

# BMJ Open Access to maternal healthcare services among Indigenous women in the Chittagong Hill Tracts, Bangladesh: A cross-sectional study

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## ABSTRACT

**Objectives** This study aimed to estimate the prevalence of, and factors associated with, accessing maternal healthcare services (MHC) by Indigenous women in the Chittagong Hill Tracts (CHT), Bangladesh.

**Design** This was a cross-sectional survey among Indigenous women of reproductive age.

**Setting** Two upazillas (subdistricts) of Khagrachhari hill district of the CHT.

**Participants** Indigenous women (15–49 years) within 36 months of delivery were surveyed about accessing MHC services (antenatal care, delivery and postnatal care) for their last pregnancy and delivery.

**Primary outcome measures** The primary outcome for this analysis is the prevalence of accessing any MHC service and secondary outcome is factors associated with access to MHC services for Indigenous women during their last pregnancy and childbirth.

**Results** Of 438 Indigenous women (220 Chakma, 100 Marma, 118 Tripura) who participated, 75% were aged 16–30 years. With an 89% response rate, a total of 258 (59%) women reported accessing at least one MHC service (Chakma 51.6%, Marma 28%, Tripura 20.5%;  $p < 0.001$ ). Independent factors associated with accessing MHC after adjusting for clustering were attending secondary school and above (OR 2.4; 95% CI 1.2 to 4.9); knowledge about nearest health facilities (OR 3.8, 95% CI 1.8 to 7.8) and knowledge of pregnancy-related complications (OR 3.0, 95% CI 1.5 to 5.8).

**Conclusion** Findings suggest that the prevalence of accessing MHC services is lower among Indigenous women in the CHT compared with national average. MHC access may be improved through better education and awareness raising of local services.

## INTRODUCTION

Access to maternal healthcare (MHC) services is a key determinant of maternal mortality. Since WHO set a Millennium Development Goal (MDG) in 2000 to reduce the maternal mortality ratio (MMR; goal 5), the world has seen a 45% decline in MMR.<sup>1</sup> However, the target of a 75% decline by 2015 was not achieved.<sup>2,3</sup> A significant increase in women accessing MHC services around the world during pregnancy and delivery is a key factor

## Strengths and limitations of this study

- This is the first study to report prevalence and factors associated with accessing maternal healthcare services among Indigenous women from three dominant Indigenous communities of the Khagrachhari district, the major ethnic groups in the two other hill districts sharing similar sociocultural status.
- This cross-sectional study, where measurements from the population were obtained at a single time point, precludes temporal sequence and causal inference.
- Data collection was designed to reduce bias and increase generalisability by attempting to recruit all eligible Indigenous women in the *para*/village.
- Not using Indigenous languages for the survey may have led to some communication barriers as the questionnaire did not use Indigenous dialectic terms for pregnancy and delivery, which may have restricted opportunities for transferring the knowledge to participants to some extent.

contributing to this decline, despite access gaps within MHC facilities.<sup>3,4</sup> To minimise those gaps, WHO Sustainable Development Goals emphasise improving MHC facilities so that, regardless of sociocultural background, women can have equal and easy access to quality MHC services ensuring universal health coverage.<sup>5,6</sup>

Bangladesh achieved notable success in improving maternal health in the MDG era with a 40% reduction of MMR from 322 (95% CI 259 to 391) to 194 (95% CI 149 to 238) deaths per 100 000 live births.<sup>4,7</sup> Improved access and attendance at MHC services are key factors attributed to this outstanding reduction.<sup>8,9</sup> This outcome does not imply that the reduction was inclusive and equitable for women from all socio-cultural backgrounds<sup>9</sup>; rather there is a lack of information regarding MHC accessibility for cultural minority groups including

Indigenous women in the Chittagong Hill Tracts (CHT) of Bangladesh.<sup>10 11</sup>

