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Applying the Three Delays Model to understand emergency care seeking and delivery in rural Bangladesh: a qualitative study

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3 **Applying the Three Delays Model to understand emergency care seeking and delivery in**
4 **rural Bangladesh: a qualitative study**
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ABSTRACT

Objectives: The Three Delays Model has been commonly used to understand and prevent maternal mortality but has not been systematically applied to emergency medical conditions more generally. The objective of this study was to apply the Three Delays Model to identify delays in emergency medical care seeking and delivery in rural Bangladesh and factors contributing to these delays.

Design: A qualitative approach was used. Data was collected through focus group discussions and in-depth interviews using semi-structured guides. Two analysts jointly developed a codebook iteratively and conducted a thematic analysis to triangulate results.

Setting: Six unions in Raiganj sub-district of Bangladesh.

Participants: Eight focus group discussions with community members (n=59) and eight in-depth interviews with healthcare providers

Results: Delays in the decision to seek care and timely receipt of care upon reaching a health facility were most prominent. The main factors influencing care-seeking decisions included ability to recognize symptoms and decision-making power. Staff and resource shortages and lack of training contributed to delays in receiving care. Delay in reaching care was not perceived as a salient barrier. Both community members and healthcare providers expressed interest in receiving training to improve management of emergency conditions.

Conclusions: The Three Delays Model is a practical framework that can be useful for understanding barriers to emergency care and developing more tailored interventions. In rural Bangladesh, training community members and healthcare providers to recognize symptoms and manage acute conditions can reduce delays in care seeking and receiving adequate care at health facilities.

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3 **Keywords:** Emergency care, Three Delays Model, Bangladesh, Qualitative research
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Strengths and limitations of this study

- This is one of few studies to apply the Three Delays Framework to the broader context of emergency medical conditions
- Purposive sampling of sub-groups of community members and healthcare providers facilitated data triangulation
- Participants were identified by local community leaders and their views may not be representative of all potential participants
- Due to logistical constraints, data was collected in only six of nine unions, potentially limiting generalizability

INTRODUCTION

Twenty four million deaths related to emergency medical conditions occur in low and middle-income countries (LMICs) annually, accounting for an estimated 1,023 million disability-adjusted life years (DALYs) and 932 million years of life lost(1). This includes both communicable and non-communicable diseases, with ischemic heart disease and cerebrovascular disease causing the highest mortality burden, and unintentional injuries causing the most DALYs(1). In Bangladesh, stroke and ischemic heart disease are the leading causes of death(2). Additionally, unintentional injuries contribute to a large burden of premature death. For instance, drowning(3) and road traffic injuries(4) result in substantial morbidity and mortality. Road traffic injuries exert a particularly high burden in rural Bangladesh and largely impact individuals between the ages of 25 and 64 years, a highly productive segment of the population(5). This burden could be reduced by improving emergency and acute care seeking and delivery.

Emergency care involves different levels of services, beginning with recognition of symptoms and care provided by laypersons at the scene of the injury or illness episode, and continuing through the care provided in a health facility. The quality and timeliness of care at each level is crucial to survival. The Three Delays Model, originally developed in the context of maternal mortality in low-income settings provides a useful framework to examine factors influencing the timeliness of care(6). According to this model, adverse outcomes from obstetric complications are attributable to three delays between the onset of complications and their ultimate outcome. The first delay is the delay in the decision to seek care, the second delay is related to reaching an appropriate health facility, and the third delay occurs once the patient reaches the health facility and waits to be seen by a medical professional. These delays are in turn influenced by socioeconomic factors, such as wealth and female education, cultural factors

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3 such as beliefs and customs, structural factors such as accessibility of care, and health system
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5 level factors such as quality of care.
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9 While the literature is consistent on the factors influencing the three delays, the relative
10 contribution of each of these delays varies across countries. A study in India(7) found that the
11 first two delays were the main contributors to maternal death, while a study in Malawi(8) found
12 that the third delay contributed the most to maternal death. Another study applied this model to
13 understand care seeking and receipt for children with pneumonia in the Peruvian Amazon and
14 found that the first and third delay were most salient(9). Additionally, differences may exist
15 across regions within countries. In rural areas, complications are more likely to result in adverse
16 outcomes than in urban areas as all three delays in care seeking and delivery tend to be present
17 and exert an interactive effect(7). A study on care seeking for obstetric complications in rural
18 Bangladesh found that socioeconomic factors such as wealth, women's literacy and women's
19 employment contributed to the delay in the decision to seek care, while service factors such as
20 proximity to the health facility and availability of adequate obstetric services at the facility
21 contributed to all three delays(10).
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39 The Three Delays Model has been widely applied to understand maternal mortality but it
40 has not been systematically applied to the context of emergency medical conditions more
41 broadly. This model could serve as a useful framework for developing and evaluating
42 interventions for emergency medical conditions owing to similarities in the factors influencing
43 care seeking and delivery for obstetric emergencies and other emergency medical conditions(11).
44
45 Therefore, the objective of this study was to apply the Three Delays Model to the context of
46 emergency care seeking and delivery in rural Bangladesh. The aims were: (i) to understand the
47 contribution of the three delays to emergency care seeking and delivery in rural Bangladesh and
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3 identify factors influencing each of the delays, and (ii) to obtain recommendations from
4 providers and patients to improve emergency care. Findings can inform interventions aimed at
5 reducing delays in emergency care seeking and delivery and reduce the burden of morbidity and
6 mortality from these conditions in rural Bangladesh.
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15 **METHODS**

16 **Study Setting**

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20 This study was conducted in the Raiganj sub-district of Bangladesh, a predominantly rural area
21 with a population of about 318,000(12). Raiganj is divided into nine unions. In each union, there
22 are multiple community health centers (CHCs), which are the community's primary point of
23 access to formal care. Each union also has one health and family welfare center and child welfare
24 clinic. For higher levels of care, each sub-district has a health complex. The highest level of care
25 is the district hospital, which delivers care in major specialty areas (Figure 1).
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38 **Study Design and Data Collection**

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41 An applied qualitative approach was used for this study, which included focus group discussions
42 (FGDs) with community members and in-depth interviews (IDIs) with healthcare providers. Data
43 collection took place in June 2016. Semi-structured guides were used for FGDs and IDIs. The
44 semi-structured format allowed for probing and follow-up questions to gain more clarity from
45 participants. The interview guides for healthcare providers covered the themes of management of
46 acute conditions in CHCs, services and resources available to manage these conditions, and
47 provider perceptions of community members' awareness of where and when to seek care for
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3 emergency conditions. The focus group guide explored community members' perceptions of
4 emergency conditions, how care seeking decisions are made, and access to and availability of
5 care. FGDs and IDIs were conducted in six of the nine unions. Participants were recruited by
6 local community leaders. All FGDs and IDIs were conducted by two local public health field
7 officers from Center of Injury Prevention and Research, Bangladesh (CIPRB). Both officers had
8 significant field experience doing qualitative data collection and contributed to the developing
9 the guides.

10
11
12 Two FGDs were held with each of the following groups of stakeholders: men, women, the
13 elderly, and community leaders, for a total of eight FGDs. In order to provide an open
14 environment where participants felt comfortable sharing their thoughts, the FGDs with each
15 stakeholder group were held separately. Eight IDIs were conducted with different types of health
16 care providers: community health care providers (n=4), family welfare visitor (n=1), sub-
17 assistant community medical officers (n=2) and upazila health and family planning officer (n=1).

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20 The FGDs and IDIs were digitally recorded with permission from participants. Field notes were
21 also taken by the interviewers. All data were collected in Bengali, transcribed verbatim and
22 translated into English for analysis.

23 24 25 **Data Analysis**

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28 Transcripts were analyzed with a thematic approach using Dedoose version 7.6.21
29 (SocioCultural Research Consultants, LLC, Los Angeles, California, USA). Two analysts
30 independently reviewed the transcripts, discussed broad themes that they identified and
31 developed an initial codebook. The same analysts independently coded extracts from multiple

1
2
3 transcripts using the initial codebook and registered an inter-coder reliability score of 0.75. The
4
5 analysts discussed discrepancies in the use of codes to ensure that codes were being applied
6
7 uniformly. As additional themes and sub-themes emerged, the analysts modified the codebook.
8
9
10 The same analysts coded all transcripts using the final version of the codebook. Analytic memos
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12 were used to identify recurring patterns and themes in coded text segments.
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18 **Ethics**

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21 All participants provided informed oral consent. Ethical approval for this study was granted by
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23 the Johns Hopkins Medicine Institutional Review Board and the Ethical Review Committee of
24
25 the Bangladesh Medical Research Council.
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31 **Patient and Public Involvement**

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33 Patients or the public were not involved in the design, or conduct, or reporting, or dissemination
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35 plans of our research
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40 **RESULTS**

41
42 IDIs and FGDs revealed factors across a continuum of care affecting timeliness and quality of
43
44 emergency medical services in rural Bangladesh (Figure 2). Salient themes surrounding factors
45
46 affecting care are organized and presented according to the Three Delays Model:
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52 **Delay 1: Delayed decision to seek care**

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3 For most community members, a clear hierarchy to care seeking existed. The first line of care
4 seeking usually consisted of using home remedies or medications and consulting traditional
5 village doctors or pharmacists at the local neighborhood or “bazaar.” For primary care and what
6 they perceived as “normal” illnesses, community members reported going to CHCs to seek
7 treatment. For more serious issues such as pregnancy, care was usually sought at a health
8 complex, which was perceived to have more staff and services than CHCs. For what they
9 perceived as emergencies, community members reported seeking care at private clinics or
10 hospitals, where they noted, “doctors are available all the time.”
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22 *Q: If any one of you or your family members get sick where do you go first?*

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25 *R: At first, we go to the community clinic, then local pharmacy and if it is getting*
26 *serious than go to the upazila health complex or district hospital. But upazila*
27 *health complex doesn't give good service so most of the time we go to the private*
28 *clinic.*
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35 – Male community member
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38 In addition to perceived severity of illness, proximity, cost and past experiences at health
39 facilities were important factors that determined care seeking decisions.
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42
43 Community members perceived symptoms such as high fever, cold, abdominal pain or fainting
44 to be indicative of “major problems”. They perceived a range of conditions to constitute
45 emergencies, ranging from cuts, burns and poisoning, to drowning, accidents, stroke and heart
46 attacks.
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3 The majority of participants reported that the decision to seek care was made by the head of the
4 household, who was typically the husband. In some cases, family elders such as mothers-in law
5
6 made care seeking decisions.
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10
11 *In our village we are very close to each other, we ask [advice from] one another*
12
13 *and then take a decision where to go; mainly the family head takes the final*
14
15 *decision.*
16

17
18 - Male community member
19

20
21 Decision making around care seeking was found not to be an individual choice, but a
22
23 household-level decision based on perceived seriousness of illness, competing demands, and
24
25 available household resources for transit and care.
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27

28 29 30 31 **Delay 2: Delayed arrival at health facility** 32

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34 When decisions to seek care were made, participants reported that CHCs were largely accessible
35
36 for most community members. A few participants reported that delays in transportation made it
37
38 difficult to quickly reach higher-level health facilities in the event of an emergency condition,
39
40 but most participants said that transportation was not an issue and several modes, such as
41
42 rickshaws and vans were available. Distances to hospitals varied depending on the union. In
43
44 some unions, hospitals were between 3-5 kilometers away from the village and took
45
46 approximately 15-20 minutes to reach, but in some unions, the nearest hospital was 10-20
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48 kilometers away and took more than an hour to reach.
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3 *If any accidental patient is very serious then they directly go to the hospital,*
4
5 *because they know we can't handle that.*
6
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8 – Healthcare provider
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10
11 Community members mostly rely on arranging their own transportation to health facilities.

