Journal of Migration and Health 9 (2024) 100213

Contents lists available at ScienceDirect

Journal of Migration and Health

journal homepage: www.elsevier.com/locate/jmh

Exploring the impact of preconception care and unintended pregnancy on access to antenatal healthcare services among Rohingya women: Insights from a cross-sectional survey

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ARTICLE INFO

Keywords:
Antenatal care uptake
Preconception care
Unintended pregnancy
Rohingya refugee
Bangladesh

ABSTRACT

Background: The low utilization of antenatal healthcare services among Rohingya refugee women contributes to high maternal and child mortality rates. The objective of this study was to evaluate the prevalence of antenatal healthcare services utilization and the impacts of preconception care and pregnancy intention on accessing these services among Rohingya refugee women in Bangladesh.

Methods: We analyzed data from 708 women collected through a multistage cross-sectional survey conducted in April 2023. The outcome variable was the uptake of at least one antenatal healthcare services, while the exposure variables were preconception care uptake and unintended pregnancy. We used a multivariate logistic regression model to determine the effects of preconception care and unintended pregnancy on antenatal care utilization, adjusting for potential covariates.

Results: Approximately 47 % of women reported not accessing any antenatal healthcare services during their most recent pregnancy. Moreover, around 68 % of women did not receive any preconception care, and nearly one-third of pregnancies were unintended at conception. We observed lower likelihoods of antenatal care utilization among women without preconception care or with unintended pregnancy. The negative effects were even more pronounced when women reported no use of preconception care along with experiencing mistimed (aOR, 0.61, 95 % CI: 0.45–0.77) and unwanted (aOR, 0.43, 95 % CI: 0.34–0.52) pregnancy for their most recent pregnancy.

Conclusion: Maternal healthcare service utilization is alarmingly low among Rohingya refugees, with a significant lack of preconception care and a high prevalence of unintended pregnancies. This underscores the critical importance of implementing awareness-building programs to increase uptake of antenatal healthcare services.

Background

The Rohingya refugee camps in Cox's Bazar, Bangladesh provide shelters to nearly one million Rohingya refugees (Daniel P. Sullivan, 2022). These individuals were forcibly displaced from Myanmar in August 2017 as a direct consequence of a large-scale military operation that resulted in the tragic loss of numerous young Rohingya men and widespread incidents of sexual assault (Jo and Ca, 2019; Mahmood et al., 2017). This unfortunate series of events has led to a profound gender imbalance within the Rohingya community, with the majority now comprised of reproductive aged women and children (Khan et al., 2021; Md Nuruzzaman Khan and Shimlin Jahan Khanam, 2023). Consequently, the camp is witnessing a higher number of pregnancies each year, with approximately half of these pregnancies being unintended (Khan et al., 2021).

The Rohingya population has endured a long history of systematic deprivation spanning several millennia, orchestrated by the Myanmar government with the aim of eradicating their identity as a distinct national group (Jo and Ca, 2019). This persistent marginalization has greatly impeded their access to education and healthcare services (Jannat et al., 2022; Khan et al., 2021). Consequently, the Rohingya face significant obstacles in acquiring essential knowledge about healthcare,

Abbreviations: SRH, sexual and reproductive health; DHS, demographic and health survey; aOR, adjusted odd ratio.

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https://doi.org/10.1016/j.jmh.2024.100213
Received 22 July 2023; Received in revised form 10 January 2024; Accepted 10 January 2024
Available online 15 January 2024
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including sexual and reproductive health services (SRH), which they often perceive as unnecessary or simply a natural physiological process (Jannat et al., 2022; Khan et al., 2021). Tragically, this lack of awareness contributed to high rates of maternal and child mortality, along with other adverse outcomes following their arrival in Bangladesh (Khan and Khanam, 2023).

Following their movement in 2017, a groundbreaking initiative was launched by the Government of Bangladesh in collaboration with over two hundred national and international organizations, including United Nations agencies (Khan et al., 2021; World Health Organization, 2017). This endeavor aimed to provide essential provisions like food and shelter to all displaced individuals while also addressing the mental health needs of this profoundly traumatized population (World Health Organization, 2017). A significant focus of this effort was to prioritize SRH services, particularly by ensuring widespread access to modern contraception to ensure every pregnancy is planned and occurred with adequate preconception care (Palma, 2017; World Health Organization, 2017). However, the progress made in these areas have been limited thus far. While there have been some improvements in maternal and child health outcomes, the credit for these advancements primarily belongs to the dedicated healthcare providers working in the refugee camps (Khan et al., 2021; Md Nuruzzaman Khan and Shimlin Jahan Khanam, 2023). These healthcare professionals have worked tirelessly to provide comprehensive care, especially for pregnant women, by offering necessary healthcare services during visible stages of pregnancy (Khan et al., 2021).