The CHT consists of three hill districts—Bandarban, Khagrachhari and Rangamati—located in the south-eastern part of Bangladesh, home to 11 Indigenous communities with distinctive cultural and ethnic identities compared with the mainstream Bengali community.<sup>12–14</sup> Apart from geographical and sociocultural differences, this area has a long history of political tensions that ended with the signing of a peace accord between the Government of Bangladesh and the Indigenous communities in 1997. More than 20 years have passed since the Peace Accord was signed and limited research has been conducted on Indigenous women's health issues in Bangladesh.<sup>15</sup>

Due to inadequate investment and limited research in Indigenous women's health issues, Indigenous women have the worst health record in the country.<sup>10 11 16</sup> According to the United Nations Children's Fund (UNICEF), the percentage of low-birth weight newborn babies is highest in the CHT, which is closely associated with maternal health during pregnancy and delivery.<sup>11 17</sup> In 2014, the Human Development Research Centre undertook a survey on various interventions of the CHT Development Facility (CHTDF); a multisectoral capacity building and development programme implemented by the United Nations development agency (United Nations Development Programme (UNDP)-CHTDF) for all CHT inhabitants since 2003.<sup>12</sup> Understanding of basic MHC services among Indigenous women was lower compared with their Bengali counterparts.<sup>12</sup> Evaluation from two UNDP-CHTDF programme household surveys (2008 and 2013) reported increased MHC service utilisation among Indigenous and non-Indigenous women in the intervention areas.<sup>6</sup>

Research on Indigenous women's health is limited and mostly conducted by international development organisations.<sup>15 18</sup> Findings from a cross-sectional and a mixed-method study among Indigenous Mru women in Bandarban Hill district, Bangladesh, indicated that cultural issues, distance, infrastructure and socioeconomic status were important determinants of accessing MHC services.<sup>19 20</sup>

Distance to services, language barriers and cost are key barriers for Indigenous women accessing existing MHC services.<sup>20–25</sup> The top-down nature of health intervention programmes can make services culturally unfriendly for Indigenous women in lower and middle income countries, impacting their access to available services.<sup>26</sup> However, drawing the same conclusion for CHT Indigenous women is difficult due to the sociopolitical context and insufficient evidence. This study aims to determine the prevalence of accessing MHC services and to identify factors associated with accessing MHC services among CHT Indigenous women in Bangladesh.

## METHOD

### Study design and setting

This cross-sectional study was conducted between September 2017 and February 2018 in two subdistricts

(*Upazila*) of Khagrachhari district, Bangladesh. Khagrachhari is bound on the north by India, south by Chittagong and Rangamati district and on the west by India and Chittagong district.<sup>12 27</sup> The Khagrachhari district is hilly with a significant proportion of the land area under forest<sup>27</sup> (see figure 1).

Three major Indigenous groups: Chakma, Marma and Tripura inhabit Khagrachhari district comprising 50% (315 167 out of 613 917) of the district population with distinctive cultural features compared with the majority Bengali community.<sup>28</sup> These ethnic communities speak Bangla language in addition to their mother tongue.<sup>12</sup>

### Sampling

Khagrachhari district was purposively selected as the study site based on available data on Indigenous communities, available primary healthcare service centres and access to different ethnic communities.<sup>12</sup> Khagrachhari has 9 subdistricts, 38 unions and 1706 villages, known as *paras* (the smallest administrative unit in the district). Distinct Indigenous groups reside together in particular paras. On average, a *para* consists of 241 people and each household comprises 5.2 members.<sup>12</sup> Two subdistricts (Khagrachhari Sadar and Matiranga) were chosen based on available public and private healthcare facilities<sup>28</sup>; 246 paras in Khagrachhari Sadar and 365 paras in Matiranga subdistrict.<sup>28</sup> The survey was administered in 47 selected paras with a high proportion of Indigenous residents; 41 in Matiranga and 6 in Khagrachhari Sadar.

### Study participants and sample size

#### Inclusion criteria

Indigenous women aged 15–49 years from the three ethnic communities in the Khagrachhari district, who resided in their paras for at least 6 months prior to the survey and were within 36 months post delivery, were eligible to participate. Delivery included normal delivery or caesarean delivery. The outcome of their last pregnancy could be a live birth, stillbirth or miscarriage.