12
13 According to CHC providers, patients had good knowledge and awareness of where to seek care
14
15 but for some patients, distance and cost could be barriers in this setting.
16
17

21 22 **Delay 3: Delayed provision of adequate care**

23
24 CHCs represent the first point of entry in to the formal healthcare system. However, CHC
25
26 providers explained that they were only able to provide basic first aid for injuries and accidents.
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29 In case of more complex conditions, they referred patients to the nearest hospital or health
30
31 complex as they either lacked the training, equipment or manpower to manage emergency
32
33 conditions.
34

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37 *Mainly we give first aid treatment and health education for diarrhea, fever, cold*
38
39 *etc. If any patient came with a serious problem then we referred them to the*
40
41 *health complex for better treatment.*
42
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44 – Healthcare Provider
45

46
47 CHCs varied in terms of number of staff members available during working hours, ranging from
48
49 one to four individuals. CHCs had a mix of office-level and field-level staff and specialized
50
51 providers such as gynecologists were not commonly reported. CHCs reported carrying medicines
52
53 and supplies for basic first aid, family planning, pregnancy-related supplementation and common
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3 illnesses such as fever. However, stock outs were common and community members indicated
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5 that people got medicines “depending on availability.”
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9 Most CHCs were equipped with basic equipment such as blood pressure machines and
10
11 glucometers, with some exceptions. While more sophisticated medical equipment such as
12
13 nebulizers and x-ray machines were available in the upazila health complex, lack of training and
14
15 infrastructure were barriers to their utilization within clinics.
16

17
18 *“We have an operation room but it’s not used, we need a surgeon and anesthetist*
19
20 *for that. We have x-ray machine but it is not working.”*
21
22

23
24 - Healthcare provider
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27 Clinic staff reported that CHCs were open six days a week, for approximately six hours each
28
29 day. However, according to community members, CHCs are open only for four to five days a
30
31 week, for about three to four hours each day. A community elder remarked: *“if we go to the*
32
33 *clinic after 1 pm, they say it’s closed.”* In contrast, the hospitals were open 24 hours, seven days
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35 a week, but hospitals are farther away from CHCs for most people in need of urgent care.
36

37
38 Upon reaching hospitals, some participants felt that patients were prioritized based on
39
40 connections they had with doctors or ability to pay, which resulted in delays in being seen by a
41
42 healthcare provider and receiving treatment.
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45 46 47 48 49 **Recommendations to improve emergency care**

50 51 52 *Providers*

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3 Providers expressed a need for and interest in receiving more training to handle acute conditions.
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5 They felt that this could help prevent deaths and save time and money for patients. Providers also
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7 felt that patients did not have confidence in their abilities and skills. Providers wanted to learn
8
9 more about management of emergency conditions.
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11

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13 *[We need] gauze, bandage and suturing materials but we have very limited*
14
15 *knowledge on suturing and other subjects. If we get some training on it, then we*
16
17 *can provide a better service*
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21 – Healthcare provider 1
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23
24 *“Emergency management of acute care, acute MI (myocardial infarction), near*
25
26 *drowning, shock – this type of management training we need the most. Sometimes*
27
28 *we refer patient for treatment but patient dies on the road. If we can manage it*
29
30 *here, the life can be saved.”*
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33 - Healthcare provider 2
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37 Providers also recommended that the supply of medicines to the CHCs be improved, particularly
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39 for antibiotics, which were often in low supply and expensive for patients to purchase. Other
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41 needs expressed by providers were having more trained staff in CHCs, particularly trained
42
43 doctors, surgeons and assistants and better infrastructure.
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45

46 47 48 49 *Community members* 50

51
52 Community members felt that providers at CHCs were insufficiently trained and could only
53
54 provide basic primary care. They also felt that providers were not good at diagnosing illnesses
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3 and could only treat “common” diseases such as fever and cold. Another concern was that many
4
5 providers were more invested in their own private practices and therefore did not offer adequate
6
7 care to patients at the CHC. Community members suggested enforcing better regulations over
8
9 doctors with private practices as well as eliminating favoritism towards patients.
10
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12
13 Community members noted cyclical shortages of medicines at the CHCs and felt that better
14
15 monitoring of supply by authorities could address these shortages. They were also concerned that
16
17 providers at CHCs were prescribing unnecessary medications based on what was available rather
18
19 than what was required.
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21

22
23 Like providers, community members felt that more trained staff and equipment was needed at
24
25 CHCs.
26
27

28 *“Because the CHCP (community health care provider) is a man, so he did not*
29 *checkup the women. It’s a problem. If a female doctor or CHCP was available*
30 *here, it will be very helpful. Some don’t want to go to the hospital and they don’t*
31 *go for checkup.”*
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38 - Female community member
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41 Community members were enthusiastic about receiving training to provide first aid and manage
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43 acute conditions. A few women mentioned that they already received training as caregivers,
44
45 known as Anchal Mas, to deliver basic first aid.
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50 *If any children cut his or her hand or leg came to me, I have first aid training*
51 *from CIPRB. I was an Anchal Ma. I have cotton gaze and medicine, so they came*
52 *to me. At first, I clean the wound, then put the bandage*
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– Female community member

DISCUSSION

In rural Bangladesh, delays in the decision to seek care and receiving care at the health facility were barriers to timely management of emergency conditions, whereas delays in reaching health facilities were less of a primary concern due to a tiered health system with multiple levels of care available to most of the population.

Factors contributing to care seeking decisions included proximity to health facility, cost of care, and past experiences receiving care. Also in this context, cultural factors underpin health-related decisions, such as the persistently strong role of traditional medicine as well as the weak decision-making power, particularly for younger women. In this setting, successful interventions to improve emergency care seeking may need to target key decision makers, such as traditional healers, male heads of household, or family elders. For instance, in Mozambique, traditional healers were utilized as part of successful intervention to increase referral rates to health facilities(13).

Another important factor contributing to delayed decisions to seek care was the ability of community members to recognize signs and symptoms of acute conditions. Although community members differentiated between ‘normal’ and ‘emergency’ conditions, basing care seeking decisions on the severity of symptoms is limited by individual capacity to understand what is biomedically urgent. Prior research has shown that the inability to recognize symptoms is a barrier to timely care seeking(7). An important component of a community-based program might include education sessions focused on screening and identifying signs and symptoms of life threatening versus less serious conditions.

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3 Delayed provision of care occurs once the patient reaches the health facility and waits to
4 be seen by a medical professional. Staffing and resource shortages often hinder the delivery of
5 timely and high quality medical care in settings where less than optimal investment in social
6 services results in overwhelmed systems. We found that community members felt that healthcare
7 providers in CHCs lacked sufficient training to provide high quality acute care, thus contributing
8 to delayed decisions to seek care in the future in a negative feedback loop. When individuals
9 sought emergency care at CHCs, they were usually referred to the health complex or hospitals as
10 CHCs lacked the resources and capacity to treat these conditions. This resulted in delays that
11 could be avoided if CHCs received adequate resources and providers are trained in management
12 of emergency conditions. Building capacity of CHC providers in the management of emergency
13 conditions can reduce the need for referrals. Even if referrals are required, better management of
14 emergency conditions at the CHC level can stabilize the patient's condition, improving the
15 likelihood of a favorable outcome once the patient reaches the tertiary healthcare facility. We did
16 find a high level of interest among healthcare providers to receive additional training in
17 emergency care. Therefore, it may be possible to adapt successful emergency care training
18 programs from other similar countries to this setting. Compared to other LMICs where health
19 worker attrition is high(14), rural Bangladesh has a community health worker (CHW) cadre
20 which is prioritized and enjoys relatively good job security; therefore, investments in CHW
21 training may see long-term improvements in health through better care practices and improved
22 patient satisfaction. Improved monitoring and accountability systems are also needed to ensure
23 that CHCs adequately serve patients.

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Other research suggests that the community's delay in mobilizing can be considered a
fourth delay that hinders timely management of emergency conditions(15). In the case of

1
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3 emergency conditions such as drowning or road traffic injuries, even if the decision to seek care
4
5 is made quickly, the delay in mobilizing care from first responders at the scene of the illness
6
7 episode can determine the outcome of the injury. Bystander education and awareness has been
8
9 identified as an important factor influencing this delay and a qualitative study on trauma delays
10
11 for road traffic injury patients in Brazil found that bystander capacity to provide care was
12
13 low(16). Simple interventions at the community level may be highly effective to mobilize first
14
15 responders in low-resource settings. For example, interventions have included training
16
17 commercial drivers in providing first aid(17) and training laypeople to be first responders(18). In
18
19 our study, community members were interested in receiving training in first aid and some had
20
21 already received prior training. Community-based programs have enjoyed much success in
22
23 Bangladesh across a range of health conditions(19). Bangladesh started community-based
24
25 programs to address drowning and these programs have shown an average DALY cost aversion
26
27 of \$362(20). Approaches from these programs can be adapted to develop community-based
28
29 education and training for the management of emergency conditions. In rural Bangladesh,
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31 community mobilization strategies that involve multiple approaches combining education and
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33 training, as well as enhanced community infrastructure may create enabling environments for
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35 improved outcomes from emergency medical conditions.
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43 **Limitations**

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46 Due to road access and weather limitations, data were only collected from six of the nine unions
47
48 in Raiganj. Additionally, participants were identified by local community leaders and their views
49
50 may not be representative of all community members; however, those individuals were sampled
51
52 based on specific criteria we deemed important for answering the research questions and
53
54 purposive sampling is a strength of this type of research.
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3 This study did have several strengths. First, by eliciting the voices of community members and
4 healthcare providers, unique insights were gained that allowed for comparisons between the local
5 and biomedical communities. Second, by including sub-groups of community members (e.g.
6 men, women, elders, and community leaders) and as well as sub-groups of healthcare providers
7 (e.g. doctors, nurses, community health workers), participant triangulation was achieved.
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18 **Conclusions**

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20 In rural Bangladesh, the health system has a far reach through a multi-tiered network of
21 providers. However, delays in deciding to seek care and delays in receiving care at the health
22 facility contribute to adverse outcomes from emergency medical conditions. While better
23 infrastructure and resources are necessary, improvements in emergency care delivery in this
24 setting may be achieved through modest, yet targeted behavior change interventions, such as
25 training of community members and healthcare providers.
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38 **CONTRIBUTORSHIP STATEMENT**

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40 BS conceived the study; BS designed the study protocol; NK and SK carried out the analysis and
41 interpretation of these data. BS, NK and SK drafted the manuscript; GY, KF, KBU, FR and JR
42 critically revised the manuscript for intellectual content. All authors read and approved the final
43 manuscript.
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51 **ACKNOWLEDGMENTS**

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COMPETING INTERESTS

None declared

ETHICAL APPROVAL

Ethical approval for this study was granted by the Johns Hopkins Medicine Institutional Review Board and the Ethical Review Committee of the Bangladesh Medical Research Council.