However, the promotion of contraception among the Rohingya refugees has faced significant hurdles, primarily due to deeply ingrained beliefs and religious interpretations (Islam et al., 2022; Khan et al., 2021; Sarker et al., 2020). According to their religious framework, the use of contraceptive methods to control fertility is considered forbidden, while the emphasis on having as many children as possible is prevalent (Jannat et al., 2022; Khan et al., 2021). This fundamental misconception is further amplified by their lack of trust in government-provided family planning services and contraception. They perceive these services as potentially leading to permanent infertility, viewing them as an attempt by the government to manipulate their return to their country of origin (Islam et al., 2021; Islam et al., 2022). Ensuring planned pregnancy with adequate preconception care under these circumstances has proven to be challenging. Such failure can then hinder access to maternal healthcare services, particularly in the aftermath of the COVID-19 pandemic, including antenatal healthcare services, along with lower knowledge of the refugee to access maternal healthcare services. Together, this presents an established pathways of occurring higher adverse maternal and child health outcomes.

There is a noticeable research gap concerning the present accessibility of antenatal healthcare services, the level of preconception care, and the incidence of unwanted pregnancies among the Rohingya refugees, as well as the interplay between these factors. Previous studies have primarily concentrated on addressing the challenges and proposing potential solutions to enhance the limited availability of safe maternity care for pregnant women in the refugee camps (Ainul et al., 2018; Azad et al., 2021; Chowdhury et al., 2018; Hossain and Dawson, 2021; Islam et al., 2021; Islam et al., 2022; Jannat et al., 2022; Sarker et al., 2020). Thus, the objective of this study was to bridge this research gap by investigating the current utilization of antenatal healthcare services, the extent of preconception care, and the prevalence of unwanted pregnancies among the Rohingya refugees. Additionally, we examined the impact of preconception care and unwanted pregnancies on the utilization of antenatal healthcare services.

Methods

Study setting

We conducted a comprehensive cross-sectional survey in the Kutupalong Refugee camps, situated in Cox's Bazar, Bangladesh, in April 2023. Initially established in 1991, the camp has now become home to all Rohingya refugees who have migrated since the most recent influx of 2017, encompassing a staggering 187,423 families. With a limited area of merely 13 square kilometers, the camps are grappling with severe overcrowding and unhygienic conditions, exacerbating the scarcity of essential resources required for sustaining a decent livelihood.

Sampling techniques

A multi-stage stratified sampling approach was employed to gather data for this study. In the first stage, five camps (Camp 2 W, Camp 4, Camp 7, Camp 13, Camp 18) were randomly selected from a pool of 30 camps using a lottery method. These five camps comprised a total of 89 blocks. In the second stage, 10 blocks were included in the study randomly, with two blocks chosen from each selected camp. Finally, in the third stage of sampling, women who met the inclusion criteria and resided in the selected camps and blocks were recruited for the survey. To be eligible for participation, women had to meet two criteria: (i) have given birth to at least one child within two years prior to the survey, and (ii) provide information on their reproductive characteristics, including pregnancy, births, family planning, and utilization of maternal healthcare services. A total of 1483 women met these criteria and were included in the data collection process. A structured questionnaire was utilized to collect data from the participants, which was initially developed based on a previous survey conducted in 2019 (Khan et al., 2021). Additionally, relevant and internationally recognized questions from the Demographic and Health Survey (DHS) were incorporated into the questionnaire (National Institute of Population Research Training, 2020). These questions are validated and recognized worldwide and can be used in the both the normal and refugee setting. Pre-testing of the questionnaire was conducted, and necessary corrections were made accordingly.

Analytic sample

We obtained and analyzed data from a subset of 708 women, extracted from the original survey, based on the inclusion criteria established for this study. These criteria encompassed two key factors: (i) women who had a youngest child aged 2 years or younger, (ii) women who provided information regarding their uptake or non-uptake of antenatal healthcare services, and (iii) given response to all explanatory variables.

Outcome variable

Antenatal healthcare services uptake was our outcome of interest. The relevant data was collected by asking women, "*Did you receive antenatal healthcare services during your most recent pregnancy?*". Those who responded affirmatively to this item were further asked, "*How many times did you receive antenatal healthcare services?*" The responses were recorded as the actual number of times they accessed antenatal healthcare services. During the survey, eligible women were requested to recollect their pregnancy timeline and provide responses to these questions. Whenever available, women were encouraged to refer to their healthcare access card or present it to the data collectors as a reference. The recorded responses were then categorized into two groups: 0 – no antenatal healthcare services uptake and 1 – at least one antenatal healthcare services uptake.

Explanatory variables

We have examined two major independent variables in our analysis: preconception care (none, at least one, and two or more) and pregnancy intention (wanted, mistimed, and unwanted). The data on preconception care was obtained through direct questioning of women,

specifically asking, "*Did you receive any form of preparation or take any actions before your most recent pregnancy?*" The options provided included physical assessment, nutritional status check, anemia check, hypertension check, folic acid intake, and seeking medical or health advice. These categories of preconception care were developed based on international recommendations and the specific needs of Rohingya refugees, with the aim of reducing adverse maternal and child health outcomes. This categorization was informed by existing literature and observations made by researchers.