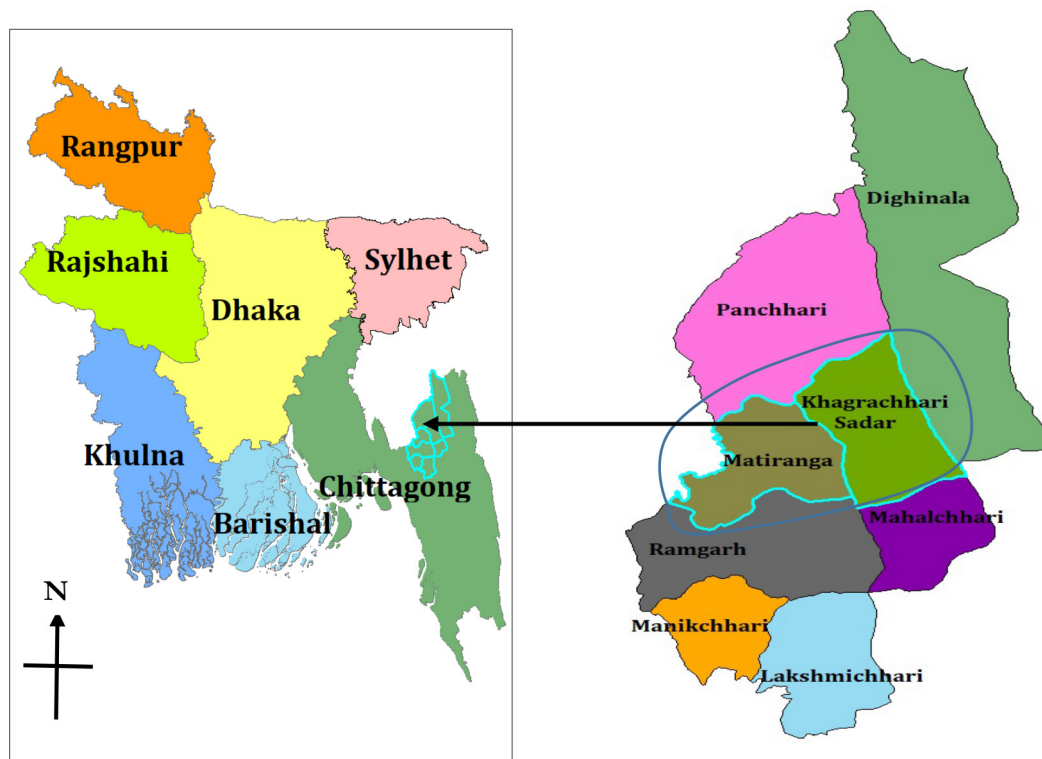
#### Exclusion criteria

Non-Indigenous women living in the same paras with Indigenous people were excluded from participating in the survey. Indigenous women who did not have the capacity to give informed consent, and where the researcher did not have the capacity to communicate with the women, were also excluded.

Sample size was estimated using a formula for a single population proportion with the assumptions of 95% CI, 5% margin of error and an expected 35.2% prevalence of women giving birth in a health institution in the Chittagong Division.<sup>29</sup> Based on a non-response rate of 20% and the distribution of the three ethnic populations, the survey required 438 Indigenous women: 220 Chakma, 100 Marma and 118 Tripura women.

### Outcome measures

The primary outcome of interest was the prevalence of accessing any MHC service, a dichotomous variable



**Figure 1** Map of Bangladesh and Khagrachhari district where the study was conducted (created using ArcMap V.10.6.1 software).

of accessing at least one MHC service (antenatal care (ANC), delivery or postnatal care (PNC)) from any primary healthcare facility or skilled community health worker during their last pregnancy or delivery or not. Prevalence was estimated by dividing the number of women within 36 months post delivery who reported accessing at least one MHC service during their last pregnancy or delivery, by the number of women within 36 months post delivery in the two subdistricts as informed by the *Karbari*. To reduce bias and increase generalisability of the findings, recruitment of all eligible Indigenous women in the *para* was attempted. Secondary outcomes were factors associated with attendance at any MHC service for Indigenous women during their last pregnancy and childbirth.