DATA AVAILABILITY STATEMENT

De-identified transcripts can be requested by emailing the lead author, Bansari Shah (bansarishahmd@gmail.com)

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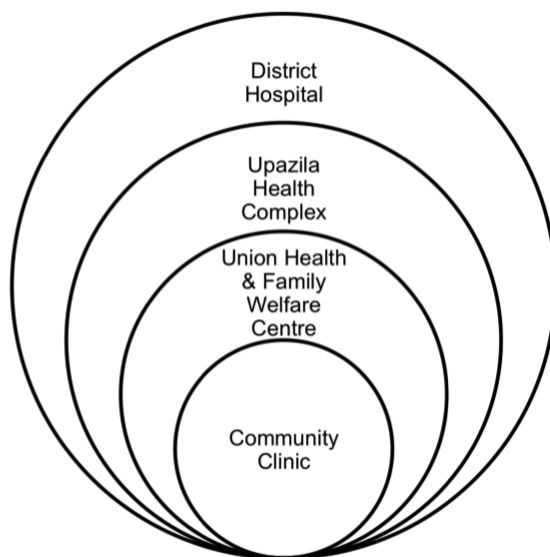
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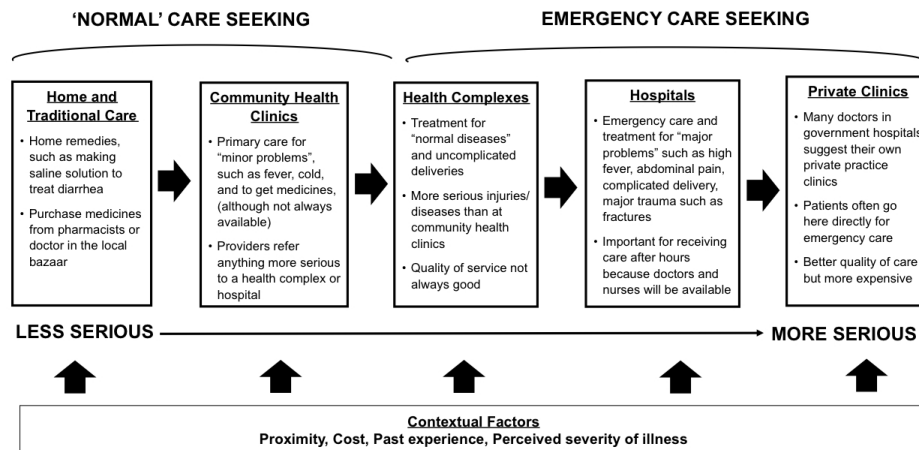
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Structure of the public health system in Bangladesh

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Continuum of care-seeking behavior as explained by community members in rural Bangladesh

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	Topic	Item	Page number
Title and abstract			
1	Title	Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	X
2	Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	X
Introduction			
3	Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Introduction Significance: paragraph 1 Review of empirical work: Paragraph 3 Problem statement: 1 st sentence, paragraph 4
4	Purpose of research question	Purpose of the study and specific objectives or questions	Introduction: end of final paragraph
Methods			
5	Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/interpretivist) is also recommended; rationale	Methods Study design and data collection: applied approach
6	Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Methods Study design and data collection paragraphs 1 and 2
7	Context	Setting/site and salient contextual factors; rationale	
8	Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale	Methods Study setting
9	Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Methods Ethics
10	Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale	Methods Study design and data collection
11	Data collection instruments and technologies	Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Methods Study design and data collection

12	Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	Methods Study design and data collection: paragraph 2
13	Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Methods Study design and data collection: paragraph 3
14	Data analysis	Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	Methods Data Analysis
15	Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale	Methods Data Analysis: use of 2 coders to develop codebook
Results/findings			
16	Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Results: organized and presented using the Three Delays Model
17	Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Results: Quotes provided under each salient theme
Discussion			
18	Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Discussion: paragraphs 1-5
19	Limitations	Trustworthiness and limitations of findings	Discussion: limitations
Other			
20	Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	No competing interests declared
21	Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Funding statement

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Applying the Three Delays Model to understand emergency care seeking and delivery in rural Bangladesh: a qualitative study

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Keywords:	ACCIDENT & EMERGENCY MEDICINE, PUBLIC HEALTH, QUALITATIVE RESEARCH

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3 **Applying the Three Delays Model to understand emergency care seeking and delivery in**
4 **rural Bangladesh: a qualitative study**
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ABSTRACT

Objectives: The Three Delays Model has been commonly used to understand and prevent maternal mortality but has not been systematically applied to emergency medical conditions more generally. The objective of this study was to identify delays in emergency medical care seeking and delivery in rural Bangladesh and factors contributing to these delays by using the Three Delays Model as a framework.

Design: A qualitative approach was used. Data was collected through focus group discussions and in-depth interviews using semi-structured guides. Two analysts jointly developed a codebook iteratively and conducted a thematic analysis to triangulate results.

Setting: Six unions in Raiganj sub-district of Bangladesh.

Participants: Eight focus group discussions with community members (n=59) and eight in-depth interviews with healthcare providers

Results: Delays in the decision to seek care and timely receipt of care upon reaching a health facility were most prominent. The main factors influencing care-seeking decisions included ability to recognize symptoms and decision-making power. Staff and resource shortages and lack of training contributed to delays in receiving care. Delay in reaching care was not perceived as a salient barrier. Both community members and healthcare providers expressed interest in receiving training to improve management of emergency conditions.

Conclusions: The Three Delays Model is a practical framework that can be useful for understanding barriers to emergency care and developing more tailored interventions. In rural Bangladesh, training community members and healthcare providers to recognize symptoms and manage acute conditions can reduce delays in care seeking and receiving adequate care at health facilities.

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3 **Keywords:** Emergency care, Three Delays Model, Bangladesh, Qualitative research
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For peer review only

Strengths and limitations of this study

- This is one of few studies to apply the Three Delays Framework to the broader context of emergency medical conditions
- Purposive sampling of sub-groups of community members and healthcare providers facilitated data triangulation
- Participants were identified by local community leaders and their views may not be representative of all potential participants
- Due to logistical constraints, data was collected in only six of nine unions, potentially limiting generalizability

INTRODUCTION

Twenty four million deaths related to emergency medical conditions occur in low and middle-income countries (LMICs) annually, accounting for an estimated 1,023 million disability-adjusted life years (DALYs) and 932 million years of life lost(1). This includes both communicable and non-communicable diseases, with ischemic heart disease and cerebrovascular disease causing the highest mortality burden, and unintentional injuries causing the most DALYs(1). In Bangladesh, stroke and ischemic heart disease are the leading causes of death(2). Additionally, unintentional injuries contribute to a large burden of premature death. For instance, drowning(3) and road traffic injuries(4) result in substantial morbidity and mortality. Road traffic injuries exert a particularly high burden in rural Bangladesh and largely impact individuals between the ages of 25 and 64 years, a highly productive segment of the population(5). This burden could be reduced by improving emergency and acute care seeking and delivery.

Emergency care involves different levels of services, beginning with recognition of symptoms and care provided by laypersons at the scene of the injury or illness episode, and continuing through the care provided in a health facility. The quality and timeliness of care at each level is crucial to survival. The Three Delays Model, originally developed in the context of maternal mortality in low-income settings provides a useful framework to examine factors influencing the timeliness of care(6). According to this model, adverse outcomes from obstetric complications are attributable to three delays between the onset of complications and their ultimate outcome. The first delay is the delay in the decision to seek care, the second delay is related to reaching an appropriate health facility, and the third delay occurs once the patient reaches the health facility and waits to be seen by a medical professional. These delays are in turn influenced by socioeconomic factors, such as wealth and female education, cultural factors

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3 such as beliefs and customs, structural factors such as accessibility of care, and health system
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5 level factors such as quality of care.
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9 While the literature is consistent on the factors influencing the three delays, the relative
10 contribution of each of these delays varies across countries. A study in India(7) found that the
11 first two delays were the main contributors to maternal death, while a study in Malawi(8) found
12 that the third delay contributed the most to maternal death. Another study applied this model to
13 understand care seeking and receipt for children with pneumonia in the Peruvian Amazon and
14 found that the first and third delay were most salient(9). Additionally, differences may exist
15 across regions within countries. In rural areas, complications are more likely to result in adverse
16 outcomes than in urban areas as all three delays in care seeking and delivery tend to be present
17 and exert an interactive effect(7). A study on care seeking for obstetric complications in rural
18 Bangladesh found that socioeconomic factors such as wealth, women's literacy and women's
19 employment contributed to the delay in the decision to seek care, while service factors such as
20 proximity to the health facility and availability of adequate obstetric services at the facility
21 contributed to all three delays(10).
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39 The Three Delays Model has been widely applied to understand maternal mortality but it
40 has not been systematically applied to the context of emergency medical conditions more
41 broadly. This model could serve as a useful framework for developing and evaluating
42 interventions for emergency medical conditions owing to similarities in the factors influencing
43 care seeking and delivery for obstetric emergencies and other emergency medical conditions(11).
44 Therefore, the aims of this study were: (i) to understand the contribution of the three delays to
45 emergency care seeking and delivery in rural Bangladesh and identify factors influencing each of
46 the delays, and (ii) to obtain recommendations from providers and patients to improve
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3 emergency care. Findings can inform interventions aimed at reducing delays in emergency care
4 seeking and delivery and reduce the burden of morbidity and mortality from these conditions in
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6 rural Bangladesh.
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10 11 12 13 **METHODS**

14 15 **Study Setting**

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18 This study was conducted in the Raiganj sub-district of Bangladesh, a predominantly rural area
19 with a population of about 318,000(12). Raiganj is divided into nine unions. In each union, there
20 are multiple community health centers (CHCs), which are the community's primary point of
21 access to formal care. Each union also has one health and family welfare center and child welfare
22 clinic. For higher levels of care, each sub-district has a health complex. The highest level of care
23 is the district hospital, which delivers care in major specialty areas (Figure 1).
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36 37 **Study Design and Data Collection**

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39 An applied qualitative approach was used for this study, which included focus group discussions
40 (FGDs) with community members and in-depth interviews (IDIs) with healthcare providers. Data
41 collection took place in June 2016. Semi-structured guides were used for FGDs and IDIs
42 (Supplementary File). The semi-structured format allowed for probing and follow-up questions
43 to gain more clarity from participants. The interview guides for healthcare providers covered the
44 themes of management of acute conditions in CHCs, services and resources available to manage
45 these conditions, and provider perceptions of community members' awareness of where and
46 when to seek care for emergency conditions. The focus group guide explored community
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3 members' perceptions of emergency conditions, how care seeking decisions are made, and
4 access to and availability of care. The guides were developed with the help of Center of Injury
5 Prevention and Research, Bangladesh (CIPRB) researchers using the rapid appraisal approach
6 for community health assessments. The guides were developed in English, translated into
7 Bengali and then back translated.