Regarding pregnancy intention, data was collected by asking respondents two consecutive questions, following the guidance of the DHS (National Institute of Population Research Training, 2020). The first question posed was, "*When you became pregnant with [name of last child born within three years of survey date], did you intend to become pregnant at that time?*" The respondents were provided with the options of "yes" or "no" to indicate their response. If the response to the first question was negative, a follow-up question was asked: "*Did you intend to have a baby later on, or did you not want any (more) children?*" The response options for this question included "later" and "not at all." We categorized these responses into three groups: wanted (if the response was "yes" to the first question), mistimed (if the response indicated "later" to the second question), and unwanted (if the response indicated "not at all" in the second question).

Covariates

Respondents' socio-demographic characteristics were considered as explanatory variables (Ainul et al., 2018; Azad et al., 2021; Chowdhury et al., 2018; Hossain and Dawson, 2021; Islam et al., 2021; Islam et al., 2022; Jannat et al., 2022; Sarker et al., 2020). These included women's age at index pregnancy (≤19, ≥20), women's educational status (no education, at least some education), and women's work engagement outside the household (yes, no), women's partner characteristics include women's partner education (no education, at least some education) and women's partner occupation (unemployed, day laborer, other voluntary work). Household characteristics include the number of children ever born (≤2, 3–4, ≥5) and household wealth quintile (lowest, second, middle, fourth, highest). The household wealth quintile variable was formulated through the application of principal component analysis, encompassing relevant variables like ownership of a mobile phone, following the DHS procedure (Rutstein, 2015).

Statistical analysis

Descriptive statistics were used to describe the characteristics of the respondents. We utilized the multiple imputation technique to predict missing data. To explore the associations of the explanatory variables with the outcome variable, we utilized a multivariate logistic regression model adjusted for covariates. The model also incorporates interaction terms involving significant variables, namely pregnancy intention and preconception care. Prior to running the model, we assessed multicollinearity to ensure the reliability of the results. Sampling weight was also considered. Hosmer-Lemeshow test was used to explore goodness of fit of the model. The outcomes were reported as adjusted odds ratios (aOR) accompanied by their respective 95 % confidence intervals (CI). All statistical analyses were conducted using Stata software version 15.1 (Stata Corporation, College Station, Texas, USA).

Ethics approval and consent to participate

The survey was approved by the Institute of Biological Science at the University of Rajshahi, Bangladesh, with approval number 125/456/IAMEBBC/IBSc. Informed consent was obtained from all participants or their legal guardian (in case of under 18 women). Stringent measures were implemented to safeguard the privacy of the respondents, and data collection took place within a designated separate room or corner. The data collected were securely stored in a computer protected by a password. All methods were performed in accordance with the relevant guidelines and regulations.

Results

Background characteristics of the respondents

Table 1 presents the background characteristics of the respondents. Out of the total women interviewed, approximately 47 % did not uptake any antenatal healthcare services. Nearly 68 % of the total women reported they did not receive any preconception care. Around 69 % of the total women reported that their most recent pregnancy was desired. The majority of the respondents were over 20 years old (64.6 %). Furthermore, a significant proportion of the women in the study had no formal education (81.2 %) and did not engage in paid work outside the household (89.5 %). The majority of their partners also lacked formal education, with 37.0 % working as day laborers and 48.9 % engaged in other voluntary work. More than half of the women had five or more children at the time of the survey. In terms of household wealth quintiles, the fourth quintile had the lowest percentage, while the remaining quintiles were distributed fairly evenly across the lowest, second, middle, and highest wealth quintiles.

Preconception care and antenatal healthcare services utilization

Fig. 1 presents how the utilization of antenatal healthcare services uptake was distributed based on preconception care utilization status. We observed a rise in antenatal healthcare services uptake as the utilization of preconception care increased. For example, among women

Table 1
Background characteristics of the study population, $N = 708$.

Characteristics	Frequency, (%)
Antenatal healthcare services uptake	
None	334 (47.2)
At least one	374 (52.8)
Preconception care	
None	482 (68.1)
At least one	161 (22.7)
Two or more	65 (9.2)
Pregnancy intention at conception of the most recent child	
Wanted	488 (68.9)
Mistimed	88 (12.4)
Unwanted	132 (18.6)
Women's age at index pregnancy	
≤19	251 (35.4)
≥20	457 (64.6)
Women's educational status	
No education	575 (81.2)
At least some education	133 (18.8)
Women' work engagement outside the household	
Yes	74 (10.5)
No	634 (89.5)
Women's partner education	
No education	428 (66.3)
At least some education	218 (33.7)
Women's partner occupation	
Unemployed	100 (14.1)
Day labourer	262 (37.0)
Other voluntary work	346 (48.9)
Children ever born	
≤2	123 (17.4)
3–4	217 (30.7)
≥5	368 (52.0)
Wealth quintile	
Lowest	172 (24.2)
Second	137 (19.3)
Middle	137 (19.5)
Fourth	87 (12.3)
Highest	175 (24.7)

