Study Title: Challenges in Dengue Referral System at Savar Upazila Health Complex, Dhaka: A mixed Method study

"Final Report of Summative Learning Project (SLP) presented to BRAC James P Grant School of Public Health, BRAC University"

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In Partial Fulfillment of the Requirements for the Degree of Master of Public Health (MPH)

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Abstract

Background: Dengue-endemic regions are home to up to 3.6 billion individuals, or 40% of the global population (CDC, 2024). In Bangladesh, 327 deaths were attributed to Dengue fever between January and August 2023, resulting in a case fatality rate of 0.47% (WHO, 2023). Bangladesh continues to face challenges in the Healthcare system, which has affected the referral process of patients seeking timely healthcare services in tertiary hospitals. This study aims to identify the barriers in the referral process for dengue management in primary healthcare settings in Bangladesh.

Methods: Savar Upazila Health Complex (UHC) was used as the study site. The study employed a mixed method concurrent study design, the qualitative approach was used to identify the barriers affecting the referral system for dengue management by exploring experiences and perceptions shared by healthcare professionals. The quantitative approach was used to assess the level of satisfaction by dengue patients in selected domains including the referral process, communication, and quality of care throughout the referral.

Results: The study identified health system barriers that disrupt the referral process for dengue patients in accessing higher medical care in tertiary hospitals. Some health system-related factors that negatively affect the timely referral include a shortage of ambulances, lack of feedback system, shortage of skilled healthcare professionals and inadequate infrastructure. Furthermore, the study found that, of the 36 referred patients (n=36), 13.89% are dissatisfied with the overall referral process, 25.00% are dissatisfied with the overall communication between UHC and the hospital and 16.67% are dissatisfied with the quality of care offered throughout the referral process. What's more is that 16.67% of the 36 patients reported experiencing form of delay during their referral, solely the main delay is the shortage of ambulances which is a transport-related challenge clearly revealed by the healthcare professionals.

Conclusion: It is recommended that the Ministry of Health and Family Welfare (MoHFW) must develop a referral management policy and a standard medical referral guideline for all healthcare facilities in Bangladesh. The MoHFW should also engage with international partners to initiate infrastructure development and increase annual budgetary allocation for address the current resources constraint faced at primary healthcare facilities. All in all, these policy changes and program implementation will strengthen the dengue referral system in Bangladesh.

Keywords: Dengue, Referral process, health system barriers, Savar Upazila Health complex (UHC)

Background

Dengue fever is a mosquito-borne, acute febrile disease that is a significant public health concern across the tropical and subtropical regions of the world. The World Health Organization (WHO) reports that dengue is endemic in over 100 nations (CDC, 2024). Dengue-endemic regions are home to up to 3.6 billion individuals, or 40% of the global population (CDC, 2024). South-east Asia, continues to be an endemic region with an estimated Disability-adjusted life years (DALYs) of 2700 per 100,000 population. In the Southeast Asia regions, countries like Nepal, the overall case fatality rate was 0.13% in the first half of 2023 (WHO, 2022). Whilst in Sri Lanka, the published report highlights 31450 cases from May 2022 to May 2023 (WHO, 2023).

In Bangladesh, 327 deaths were attributed to Dengue fever between January and August 2023, resulting in a case fatality rate of 0.47% (WHO, 2023). Mahmud et. al (2024), stated that the mortality rate was 4.9 deaths per 100000 dengue-confirmed cases during the major outbreaks in 2023 compared to 1.6 deaths per 100000 in 2019. The World Health Organization (WHO) continues to work extensively with the Ministries of Health and other stakeholders from Low-middle-income countries (LMICs) to reduce the dengue case-fatality rate from 0.80% to 0.30% by 2025 through core interventions that include Water Sanitation and Hygiene (WASH), Vector control and Case management (WHO, 2021).

In terms of health service, the referral system is an important component as it aims to allow patients to receive specialist health care when needed, whilst upholding satisfactory use of resources (WHO, 2023). Bashar et, al. (2019) define referral as a dynamic process where one health worker in one level of a health system seeks help from the same or higher level to manage a clinical condition. The components of a referral system consist of a referring facility either it may be a community health clinic or a primary health center and a receiving facility from higher healthcare facilities like a tertiary hospital. Between the two facilities, there is a referral steering function. It provides supervision, builds and strengthens referral capacity, and fosters engagement between service providers. An effective referral system is composed of a unified relationship among all levels of healthcare providers in providing healthcare services (Seyed-Nezhad, Ahmadi & Akbari-Sari, 2021). Globally, all health referral system faces problems such as system-level problems, decision-making issues, information flow issues etc.

Bangladesh continues to face challenges in the delivery of primary healthcare services, which has affected the referral process of patients in seeking timely healthcare services in secondary and tertiary hospitals. According to the Bangladesh Bureau of Statistics (2022), 58% of the population in Bangladesh live in

rural areas, whilst 52 % live in urban areas, however access to primary healthcare remains inequitable. One important health system drawback that contributes to increased rates of morbidity and mortality associated with dengue is nonfunctional referral networks. The dengue clinical guideline introduced by the Ministry of Health and Family Welfare (MoHFW), clearly states that moderate cases of dengue fever should be closely monitored and hospitalized, and severe Dengue fever should be referred to tertiary hospitals (DGHS, 2022). Thus, it is important to explore the status of the referral system and identify the factors that disrupts the referral process.

A recent qualitative study indicated that inadequate coordination and a lack of functioning referral services affect health services, including those for non-communicable diseases (NCDs) (Kabir, Karim & Billah). Another study by Thakkar et al (2022) found that poor provider linkages and lack of down referrals affect patients with hypertension seeking services at the healthcare facility. A study by Daniels and Abuosi (2020), classifies barriers encountered under these categories, referral transport system, referrer-receiver communication barriers, inadequate infrastructure and supplies, and insufficient health personnel. Extensively, barriers to the referral system are commonly categorized into health system factors and patient factors. Health system factors include transportation, network infrastructure, etc. Patient factors include knowledge about referral, environments, culture, and poverty (Harahap, Handayani & Hidayanto, 2019).