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10 FGDs and IDIs were conducted in six of the nine unions. A purposive sampling strategy was
11 used to elicit perspectives from different groups of community members and different types of
12 healthcare providers. Two FGDs were held with each of the following groups of stakeholders:
13 men, women, the elderly, and community leaders, for a total of eight FGDs (n=59). In order to
14 provide an open environment where participants felt comfortable sharing their thoughts, the
15 FGDs with each stakeholder group were held separately. Eight IDIs were conducted with
16 different types of health care providers: community health center providers (n=4), family welfare
17 visitor (n=1), sub-assistant community medical officers (n=2) and upazila health and family
18 planning officer (n=1).

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21 Community members were recruited by local community leaders. They were chosen based on
22 their involvement in community affairs, availability, and willingness to speak openly. Healthcare
23 providers were recruited by CIPRB researchers. As there are limited healthcare providers in each
24 community, we approached all of those who were available and willing to speak to us. All
25 participants were over the age of 18. All FGDs and IDIs were conducted by two local public
26 health field officers from CIPRB (KF and KBU). Both officers had significant field experience
27 doing qualitative data collection and contributed to developing the guides. The FGDs and IDIs
28 were digitally recorded with permission from participants. Field notes were also taken by the

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3 interviewers. All data were collected in Bengali, transcribed verbatim and translated into English
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5 for analysis. On average, each interview/focus group lasted 30 minutes.
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11 **Data Analysis**

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14 Transcripts were analyzed with a thematic approach using Dedoose version 7.6.21
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16 (SocioCultural Research Consultants, LLC, Los Angeles, California, USA). The analysis
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18 combined an inductive and deductive approach. Two analysts (NK and SK) independently
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20 reviewed the transcripts and jointly developed a codebook, which consisted of some pre-defined
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22 themes as well as additional themes that emerged from the data. The same analysts
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24 independently coded extracts from multiple transcripts using the initial codebook and registered
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26 an inter-coder reliability score of 0.75. The analysts discussed discrepancies in the use of codes
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28 to ensure that codes were being applied uniformly. As additional themes and sub-themes
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30 emerged, the analysts modified the codebook. The same analysts coded all transcripts using the
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32 final version of the codebook. Analytic memos were used to identify recurring patterns and
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34 themes in coded text segments.
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43 **Ethics**

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46 All participants provided informed oral consent. Ethical approval for this study was granted by
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48 the Johns Hopkins Medicine Institutional Review Board and the Ethical Review Committee of
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50 the Bangladesh Medical Research Council.
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Patient and Public Involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research

RESULTS

IDIs and FGDs revealed factors across a continuum of care affecting timeliness and quality of emergency medical services in rural Bangladesh . Salient themes surrounding factors affecting care are organized and presented according to the Three Delays Model:

Delay 1: Delayed decision to seek care

The decision to seek care was influenced by several socio-contextual factors, most notably perceived severity of illness. Community members perceived symptoms such as high fever, cold, abdominal pain or fainting to be indicative of “major problems”. They perceived a range of conditions to constitute emergencies, ranging from cuts, burns and poisoning, to drowning, accidents, stroke and heart attacks.

Greater distances from health facilities, high cost and negative past experiences at health facilities contributed to delays in deciding to seek care. However, perceived severity of illness superseded these other factors. If the illness was perceived to be very severe, participants reported that care was sought immediately regardless of these other factors as this focus group exchange with female community members illustrated:

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3 *Participant 5: During my pregnancy, at the time of delivery my water was broken*
4 *but there was no pain, so we were waiting the whole night and went to the*
5 *Shirajgonj hospital at the morning.*

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11 *Moderator: Your water broke but you wait for morning, why not go to the*
12 *hospital that time?*

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14
15
16 *Participant 5: Because the time was midnight, so we wait for morning.*

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18
19 *Moderator: If these types of emergency arise do you go as soon as possible or*
20 *wait for some time?*

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23
24 *Participant 3: No, no. When her mother-in-law became sick, they took her*
25 *immediately.*

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28
29 Additionally, cultural factors including female decision-making power and role of traditional
30 medicine influenced care seeking decisions. The majority of participants reported that the
31 decision to seek care was made by the head of the household, who was typically the husband. In
32 some cases, family elders such as mothers-in law made care seeking decisions.

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39 *In our village we are very close to each other, we ask [advice from] one another*
40 *and then take a decision where to go; mainly the family head takes the final*
41 *decision.*

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47 - Male community member

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50 Based on these factors, for most community members, a clear hierarchy to care seeking existed
51 (Figure 2). The first line of care seeking, particularly for women, usually consisted of using
52 home remedies or medications and consulting traditional village doctors or pharmacists at the
53

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3 local neighborhood or “bazaar.” For primary care and what they perceived as “normal” illnesses,
4
5 community members reported going to CHCs to seek treatment. For more serious issues such as
6
7 pregnancy, care was usually sought at a health complex, which was perceived to have more staff
8
9 and services than CHCs. For what they perceived as emergencies, community members reported
10
11 seeking care at private clinics or hospitals, where they noted, “doctors are available all the time.”
12
13

14
15 *Q: If any one of you or your family members get sick where do you go first?*

16
17
18 *R: At first, we go to the community clinic, then local pharmacy and if it is getting*
19
20 *serious than go to the upazila health complex or district hospital. But upazila*
21
22 *health complex doesn't give good service so most of the time we go to the private*
23
24 *clinic.*
25
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27
28 – Male community member
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34 **Delay 2: Delayed arrival at health facility**

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37 When decisions to seek care were made, participants reported that CHCs were largely accessible
38
39 for most community members. A few participants reported that delays in transportation made it
40
41 difficult to quickly reach higher-level health facilities in the event of an emergency condition,
42
43 but most participants said that transportation was not an issue and several modes, such as
44
45 rickshaws and vans were available. Distances to hospitals varied depending on the union. In
46
47 some unions, hospitals were between 3-5 kilometers away from the village and took
48
49 approximately 15-20 minutes to reach, but in some unions, the nearest hospital was 10-20
50
51 kilometers away and took more than an hour to reach.
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3 Community members mostly rely on arranging their own transportation to health facilities.
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5 According to CHC providers, patients had good knowledge and awareness of where to seek care
6
7 but for some patients, distance and cost could be barriers in this setting.
8
9

10
11 *If any accident patient is very serious then they directly go to the hospital,*
12
13 *because they know we can't handle that.*
14

15
16 – Upazila health and family planning officer
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25 **Delay 3: Delayed provision of adequate care**

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28 CHCs represent the first point of entry in to the formal healthcare system. However, lack of
29
30 adequate training of providers and shortage of resources and staff contributed to delays in
31
32 patients receiving care at these facilities. CHC providers explained that they were only able to
33
34 provide basic first aid for injuries and accidents. In case of more complex conditions, they
35
36 referred patients to the nearest hospital or health complex to manage emergency conditions.
37
38

39
40 *Mainly we give first aid treatment and health education for diarrhea, fever, cold*
41
42 *etc. If any patient came with a serious problem then we referred them to the*
43
44 *health complex for better treatment.*
45
46

47
48 – Community health center provider
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50

51 CHCs reported carrying medicines and supplies for basic first aid, family planning, pregnancy-
52
53 related supplementation and common illnesses such as fever. However, stock outs were common
54
55 and community members indicated that people got medicines “depending on availability.”
56
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3 Most CHCs were equipped with basic equipment such as blood pressure machines and
4
5 glucometers, with some exceptions. While more sophisticated medical equipment such as
6
7 nebulizers and x-ray machines were available in the upazila health complex, lack of training and
8
9 infrastructure were barriers to their utilization within clinics.
10
11

12
13 *“We have an operation room but it’s not used, we need a surgeon and anesthetist*
14
15 *for that. We have x-ray machine but it is not working.”*
16
17

18 - Upazila health and family planning officer
19
20

21 CHCs varied in terms of number of staff members available during working hours, ranging from
22
23 one to four individuals. CHCs had a mix of office-level and field-level staff and specialized
24
25 providers such as gynecologists were not commonly reported. Clinic staff reported that CHCs
26
27 were open six days a week, for approximately six hours each day. However, according to
28
29 community members, CHCs are open only for four to five days a week, for about three to four
30
31 hours each day. A community elder remarked: *“if we go to the clinic after 1 pm, they say it’s*
32
33 *closed.”* In contrast, the hospitals were open 24 hours, seven days a week, but hospitals are
34
35 farther away from CHCs for most people in need of urgent care.
36
37

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39
40 Additionally, some community members felt that upon reaching hospitals, patients were
41
42 prioritized based on connections they had with doctors or ability to pay, which resulted in delays
43
44 in being seen by a healthcare provider and receiving treatment. Community members also felt
45
46 that shortage of resources such as medications contributed to delays in receiving timely care once
47
48 they reached the health facility:
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3 *“Raigonj hospital has no medicine and Jia medical also has very limited*
4 *medicine. Last week I go to Jia medical college hospital to visit a patient and it*
5 *was a very helpless situation.*

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11 - Community elder
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16 **Recommendations to improve emergency care**

17 *Providers*

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20 Providers expressed a need for and interest in receiving more training to handle acute conditions.
21
22 They felt that this could help prevent deaths and save time and money for patients. Providers also
23
24 felt that patients did not have confidence in their abilities and skills. Providers wanted to learn
25
26 more about management of emergency conditions.
27
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31
32 *[We need] gauze, bandage and suturing materials but we have very limited*
33 *knowledge on suturing and other subjects. If we get some training on it, then we*
34 *can provide a better service*

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37
38 - Community health center provider
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43 *“Emergency management of acute care, acute MI (myocardial infarction), near*
44 *drowning, shock – this type of management training we need the most. Sometimes*
45 *we refer patient for treatment but patient dies on the road. If we can manage it*
46 *here, the life can be saved.”*

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51
52 - Upazila health and family planning officer
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3 Providers also recommended that the supply of medicines to the CHCs be improved, particularly
4
5 for antibiotics, which were often in low supply and expensive for patients to purchase. Other
6
7 needs expressed by providers were having more trained staff in CHCs, particularly trained
8
9 doctors, surgeons and assistants and better infrastructure.
10
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16 *Community members*