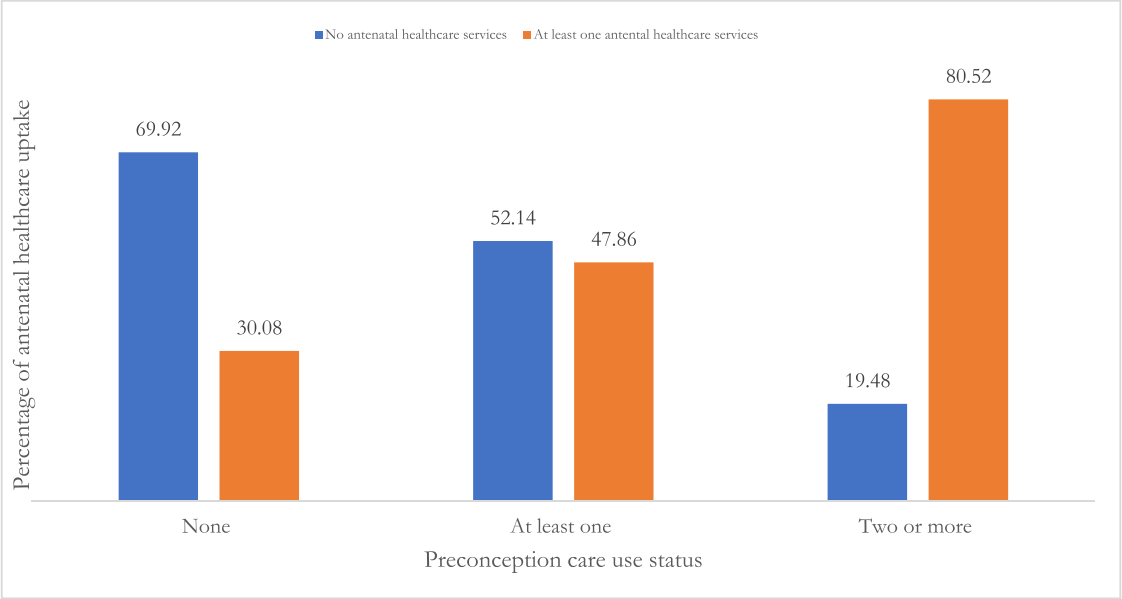


Fig. 1. Uptake of antenatal healthcare services across preconception care use status.

who reported not using preconception care, the antenatal healthcare services uptake was approximately 30 %, whereas this figure climbed to nearly 81 % for women who had utilized at least two preconception care.

Antenatal healthcare services uptake across women's pregnancy intention

Fig. 2 shows the distribution of antenatal healthcare services uptake across women's pregnancy intention in their most recent pregnancy. We reported a higher uptake of antenatal healthcare services among women who reported having a wanted pregnancy, accounting for approximately 75.6 %. In contrast, the percentage of antenatal healthcare services uptake gradually declined for women who reported having mistimed (52 %) and unwanted (30 %) pregnancies in their most recent pregnancy.

Independent and interaction effects of preconception care and pregnancy intention on antenatal care services utilization

The independent and interaction effects of preconception care and pregnancy intention on antenatal healthcare services utilization are presented in Table 2. We found that receiving preconception care was positively associated with antenatal healthcare services uptake. Compared to women who received no preconception care, those who received at least one and two or more preconception care reported 1.88 times (95 % CI, 1.52–2.24) and 2.10 times (95 % CI, 1.61–2.59) higher likelihoods of utilizing at least one antenatal healthcare service. Alternatively, women's experience of mistimed and unwanted pregnancies, as compared to wanted pregnancies, were found to be associated with 20 % (aOR, 0.80, 95 % CI, 0.74–0.86) and 60 % (aOR, 0.40, 95 % CI, 0.31–0.49) lower likelihoods of at least one antenatal healthcare service uptake. When we considered the interaction effects of not receiving preconception care and experiencing mistimed and unwanted pregnancies, we found a 39 % (aOR, 0.61, 95 % CI: 0.45–0.77) decline in the likelihoods for women with mistimed pregnancies and no preconception care, and a 57 % (aOR, 0.43, 95 % CI: 0.34–0.52) decline for women with unwanted pregnancies and no preconception care.

We found a higher likelihood of at least one antenatal healthcare services uptake among women whose partners had at least some education (aOR, 2.78, 95 % CI, 1.80–4.30) compared to women whose

