This phase was critical for identifying the service quality dimensions and specific elements within the SERVQUAL model that were applicable to the specific context of nutrition services delivered to under-five children. The resulting conceptual framework for the study is presented in Figure 02.

The interviewer-administered questionnaire (IAQ) was developed based on this adapted SERVQUAL model. Initially, items were identified by studying questionnaires used in previous research [23, 24, 25, 26]. The suitability of each potential item for the multi-item constructs (primary dimensions) of the SERVQUAL model was then rigorously discussed with professors and consultants in community medicine. Face validity and content validity were established, and questions were included or

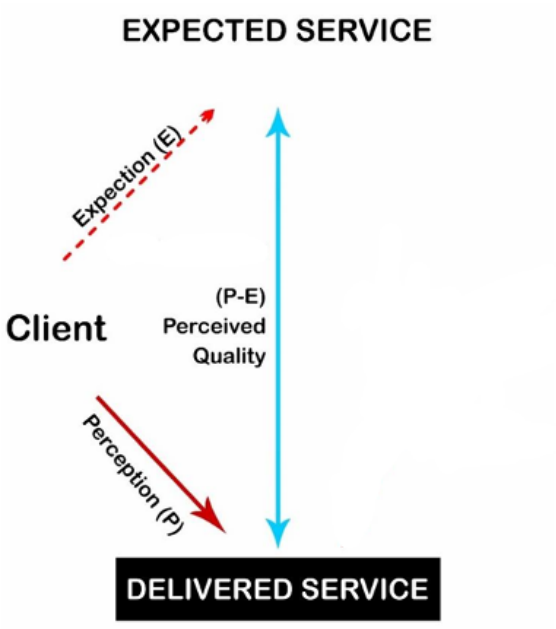


Figure 2: Conceptual Framework

modified based on expert suggestions.

The final instrument comprised twenty-nine items (Table 01) distributed across the five primary SERVQUAL constructs related to nutrition service delivery: Tangibles (8 items), Reliability (4 items), Responsiveness (4 items), Assurance (5 items), and Empathy (7 items).

The IAQ consisted of two identical 29-item sections, designed to evaluate expectations and perceptions of the service, respectively. These sections demonstrated high internal consistency (Cronbach's alpha for expectations and for perceptions). The instrument also included additional questions to capture respondent demographic variables. All SERVQUAL items utilized a 5-point Likert Scale rating format, ranging from 1 (least preferable/strongly disagree) to 5 (most preferable/strongly agree).

The instrument was pretested among a similar client group, and the order of the questions was slightly modified based on expert opinion to prevent a preceding question from influencing the answer to a subsequent question. To ensure comprehension across the study population, the SERVQUAL was professionally translated from English to Sinhala and Tamil and subsequently back-translated by independent professional translators.

Phase II- the Application Phase, utilized this finalized instrument to measure the service quality dimensions by collecting the specific expectation and perception scores from the target population.

A multistage cluster sampling method was used to select the study participants. The first stage involved the random selection of six MOH areas out of the thirteen within the district. The required sample size was calculated using the formula proposed by Lwanga and Lemeshow [27], adjusting for a design effect of 1.5 and an anticipated non-response rate of 5%. The resulting sample size reached 604. Considering this was a household survey, the final sample size was approximately 600 participants, constituting 20 clusters with a target of 30 clients per PHM area. Clusters (PHM areas were selected according to probability proportionate to size method.

The study participants included mothers and guardians of under five children who had been residing in the district for more than one year. Mothers/guardians of children with congenital abnormalities or known developmental disorders were excluded.

To ensure comprehension across the study population, the SERVQUAL was professionally translated from English to Sinhala and Tamil and subsequently back-translated by independent professional translators. Data collection commenced after obtaining Ethical Clearance from the Ethical Review Committee of the Postgraduate Institute of Medicine, University of Colombo. Single trained Tamil translator was used for entire data collection process. The starting point for data collection in each PHM area was randomly