Other referral barriers found in a study by Give et al (2019), include not receiving preferential treatment despite the presence of referral slip, transport costs, geographical distance, and use of referral data. Nakayuki, Basaza, and Namatovu (2021) categorize referral challenges as human resources constraints, financial constraints, Non-compliance, and communication challenges. Inadequate medical supplies and medication have been identified as obstacles to an effective referral process (Matolengwe, Murray & Okafor, 2023). Interestingly, similar studies highlighted the non-implementation of referral policy at a district-level challenges the provision of health service among patients (Akram et.al 2022; Oesakede et al, 2023). Changes in senior managers and the unwillingness of some patients to follow the referral system remain obstacles to an effective referral process (Kabir et, al, 2023). A quantitative study by Andres (2024), discovers that there is no statistically significant association between perceived barriers to inter-hospital referral systems plus demographic variables, the indicators include the great distance between health facilities, availability of ambulances, bed availability in the referral facility, communication, delay in the transfer, etc. A hospital-based study (Prathiba et al, 2019) highlights that 60 percent of the patient out of

286 women with obstetric emergencies were referred through verbal communication one-third used a referral slip, for transport 40.4 percent used bus and private vehicles, and 10 percent traveled by ambulances.

As the case-fatality rate of dengue fever continues to stagger, these studies collectively open a crucial study gap that focuses on identifying the barriers to the referral system for dengue management in primary healthcare settings in Bangladesh. The rationale of this study is to generate policy recommendations to improve the primary healthcare referral system for the management of dengue cases and strengthen stakeholder collaboration for effective policy implementation.

Research Questions

- What are the barriers that prevent an effective referral system for dengue management at the Savar Upazila Health Complex, Dhaka, Bangladesh**?**

Objectives

General Objectives

- To identify the barriers that disrupts the dengue referral system

Specific Objectives

- To determine the health system barriers that disrupt the referral process in managing dengue cases
- To assess patients' experiences and their level of satisfaction with their referral process
- To provide recommendations for the improvement of dengue referrals at Savar Upazila Health Complex, Dhaka

Conceptual Framework

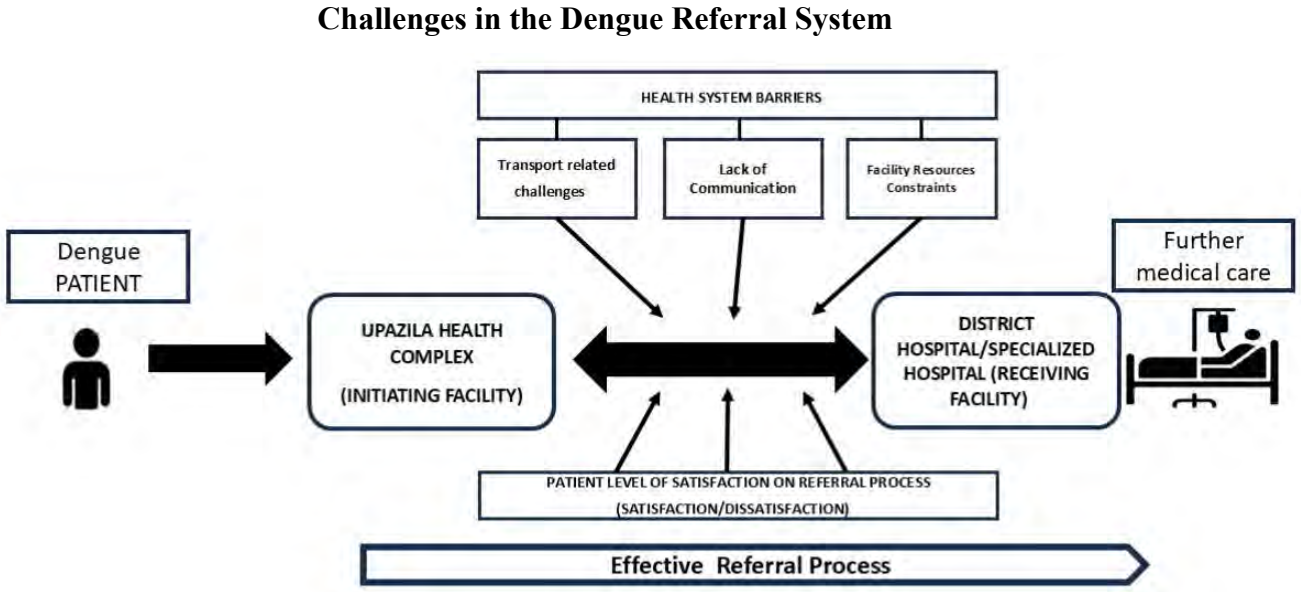

Figure 1*:This Conceptual Framework illustrates the dengue referral process between a primary health facility and a District or tertiary hospital*

This Conceptual framework shows a pictorial illustration on how a linear referral system works in terms of dengue management. The referral process functions between the upazila health complex and the district hospital or a specialized hospital as per the Bangladesh health facility classification. The black vector person symbolized dengue patients seeking treatment at the UHC, and as he or she is being referred to district or specialized hospital for further medical care. During the process of seeking care, the boxes above represent how health system barriers tend to affect a dengue patient, and delays he or she in receiving further medical care. The box below the big arrow bridging the two-health facility represents the level of satisfaction faced the patients.

Methodology

Study design

The study employed a mixed method concurrent study design. The qualitative approach was used to identify the barriers affecting the referral system for dengue management by exploring experiences and perceptions shared by healthcare professionals. In supplementation to the qualitative approach, the quantitative approach was used to assess the level of satisfaction in selected domains including the referral process, referral communication, and quality of care throughout the referral process experienced by dengue patients using the 7-item Referral System Questionnaire. In terms of the priority status, the qualitative method dominates the quantitative method, as the quantitative is nested (QUAL+quant).

Study Setting

Savar UHC was selected as the study site. It is situated in a dengue-endemic zone and it faces various health system challenges. It is a government-run healthcare facility that was established in 1984, operated under MoHFW. Savar UHC is located approximately 24 Kilometer (Km) away from Dhaka city. It serves a population of 2311796 (Bangladesh Bureau of Statistics, 2022). This UHC is a 50-bed health facility that provides primary health care services including outpatient department and inpatient departments, maternal and child health services, pathology, pharmacy, and ambulance. For dengue admission, the in-patient department has allocated 8 beds for both males and females respectively. In the Medical records unit, there is a dengue registry that records admitted positive cases of dengue.