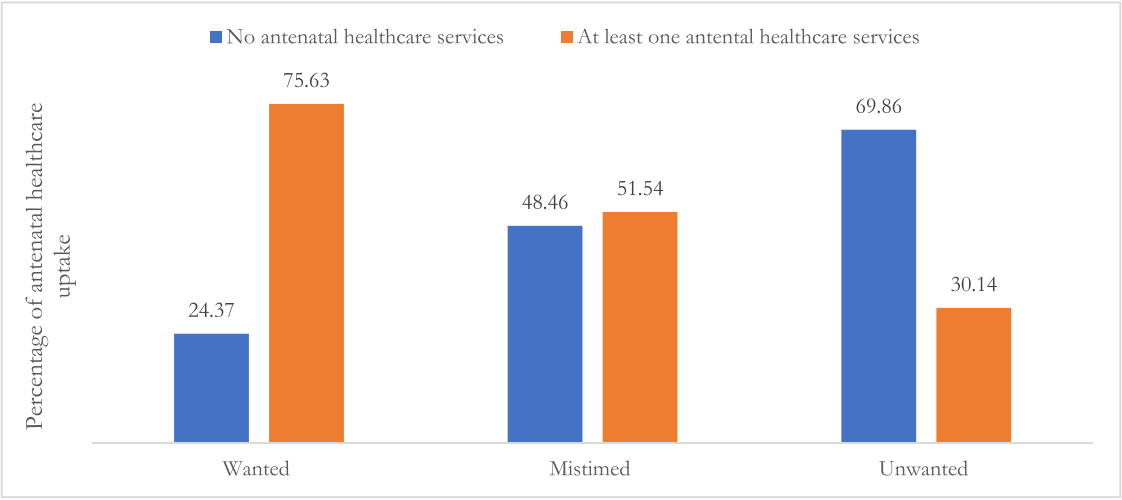


Fig. 2. Distribution of antenatal healthcare services uptake across women's pregnancy intention categories.

Table 2
Independent and interaction effects of preconception care and pregnancy intention on antenatal healthcare services utilization adjusted for covariates, Bangladesh.

Characteristics	At least one antenatal healthcare service uptake (Adjusted Odds Ratio, aOR)	95 % Confidence Interval	*p*-value
Preconception care			
None	1.00		
At least one	1.88	1.52–2.24	$p < 0.01$
Two or more	2.10	1.61–2.59	$p < 0.05$
Pregnancy intention at conception of most recent child			
Wanted	1.00		
Mistimed	0.80	0.74–0.86	$p < 0.05$
Unwanted	0.40	0.31–0.49	$p < 0.05$
Women's age at index pregnancy			
≤19	1.00		
≥20	0.97	0.68–1.40	0.878
Women's educational status			
No education	1.00		
At least some education	1.16	0.65–2.05	0.615
Women' work engagement outside the household			
Yes	1.00		
No	0.99	0.52–1.89	0.971
Women's partner education			
No education	1.00		
At least some education	2.78	1.80–4.30	$p < 0.01$
Women's partner occupation			
Unemployed	1.00		
Voluntary work	0.78	0.45–1.37	0.386
Day labourer	0.55	0.31–0.96	$p < 0.05$
Children ever born			
≤2	1.00		
3–4	1.14	0.98–1.30	0.862
≥5	1.45	1.10–1.80	$p < 0.05$
Wealth quintile			
Lowest	1.00		
Second	2.21	1.31–3.72	$p < 0.01$
Middle	2.01	1.18–3.40	$p < 0.01$
Fourth	3.35	1.82–6.20	$p < 0.01$
Highest	4.26	2.36–7.70	$p < 0.01$
Interaction effects of preconception care and pregnancy intention at conception			
Mistimed ##no preconception care	0.61	0.45–0.77	$p < 0.01$
Unwanted ## no preconception care	0.43	0.34–0.52	$p < 0.01$
Hosmer-Lemeshow test to check goodness of model fit			
Chi-square test value (*p*-value)	205.98 (0.542)		

partners had no education. Furthermore, women with five or more children had a higher likelihood of receiving at least one antenatal healthcare service (aOR, 1.45, 95 % CI, 1.10–1.80) compared to women with two or fewer children. Additionally, we found increased odds of utilizing at least one antenatal healthcare service among women in the second to highest household wealth quintile compared to women in the lowest household wealth quintile. Women's partner occupation as a day laborer was found to be associated with a 45 % (aOR, 0.55, 95 % CI, 0.31–0.96) decline in the likelihood of at least one antenatal healthcare service uptake as compared to women whose partners were unemployed. Hosmer-Lemeshow test indicated good fit of the model.

Discussion

Approximately 47 % of women in the Rohingya camps did not access any antenatal healthcare services, and 68 % did not receive any preconception care. The occurrence of unintended pregnancies is also found to be higher for one third of the total pregnancies. Women who did not receive preconception care and those with mistimed and unwanted pregnancies exhibited lower likelihoods of accessing antenatal healthcare services. The likelihood of utilizing antenatal healthcare services decreased further when combining the absence of preconception care with mistimed or unwanted pregnancies. These findings highlight the urgent need to address inadequate pregnancy planning in the Rohingya camps. To achieve this, policymakers should focus on providing preconception care and promoting effective contraception to ensure every pregnancy in the camps is wanted and occurs at the right time.