### Survey design

The survey was modified based on two previous surveys.<sup>29,30</sup> Information was collected on sociodemographic characteristics, reproductive history and knowledge and use of local services for women of reproductive age. Questions related to distance between home and MHC services facilities were asked and distance between the nearest health centres and each *para* was estimated using mobile global positioning system (GPS) applications. The survey was translated into English and Bangla by a local translator, and cross verified using independent speakers of Bangla and English.

### Data collection procedures

Data were collected from participants by the first author (SA) and one field assistant from each of the three

ethnic communities; all fluent in ethnic and Bengali languages. Field assistants underwent a 3-day training programme comprising the study objectives, survey conduct, cultural sensitivity, informed consent, privacy and confidentiality, use of survey software and survey field testing. REDCap software (Vanderbilt University, Nashville, Tennessee, USA),<sup>31</sup> a web application for building and managing online surveys and databases, was used for data collection using tablet computers. To minimise unforeseeable situations, the survey team carried hard copies of the survey.

The survey was administered seeking verbal consent from participants as previous studies in CHT suggest that Indigenous people have trust issues with signed documents due to bitter experiences related to land acquisition practice.<sup>19,32</sup> Before accessing villages, the first author formally contacted the *para karbari* or headman (traditional community leader) to describe the study objectives and seek verbal permission to administer the survey. Prior to data collection, the research team visited local administrative offices to collect household lists and seek advice about the number of eligible Indigenous women in each household. Given the nature of Indigenous women's daily activities, community leaders suggested the best time to visit paras to approach women for interviews and provided a local guide to assist. Permission was sought from the head of the household if present and permission was sought from parents if the woman was aged under 18 years. The survey was conducted in Bangla.<sup>12</sup> Three attempts were made to reach eligible women who were

not at home; otherwise, those women were considered as 'missing'. Data were collected anonymously to ensure participants' confidentiality. Average duration of survey completion was 25 min.