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18
19 Community members felt that providers at CHCs were insufficiently trained and could only
20
21 provide basic primary care. They also felt that providers were not good at diagnosing illnesses
22
23 and could only treat “common” diseases such as fever and cold. Another concern was that many
24
25 providers were more invested in their own private practices and therefore did not offer adequate
26
27 care to patients at the CHC. Community members suggested enforcing better regulations over
28
29 doctors with private practices as well as eliminating favoritism towards patients.
30
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33
34 Community members noted cyclical shortages of medicines at the CHCs and felt that better
35
36 monitoring of supply by authorities could address these shortages. They were also concerned that
37
38 providers at CHCs were prescribing unnecessary medications based on what was available rather
39
40 than what was required.
41
42

43
44 Like providers, community members felt that more trained staff and equipment was needed at
45
46 CHCs.
47

48
49 *“We need a full time doctor here for any emergency. In case of any emergency*
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51 *like heart disease, he/she can manage it immediately.”*
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54 - Female community member
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3 Community members were enthusiastic about receiving training to provide first aid and manage
4 acute conditions. A few women mentioned that they already received training as caregivers,
5
6 known as Anchal Mas, to deliver basic first aid.
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11
12 *If any children cut his or her hand or leg came to me, I have first aid training*
13 *from CIPRB. I was an Anchal Ma. I have cotton gaze and medicine, so they came*
14 *to me. At first, I clean the wound, then put the bandage*
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20 – Female community member
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25 **DISCUSSION**

26
27 In rural Bangladesh, we found that several socio-contextual factors influenced care
28 seeking decisions, which could contribute to delays in the decision to seek care. Delays in
29 receiving care at the health facility were also a barrier to timely management of emergency
30 conditions, whereas delays in reaching health facilities were less of a primary concern due to a
31 tiered health system with multiple levels of care available to most of the population.
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39 Factors contributing to care seeking decisions included perceived severity of illness,
40 proximity to and timings of health facilities, cost of care, and past experiences receiving care.
41 Among these, perceived illness severity appeared to be the strongest factor influencing decision-
42 making. Determining severity of an illness episode depends on the ability of community
43 members to recognize signs and symptoms of acute conditions. Although community members
44 differentiated between ‘normal’ and ‘emergency’ conditions, basing care seeking decisions on
45 the severity of symptoms is limited by individual capacity to understand what is biomedically
46 urgent. Moreover, seemingly mild or non-specific symptoms, such as nausea could be indicative
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3 of serious conditions such as myocardial infarctions(13). Prior research has shown that the
4 inability to recognize symptoms is a barrier to timely care seeking(7) and that awareness of
5 symptoms for emergency conditions such as heart attacks and stroke is low (14,15). Therefore,
6 an important component of a community-based program might include education sessions
7 focused on screening and identifying signs and symptoms of life threatening versus less serious
8 conditions.

9
10 We also found that in this context, cultural factors such as the strong role of traditional
11 medicine as well as the weak decision-making power, particularly for younger women underpin
12 health-related decisions. Of all the demographic groups, women were more likely to report first
13 seeking care from the village doctor. This could stem from gender norms in Bangladesh, which
14 dictate that women should remain at home and should be accompanied by men in public spaces
15 (16). As village doctors are located closer to home, it may be easier and more acceptable for
16 women to go to the “bazaar” unaccompanied. In this setting, successful interventions to improve
17 emergency care seeking may need to target key decision makers, such as traditional healers, male
18 heads of household, or family elders. For instance, in Mozambique, traditional healers were
19 utilized as part of successful intervention to increase referral rates to health facilities(17).

20
21 Delayed provision of care occurs once the patient reaches the health facility and waits to
22 be seen by a medical professional. Staffing and resource shortages often hindered the delivery of
23 timely and high quality medical care. We also found that community members felt that
24 healthcare providers in CHCs lacked sufficient training to provide high quality acute care, a view
25 that was echoed by healthcare providers themselves. When individuals sought emergency care at
26 CHCs, they were usually referred to the health complex or hospitals as CHCs lacked the
27 resources and capacity to treat these conditions. This resulted in delays that could be avoided if

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3 CHCs received adequate resources and providers are trained in management of emergency
4 conditions. Building capacity of CHC providers in the management of emergency conditions can
5 reduce the need for referrals. Even if referrals are required, better management of emergency
6 conditions at the CHC level can stabilize the patient's condition, improving the likelihood of a
7 favorable outcome once the patient reaches the tertiary healthcare facility. We did find a high
8 level of interest among healthcare providers to receive additional training in emergency care.
9
10 Therefore, it may be possible to adapt successful emergency care training programs from other
11 similar countries to this setting. Compared to other LMICs where health worker attrition is
12 high(18), rural Bangladesh has a community health worker (CHW) cadre which is prioritized and
13 enjoys relatively good job security; therefore, investments in CHW training may see long-term
14 improvements in health through better care practices and improved patient satisfaction. Improved
15 monitoring and accountability systems are also needed to ensure that CHCs adequately serve
16 patients.

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33 Other research suggests that the community's delay in mobilizing can be considered a
34 fourth delay that hinders timely management of emergency conditions(19). In the case of
35 emergency conditions such as drowning or road traffic injuries, even if the decision to seek care
36 is made quickly, the delay in mobilizing care from first responders at the scene of the illness
37 episode can determine the outcome of the injury. Bystander education and awareness has been
38 identified as an important factor influencing this delay and a qualitative study on trauma delays
39 for road traffic injury patients in Brazil found that bystander capacity to provide care was
40 low(20). Simple interventions at the community level may be highly effective to mobilize first
41 responders in low-resource settings. For example, interventions have included training
42 commercial drivers in providing first aid(21) and training laypeople to be first responders(22). In
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our study, community members were interested in receiving training in first aid and some had already received prior training. Community-based programs have enjoyed much success in Bangladesh across a range of health conditions(23). Bangladesh started community-based programs to address drowning and these programs have shown an average DALY cost aversion of \$362(24). Approaches from these programs can be adapted to develop community-based education and training for the management of emergency conditions. In rural Bangladesh, community mobilization strategies that involve multiple approaches combining education and training, as well as enhanced community infrastructure may create enabling environments for improved outcomes from emergency medical conditions.

Limitations

Due to road access and weather limitations, data were only collected from six of the nine unions in Raiganj. Additionally, participants were identified by local community leaders and their views may not be representative of all community members; however, those individuals were sampled based on specific criteria we deemed important for answering the research questions and purposive sampling is a strength of this type of research.

This study did have several strengths. First, by eliciting the voices of community members and healthcare providers, unique insights were gained that allowed for comparisons between the local and biomedical communities. Second, by including sub-groups of community members (e.g. men, women, elders, and community leaders) and as well as sub-groups of healthcare providers (e.g. doctors, nurses, community health workers), participant triangulation was achieved.

Conclusions

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3 In rural Bangladesh, the health system has a far reach through a multi-tiered network of
4 providers. However, several socio-contextual factors influence care seeking decisions and could
5 contribute to delays in deciding to seek care, while lack of adequate training, and manpower and
6 resource shortages resulted in delays in receiving care at the health facility. Both these factors
7 could contribute to adverse outcomes from emergency medical conditions. While better
8 infrastructure and resources are necessary, improvements in emergency care delivery in this
9 setting may be achieved through modest, yet targeted behavior change interventions, such as
10 training of community members and healthcare providers.
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25 **CONTRIBUTORSHIP STATEMENT**

26 BS conceived the study; BS designed the study protocol; NK and SK carried out the analysis and
27 interpretation of these data. BS, NK and SK drafted the manuscript; GY, KF, KBU, FR and JR
28 critically revised the manuscript for intellectual content. All authors read and approved the final
29 manuscript.
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47 Center for Global Health.
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52 **COMPETING INTERESTS**

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None declared

ETHICAL APPROVAL

Ethical approval for this study was granted by the Johns Hopkins Medicine Institutional Review Board and the Ethical Review Committee of the Bangladesh Medical Research Council.

DATA AVAILABILITY STATEMENT

De-identified transcripts can be requested by emailing the lead author, Bansari Shah (bansarishahmd@gmail.com)

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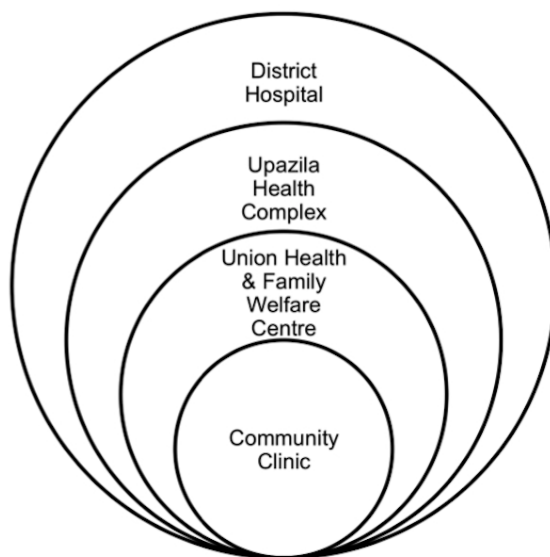
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33 FIGURES

34 **Figure 1:** Structure of the public health system in Bangladesh

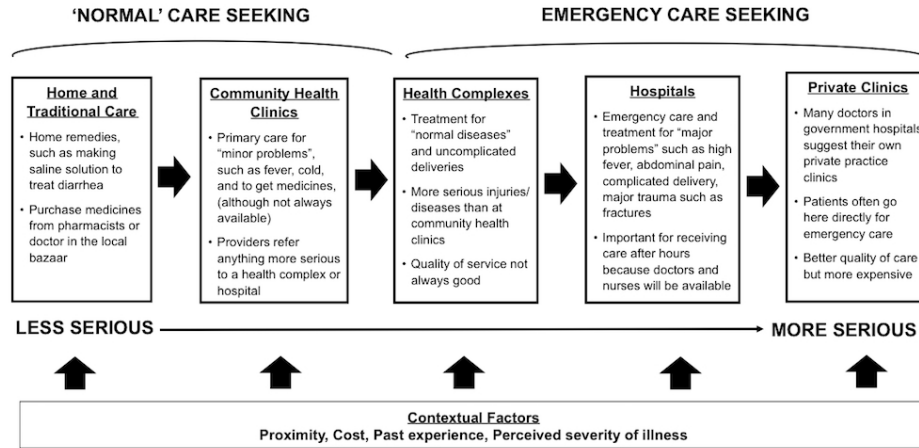
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38 **Figure 2:** Continuum of care-seeking behavior as explained by community members in rural
39 Bangladesh
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Structure of the public health system in Bangladesh

90x67mm (300 x 300 DPI)

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Continuum of care-seeking behavior as explained by community members in rural Bangladesh

90x50mm (300 x 300 DPI)

Interview guide for Healthcare providers

General Work

- 1) How long have you worked in this region?
- 2) Who do you treat? (questions pertaining to patient population)
 - a. What is the age range of patients you see?
 - b. What is the general socioeconomic background of your patients?
- 3) What are the most common reasons patients seek care? (questions pertaining to illness/disease diagnosed and treated)
 - a. Are you able to provide them appropriate care?
 - b. What type of interventions do you use?
- 4) When do patients come to you? (questions about timing)
 - a. When are you available?
- 5) Where do you see your patients? (questions pertaining to location)
 - a. Where do you get the supplies for your interventions?
 - b. Are the supplies always available?
 - c. Where do you refer patients to?
 - d. How far are these referral locations?