Study Population

For this study, the study population includes the healthcare professionals of Savar Upazila Health Complex. The healthcare professionals include both clinicians and non-clinicians who currently hold positions and serve at the UHC. The patients are dengue-diagnosed who visited, admitted and discharged at the UHC. The inclusion and exclusion criteria are as follows:

Inclusion criteria

Healthcare Professionals

- Any professionals (medical doctors, nurses, admin staff)
- He or she must be working for 6 or more months at this facility
- Must be a civil servant or engaged by a recognized NGO

Patients

- Any person clinically diagnosed with dengue fever (lab-tested positive) in the past 6 months
- Patient should be 18 years of age and above
- Patients who have been referred to a secondary or tertiary hospital
- A referral slip or referral note must be written in the patient medical chart/records

Exclusion criteria

Healthcare Professionals

- Any healthcare professional working for less than 6 months at this facility
- Works for other UCHs but present during the time of study

Patients

- Non-dengue patients
- Non-referral and self-referred patients

Sampling method

The study used convenient sampling to identify key HCWs to participate in the interviews. From the 300-plus staff, 9 key HCWs were chosen to partake in the interviews according to the inclusion criteria and most importantly those who have experience and knowledge about dengue management. These Healthcare professional includes doctors, nurses, admin officers and support staffs.

For the quantitative approach, the study used the dengue registry, which captures information of all dengue cases and is updated every month. The registry accounts for a total of 403 dengue cases which were recorded for the last 6 months which proves that these patients were admitted and received care at Savar UHC. A total of 197 patients were assessed and screened for eligibility using the inclusion and exclusion criteria, which resulted in only 36 patients who proceeded and completed the data collection process of this study.

Tool Development

A 13-item open-ended guideline was used for qualitative data collection. This was developed with integration of the referral system assessment and monitoring toolkit produced by the US President's Emergency Plan for AIDS Relief (PEPFAR) and MEASURE Evaluation organization. The Quantitative

survey questionnaire contains demographic information, that includes the name, age, sex, education level, total household income etc. of the patients. The second section of the questionnaire includes binary and Likert scale questions related to the referral system, it accommodates responses like yes or no and the satisfaction level includes very satisfied, satisfied, unsure, dissatisfied and very dissatisfied. The survey was developed and transformed into a Google form which was accessible to digital devices like phones and laptops.

Data Collection Procedure

The study used Key Informant Interviews (KIIs) and it was conducted with 9 healthcare professionals, it was a one-to-one interaction. The duration of the interviews lasted between 45 to 60 minutes. The research assistant took ample time to explain the purpose of the study to the participants before obtaining their consent. The interview was conducted following the open-ended questions with probing statements to enhance clarity and obtain relevant responses from the participants. All the interviews were recorded and uploaded to a secured electronic drive. For the quantitative survey, the data collection method includes face-to-face interviews and phone interviews. The research assistants conducted the survey with the necessary consent obtained at the convenience and comfort of the patients. For the phone interviews, participants agreed to set a convenient time at 6-8 pm and were able to complete their scheduled interview. All entries were captured in the Google survey form and stored in an Excel sheet.

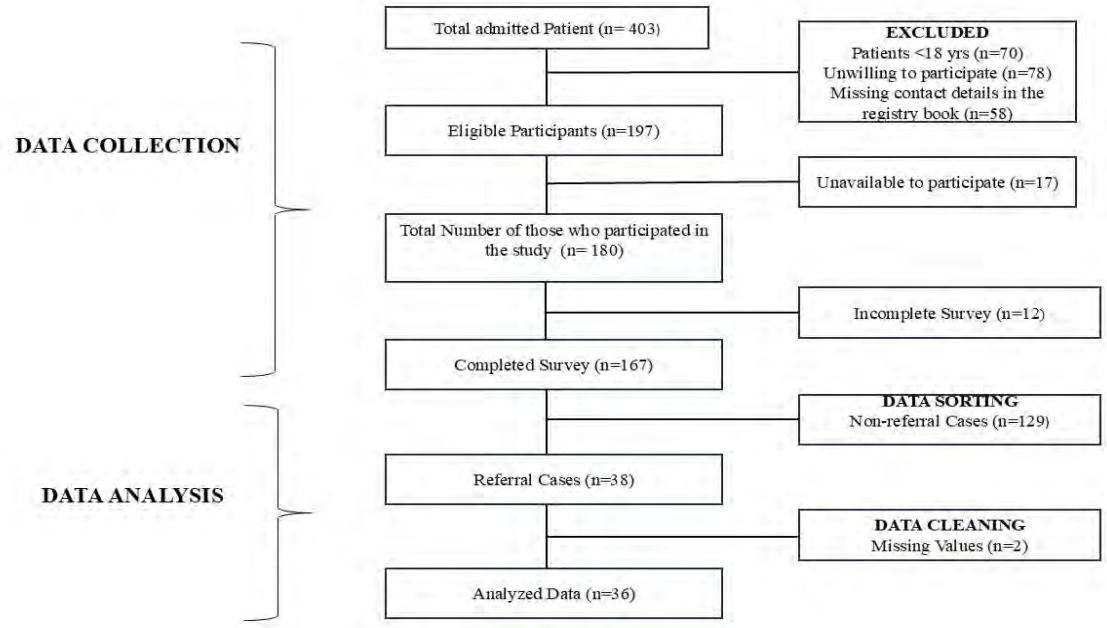

Figure 2: *This diagram illustrates the data collection method used in the Quantitative Survey*

Data Analysis Plan

For data analysis, all the recordings of the interviews were transcribed. From the transcriptions, it was available in English since the interview was conducted using the Bangla language. The content of all the transcriptions was read, re-read, and color-coded. A codebook was developed and used with only five main theme codes, as shown in Annex 1. Out of the five main themes, eight sub-themes were identified. Next, a matrix was developed that classified the demographic characteristics including the name of the KII participant, sex, age, and education level. The matrix captures all the themes with quotes retrieved from the transcription. After the matrix is organized and filled, it produces sufficient raw qualitative results for thematic analysis.

For Quantitative data analysis, the first phase covers the cleaning and sorting of data in an Excel sheet. Then, STATA 17.0 was used to generate all variables including demographic characteristics such as age, gender, marital status, education level, and monthly income and expenditure other variables include the overall level of satisfaction with the referral process, referral communication, and quality of care.

Descriptive statistics were applied to generate frequencies and percentages, with mean, median and standard deviation for continuous and categorical variables. For example, the parentage of males who have dengue fever. For the interest of this specific study, the analysis included the responses to the demographic characteristics, referral system related questionnaire like the percentage of the overall communication between UHC and the hospital. Out of the 38 patients who were categorized as referral cases, 2 responses were found with multiple missing values that included error entries and unfilled entries of values for a few questionnaires. The information on these 2 patients was removed from the working data file leaving information of 36 patients.