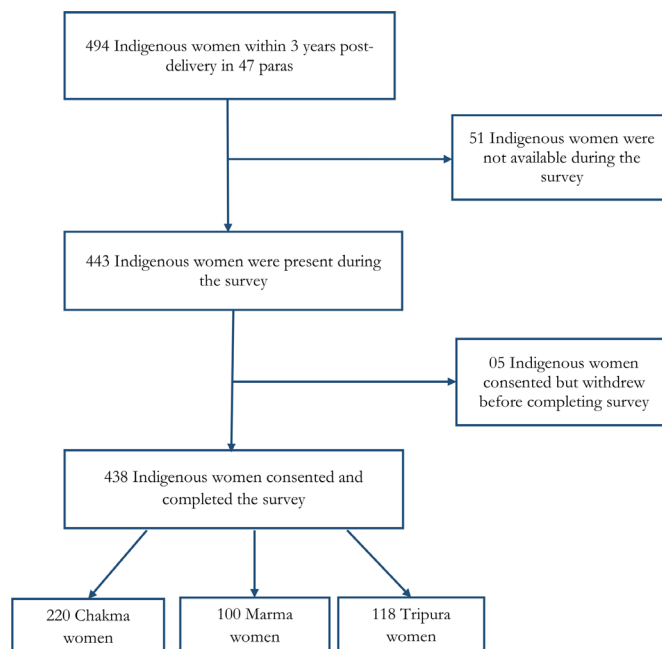
### Data analysis

Software package STATA V.15 (StataCorp LLC, USA) was used to analyse data. All variables were checked for implausible values, errors and missing data. Associations between categorical variables were analysed using  $\chi^2$  test and to assess factors associated with MHC services access within 3 years of delivery, univariate and multivariable logistic regression analyses were used. Factors of interest included demographic factors (age, ethnicity, religion, education, occupation, their partner's education and occupation, household income and subdistrict), reproductive history (age at first pregnancy, number of pregnancies, outcome of pregnancies, experience of pregnancy complications and expected number of children); knowledge about nearest health facilities, knowledge of pregnancy-related complications and access to media (see online supplementary table 1). Given small cell sizes, categories were collapsed to aid regression analysis for the variables of participants' and their partners' education status, and for participants' and partners' occupation. The variable 'number of pregnancies till survey date' was collapsed into two categories: '1–2 pregnancies' and '3 and above' reflecting the Bangladesh Population Policy that encouraged 'No more than two children, but one is better' for all married couples.<sup>33</sup> The variable 'knowledge of pregnancy-related complications' was categorised as 'mild, moderate (should see a doctor) or severe (needs immediate medical intervention)' using WHO and UNICEF recommendations.<sup>34</sup>

In the multivariable logistic regression model, variables with a  $p \leq 0.250$  on univariate analysis were included using a backward stepwise approach. Final model included variables with a  $p < 0.100$ . As individual participants were nested within paras (primary sampling unit), and paras were nested within subdistricts, clustering by para was adjusted for in the model. Results are reported as OR, adjusted OR (AOR) and 95% CIs.

### Partial patient and public involvement

Respected members of Khagrachhari district community from the three Indigenous groups including school teachers, health professionals and non-government organisation officers were informed about the potential research to seek their support. These persons helped refine the research design and approach by providing important information regarding numbers of paras in the two field sites and the existence of health programme targeting Indigenous communities. Informed verbal consent was obtained from all participants prior to data collection. Participation was voluntary, and privacy and confidentiality were maintained.

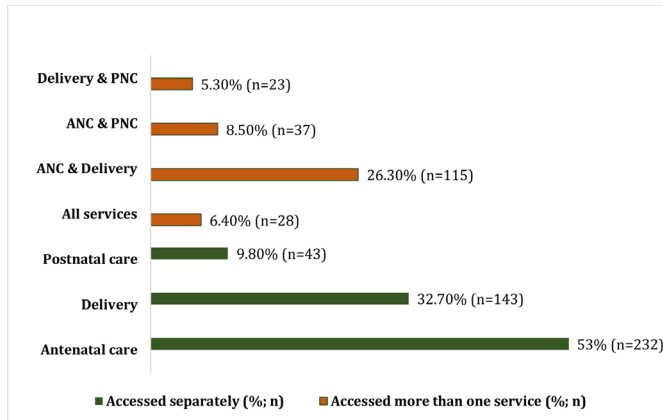


**Figure 2** Flow chart defining the cohort of Indigenous women from Chittagong Hill Tracts, Bangladesh.

### RESULTS

According to the health workers and community Karbari, 494 Indigenous women were permanent residents and living for the last 6 months in 47 paras in Matiranga (41 paras) and Khagrachhari sadar (6 paras) upazilas, having delivered at least one child, including miscarriage and abortion, within 3 years preceding the survey. Fifty-one Indigenous women (11.3%) were not at home and documented as missing after three attempts to administer the survey. The remaining 443 women were invited to participate and 438 provided verbal consent; no participants were excluded. Five women who consented withdrew from the study before completing the survey. The overall response rate was 88.7% (438/494). Of the 438 women who completed the survey, 220 (50.2%) were Chakma, 100 were Marma (22.8%) and 118 (26.9%) were Tripura women (see figure 2)

Of the 438 participants, 59% (n=258) accessed at least one MHC service related to their last pregnancy; the remaining 41% of participants (n=180) did not report accessing any MHC services during their last pregnancy or delivery. Of the 258 participants who accessed at least one MHC service, 16% (n=41) were aged between 13 and 19 years. Prevalence of accessing MHC services was 53%, 33% and 9.8% for ANC, delivery and PNC, respectively. Of the 258 participants who accessed at least one MHC service, 90% (n=232) accessed ANC services, 16.7% (n=43) accessed PNC services only and 6.4% (n=28) accessed all three MHC services. Approximately, one quarter (n=115, 26.3%) accessed ANC and delivery services, while only 23 women (5.3%) reported accessing



**Figure 3** Estimated prevalence of accessing maternal healthcare services during pregnancy and delivery by the Indigenous women from Chittagong Hill Tracts, Bangladesh. ANC,- antenatal care; PNC,- postnatal care.

delivery and PNC services (see [figure 3](#)). Twenty-one participants (15%) reported delivery of their last child by caesarean section.