Emergency Care

- 6) How do you deal with emergency situations?
- 7) What resources do you have for these situations?
- 8) Do community members know where to go when they have an emergency?
- 9) Do you feel patients understand when to seek help?
- 10) Are timely interventions possible?
- 11) Is timely transportation an issue?
- 12) What do you think could improve the situation?

Focus Group guide for Community Members

- 1) Who is the first person you contact when you need urgent health care?
 - a. Who makes the decision to seek outside help?
 - b. Who do you notify?
- 2) What do you perceive as an emergency?
 - a. How do you decide?
- 3) When do you seek medical care in the day?
 - a. What about at night?
 - b. Is there a delay in time before seeking care? If so, Why?
- 4) Where do you go?
 - a. How far is this from home?
 - b. Why this location?
 - c. Is this where you go for care for your children as well?
 - d. Where do you go for medications?
 - e. What hours are these services available?
- 5) Do you receive the help you need?

	Topic	Item	Page number
Title and abstract			
1	Title	Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Title Page
2	Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 1
Introduction			
3	Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Pages 4-5
4	Purpose of research question	Purpose of the study and specific objectives or questions	Page 5: lines 21-23
Methods			
5	Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/interpretivist) is also recommended; rationale	Page 6: line: 15
6	Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 7: lines 19-21
7	Context	Setting/site and salient contextual factors; rationale	
8	Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale	Page 7: lines 6, 15-19
9	Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 8: lines 18-20
10	Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale	Page 6: lines 15-17
11	Data collection instruments and technologies	Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 6: lines 17-22; Page 7: lines 1-5
12	Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of	Page 7: lines 8-14

		participation (could be reported in results)	
13	Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Page 7: lines 21-22; Page 8: lines 1-2
14	Data analysis	Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	Page 8: lines 5-15
15	Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale	Page 8: lines 7-11
Results/findings			
16	Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Page 9: lines 6-8
17	Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Pages 10-16
Discussion			
18	Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Pages 16-19
19	Limitations	Trustworthiness and limitations of findings	Page 19
Other			
20	Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 21: lines 1-2
21	Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 20: lines 20-22

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Applying the Three Delays Model to understand emergency care seeking and delivery in rural Bangladesh: a qualitative study

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3 **Applying the Three Delays Model to understand emergency care seeking and delivery in**
4 **rural Bangladesh: a qualitative study**
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ABSTRACT

Objectives: The Three Delays Model has been commonly used to understand and prevent maternal mortality but has not been systematically applied to emergency medical conditions more generally. The objective of this study was to identify delays in emergency medical care seeking and delivery in rural Bangladesh and factors contributing to these delays by using the Three Delays Model as a framework.

Design: A qualitative approach was used. Data was collected through focus group discussions and in-depth interviews using semi-structured guides. Two analysts jointly developed a codebook iteratively and conducted a thematic analysis to triangulate results.

Setting: Six unions in Raiganj sub-district of Bangladesh.

Participants: Eight focus group discussions with community members (n=59) and eight in-depth interviews with healthcare providers

Results: Delays in the decision to seek care and timely receipt of care upon reaching a health facility were most prominent. The main factors influencing care-seeking decisions included ability to recognize symptoms and decision-making power. Staff and resource shortages and lack of training contributed to delays in receiving care. Delay in reaching care was not perceived as a salient barrier. Both community members and healthcare providers expressed interest in receiving training to improve management of emergency conditions.

Conclusions: The Three Delays Model is a practical framework that can be useful for understanding barriers to emergency care and developing more tailored interventions. In rural Bangladesh, training community members and healthcare providers to recognize symptoms and manage acute conditions can reduce delays in care seeking and receiving adequate care at health facilities.

1
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3 **Keywords:** Emergency care, Three Delays Model, Bangladesh, Qualitative research
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For peer review only

Strengths and limitations of this study

- This is one of few studies to apply the Three Delays Framework to the broader context of emergency medical conditions
- Purposive sampling of sub-groups of community members and healthcare providers facilitated data triangulation
- Participants were identified by local community leaders and their views may not be representative of all potential participants
- Due to logistical constraints, data was collected in only six of nine unions, potentially limiting generalizability

INTRODUCTION

Twenty four million deaths related to emergency medical conditions occur in low and middle-income countries (LMICs) annually, accounting for an estimated 1,023 million disability-adjusted life years (DALYs) and 932 million years of life lost(1). This includes both communicable and non-communicable diseases, with ischemic heart disease and cerebrovascular disease causing the highest mortality burden, and unintentional injuries causing the most DALYs(1). In Bangladesh, stroke and ischemic heart disease are the leading causes of death(2). Additionally, unintentional injuries contribute to a large burden of premature death. For instance, drowning(3) and road traffic injuries(4) result in substantial morbidity and mortality. Road traffic injuries exert a particularly high burden in rural Bangladesh and largely impact individuals between the ages of 25 and 64 years, a highly productive segment of the population(5). This burden could be reduced by improving emergency and acute care seeking and delivery.

Emergency care involves different levels of services, beginning with recognition of symptoms and care provided by laypersons at the scene of the injury or illness episode, and continuing through the care provided in a health facility. The quality and timeliness of care at each level is crucial to survival. The Three Delays Model, originally developed in the context of maternal mortality in low-income settings provides a useful framework to examine factors influencing the timeliness of care(6). According to this model, adverse outcomes from obstetric complications are attributable to three delays between the onset of complications and their ultimate outcome. The first delay is the delay in the decision to seek care, the second delay is related to reaching an appropriate health facility, and the third delay occurs once the patient reaches the health facility and waits to be seen by a medical professional. These delays are in turn influenced by socioeconomic factors, such as wealth and female education, cultural factors

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3 such as beliefs and customs, structural factors such as accessibility of care, and health system
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5 level factors such as quality of care.
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9 While the literature is consistent on the factors influencing the three delays, the relative
10 contribution of each of these delays varies across countries. A study in India(7) found that the
11 first two delays were the main contributors to maternal death, while a study in Malawi(8) found
12 that the third delay contributed the most to maternal death. Another study applied this model to
13 understand care seeking and receipt for children with pneumonia in the Peruvian Amazon and
14 found that the first and third delay were most salient(9). Additionally, differences may exist
15 across regions within countries. In rural areas, complications are more likely to result in adverse
16 outcomes than in urban areas as all three delays in care seeking and delivery tend to be present
17 and exert an interactive effect(7). A study on care seeking for obstetric complications in rural
18 Bangladesh found that socioeconomic factors such as wealth, women's literacy and women's
19 employment contributed to the delay in the decision to seek care, while service factors such as
20 proximity to the health facility and availability of adequate obstetric services at the facility
21 contributed to all three delays(10).
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39 The Three Delays Model has been widely applied to understand maternal mortality but it
40 has not been systematically applied to the context of emergency medical conditions more
41 broadly. This model could serve as a useful framework for developing and evaluating
42 interventions for emergency medical conditions owing to similarities in the factors influencing
43 care seeking and delivery for obstetric emergencies and other emergency medical conditions(11).
44 Therefore, the aims of this study were: (i) to understand the contribution of the three delays to
45 emergency care seeking and delivery in rural Bangladesh and identify factors influencing each of
46 the delays, and (ii) to obtain recommendations from providers and patients to improve
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3 emergency care. Findings can inform interventions aimed at reducing delays in emergency care
4 seeking and delivery and reduce the burden of morbidity and mortality from these conditions in
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6 rural Bangladesh.
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10 11 12 13 **METHODS**

14 15 **Study Setting**

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18 This study was conducted in the Raiganj sub-district of Bangladesh, a predominantly rural area
19 with a population of about 318,000(12). Raiganj is divided into nine unions. In each union, there
20 are multiple community health centers (CHCs), which are the community's primary point of
21 access to formal care. Each union also has one health and family welfare center and child welfare
22 clinic. For higher levels of care, each sub-district has a health complex. The highest level of care
23 is the district hospital, which delivers care in major specialty areas (Figure 1).
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36 37 **Study Design and Data Collection**

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39 An applied qualitative approach was used for this study, which included focus group discussions
40 (FGDs) with community members and in-depth interviews (IDIs) with healthcare providers. Data
41 collection took place in June 2016. Semi-structured guides were used for FGDs and IDIs
42 (Supplementary File). The semi-structured format allowed for probing and follow-up questions
43 to gain more clarity from participants. The interview guides for healthcare providers covered the
44 themes of management of acute conditions in CHCs, services and resources available to manage
45 these conditions, and provider perceptions of community members' awareness of where and
46 when to seek care for emergency conditions. The focus group guide explored community
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3 members' perceptions of emergency conditions, how care seeking decisions are made, and
4 access to and availability of care. The guides were developed with the help of Center of Injury
5 Prevention and Research, Bangladesh (CIPRB) researchers using the rapid appraisal approach
6 for community health assessments. The guides were developed in English, translated into
7 Bengali and then back translated by CIPRB researchers.
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12 FGDs and IDIs were conducted in six of the nine unions. A purposive sampling strategy was
13 used to elicit perspectives from different groups of community members and different types of
14 healthcare providers. Two FGDs were held with each of the following groups of stakeholders:
15 men, women, the elderly, and community leaders, for a total of eight FGDs (n=59). In order to
16 provide an open environment where participants felt comfortable sharing their thoughts, the
17 FGDs with each stakeholder group were held separately. Eight IDIs were conducted with
18 different types of health care providers: community health center providers (n=4), family welfare
19 visitor (n=1), sub-assistant community medical officers (n=2) and upazila health and family
20 planning officer (n=1).
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37 Community members were recruited by local community leaders. They were chosen based on
38 their involvement in community affairs, availability, and willingness to speak openly. Healthcare
39 providers were recruited by CIPRB researchers. As there are limited healthcare providers in each
40 community, we approached all of those who were available and willing to speak to us. All
41 participants were over the age of 18. All FGDs and IDIs were conducted by two local public
42 health field officers from CIPRB (KF and KBU). Both officers had significant field experience
43 doing qualitative data collection and contributed to developing the guides. The FGDs and IDIs
44 were digitally recorded with permission from participants. Field notes were also taken by the
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3 interviewers. All data were collected in Bengali, transcribed verbatim and translated into English
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5 for analysis by CIPRB researchers. On average, each interview/focus group lasted 30 minutes.
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11 **Data Analysis**

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14 Transcripts were analyzed with a thematic approach using Dedoose version 7.6.21
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16 (SocioCultural Research Consultants, LLC, Los Angeles, California, USA). The analysis
17
18 combined an inductive and deductive approach. Two analysts (NK and SK) independently
19
20 reviewed the transcripts and jointly developed a codebook, which consisted of some pre-defined
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22 themes as well as additional themes that emerged from the data. The same analysts
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24 independently coded extracts from multiple transcripts using the initial codebook and registered
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26 an inter-coder reliability score of 0.75. The analysts discussed discrepancies in the use of codes
27
28 to ensure that codes were being applied uniformly. As additional themes and sub-themes
29
30 emerged, the analysts modified the codebook. The same analysts coded all transcripts using the
31
32 final version of the codebook. Analytic memos were used to identify recurring patterns and
33
34 themes in coded text segments.
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43 **Ethics**

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46 All participants provided informed oral consent. Ethical approval for this study was granted by
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48 the Johns Hopkins Medicine Institutional Review Board and the Ethical Review Committee of
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50 the Bangladesh Medical Research Council.
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Patient and Public Involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research

RESULTS

IDIs and FGDs revealed factors across a continuum of care affecting timeliness and quality of emergency medical services in rural Bangladesh . Salient themes surrounding factors affecting care are organized and presented according to the Three Delays Model:

Delay 1: Delayed decision to seek care

The decision to seek care was influenced by several socio-contextual factors, most notably perceived severity of illness. Community members perceived symptoms such as high fever, cold, abdominal pain or fainting to be indicative of “major problems”. They perceived a range of conditions to constitute emergencies, ranging from cuts, burns and poisoning, to drowning, accidents, stroke and heart attacks.