Ethical Consideration

This study was approved by the Independent Review Board (IRB) of James P Grant School of Public Health, BRAC University. We also attained approval from the Directorate of General Health Service permitting us to visit Savar UHC for data collection. We obtained written consent from Healthcare Professionals. Before obtaining the consent, an information sheet was handed out and each participant took the chance to read and understand the purpose of this research study. By agreeing to the consent, we took the responsibility, to ensure all information obtained remains confidential. In this study, all information collected by hard copies is stored in locked drawers, and soft copies are secured in a locked

internal drive. We informed our participants that their rights and autonomy remain vital, and they can disengage from the study at any given time without impending circumstances. Finally, we advised them that there are no direct incentives for their participation.

Results

The results of this study present health system barriers that disrupt the referral process of dengue patients. These barriers were identified from the supply side of the referral system using qualitative interviews that were conducted among HCWs. It includes lack of transportation, lack of communication, lack of training on referral protocols, resource constraints and mode of referrals. The findings from the healthcare professionals were thematically analyzed and presented. Of a total of 9 Key Informants who were interviewed, 4 are clinicians and 3 are non-clinicians, their socio-demographic details are elaborated in Table 1.

The other component of the results section presents quantitative survey findings that includes the level of satisfaction on identified key domains among the dengue patients. The key barriers include the status of the referral process, overall communication, and the quality of care received throughout the referral process. This was assessed and reported using a 7-item quantitative survey questionnaire. A sum of 36 patients were surveyed and their sociodemographic details are shown in Table 2. In addition, the final component of the results is the merged findings, which includes an explanation of few quantitative variables correlating with the key health system barriers reported the qualitative findings section.

Table 1: *Socio-demographic Characteristics of Healthcare Professionals*

Participant ID	**Profession**	**Sex**	**Age**	**Education**
KII1	Medical Officer	Male	43	Medical Degree
KII2	Medical Officer	Male	44	MBBS
KII3	Medical Officer	Male	40	MBBS
KII4	Medical Officer	Male	42	MBBS
KII5	Nurse	Female	27	B.Sc. Nursing

KII6	Nurse	Female	58	Diploma in Nursing
KII7	Admin Officer	Male	57	Bachelor of Science
KII8	Support Staff	Male	30	High School certificate
KII9	Support Staff	Male	47	High School certificate

Demographic Characteristics of the Patients

In supplementation to the qualitative findings of this study, a quantitative survey was conducted among 180 eligible participants. Of the 180 participants, only 36 were found to be referral patients. The data obtained from these 36 patients are presented in Table 2 highlighting the socio-demographic characteristics, the frequencies, and the percentages. Approximately two-thirds (72.22%) of the patients are male and 27.78 % are female. For the age group, 18-25 years with 36.11%, 26-45 years, 36-45 years, and 40 + years account for 33.33%, 22.22%, and 8.33% respectively. In terms of marital status, 30.56 % are single and 69.44 % are married. For the education level, the highest percentage is 36.11%, which is graduate level and above and the second highest percentage is 25.00% which corresponds to those who attend madrasa school. For the estimated monthly household income, of the 36 responses approximately 36.11 % is proportion to those earning ≤20,000 BDT, 33.33% for those earning 20,000-30,000BDT and 30.56% are those who earn≥30,000 BDT. In terms of the estimated monthly household expenditure, 44.44% are those 36 refereed patients spends about ≤20,000 BDT, 32.33% accounts for those who spent about 20,000-30,000 BDT, and 22.22 % spent about ≥30,000 BDT.

Table 2: *Basic socio-demographic characteristics of the 36 referral patients reported in the Quantitative Survey*

Sociodemographic Characteristics		**Frequency**	**Percentage (%)**
Sex	Male	10	27.78
	Female	26	72.22
Age	18-25	13	36.11
	26-45	12	33.33
	36-45	8	22.22
	40+	3	8.33
Marital Status	Single	11	30.56

	Married	25	69.44
Level of Education	No Formal education	2	5.56
	Primary School	1	2.78
	Secondary School	3	8.33
	Higher Secondary School	8	22.22
	Madrasa	9	25.00
	Graduation and above	13	36.11
Occupation	Currently Employed	21	58.33
	Unemployed	4	11.11
	Homemaker	4	11.11
	Student	7	19.44
Estimated Household Income	≤20,000	13	36.11
	20,000-30,000	12	33.33

	≥30,000	11	30.56
Household Expenditure/Month	≤20,000	16	44.44
	20,000-30,000	12	32.33
	≥30,000	9	22.22

Qualitative Findings

The study identified health system barriers that disrupts the referral process for dengue patients in accessing higher medical care in secondary or tertiary hospitals. The barriers are shown thematically below.

Transportation-Related Challenges

Shortage of ambulances

In our Qualitative study, our findings indicated that the UHC faced transport-related challenges, which included a shortage of ambulances, the cost of ambulance service, and a lack of professional escort. These challenges have significantly affected the management of dengue patients, especially ensuring the timely transfer of moderate and severe dengue patients to a tertiary hospital. During one of the interviews on the issue of lack of transportation, a support staff mentioned that there is an ambulance shortage at Savar UHC with only one ambulance at hand and one full-time driver, the support staff further stated;

> "… there's an ambulance shortage when 2-3 patients need to be referred simultaneously. We have only one ambulance..." (Support staff, KII7)

This statement points out that having only one ambulance cannot assist multiple patients who need to be referred simultaneously from Savar UHC to any secondary or tertiary hospital. While patients are assisted by this ambulance, patients tend to arrange their transport to take them to the hospital, as the office assistant quoted;

> "…If an ambulance is unavailable, a private car is used …" (Office Assistant, KII8)

The statement issued reveals that when the ambulance is unavailable, private cars are arranged and used by those patients who cannot access the UHC ambulance. Whilst the shortage of ambulances becomes an impending factor in transporting patients, the cost of the ambulance service remains another challenge.

Cost of Ambulance Service

The cost of ambulance service was highlighted in our qualitative findings to be a challenge that often hinder dengue patients from seeking further medical care in a secondary or tertiary hospital despite being formally referred by a medical officer. In interviews, three healthcare professionals mentioned as;

"…Some can't afford it, and don't dare to go to big hospitals..." (Medical Officer, KII2)

"…Sometimes patients are unwilling to go due to financial reasons…" (Senior Nurse, KII5)

"...sometimes, poor patients can't pay the fare..." (Support staff, KII9)

These statements reveal that healthcare professionals are referring patients, however some of them cannot afford the ambulance fee which worsens their medical conditions as they don't transit quickly to get urgent medical attention. Furthermore, it is seen that these patients are from low socioeconomic status, have insufficient money, and possess a lack of knowledge on health-seeking practices. Having this issue on the cost of ambulance service being discussed during the interview, a question was posed on why ambulance service is not free, one of the UHC staff members responded as;

"… there is no separate budget for hospital transport costs..." (Support staff, KII9)

This reveals that the UHC is experiencing financial constraints which have left this service not being prioritized, whilst still imposing a fee that has disadvantaged patients who cannot afford it. As all these transport issues are being revealed, another main challenge posed is the lack of professional escort.