[Table 1](#) compares the demographic and obstetric characteristics of the CHT Indigenous women who accessed at least one MHC services within 36 months of delivery to those who did not access any MHC services. A significantly higher proportion of CHT Indigenous women who accessed MHC resided in Matiranga upazilla were older, had higher school attendance, were not involved in household income generating activities, had higher household income, had prior knowledge about nearest health facilities, did not access media for MHC information, had prior knowledge of pregnancy-related complications and experienced more pregnancy-related complications during the last pregnancy compared with those who did not access any MHC services. A significantly higher proportion of Indigenous women who did not access MHC services became pregnant before their 20<sup>th</sup> birthday, experienced a negative pregnancy outcome (stillbirth/miscarriage/abortion) and had 2 deliveries in the last 3 years than women who did access MHC services.

Responses regarding distance to the nearest health facility was low. GPS data indicated that distance between the nearest health centres and each *para* ranged from 0.5 to 45 km with a mean (SD) distance of 12 km (13.4). Half of participants (52.3%, n=229) lived between 5 and 10 km from the nearest healthcare centre, with the closest centres more than 10 km away for 25.6% of participants. In many cases, there was no direct walkway or transport system to reach the facility due to the steep hilly landscape of the area.

In the multivariable logistic regression analysis, participants' age, ethnicity distance to facility, household income and access to media were not independent factors after adjusting for other variables in the model. Indigenous women who attended secondary school and above had twice the odds of accessing MHC services compared with Indigenous women who attended up to Junior school

(AOR 2.4, 95% CI 1.2 to 4.9). Indigenous women with knowledge about nearest health clinics had nearly four times the odds of accessing MHC services (AOR 3.8, 95% CI 1.8 to 7.8). Furthermore, Indigenous women with prior knowledge of pregnancy-related complications had three times the odds of accessing MHC services in comparison to Indigenous women who were unaware of complications (AOR 3.0, 95% CI 1.5 to 5.8). Relative to Indigenous women with one or two parity, those with three and above had significantly reduced odds of accessing MHC services (AOR 0.54, 95% CI 0.30 to 1.0; see [table 2](#)).

## DISCUSSION

This landmark study in the CHT of Bangladesh included women from three different Indigenous groups to estimate prevalence and identify factors associated with access to MHC services. The proportion of participating Indigenous women from each group was representative of the ethnic distribution of the CHT population.<sup>28</sup> Estimated prevalence of Indigenous CHT women accessing at least one MHC service for their last pregnancy was just over half (59%) and for attending ANC services was 53%; however, these rates differed among the three ethnic groups. The national average of women accessing any ANC service in Bangladesh according to 2014 Bangladesh Demographic and Health Survey report was 78% in 2014.<sup>29</sup> Delivery at a healthcare facility was 37% with delivery by caesarean section 23%.<sup>29</sup> Among Indigenous women in the CHT, the percentage of accessing ANC and facility delivery services were 53% and 33%, respectively, and 15% delivered their last child by caesarean section in the 3 years preceding the survey date. Key modifiable factors associated with attendance included education and knowledge about nearest health facilities and pregnancy-related complications.