Greater distances from health facilities, high cost and negative past experiences at health facilities contributed to delays in deciding to seek care. However, perceived severity of illness superseded these other factors. If the illness was perceived to be very severe, participants reported that care was sought immediately regardless of these other factors as this focus group exchange with female community members illustrated:

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3 *Participant 5: During my pregnancy, at the time of delivery my water was broken*
4 *but there was no pain, so we were waiting the whole night and went to the*
5 *Shirajgonj hospital at the morning.*

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11 *Moderator: Your water broke but you wait for morning, why not go to the*
12 *hospital that time?*

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16 *Participant 5: Because the time was midnight, so we wait for morning.*

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19 *Moderator: If these types of emergency arise do you go as soon as possible or*
20 *wait for some time?*

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24 *Participant 3: No, no. When her mother-in-law became sick, they took her*
25 *immediately.*

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29 Additionally, cultural factors including female decision-making power and role of traditional
30 medicine influenced care seeking decisions. The majority of participants reported that the
31 decision to seek care was made by the head of the household, who was typically the husband. In
32 some cases, family elders such as mothers-in law made care seeking decisions.

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39 *In our village we are very close to each other, we ask [advice from] one another*
40 *and then take a decision where to go; mainly the family head takes the final*
41 *decision.*

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47 - Male community member

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50 Based on these factors, for most community members, a clear hierarchy to care seeking existed
51 (Figure 2). The first line of care seeking, particularly for women, usually consisted of using
52 home remedies or medications and consulting traditional village doctors or pharmacists at the
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1
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3 local neighborhood or “bazaar.” For primary care and what they perceived as “normal” illnesses,
4
5 community members reported going to CHCs to seek treatment. For more serious issues such as
6
7 pregnancy, care was usually sought at a health complex, which was perceived to have more staff
8
9 and services than CHCs. For what they perceived as emergencies, community members reported
10
11 seeking care at private clinics or hospitals, where they noted, “doctors are available all the time.”
12
13

14
15 *Q: If any one of you or your family members get sick where do you go first?*

16
17
18 *R: At first, we go to the community clinic, then local pharmacy and if it is getting*
19
20 *serious than go to the upazila health complex or district hospital. But upazila*
21
22 *health complex doesn't give good service so most of the time we go to the private*
23
24 *clinic.*
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28 – Male community member
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34 **Delay 2: Delayed arrival at health facility**

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37 When decisions to seek care were made, participants reported that CHCs were largely accessible
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39 for most community members. A few participants reported that delays in transportation made it
40
41 difficult to quickly reach higher-level health facilities in the event of an emergency condition,
42
43 but most participants said that transportation was not an issue and several modes, such as
44
45 rickshaws and vans were available. Distances to hospitals varied depending on the union. In
46
47 some unions, hospitals were between 3-5 kilometers away from the village and took
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49 approximately 15-20 minutes to reach, but in some unions, the nearest hospital was 10-20
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51 kilometers away and took more than an hour to reach.
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Community members mostly rely on arranging their own transportation to health facilities.

According to CHC providers, patients had good knowledge and awareness of where to seek care but for some patients, distance and cost could be barriers in this setting.

If any accident patient is very serious then they directly go to the hospital, because they know we can't handle that.

– Upazila health and family planning officer

Delay 3: Delayed provision of adequate care

CHCs represent the first point of entry in to the formal healthcare system. However, lack of adequate training of providers and shortage of resources and staff contributed to delays in patients receiving care at these facilities. CHC providers explained that they were only able to provide basic first aid for injuries and accidents. In case of more complex conditions, they referred patients to the nearest hospital or health complex to manage emergency conditions.

Mainly we give first aid treatment and health education for diarrhea, fever, cold etc. If any patient came with a serious problem then we referred them to the health complex for better treatment.

– Community health center provider

CHCs reported carrying medicines and supplies for basic first aid, family planning, pregnancy-related supplementation and common illnesses such as fever. However, stock outs were common and community members indicated that people got medicines “depending on availability.”

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3 Most CHCs were equipped with basic equipment such as blood pressure machines and
4
5 glucometers, with some exceptions. While more sophisticated medical equipment such as
6
7 nebulizers and x-ray machines were available in the upazila health complex, lack of training and
8
9 infrastructure were barriers to their utilization within clinics.
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11

12
13 *“We have an operation room but it’s not used, we need a surgeon and anesthetist*
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15 *for that. We have x-ray machine but it is not working.”*
16
17

18 - Upazila health and family planning officer
19
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21 CHCs varied in terms of number of staff members available during working hours, ranging from
22
23 one to four individuals. CHCs had a mix of office-level and field-level staff and specialized
24
25 providers such as gynecologists were not commonly reported. Clinic staff reported that CHCs
26
27 were open six days a week, for approximately six hours each day. However, according to
28
29 community members, CHCs are open only for four to five days a week, for about three to four
30
31 hours each day. A community elder remarked: *“if we go to the clinic after 1 pm, they say it’s*
32
33 *closed.”* In contrast, the hospitals were open 24 hours, seven days a week, but hospitals are
34
35 farther away from CHCs for most people in need of urgent care.
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40 Additionally, some community members felt that upon reaching hospitals, patients were
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42 prioritized based on connections they had with doctors or ability to pay, which resulted in delays
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44 in being seen by a healthcare provider and receiving treatment. Community members also felt
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46 that shortage of resources such as medications contributed to delays in receiving timely care once
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48 they reached the health facility:
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3 *“Raigonj hospital has no medicine and Jia medical also has very limited*
4 *medicine. Last week I go to Jia medical college hospital to visit a patient and it*
5 *was a very helpless situation.*

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11 - Community elder
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16 **Recommendations to improve emergency care**

17 *Providers*

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20 Providers expressed a need for and interest in receiving more training to handle acute conditions.
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22 They felt that this could help prevent deaths and save time and money for patients. Providers also
23
24 felt that patients did not have confidence in their abilities and skills. Providers wanted to learn
25
26 more about management of emergency conditions.
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32 *[We need] gauze, bandage and suturing materials but we have very limited*
33 *knowledge on suturing and other subjects. If we get some training on it, then we*
34 *can provide a better service*

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38 - Community health center provider
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43 *“Emergency management of acute care, acute MI (myocardial infarction), near*
44 *drowning, shock – this type of management training we need the most. Sometimes*
45 *we refer patient for treatment but patient dies on the road. If we can manage it*
46 *here, the life can be saved.”*

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52 - Upazila health and family planning officer
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3 Providers also recommended that the supply of medicines to the CHCs be improved, particularly
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5 for antibiotics, which were often in low supply and expensive for patients to purchase. Other
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7 needs expressed by providers were having more trained staff in CHCs, particularly trained
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9 doctors, surgeons and assistants and better infrastructure.
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16 *Community members*

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19 Community members felt that providers at CHCs were insufficiently trained and could only
20
21 provide basic primary care. They also felt that providers were not good at diagnosing illnesses
22
23 and could only treat “common” diseases such as fever and cold. Another concern was that many
24
25 providers were more invested in their own private practices and therefore did not offer adequate
26
27 care to patients at the CHC. Community members suggested enforcing better regulations over
28
29 doctors with private practices as well as eliminating favoritism towards patients.
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34 Community members noted cyclical shortages of medicines at the CHCs and felt that better
35
36 monitoring of supply by authorities could address these shortages. They were also concerned that
37
38 providers at CHCs were prescribing unnecessary medications based on what was available rather
39
40 than what was required.
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44 Like providers, community members felt that more trained staff and equipment was needed at
45
46 CHCs.
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49 *“We need a full time doctor here for any emergency. In case of any emergency*
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51 *like heart disease, he/she can manage it immediately.”*
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54 - Female community member
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3 Community members were enthusiastic about receiving training to provide first aid and manage
4 acute conditions. A few women mentioned that they already received training as caregivers,
5
6 known as Anchal Mas, to deliver basic first aid.
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12 *If any children cut his or her hand or leg came to me, I have first aid training*
13 *from CIPRB. I was an Anchal Ma. I have cotton gaze and medicine, so they came*
14 *to me. At first, I clean the wound, then put the bandage*
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20 – Female community member
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25 **DISCUSSION**

26
27 In rural Bangladesh, we found that several socio-contextual factors influenced care
28 seeking decisions, which could contribute to delays in the decision to seek care. Delays in
29 receiving care at the health facility were also a barrier to timely management of emergency
30 conditions, whereas delays in reaching health facilities were less of a primary concern due to a
31 tiered health system with multiple levels of care available to most of the population.
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39 Factors contributing to care seeking decisions included perceived severity of illness,
40 proximity to and timings of health facilities, cost of care, and past experiences receiving care.
41 Among these, perceived illness severity appeared to be the strongest factor influencing decision-
42 making. Determining severity of an illness episode depends on the ability of community
43 members to recognize signs and symptoms of acute conditions. Although community members
44 differentiated between ‘normal’ and ‘emergency’ conditions, basing care seeking decisions on
45 the severity of symptoms is limited by individual capacity to understand what is biomedically
46 urgent. Moreover, seemingly mild or non-specific symptoms, such as nausea could be indicative
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3 of serious conditions such as myocardial infarctions(13). Prior research has shown that the
4 inability to recognize symptoms is a barrier to timely care seeking(7) and that awareness of
5 symptoms for emergency conditions such as heart attacks and stroke is low (14,15). Therefore,
6 an important component of a community-based program might include education sessions
7 focused on screening and identifying signs and symptoms of life threatening versus less serious
8 conditions.