Lack of Professional Escort

Our findings identified that there are no escort nurse or medical officer who can provide referral care while transporting the patients to the next point of care. During interviews, two healthcare professionals mentioned that patients' lives were sometimes at risk as there were no medical professionals who could accompany them during the ambulance transfer from Savar UHC to the hospitals in Dhaka. They further stated;

"The main challenge is lack of accompanying staff, only the driver goes …" (Administrative officer, KII7)

"The patient's guardian goes alone, there is no doctor..." (Support staff, KII9)

The above description suggests that only the driver and the guardian or relatives accompany patients during the referral, however, there is no nurse or medical officer who travels with the patient to provide medical care if a patient needs urgent medical attention. This shows that the ambulance service provided by Savar UHC lacks this component of having an escort nurse or medical officer available during referrals.

Lack of Communication

Lack of Feedback System

Participants have reported that no feedback system is in place to provide an update of the status of dengue patients who have been referred from Savar UHC to secondary or tertiary care hospitals in Dhaka. During one of the interviews, an medical officer at Savar UHC explained that the current scenario is that patients are being referred to the hospital with their referral slips or forms, and after that, there no communication takes place between the Savar UHC and the receiving hospital. Two healthcare professionals shared;

"… we don't have any tracking system for where the patient went after being referred…" (Office Assistant, KII7)

"There is no communication between Savar UHC and the Hospitals…" (Medical officer, KII3)

These statements simply indicate that there is no feedback communication system that exists to allow the receiving hospital to update the UHC on the progress of the referred patient and his or her medical care plan. On the same note, a staff member from the Savar UHC reported that it would be better if there was a system to give information that our patients are progressing well in receiving care at the hospital however it is still impossible. According to another medical officer:

"No such system has been developed for feedback communication…" (Medical officer, KII1)

Again, this emphasizes a need for feedback to be developed to ensure healthcare professionals at the UHC know the status of their patients from any medical staffs at the referring hospital. They can keep constant communication from time to time and collaboratively work together to enhance the care given to the

referred patients. Another challenge is pre-referral communication which is an important element in ensuring receiving hospitals are prepared accordingly to receive severe dengue cases.

Pre-referral Communication

During the interviews it was revealed by one of the officers of Savar UHC that they don't communicate with the receiving hospital before referring a patient, instead, they just refer as they intend to do with the thought that their patients must arrive and receive care as quickly as possible. The admin staff further elaborated that the receiving hospital comes to know about the referral as soon as the patients arrive at the hospital.

> "…They find out after we arrive, there is no communication before the referrals we made…." (Administrative officer, KII9)

This statement shows that there is a lack of pre-referral communication between the medical officer at Savar UHC and the receiving hospital. This poses a greater risk to the conditions of the patient especially for those severe dengue patients who should receive timely treatment, which can be fatal if not treated quickly. Whilst considering lack of communication as a barrier in the referral process for dengue patients, the qualitative findings highlight another barrier which is lack of training on referral protocols.

Lack of training on referral protocols

In our qualitative findings, one clinical staff shared that there is no training on referral protocols with integration into any emergencies either for dengue cases or other medical conditions or even trauma. During that interview, the participant clearly stated as;

> "…We do not have any training related to referrals…" (Medical officer, KII2)

This quote explains that healthcare professionals have not received any training and lack the skill on how a referral process looks like, and how to follow the steps involved in a referral protocol, to implement a successful patient referral. Another medical officer stated;

> "…Yes, they need training, particularly on what ideal clinical patient management should look like…" (Medical Officer, KII4)

This statement particularly highlights that there is a need for training on referral protocol with integration to all diseases clinical protocol like dengue, tuberculosis, diabetes etc. This would foster

specific skills and knowledge regarding how and when patients with different diseases or medical conditions should be referred. In this regard, lack of training on referral protocols is a barrier in the referral process. Other resource constraints including staff shortage, insufficient medical equipment, and inadequate infrastructure are also factors that hinder timely and effective referral.

Resources Constraints

Shortage of Healthcare Professionals

In the informant interviews, the shortage of nurses and medical officers was reported to be a factor in the referral process for dengue patients. It was mentioned in the interviews that there aren't enough healthcare professionals to serve the needs of Savar's growing population. Of the nine healthcare professionals interviewed, two of them stated as;

> "…There is also a shortage of MBBS doctors..." (Medical officer, KII1)

> "…We always strive to provide the best care possible, but given the dense population…" (Office Assistant, KII8)

These quotes show that due to a shortage of staff, dengue patients have received low quality care, which has resulted in having them referred, due to the worsening of their conditions. Furthermore, these statements point out that the dense population of Savar has burdened the primary healthcare services provided and outnumbered the amount of healthcare professionals currently employed. Also, during one interview, another medical officer shared;

> "...additional manpower specific to Savar UHC's context are crucial..." (Medical officer, KII4)

Again, this quote strongly reveals the need for more healthcare professionals to be recruited in Savar UHC to address the issue of staff shortage and improve the quality of care. Considering the issue of staff shortage, insufficient medical equipment adds up together as these resource constraints tend to create barriers in the referral process.

Insufficient Medical Equipment

During the qualitative interviews, insufficient medical equipment was reported to be an important factor that caused more referrals of dengue patients to secondary and tertiary hospitals. Specifically, Savar UHC lacks sufficient diagnostic tools to assess and find plasma leakage for dengue patients during blood sampling. Again, three officers from the nine mentioned;

"If we have more patients, we cannot provide quick results. We can only process them until a certain point, but after that, we cannot take any more…" (Medical officer, KII3*)*

"…Depending on the hospital's equipment and the patient's needs, if we can't manage the situation, we refer them…" (Senior Nurse, KII6)

"…Not all the required equipment is available..." (Office Assistant, KII8)

These statements reveal that Savar UHC lacks sufficient medical equipment in comparison to high demand from the patients; this increases referrals and overburdens the receiving hospital. From this perspective, inadequate infrastructure and lack of capacity appear as conjoint factors that also hinder the referral process.