Table 01: SERVQUAL 29-Item Distribution among Main Five Dimensions

Primary Dimension	Individual items
Tangibles	1. Seating facilities
	2. Waiting areas
	3. Toilet facilities
	4. Safe drinking water availability
	5. Interior arrangement of the clinic
	6. Surrounding environment
	7. Neat appearance of staff in uniform
	8. Equipment availability
Reliability	9. Sticking on to the time frame
	10. Keeping promises
	11. Time allocated per home visit
	12. Dedication to the task
Responsiveness	13. Willingness to help
	14. Ease of scheduling an appointment
	15. Waiting time for a given appointment
	16. Opportunity given to ask questions
	17. Contactability over the phone
Assurance	18. Friendliness in the field
	19. Politeness
	20. Respect and dignity towards clients
	21. Confidence developed among clients
	22. Knowledge and skills
Empathy	23. Language proficiency
	24. Distance to clinic
	25. Distance to weighing post
	26. Accessibility in the field
	27. Convenient timing of activities
	28. Personal attention to each child
	29. Active listening to nutrition problems

selected, typically focusing on central location. The initial direction for data collection was also determined randomly. Data collection then proceeded along both sides of the road. All households with eligible under-five children were engaged consecutively, and at street junctions, the sub-street toward the left was taken to continue data collection until the sample size of 30 was reached in each area. Informed written consent was obtained from all available mothers/guardians who wished to participate prior to their enrolment.

Data were entered into the Epi-Info software and subsequently loaded into SPSS version 26 for statistical analysis. Mean scores for 29 items were calculated separately for expectations and perceptions. Client-perceived quality scores (perception–expectation) were also calculated for each item and primary dimension. Statistical analysis employed the paired t-test for the comparison of means between bivariate variables [27,28,29].

Results

Client Demographic and Socioeconomic Profile

A total of 600 participants were enrolled in the study. The client population was predominantly Tamil (56.7%, n=340). Most households were small, with 76.3% (n=478) having two children. Among the index children (under-five), the gender distribution was approximately equal, and most were over two years old (63.0%, n=378). The primary guardians were overwhelmingly the mothers (92.0%, n=552), of whom a large proportion were housewives (79.5%, n=477). As anticipated for this cohort, most mothers/guardians were within the 20–40 year age range (91.7%, n=550). Regarding education, the majority had attained education up to the secondary level (62.0%, n=377). Socioeconomically, most households reported a monthly salary of less than Rs. 30,000 (70.3%, n=422).

Table 02: Frequency distribution of socio-demographic data of clients

Socio-demographic characteristic		Frequency	Percentage
Ethnicity	Sinhala	226	37.7
	Tamil	340	56.7
	Muslim	34	5.7
Child no	<=2	458	76.3
	>2	142	23.7
Relationship	Mother	552	92
	Guardian except mother	48	8
Child age category	<366 days	78	13
	366-730 days	144	24
	>=731 days	378	63
Guardian education	Primary (grade1-5)	36	6
	Secondary (grade 6-11)	377	62.8
	Tertiary & higher (>grade 12)	187	31.2
Guardian age	<30	274	45.7
	30-40	276	46
	>40	50	8.3
Guardian occupation	Estate work	67	11.2
	Housewife	477	79.5
	Government or Private	56	9.3
Guardian salary (LKR)	<30000	422	70.3
	30000-<50000	131	21.8
	>50000	47	7.8
Total		**600**	**100%**

Table 03: Clients' Mean Expectation, Perception, Perceived quality scores for Primary SERVQUAL Dimensions

	Expectations		Perceptions		Perceived quality (P-E)	
	Mean	(SD)	Mean	(SD)	Mean gap	(SD)
Tangibles	4.51	(0.40)	3.71	(0.62)	-0.79	(0.71)
Reliability	4.63	(0.37)	4.23	(0.66)	-0.40	(0.68)
Responsiveness	4.49	(0.44)	4.30	(0.53)	-0.19	(0.55)
Assurance	4.63	(0.39)	4.51	(0.51)	-0.12	(0.51)
Empathy	4.39	(0.45)	4.20	(0.56)	-0.19	(0.61)
Total Mean score	4.53	(0.31)	4.19	(0.43)	**-0.34 (Total P-E)**	(0.41)

Statistical Rationale and Service Quality Gaps

The perceived quality scores demonstrated a normal distribution, thus validating the application of parametric tests for statistical analysis. Table 3 presents the mean scores for client expectations, perceptions, and the resultant perceived quality (P-E gap) across the five primary SERVQUAL dimensions.

To assess the significance of the service quality gap, a paired samples t-test was performed for all 29 individual items comparing expectation and perception scores [28,29,30]. The analysis revealed that the majority of items resulted in a negative perceived quality score, indicating that clients' expectations exceeded their perceptions of the service received. Only two items (Item 7 – Neat appearance of staff in uniform and Item 25- Distance to weighing post) yielded a positive perceived quality score. Furthermore, a significant difference between the level of expectation and clients' perception was observed for all items except for Item 20 (Dignity towards clients) and Item 25 (Distance to weighing post) (Table 4).