Previously, research on MHC service utilisation by Indigenous women in the CHT reported low access to MHC services (30.7%)<sup>19</sup>; however, results were not representative of the wider CHT Indigenous population as only one ethnic minority group was included.<sup>19</sup> The Mru community is one of the most underprivileged ethnic minority groups in the CHT residing in remote and hilly areas of Bandarban district.<sup>19</sup> Previous studies in lower and middle-income countries indicate distance to facilities and religion are associated with MHC access<sup>26</sup>; however, the current study did not find this. Minority groups, including Indigenous people, who experienced systematic discrimination, displacement or were undervalued by the majority groups might be reluctant or afraid of accessing health facilities.<sup>6 26 35</sup>

Survey data from the UNDP-CHTDF intervention programme among Indigenous and non-Indigenous women in the CHT reported that ANC and facility delivery utilisation increased (by 18% and 23%, respectively) among Indigenous women in the intervention areas however in women with experience of violence,

**Table 1** Sociodemographic characteristics of Indigenous women from Chittagong Hill Tracts, Bangladesh, who accessed at least one maternal healthcare service (MHC) for last delivery

Variable	Participants accessed at least one MHC services in last pregnancy & delivery (n=258)		Participants did not access any MHC services in last pregnancy & delivery (n=180)		Pearson's Chi-Square test		
	n	%*	n	%*	$\chi^2$	df	p-value
<b>Place of residence (subdistrict)</b>							
Matiranga	166	64.3	159	88.3			
Khagrachhari Sadar	92	35.7	21	11.7	31.9	1	<0.001
<b>Age (years)</b>							
16–24	108	41.9	107	59.4			
25–30	96	37.2	50	27.8			
Above 30	54	20.9	23	12.8	13.5	2	0.001
<b>Ethnicity</b>							
Chakma	133	51.6	87	48.3			
Marma	72	27.9	28	15.6			
Tripura	53	20.5	65	36.1	16.8	2	<0.001
<b>Language</b>							
Changma	133	51.6	87	48.3			
Marma	72	27.9	28	15.6			
Kokborok	53	20.5	65	36.1	16.8	2	<0.001
<b>Religion</b>							
Buddhist	205	79.5	115	63.9			
Sonaton/Hindu	53	20.5	65	36.1	13.1	1	<0.001
<b>Participants' school attendance</b>							
Did not attend – Primary	80	31	125	69.4			
Junior – Secondary	114	44.2	54	30			
Higher Secondary & above	64	24.8	1	0.6	81	2	<0.001
<b>School attendance of partners</b>							
Did not attend – Primary	83	32.2	112	62.2			
Junior – Secondary	106	41.1	63	35			
Higher Secondary & above	69	26.7	5	2.8	58.6	2	<0.001
<b>Occupation</b>							
Complete housewife	145	56.2	69	38.3			
Involved in income generation	113	43.8	111	61.7	13.4	1	<0.001
<b>Occupation of partner</b>							
Daily labour/Farmer	111	43	110	61.1			
Service holder (govt/non-govt)	99	38.4	60	33.3			
Business	48	18.6	10	5.6	21.3	2	<0.001
<b>Monthly Household income (BDT)</b>							
4000–9000	82	31.8	116	64.4			
10 000–19 000	66	25.6	45	25			
20 000 and above	110	42.6	19	10.6	62.1	2	<0.001
<b>Knowledge about any nearest facility</b>							
Yes	242	93.8	128	71.1			
No	16	6.2	52	28.9	41.6	1	<0.001
<b>Knowledge of type of nearest healthcare facilities</b>							
Did not know any	16	6.2	52	28.9			