The reported prevalence of non-use of antenatal healthcare services in the camps in this study is closely aligned with the previously reported rate of 46.5 % in 2018 (Chowdhury et al., 2018). However, the reported rate of antenatal healthcare services uptake is considerably lower than the utilization of antenatal healthcare services reported for Syrian, Ukrainian, or Somali refugees (Abbasi-Kangevari et al., 2020; Fareed and Ismail, 2019; Råssjö et al., 2013; Umer et al., 2020). This suggests a lack of progress in improving antenatal healthcare services uptake despite the efforts of various stakeholders (Ainul et al., 2018). However, it is important to acknowledge that there may be COVID-19 effects on our reported prevalence as the data we analyzed encompassed pregnancies occurring from early 2020 and onwards when numerous COVID-19 restrictions, including limitations on movement, were in effect in the camps (Akter et al., 2021; Truelove et al., 2020). However, when we segregated our results to the current year only, we did not notice any significant difference. This indicates that additional challenges may be present in the camps. We also cannot ignore the effects of the COVID-19 pandemic, as a significant portion of the healthcare stakeholders working in the camps are now facing financial burdens compounded by the economic crisis triggered by the pandemic (Akter et al., 2021). This results in reduced service coverage and the discontinuation of services. These factors are in addition to the decreasing attention from global collaborators over time, who were actively involved in providing care during the early stages of the camps (UNHCR, 2022). Collectively, these factors contribute to the challenges encountered in ensuring adequate access to antenatal healthcare services.

The scarcity of relevant literature limits our ability to compare the significantly higher rate of unintended pregnancy reported in this study. However, these highlight that the existing family planning services in the camps are not effectively achieving their ultimate goal of ensuring planned pregnancies at the appropriate time (Khan et al., 2021). The inefficiency of the family planning services can be attributed to both provider-level and respondent-level challenges (Khan et al., 2021). Provider-level barriers include a strong focus on contraception methods that may not be familiar or culturally accepted by the Rohingya population, as well as an emphasis on women's responsibility for contraception decision-making without considering their capacity to do so (M Islam et al., 2022; Khan et al., 2021). Additionally, family planning workers in the camps often have extensive responsibilities covering a large number of households, which hinders their ability to provide focused and personalized attention, an important aspect of ensuring effective contraception for this group (Hossain and Dawson, 2021; Islam

et al., 2022). Respondent-level barriers include deep-rooted beliefs and religious interpretations regarding the use of contraception (Islam et al., 2022; Khan et al., 2021; Sarker et al., 2020). These factors are primarily influenced by cultural norms and expectations, as well as the perception that additional children can result in increased food aid and potential future sources of income [4, 6, 9].

Our findings also indicate that the absence or limited utilization of preconception care, as well as mistimed and unwanted pregnancies, significantly hinder the utilization of antenatal healthcare services. These negative effects are even more pronounced when these factors occur in combination. The underlying reasons behind these associations are multifaceted and can be attributed to various factors specific to the Rohingya refugee population in Bangladesh. When we compare women who receive preconception care or actively plan their pregnancies with those who do not receive any preconception care or do not plan their pregnancies, we are essentially comparing women who are aware of their pregnancy before it occurs with those who are not (Khan et al., 2019; Valibhoy et al., 2017). This awareness leads to the immediate initiation of antenatal healthcare services following conception, a benefit that is often unattainable for women with unwanted pregnancies due to delayed detection and dissatisfaction with the pregnancy (Khan et al., 2019). Furthermore, the receipt of preconception care or engaging in pregnancy planning within refugee settings can be attributed to factors at the respondent's level, the health facility level, or both (Sultana et al., 2020). At the respondent's level, these factors may be associated with a comparatively higher socio-economic status, including education and wealth quintile, which is conducive to accepting contraception (Iseyemi et al., 2017). Women of higher socio-economic status also possess a greater capacity to acquire healthcare knowledge available in the camps due to their active engagement in healthcare-related programs (Islam et al., 2022; Khan et al., 2021; Md Nuruzzaman Khan and Shimlin Jahan Khanam, 2023). Moreover, women residing in households with a higher socio-economic status experience enhanced autonomy when seeking healthcare services from nearby centers. This increased agency is attributed primarily to the improved education of their husbands, who play a pivotal role in facilitating access to maternal healthcare services within the community (Md Nuruzzaman Khan and Shimlin Jahan Khanam, 2023). A parallel observation can be made regarding the infrequent utilization of antenatal healthcare among women whose husbands work as day laborers. These individuals are often constrained by restrictions on engaging in income-generating occupations, and those who are employed may struggle to find time to accompany their wives to healthcare facilities (Md Nuruzzaman Khan and Shimlin Jahan Khanam, 2023). At the healthcare facility level, the availability of reproductive healthcare services plays a role in shaping barriers to antenatal healthcare service uptake at the respondents' level and increase overall utilization of antenatal healthcare among the respondents (Md Nuruzzaman Khan and Shimlin Jahan Khanam, 2023; Palma, 2017). Together these indicate need for strengthening preconception care, enhancing family planning services, implementing awareness campaigns, investing in healthcare infrastructure to improve antenatal healthcare services in the camps along with reduction of unwanted pregnancies and improvement of preconception care.