Inadequate Infrastructure

As per the qualitative findings, it was remarked that inadequate infrastructure, specifically insufficient rooms and spaces create an accommodation issue for dengue patients who are admitted. It was reported that when all wards in the UHC are fully occupied, patients are referred to other hospitals. Three healthcare professionals shared;

"…Some patients also request a cabin, but we only have two, and they're not always available…" (Senior Nurse, KII6)

"…We need to explain to the patient's relatives that the patient should go to another place with better facilities, especially if our hospital lacks certain facilities…" (Admin officer, KII7)

"…If we lack the necessary facilities, we must refer patients…" (Senior Nurse, KII5)

The above description suggests that patients are no longer being referred due to their condition, but due to limited rooms and the wards. This emphasizes a great need to expand the spacing capacity of the Savar UHC, especially by increasing the number of rooms and wards to accommodate more patients. In light of all these barriers impacting the referral process among dengue patients, Savar UHC continues to make direct referrals to all Specialized hospitals in Dhaka City.

Mode of referral

Savar UHC makes direct referrals to government tertiary hospitals in Dhaka City as plainly reported in our interviews. For dengue patients, most referrals were brought to the Dengue DNCC Hospital in the

Mohakhali area, Dhaka. During the interviews, three of the nine healthcare professionals similarly mentioned;

> "…We only refer to government hospitals, such as Dhaka Medical or Suhrawardy, through our system…" (Medical officer, KII1)

> "…We referred patients to Dhaka Medical, Suhrawardy Medical, and Mugda Medical. Mainly to government hospitals…" (Support staff, KII9)

> "…If more treatment is needed, we refer to private hospitals like Dhaka Medical College, Solimullah Medical, or Orthopedics…" (Office Assistant, KII8)

The quotes above reflect that Savar UHC is providing direct referrals to various hospitals in Dhaka city depending on the type of diseases or medical conditions. Thus, the KII findings prove that the referral process is being maintained to a limited extent, however, all identified barriers tend to hinder the referral process of dengue patients.

Quantitative Survey Results

Level of Satisfaction: Referral Process

The survey was completed by 36 patients' (n=36). Few questionaries have merged to represent various key areas of the referral system. The Likert Scale data are shown in Table 3. The responses of 36 participants are represented as the level of satisfaction under these themes as the overall referral process, referral communication, and quality of care. For the overall referral process, 16.67 % are very satisfied, 61.11% are satisfied, 5.56% are unsure, 13.89% are dissatisfied and 2.78% are very dissatisfied. In terms of the overall referral communication between Savar UHC and other receiving health facility, 8.33% are very satisfied, 11.11% are satisfied, 47.22% are unsure, 25.00% are dissatisfied and 8.33% are very dissatisfied. Ultimately, the rating for the quality of care seen through the referral process depicts that 8.33% are very satisfied, 55.56% are satisfied, 19.44% are unsure, and 16.67% are dissatisfied.

Table 3: *Frequencies & Percentage of the Likert Scale Survey Questionnaire on identified Key Areas of the referral Process*

Question Item	**Very Satisfied**	**Satisfied**	**Unsure**	**Dissatisfied**	**Very Dissatisfied**

	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Referral Process How satisfied are you with the referral process at the UHC?	6 (16.67%)	22 (61.11%)	2 (5.56%)	5 (13.89%)	1 (2.78%)
Referral Communication How are you satisfied with the communication about your referral between the UHC and the Hospital?	3 (8.33%)	4 (11.11%)	17 (47.22%)	9 (25.00%)	3 (8.33%)
Quality of Care How satisfied are you with the overall quality of care received through the referral system from the UHC to the Hospital?	3 (8.33%)	20 (55.56%)	7 (19.44%)	6 (16.67%)	-

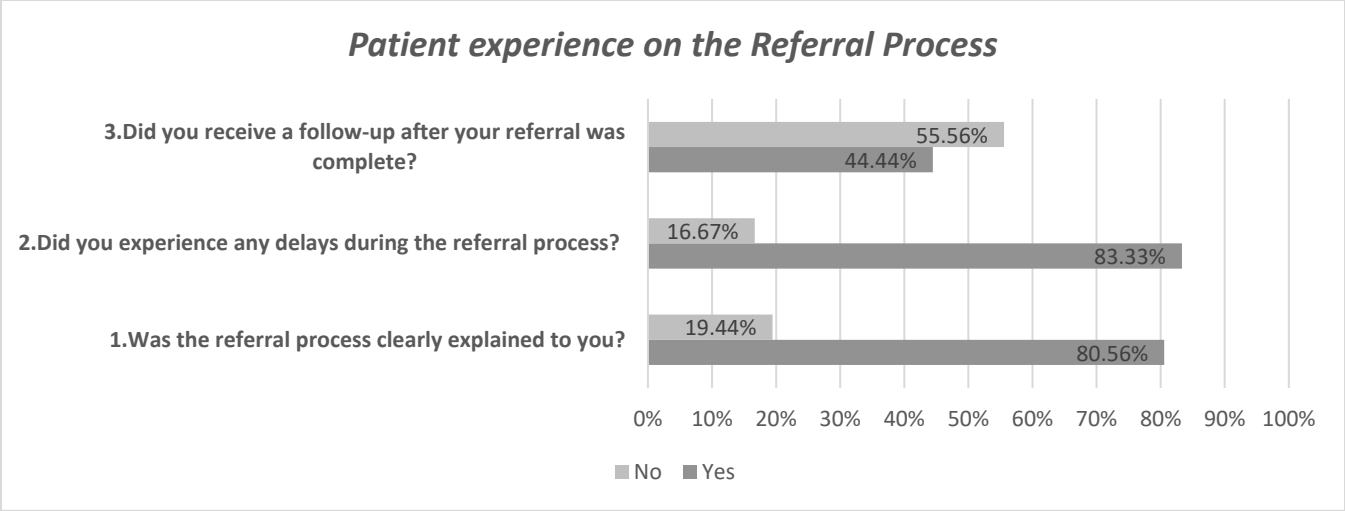

***Figure 3**: Perceived Patient experience on the Referral Process*

This graph shows the experiences of the patients in few situations they faced during their referral at Savar UHC to tertiary hospitals in Dhaka city. Significantly, of the 36 responses 16.67% experience a form delay in the referral process. 55.56% did not receive a follow-up after their referral was complete. Furthermore, 19.44% of the 36 referred patient affirms that the referral process was not explained to them. This quantitative finding shows that a quarter of these referred patient tend to face a form barrier posed by the healthcare provider.