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10 We also found that in this context, cultural factors such as the strong role of traditional
11 medicine as well as the weak decision-making power, particularly for younger women underpin
12 health-related decisions. Of all the demographic groups, women were more likely to report first
13 seeking care from the village doctor. This could stem from gender norms in Bangladesh, which
14 dictate that women should remain at home and should be accompanied by men in public spaces
15 (16). As village doctors are located closer to home, it may be easier and more acceptable for
16 women to go to the “bazaar” unaccompanied. In this setting, successful interventions to improve
17 emergency care seeking may need to target key decision makers, such as traditional healers, male
18 heads of household, or family elders. For instance, in Mozambique, traditional healers were
19 utilized as part of successful intervention to increase referral rates to health facilities(17).

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21 Delayed provision of care occurs once the patient reaches the health facility and waits to
22 be seen by a medical professional. Staffing and resource shortages often hindered the delivery of
23 timely and high quality medical care. We also found that community members felt that
24 healthcare providers in CHCs lacked sufficient training to provide high quality acute care, a view
25 that was echoed by healthcare providers themselves. When individuals sought emergency care at
26 CHCs, they were usually referred to the health complex or hospitals as CHCs lacked the
27 resources and capacity to treat these conditions. This resulted in delays that could be avoided if

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3 CHCs received adequate resources and providers are trained in management of emergency
4 conditions. Building capacity of CHC providers in the management of emergency conditions can
5 reduce the need for referrals. Even if referrals are required, better management of emergency
6 conditions at the CHC level can stabilize the patient's condition, improving the likelihood of a
7 favorable outcome once the patient reaches the tertiary healthcare facility. We did find a high
8 level of interest among healthcare providers to receive additional training in emergency care.
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10 Therefore, it may be possible to adapt successful emergency care training programs from other
11 similar countries to this setting. Compared to other LMICs where health worker attrition is
12 high(18), rural Bangladesh has a community health worker (CHW) cadre which is prioritized and
13 enjoys relatively good job security; therefore, investments in CHW training may see long-term
14 improvements in health through better care practices and improved patient satisfaction. Improved
15 monitoring and accountability systems are also needed to ensure that CHCs adequately serve
16 patients.
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33 Other research suggests that the community's delay in mobilizing can be considered a
34 fourth delay that hinders timely management of emergency conditions(19). In the case of
35 emergency conditions such as drowning or road traffic injuries, even if the decision to seek care
36 is made quickly, the delay in mobilizing care from first responders at the scene of the illness
37 episode can determine the outcome of the injury. Bystander education and awareness has been
38 identified as an important factor influencing this delay and a qualitative study on trauma delays
39 for road traffic injury patients in Brazil found that bystander capacity to provide care was
40 low(20). Simple interventions at the community level may be highly effective to mobilize first
41 responders in low-resource settings. For example, interventions have included training
42 commercial drivers in providing first aid(21) and training laypeople to be first responders(22). In
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our study, community members were interested in receiving training in first aid and some had already received prior training. Community-based programs have enjoyed much success in Bangladesh across a range of health conditions(23). Bangladesh started community-based programs to address drowning and these programs have shown an average DALY cost aversion of \$362(24). Approaches from these programs can be adapted to develop community-based education and training for the management of emergency conditions. In rural Bangladesh, community mobilization strategies that involve multiple approaches combining education and training, as well as enhanced community infrastructure may create enabling environments for improved outcomes from emergency medical conditions.

Limitations

Due to road access and weather limitations, data were only collected from six of the nine unions in Raiganj. Additionally, participants were identified by local community leaders and their views may not be representative of all community members; however, those individuals were sampled based on specific criteria we deemed important for answering the research questions and purposive sampling is a strength of this type of research.

This study did have several strengths. First, by eliciting the voices of community members and healthcare providers, unique insights were gained that allowed for comparisons between the local and biomedical communities. Second, by including sub-groups of community members (e.g. men, women, elders, and community leaders) and as well as sub-groups of healthcare providers (e.g. doctors, nurses, community health workers), participant triangulation was achieved.

Conclusions

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3 In rural Bangladesh, the health system has a far reach through a multi-tiered network of
4 providers. However, several socio-contextual factors influence care seeking decisions and could
5 contribute to delays in deciding to seek care, while lack of adequate training, and manpower and
6 resource shortages resulted in delays in receiving care at the health facility. Both these factors
7 could contribute to adverse outcomes from emergency medical conditions. While better
8 infrastructure and resources are necessary, improvements in emergency care delivery in this
9 setting may be achieved through modest, yet targeted behavior change interventions, such as
10 training of community members and healthcare providers.
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25 **CONTRIBUTORSHIP STATEMENT**

26 BS conceived the study; BS designed the study protocol; NK and SK carried out the analysis and
27 interpretation of these data. BS, NK and SK drafted the manuscript; GY, KF, KBU, FR and JR
28 critically revised the manuscript for intellectual content. All authors read and approved the final
29 manuscript.
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39 None
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47 Center for Global Health.
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54 **COMPETING INTERESTS**

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None declared

ETHICAL APPROVAL

Ethical approval for this study was granted by the Johns Hopkins Medicine Institutional Review Board and the Ethical Review Committee of the Bangladesh Medical Research Council.

DATA AVAILABILITY STATEMENT

De-identified transcripts can be requested by emailing the lead author, Bansari Shah (bansarishahmd@gmail.com)

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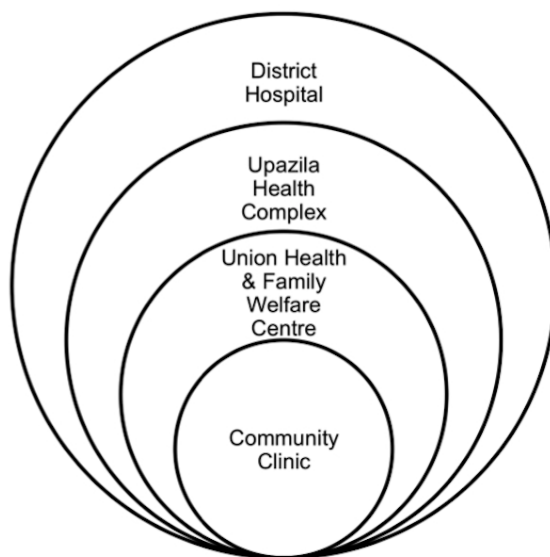
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33 FIGURES

34 **Figure 1:** Structure of the public health system in Bangladesh

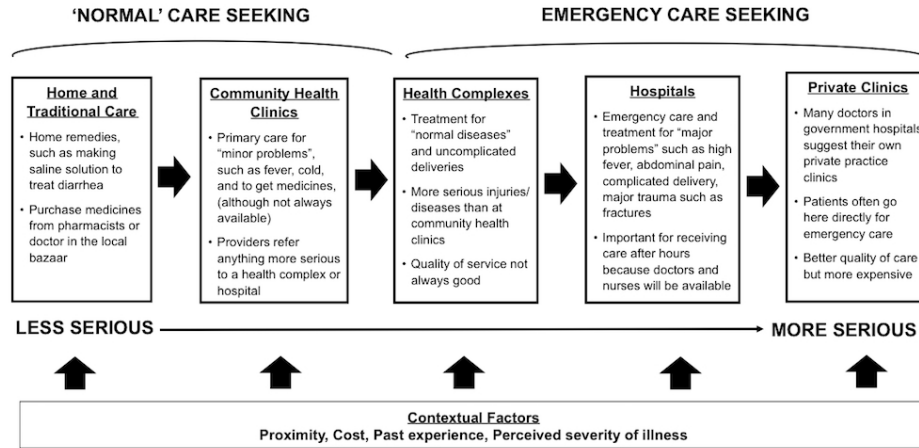
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38 **Figure 2:** Continuum of care-seeking behavior as explained by community members in rural
39 Bangladesh
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Structure of the public health system in Bangladesh

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Continuum of care-seeking behavior as explained by community members in rural Bangladesh

90x50mm (300 x 300 DPI)

Interview guide for Healthcare providers

General Work

- 1) How long have you worked in this region?
- 2) Who do you treat? (questions pertaining to patient population)
 - a. What is the age range of patients you see?
 - b. What is the general socioeconomic background of your patients?
- 3) What are the most common reasons patients seek care? (questions pertaining to illness/disease diagnosed and treated)
 - a. Are you able to provide them appropriate care?
 - b. What type of interventions do you use?
- 4) When do patients come to you? (questions about timing)
 - a. When are you available?
- 5) Where do you see your patients? (questions pertaining to location)
 - a. Where do you get the supplies for your interventions?
 - b. Are the supplies always available?
 - c. Where do you refer patients to?
 - d. How far are these referral locations?

Emergency Care

- 6) How do you deal with emergency situations?
- 7) What resources do you have for these situations?
- 8) Do community members know where to go when they have an emergency?
- 9) Do you feel patients understand when to seek help?
- 10) Are timely interventions possible?
- 11) Is timely transportation an issue?
- 12) What do you think could improve the situation?

Focus Group guide for Community Members

- 1) Who is the first person you contact when you need urgent health care?
 - a. Who makes the decision to seek outside help?
 - b. Who do you notify?
- 2) What do you perceive as an emergency?
 - a. How do you decide?
- 3) When do you seek medical care in the day?
 - a. What about at night?
 - b. Is there a delay in time before seeking care? If so, Why?
- 4) Where do you go?
 - a. How far is this from home?
 - b. Why this location?
 - c. Is this where you go for care for your children as well?
 - d. Where do you go for medications?
 - e. What hours are these services available?
- 5) Do you receive the help you need?

	Topic	Item	Page number
Title and abstract			
1	Title	Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	Title Page
2	Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	Page 1
Introduction			
3	Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	Pages 4-5
4	Purpose of research question	Purpose of the study and specific objectives or questions	Page 5: lines 21-23
Methods			
5	Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/interpretivist) is also recommended; rationale	Page 6: line: 15
6	Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Page 7: lines 19-21
7	Context	Setting/site and salient contextual factors; rationale	
8	Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale	Page 7: lines 6, 15-19
9	Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Page 8: lines 18-20
10	Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale	Page 6: lines 15-17
11	Data collection instruments and technologies	Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	Page 6: lines 17-22; Page 7: lines 1-5
12	Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of	Page 7: lines 8-14

		participation (could be reported in results)	
13	Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	Page 7: lines 21-22; Page 8: lines 1-2
14	Data analysis	Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	Page 8: lines 5-15
15	Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale	Page 8: lines 7-11
Results/findings			
16	Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	Page 9: lines 6-8
17	Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Pages 10-16
Discussion			
18	Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	Pages 16-19
19	Limitations	Trustworthiness and limitations of findings	Page 19
Other			
20	Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	Page 21: lines 1-2
21	Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Page 20: lines 20-22