Discussion

The primary objective of this study was to assess the service quality of nutrition services delivered to under-five children in the Nuwaraeliya District using the SERVQUAL model developed by Parasuraman et al. [25]. The SERVQUAL model's emphasis on measuring the gap between client expectations and perceptions provides the most fundamental parameter for assessing service quality [30]. The analysis revealed a persistent negative service quality gap across the primary SERVQUAL dimensions, resulting in an overall mean perceived quality gap of -0.34 (SD=0.41) (Table 3). This negative score indicates that clients' expectations consistently exceed their actual perceptions of the nutrition services, indicating a clear need for improvement to satisfy the recipients. This finding is consistent with previous local study on healthcare service quality, such conducted by Thotagamuwa [22] on Outpatient Department (OPD) services in the Kalutara district, which also reported a significant negative gap. The presence of this negative gap suggests that, while service delivery is ongoing, the service provided does not meet the standards or benchmarks that clients hold for quality care. When examining the P-E gap scores by dimension, the disparities reveal the priority areas for intervention. The negative gap scores were highest (most negative) in the following descending order: Tangibles, Reliability, Responsiveness, Empathy, and Assurance.

The most pronounced disparity was observed in the Tangibles construct. This dimension encompassed the physical facilities and environment, including seating, waiting areas, safe drinking water, toilet facilities, interior clinic arrangement, surrounding environment, staff appearance, and equipment availability. The large negative gap in Tangibles strongly suggests a major deficit in the physical infrastructure supporting nutrition services. This aligns with findings from the Institute of Health Policy [7], which highlighted the need for infrastructure development in the district, and local studies by [22] and [21] confirming poor physical facilities in similar local health settings.

In contrast, the dimensions of Assurance and Empathy registered the lowest (least negative) gap scores. While these gaps are still negative, they indicate a relatively smaller disconnect between expectations and perceptions regarding the staff's ability to inspire trust (Assurance) and provide individualized, caring attention (Empathy). Interestingly, clients expressed the highest expectations in the Reliability and Assurance domains, underscoring the critical importance they place on receiving consistent, accurate, and trustworthy service provision for their children. The fact that Reliability, considered by Parasuraman et al. [24] as the most crucial dimension, was ranked second-to-last in terms of perceived quality gap

Table 04: Mean perceived quality (P-E) for individual items in the SERVQUAL model

Domain	Item No	Item	Expectations Mean		Perceptions Mean		P-E	t	
Tangibles	1	Seating facilities	4.36	(0.781)	3.59	(0.93)	-0.77	15.73	*
	2	Waiting areas	4.35	(0.699)	3.55	(0.925)	-0.80	17.06	*
	3	Toilet facilities	4.72	(0.624)	3.37	(1.171)	-1.36	24.26	*
	4	Safe drinking water availability	4.61	(0.72)	3.20	(1.275)	-1.41	23.15	*
	5	Interior arrangement of the clinic	4.34	(0.76)	3.82	(0.856)	-0.52	11.70	*
	6	Surrounding environment	4.56	(0.689)	3.80	(0.86)	-0.76	16.70	*
	7	Neat appearance of staff in uniform	4.37	(0.829)	4.54	(0.68)	0.17	-4.21	*
	8	Equipment availability	4.68	(0.568)	3.81	(0.93)	-0.87	20.74	*
Reliability	9	Sticking on to the time frame	4.63	(0.562)	4.16	(0.89)	-0.47	11.65	*
	10	Keeping promises	4.55	(0.62)	4.15	(0.898)	-0.40	9.64	*
	11	Time allocated per home visit	4.59	(0.607)	4.20	(0.92)	-0.40	9.16	*
	12	Dedication to the task	4.69	(0.564)	4.39	(0.83)	-0.30	7.60	*
Reliability	13	Willingness to help	4.56	(0.654)	4.42	(0.76)	-0.15	3.80	*
	14	Ease of scheduling an appointment	4.35	(0.755)	4.18	(0.79)	-0.17	4.46	*
	15	Waiting time for a given appointment	4.41	(0.732)	4.03	(0.85)	-0.38	9.00	*
	16	Opportunity given to ask questions	4.67	(0.577)	4.42	(0.81)	-0.25	7.20	*
	17	Contact-ability over the phone	4.43	(0.785)	4.33	(0.77)	-0.10	2.46	**
Assurance	18	Friendliness in the field	4.63	(0.587)	4.47	(0.79)	-0.17	4.84	*
	19	Politeness	4.5	(0.698)	4.37	(0.85)	-0.13	3.03	*
	20	Respect and dignity towards clients	4.45	(0.697)	4.43	(0.81)	-0.02	0.56	*
	21	Confidence developed among clients	4.77	(0.503)	4.52	(0.74)	-0.25	7.63	
	22	Knowledge and skills	4.75	(0.566)	4.51	(0.82)	-0.24	6.33	*
Empathy	23	Language proficiency	4.56	(0.648)	4.18	(0.99)	-0.38	8.21	*
	24	Distance to clinic	4.12	(0.947)	3.89	(0.98)	-0.24	4.28	*
	25	Distance to weighing post	4.05	(0.927)	4.06	(0.96)	0.01	-0.06	*
	26	Accessibility in the field	4.34	(0.785)	4.11	(0.81)	-0.23	6.06	**
	27	Convenient timing of activities	4.25	(0.818)	4.15	(0.84)	-0.10	2.30	*
	28	Personal attention to each child	4.56	(0.742)	4.33	(0.84)	-0.23	5.37	*
	29	Active listening to nutrition problems	4.78	(0.475)	4.52	(0.78)	-0.26	7.34	