Merged Findings

There are few correlations between the health system barriers found in the qualitative findings and the experiences quantified in the quantitative survey. Exclusively, for referral communication, it is reported that 25.00% and 8.33% of the 36 referred patients were dissatisfied and very dissatisfied. This correlates with Lack of prereferral communication reported by the healthcare professionals. Due to lack of prereferral communication more patients are dissatisfied with the overall referral communication. Furthermore, it is reported that 44.44 % of the referred patient did not receive any follow-up after completing their referral. This affirms that the lack of a feedback system has caused this percentage of referred patients to be lost to follow-up. Additionally, of the 36 responses 16.67% of the referred patients were dissatisfied with the quality of care. This is linked to the shortage of healthcare professionals, insufficient medical equipment, and inadequate infrastructure, these constraints decrease the quality of care offered to patients. What's more is that 16.67% of the 36 patients reported experiencing form of delay during their referral, solely the main delay is the shortage of ambulances which is a transport-related challenge and lack of training on referral protocols as clearly revealed by the healthcare professionals.

Ultimately, both quantitative and merged findings remain significant and strongly support qualitative findings which is the health system barriers of dengue management at Savar UHC.

Discussion

In this study, we identified health-system barriers that affect the referral process for dengue patients at Savar UHC, Dhaka Bangladesh. Our study involved healthcare professionals and dengue patients who have been referred to a secondary or tertiary hospital. It was revealed that lack of transportation was a barrier that hindered referred patients at Savar UHC from accessing treatment at secondary and tertiary hospitals in Dhaka. Specific findings highlighted by healthcare professionals pointed out that the shortage of ambulances has affected the timely transfer of dengue patients to seek urgent medical attention. This finding is supported by a similar study in Tanzania and Ghana that highlighted that the lack of hospital ambulances has become a hindrance for women with obstetric complications to accessing tertiary hospitals to receive timely medical treatment (Danels and Abuosi, 2020; Mselle et al, 2021:). Also, another study in Malawi by Kaunda et al (2021) reported that the availability of ambulance service as part of the referral transport system has impacted the under-five sick children to accessing timely medical care. Whilst noting this challenge, our study identified the lack of escort nurses or medical officers as another important barrier in Savar UHC. It was revealed that no nurse or medical officer accompanies patients during dengue referrals, this has created greater health risks for these patients while traveling. A study in Uganda identified that a lack of professional escort for emergency maternal referrals has an impact on the health of pregnant mothers during the transit (Kanyesigye et al, 2022). As this challenge is considered, the cost of ambulance service remains another burden that often prevent dengue patients from seeking appropriate medical attention at secondary or tertiary hospitals, as a similar study in Malawi highlights cost of transport hinders school-age children in access malaria treatment (Mhango et al, 2023). Furthermore, it was revealed that patients from low socioeconomic status need a free ambulance service which is still not deliberated by the management of Savar UHC.

Communication is a vital element in any referral process, our findings revealed that there is a lack of feedback system between Savar UHC and the receiving hospital. When dengue patients are referred to a secondary or tertiary hospital, there is a system that allows referring medical officers to receive an update on the status of the patients after he or she arrives at the receiving hospital. Similar Studies in Ghana and Ethiopia pinpoints the same challenge, where the lack of a feedback system remains a barrier that disrupts the emergency neonatal and obstetrics referral system (Ofosu, 2021; Teklu et al, 2020). In considering

lack of communication as a barrier, it's not only the lack of a feedback system but it is also the lack of pre-referral communication that was found in our study that poses a risk to the patient's condition. Pre-referral communication allows the receiving hospital to prepare and provide immediate medical attention upon the arrival of the referred patient. Thes communication element was found to be lacking in Savar UHC. A study in North India found that the absence of pre-referral communication was a crucial factor that led to death among pediatric emergencies observed in tertiary hospitals (Praveen, Nallasamy & Kumar, 2019). More interestingly, our quantitative survey findings show that among the 36 referred dengue patients, 25.00% are dissatisfied and 2.78% are very dissatisfied with the referral communication between UHC and the Hospital. These findings are supported by the study of Benson, Benson, and Luke (2019) in Zambia which found that 20% of the Healthcare workers (HCWs) interviewed highlighted that lack of feedback from referrals remains a common communication challenge in the maternal referral system.

Our study found that lack of training on referral protocol becomes another barrier in the referral process of dengue patients. It was revealed that the healthcare professionals at Savar UHC have not received any training and they lacked skills in initiating a successful patient referral. Mengist et al. (2024) highlighted that the lack of necessary referral skills has affected the maternal referral system for obstetric mothers in eastern Ethiopia. Similar studies that support this finding was conducted in South Africa and Nigeria, and observed that lack of training remains a staff capacity-related challenge that prohibits healthcare professionals from recognizing the need for patients to be referred appropriately (Matolengwe, Murray & Okafor, 2024; Toyin et al, 2024). As a consequence, dengue patients are not accessing urgent medical attention simply because nurses or medical officers aren't trained on referral protocols. Our quantitative survey reports that 16.65% of 36 referred patients have experienced a form of delay during the referral process. This can be a form of delay where the patients are not being assessed and not being referred on time simply because there is no training on referral protocol.

Insufficient medical equipment, inadequate infrastructure and a shortage of health workforce tend to become the main factors that affect the effective management and referral of dengue patients in Savar UHC. It is revealed that patients are referred to hospitals in Dhaka for further diagnostic investigation like blood tests to assess plasma volume, especially for dengue. Risky & Nofitasari (2017) found that lack of equipment has become an implementation barrier in the community health center referral system in Indonesia, the study further identifies that there was an increase in patients' referrals to higher health facilities as the community health centers face insufficient and limited supply of medical equipment.

Furthermore, our study found that when the hospital wards are fully occupied with no rooms spared, most dengue patients are referred to other hospitals so they can be accommodated and continue their treatment. Again, this finding is supported by Shrestha et al. (2024) who pointed out that health system factors like lack of diagnostic facilities and unavailability of beds tend to affect the referral system of cardiovascular disease (CVD) cases in Nepal. In Malawi, a study by Chitsa (2019) pinpoints that the shortage of skilled healthcare providers has led to reduced quality of care provided to patients, this a similar experience was faced by dengue patients and was even made known by healthcare professionals in Savar UHC. Similar studies explored that limited maternity healthcare providers as become provider-side characteristic that caused more referrals to be made from the primary health facility to the regional hospital (Grand-Guillaume-Perrenoud, Origlia & Cignacco, 2022 ; Salemani et al, 2024), this is the same scenario that occurs in Savar UHC where dengue patients are referred due to insufficient manpower .Thus, the constraint of insufficient medical equipment, inadequate infrastructure and shortage of health workers remains a barrier that disrupts the dengue referral system. Despite the direct referrals made by healthcare professionals at Savar UHC, both our findings and other studies clearly shows that that health system related factors still impair and disrupts an effective referral system for all diseases and conditions.