One of the major strengths of this study is the analysis of a comparably larger sample size, collected through a rigorous sampling technique. Appropriate statistical methods was utilized to established the associations of explanatory variables with the outcome variable. Therefore, the reported findings provide novel insights specific to the Rohingya refugee population. However, the study's major limitations stem from the analysis of cross-sectional survey data, limiting causal inferences. The retrospective data collection introduces the possibility of recall bias, although any such error is likely to be random. Moreover, there was a risk of systematic error for certain variables included in the survey. For instance, a significant difference may exist between women who planned their pregnancies and those who did not, particularly concerning the importance of accessing antenatal healthcare services, and underreporting was expected to be more common in the latter group. In addition, it is important to mention that we collected data exclusively from women who had given birth within two years of the survey. This restriction meant that we were unable to collect information from mothers who were experiencing pregnancies but unfortunately lost their babies due to various reasons, such as stillbirth or miscarriage. Furthermore, the model lacks adjustment for important factors at the healthcare facility level, which could influence decisions regarding antenatal healthcare services uptake. Unfortunately, these variables were not included in the survey. Despite these limitations, the findings of this study contribute to evidence-based policy and program development to enhance maternal healthcare services among the Rohingya refugees in Bangladesh as well as refugees in other countries.

Conclusion

Access to antenatal healthcare services is insufficient in the Rohingya refugee camps. The absence of preconception care and experiencing mistimed or unwanted pregnancies significantly reduces the likelihood of utilizing antenatal healthcare services. Particularly, the impact is more pronounced for women who receive no preconception care and also have mistimed or unwanted pregnancies. These findings emphasize the poor antenatal healthcare service uptake in the camps, along with the associated sociodemographic and pregnancy related challenges. Enhancing the existing maternal healthcare services, launching awareness campaigns, and making investments in healthcare infrastructure are crucial steps to enhance the utilization of antenatal healthcare services in the camps.

Funding

This research did not receive any specific funds.

Data availability

The data for this study were collected through a cross-sectional survey, and all authors had access to it. We cannot share this data publicly because of the restriction imposed by the ethical approval broad.

CRediT authorship contribution statement

Md Nuruzzaman Khan: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Shimlin Jahan Khanam:** Writing – original draft, Writing – review & editing. **Md Badsha Alam:** Writing – review & editing.

Declaration of competing interest

The authors declare there is no conflict of interests.

Acknowledgment

We acknowledge the support of Jatiya Kabi Kazi Nazrul Islam University, Bangladesh.

References

Abbasi-Kangevari, M., Amin, K., Kolahi, A.-A., 2020. Antenatal care utilisation among Syrian refugees in Tehran: a respondent driven sampling method. Women Birth 33 (2), e117–e121.

Ainul, S., Ehsan, I., Haque, E., Amin, S., Rob, U., Melnikas, A.J., Falcone, J., 2018. Marriage and sexual and reproductive health of Rohingya adolescents and youth in Bangladesh: a qualitative study. Population Council, Dhaka, Bangladesh.

Akter, S., Dhar, T.K., Rahman, A.I.A., Uddin, M.K., 2021. Investigating the resilience of refugee camps to COVID-19: a case of Rohingya settlements in Bangladesh. J. Migr. Health 4, 100052. https://doi.org/10.1016/j.jmh.2021.100052.

Azad, M.A.K., Zakaria, M., Nachrin, T., Das, M.C., Cheng, F., Xu, J., 2021. Family planning knowledge, attitudes and practices among Rohingya women living in refugee camps in Bangladesh: a cross-sectional study.Reproductive. Health 19 (105), 04258.

Chowdhury, M.A.K., Billah, S., Karim, F., Khan, A.N.S., Islam, S., Arifeen, S.E., 2018. Report on Demographic profiling and needs assessment of maternal and child health (MCH) care for the Rohingya refugee. population in Cox's Bazar. Bangladesh.icddr,b, Dhaka, Bangladesh.

Fareed, S.M., Ismail, K.H., 2019. Utilization of antenatal care services in Syrian refugee camps in Erbil, Iraq. Z. J. Med. Sci. 23 (2), 250–256.

Hossain, M.A., Dawson, A., 2021. Sexual and reproductive health needs, experiences, access to services, and interventions among The Rohingya and The Afghan refugee women of reproductive age in Asia: a mixed methods systematic review protocol. Women Midw. Midwif. 1 (3), 1–12.

Iseyemi, A., Zhao, Q., McNicholas, C., Peipert, J.F., 2017. Socioeconomic status as a risk factor for unintended pregnancy in the contraceptive CHOICE project. Obstet. Gynecol. 130 (3), 609–615. https://doi.org/10.1097/aog.0000000000002189.

Islam, M.M., Khan, M.N., Rahman, M.M., 2021. Factors affecting child marriage and contraceptive use among Rohingya girls in refugee camps. Lancet Reg. Health West Pac. 12, 100175 https://doi.org/10.1016/j.lanwpc.2021.100175.