t-test two-tail probability < 0.05;

** t-test two-tail probability < 0.01

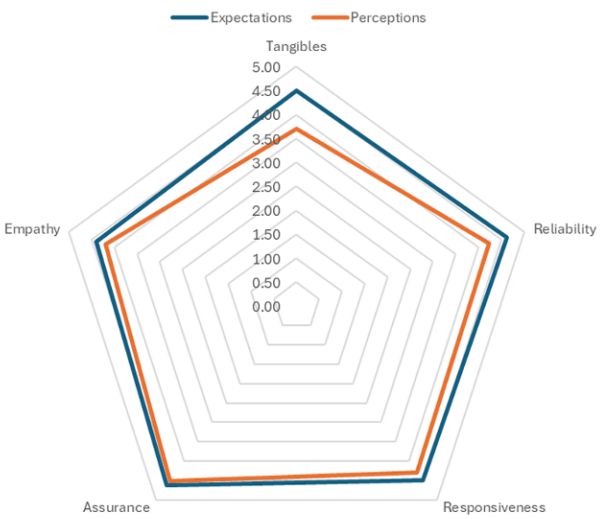


Figure 03: Radar plot of SERVQUAL primary dimensions showing perceived quality (P-E)

indicates that while the reliability of services needs improvement, the immediate client dissatisfaction is rooted more in the physical experience (Tangibles).

The detailed item-level analysis using the paired samples t-test provided granular insight into the specific service failures. Out of the 29 items, only two items (Item 7 – Neat appearance of staff in uniform and Item 25- Distance to weighing post) yielded a positive perceived quality score, suggesting that perceptions exceeded expectations only for these specific service attributes. Crucially, the expectation and perception levels were not significantly different for Item 20 (Dignity towards clients) and Item 25 (Distance to weighing post), while a significant difference was observed for all other items. This comprehensive pattern demonstrates that clients do not merely perceive a low-quality service, but that this low perception is statistically significantly lower than their established expectations across nearly all dimensions of service delivery.

Contextual Considerations

The present quantitative study builds upon prior SERVQUAL research, contrasting with three-dimensional models [31] or qualitative studies used to identify barriers and facilitators in other contexts [32]. While the low expectation for Empathy in this study suggests clients prioritized physical and functional aspects over individualized care, this may be context-specific and should not be generalized to all healthcare settings, as evidenced by studies where Empathy was highly valued [15].

Conclusions

The assessment of nutrition service quality for under-five children in the NED clearly indicates that clients' expectations exceeded their perceptions across all five primary SERVQUAL dimensions, resulting in a significant negative service quality gap with an overall score of -0.34 (SD=0.41). This finding indicates that the current service delivery does not meet established client quality benchmarks, presenting a clear opportunity for targeted improvement. The most critical areas requiring immediate attention are the Tangibles and Reliability dimensions, which registered the highest negative gap scores, pointing to deficiencies in physical infrastructure and the consistency of service provision.

Recommendations

It is imperative to launch focused initiatives aimed at closing the negative service quality gap, with particular emphasis on the Tangibles and Reliability dimensions. To address the significant gap in Tangibles, it is strongly recommended that the health sector collaborate closely with estate sector management and local governance to rapidly improve the physical infrastructure of clinic settings, including seating areas, toilet facilities, and the availability of essential equipment. Forging partnerships with external entities and public private partnership is advised to help achieve necessary program goals bound by the current financial constraints. Improving Reliability requires addressing resource shortfalls, including tackling staff shortages and improving the consistency and timeliness of service delivery processes. It is also recommended to localize certain interventions, involving non-health sector resources and community stakeholders, to enhance both reliability and responsiveness. Finally, a system for continuous monitoring and client feedback should be established to regularly track and evaluate service quality perceptions, ensuring that service improvements are sustained and client satisfaction progresses over time.

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