Study Strengths and Limitations

This study provides information on the barriers affecting the dengue referral system at Savar UHC in the division of Dhaka, Bangladesh. From real insights from healthcare professionals and the shared experiences of the patients, this study fosters an understanding of how health system factors affect the referral process of dengue patients in seeking higher medical care at secondary and tertiary hospitals. This study contributes to the body of knowledge on the challenges of dengue management in LMICs like Bangladesh, and more specifically in primary healthcare settings like in the Upazila health complex. There several limitations in this study. Firstly, the study site is single, thus the results generated by this study cannot be generalized for all the other UHCs in Bangladesh. The quantitative component of our study gathered information from only 36 patients about their experience with the referral process which partially represents the population of Savar. Another main limitation includes time and resource constraints, these have shorter the data collection phase of this study. This study expresses the need for quantitative studies to be conducted, specifically quantifying the health system barriers and generating statistical analysis. Furthermore, another mixed method study can be conducted to explore, examine and correlate health workers and patients' perceptions and experiences on the referral process.

Recommendations

Based on our findings we recommend that there must be a referral management policy and standard medical referral guideline to be developed for all government healthcare facilities in Bangladesh including the UHCs. The referral management policy ensures there is a built framework that illustrates a health service referral pathway that starts from the community clinic, links to the union subcenter, UHC, district hospital and the medical college and specialized hospital. This pathway must align with the different administrative structure of government in Bangladesh that includes unions, thanas or wards, upazilas, districts and divisions. The policy will also foster working collaboration with other government agencies like Ministry of Transport, Ministry of Education, Police, City Corporations etc. Most importantly, the policy will initiate a financing mechanism for innovative development in strengthening the referral system, like developing an GPS-referral communication system that can be operated as a computerized application that will be install in all ambulances and linked to hospitals. Such development will foster better pre-referral communication between initiating health facility and prepares receiving hospitals to provide timely medical attention.

The standard medical referral guideline, will be used in harmony with all other disease treatment guidelines like the dengue treatment protocol. The guideline will give practical direction for all healthcare professionals to refer patients to the right the health facility, following the right procedures and in accordance to severity of their medical condition. For instance, if a UHC receives a severe dengue patient, the guideline will direct the medical officer to refer that patient to a district hospital in that administrative districts, and further referrals can be made with strict adherence to the referral guideline. This ensures smooth referral process, avoid bypassing of health facilities and overburdening of hospitals.

Importantly, it is also our recommendation that the Ministry of Health and Family Welfare must work in collaboration with international development partners to invest in short-term and long-term development for healthcare facilities. This may ensure new infrastructure projects can be initiated like the refurbishment and extension of hospital wards, increasing spacing capacities, additional beds installed and purchasing of new ambulances. Specially for Savar UHC, it is our strong commendation that annual budgetary allocation for must be increase to meet the growing population of Savar and other neighboring wards. These funds will ensure an efficient operation of health services and ensuring more dengue prevention programs will be implemented like distribution of treated bed nets and primary school advocacy campaigns. By then, manpower shortage will be also addressed as more skilled health workers will be

recruited and paid. Finally, additional medical equipment like Blood volume Analyzers and other dengue diagnostic test instruments should be procured and utilized accordingly.

Conclusion

The dengue referral system in Bangladesh remains fragile due to health system barriers such as shortage of ambulances, costs of ambulance service, lack of professional escort, poor communication between UHCs and the higher-level healthcare facilities, lack of training among healthcare professionals, and inadequate diagnostic and equipment facilities at the UHCs. Addressing these factors through policy changes and full implementation of programs at both national and local levels health authorities will benefit dengue patients, specifically ensuring that these patients receive advanced medical care at secondary and tertiary hospitals would contribute to a reduction of dengue-related mortality and morbidity rates without facing systematic challenges. All in all, these policy changes and program implementation will ultimately strengthen the dengue referral system in Bangladesh.

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Annex 1

CODE BOOK FOR THEMATIC ANALYSIS			
Theme	**Subtheme**	**Definitions**	**Examples**
Transport-related Challenges	Shortage of Ambulances	Healthcare Professional mentions that Savar UHC has one ambulance and during multiple referrals, one ambulance cannot cater for all referrals	"… there's an ambulance shortage when 2-3 patients need to be referred simultaneously. We have only one ambulance..." (Support staff, KII7)
	Cost of Ambulance Service	Healthcare Professional reveals that the cost of ambulance service is not affordable for some patient	"...sometimes, poor patients can't pay the fare..." (Support staff, KII9)
	Lack of Professional Escort	Healthcare Professional reveals there is no trained personals, nurse or doctors who accompanies the patient during referral	"The main challenge is lack of accompanying staff, only the driver goes …" (Administrative officer, KII7)
Lack of Communication	Lack of Feedback System	Healthcare Professional reveals that there is no system that updates Savar UHC from the receiving hospital after a patient has been referred	"… we don't have any tracking system for where the patient went after being referred…" (Office Assistant, KII7)
	Lack of Pre-referral Communication	Healthcare Professional reveals that there is no communication done between Savar UHC and the receiving hospital before a patient referral	"…They find out after we arrive, there is no communication before the referrals we made…." (Administrative officer, KII9)
Training	Lack of training on referral protocols	Healthcare Professional reveals that there is no training about how referrals should be done in context of different disease treatment guidelines	"…They do not have any training related to referrals…"

			(Medical officer, KII2)
Resources constraints	Shortage of Skilled health Professionals	Healthcare Professional reveals that there is shortage of Skilled health Professionals that causes referrals to be made	"…There is also a shortage of MBBS doctors..." (Medical officer, KII1)
	Insufficient Medical Equipment	Healthcare Professional reveals that there is Insufficient Medical Equipment that causes referrals to be made	"…Depending on the hospital's equipment and the patient's needs, if we can't manage the situation, we refer them…" (Senior Nurse, KII6)
	Inadequate Infrastructure	Healthcare Professional reveals that there is Inadequate Infrastructure that causes referrals to be made	"…Some patients also request a cabin, but we only have two, and they're not always available…" (Senior Nurse, KII6)
Mode of referral	Direct Referral	Healthcare Professional reveals that there are direct referrals made from Savar to various tertiary hospitals with patients given referral slips	"…We referred patients to Dhaka Medical, Suhrawardy Medical, and Mugda Medical. Mainly to government hospitals…" (Support staff, KII9)