Islam, M.M., Rahman, M.M., Khan, M.N., 2022. Barriers to male condom use in Rohingya refugee camps in Bangladesh: a qualitative study. Lancet Reg. Health-Southeast Asia 2, 100008.

Jannat, S., Sifat, R.I., Khisa, M., 2022. Sexual and reproductive health conditions of women: insights from Rohingya Refugee Women in Bangladesh. Sexual. Res. Soc. Policy 1–14.

Jo, A., Ca, J., 2019. The Rohingya people: past, present, and future. Lancet 394 (2202), 33139-33133.

Khan, M.N., Khanam, S.J., 2023a. Women's participation in childbearing decision-making and its effects on short-interval births in Rohingya refugee camps of Bangladesh. Lancet Reg. Health-Southeast Asia 15, 100250.

Khan, Md N., Khanam, S.J., 2023b. Women's participation in childbearing decision-making and its effects on short-interval births in Rohingya refugee camps of Bangladesh. Lancet Reg. Health-Southeast Asia.

Khan, M.N., Harris, M.L., Shifti, D.M., Laar, A.S., Loxton, D., 2019a. Effects of unintended pregnancy on maternal healthcare services utilization in low- and lower-middle-income countries: systematic review and meta-analysis. Int. J. Public Health 64 (5), 743–754. https://doi.org/10.1007/s00038-019-01238-9.

Khan, N.N., Boyle, J.A., Lang, A.Y., Harrison, C.L., 2019b. Preconception Health Attitudes and Behaviours of Women: a Qualitative Investigation. Nutrients. 11 (7) https://doi.org/10.3390/nu11071490.

Khan, M.N., Islam, M.M., Rahman, M.M., Rahman, M.M., 2021. Access to female contraceptives by Rohingya refugees, Bangladesh. Bull. World Health Organ. 99 (3), 201.

Mahmood, S.S., Wroe, E., Fuller, A., Leaning, J., 2017. The Rohingya people of Myanmar: health, human rights, and identity. Lancet 389 (10081), 1841–1850.

National Institute of Population Research Training, 2020. Bangladesh Demographic and Health Survey 2017-18. Retrieved from Dhaka, Bangladesh. https://www.dhsprogram.com/pubs/pdf/FR344/FR344.pdf.

Palma, P., 2017. Family planning: too important, yet ignored: Rohingya mothers, children in danger for lack of services. Daily Star. Dhaka.

Råssjö, E.B., Byrskog, U., Samir, R., Klingberg-Allvin, M., 2013. Somali women's use of maternity health services and the outcome of their pregnancies: a descriptive study comparing Somali immigrants with native-born Swedish women. Sexual Reprod. Healthc. 4 (3), 99–106.

Rutstein, S.O., 2015. Steps to Constructing the New DHS Wealth Index. ICF International, Rockville, MD.

Sarker, M., Saha, A., Matin, M., Mehjabeen, S., Tamim, M.A., Sharkey, A.B., Shahabuddin, A., 2020. Effective maternal, newborn and child health programming among Rohingya refugees in Cox's Bazar, Bangladesh: implementation challenges and potential solutions. PLoS ONE 15 (3), e0230732.

Sullivan, D.P., 2022. Hope Amid Despair: Finding Solutions for Rohingya in Bangladesh - Refugees International. Retrieved from Dhaka, Bangladesh.

Sultana, S., Tofigh, S., Chowdhury, R., Rubayet, S., Samandari, G., Edelman, A., 2020. Expanding access to comprehensive abortion care in humanitarian contexts: case study from the Rohingya refugee camps in Bangladesh. Int. Perspect. Sex. Reprod. Health 46 (Suppl 1), 45–52. https://doi.org/10.1363/46e0820.

Truelove, S., Abrahim, O., Altare, C., Lauer, S.A., Grantz, K.H., Azman, A.S., Spiegel, P., 2020. The potential impact of COVID-19 in refugee camps in Bangladesh and beyond: a modeling study. PLoS Med. 17 (6), e1003144 https://doi.org/10.1371/journal.pmed.1003144.

Umer, A., Zinsstag, J., Schelling, E., Tschopp, R., Hattendof, J., Osman, K., Zemp, E., 2020. Antenatal care and skilled delivery service utilisation in Somali pastoral communities of eastern Ethiopia. Trop. Med. Int. Health 25 (3), 328–337.

UNHCR, 2022. New Frontiers: The Future Narratives of Refugee Crises. Publication no. https://www.unhcr.org/innovation/new-frontiers-the-future-narratives-of-refugee-crises/.

Valibhoy, M.C., Kaplan, I., Szwarc, J., 2017. It comes down to just how human someone can be": a qualitative study with young people from refugee backgrounds about their experiences of Australian mental health services. Transcult. Psychiatry 54 (1), 23–45. https://doi.org/10.1177/1363461516662810.

World Health Organization, 2017. Reports on Situation Analysis and Practices in Addressing the Health Needs of Refugees and Migrants. Refugee and Migrant Health Web site.