Continued

Table 1 Continued

Variable	Participants accessed at least one MHC services in last pregnancy & delivery (n=258)		Participants did not access any MHC services in last pregnancy & delivery (n=180)		Pearson's Chi-Square test		
	n	%*	n	%*	$\chi^2$	df	p-value
Community-based facility	81	31.4	74	41.1			
Government hospitals	61	23.6	45	25			
Private clinic	100	38.8	9	5	86.6	3	<0.001
Age during first pregnancy in years							
Became pregnant before 20 <sup>th</sup> birthday	141	54.7	143	79.4			
Became pregnant after 20 <sup>th</sup> birthday	117	45.3	37	20.6	28.6	1	<0.001
Any media access for MHC information							
Yes	80	31	6	3.3			
No	178	69	174	96.7	51.5	1	<0.001
Negative pregnancy outcome †							
Yes	53	20.5	60	33.3			
No	205	79.5	120	66.7	9.1	1	0.003
Number of total pregnancies							
1–2 pregnancies	199	77.1	111	61.7			
3 & above pregnancies	59	22.9	69	38.3	12.3	1	<0.001
Number of deliveries in last 3 years							
1	229	88.8	142	78.9			
2	29	11.2	38	21.1	7.9	1	0.005
Knowledge on pregnancy-related complications							
Yes	91	35.3	24	13.3			
No	167	64.7	156	86.7	26.4	1	<0.001
Pregnancy-complications experienced during last pregnancy							
Yes	175	67.8	100	55.6			
No	83	32.2	80	44.4	6.8	1	0.01
Pregnancy complications experienced last time (according to severity)							
No problems reported	83	32.2	80	44.4			
Mild	94	36.4	49	27.2			
Moderate	10	3.9	7	3.9			
Severe	71	27.5	44	24.5	7.4	3	0.06

\*Column percentages.

†Negative pregnancy outcomes=pregnancy that resulted in miscarriage/abortion/stillbirth/live birth but the child died <1 month. BDT, Bangladeshi Taka.

ANC service access only increased by 4%.<sup>6</sup> This current study collected data in *paras* without consideration of any intervention programme. Findings reported here provide important information on Indigenous women's access to MHC services not previously obtained for this population that could inform interventions and influence policy.

Sociodemographic characteristics of participants of this current study indicated that level of school attendance

was lower among the Indigenous population (35.8%) than the national percentage of literacy (66%) among ever-married women aged 15–49.<sup>29</sup> Higher level of school attendance, higher household income and lack of knowledge regarding existing nearby facilities were major factors influencing MHC service access among Indigenous women in the CHT, similar to studies in China, Vietnam and India.<sup>22 24 25 36</sup> A majority of Indigenous

**Table 2** Univariate and multivariable logistic regression models for identifying factors associated with access to maternal healthcare services (MHC) among Indigenous women in Chittagong Hill Tracts, Bangladesh, after adjusting for clustering by para

Variables	n (%)	Univariate analysis			Multivariable logistic regression		
		OR	95% CI for OR	P value	Adjusted OR	95% CI for AOR	P value
Place of residence (subdistrict)							
Matiranga	325 (74.2)	Ref					
Khagrachhari Sadar	113 (25.8)	4.2	2.5 to 7.1	<0.001	2.4	0.90 to 7.0	0.10
Ethnicity							
Chakma	220 (50.2)	Ref			Ref		
Marma	100 (22.8)	1.6	1.0 to 2.8	0.05	0.8	0.32 to 2.0	0.70
Tripura	118 (27.0)	0.50	0.34 to 0.84	0.006	0.5	0.25 to 1.3	0.20
Age							
Young (15–29)	328 (74.9)	Ref			Ref		
Adult (30 and above)	110 (25.1)	1.9	1.2 to 3.0	0.007	1.7	0.90 to 3.5	0.10
School attendance							
Did not attend—Junior	281 (64.2)	Ref			Ref		
Secondary and above	135 (35.8)	7.9	4.7 to 13.1	<0.001	2.4	1.2 to 4.9	0.01
Household income							
4000–9000	198 (45.2)	Ref			Ref		
10000–19 000	111 (25.3)	2.1	1.3 to 3.3	0.002	1.1	0.61 to 2.1	0.24
20000 and above	129 (29.5)	8.2	4.7 to 14.4	<0.001	2.0	0.90 to 4.4	0.11
Knowledge of nearest health facilities							
No	68 (15.5)	Ref			Ref		
Yes	370 (84.5)	6.1	3.4 to 11.1	<0.001	3.8	1.8 to 7.8	<0.001
Access to media access for MHC information							
No	352 (80.4)	Ref			Ref		
Yes	86 (19.6)	13.0	5.5 to 30.7	<0.001	2.3	0.76 to 7.2	0.14
Knowledge on pregnancy-related complications							
No	323 (73.7)	Ref			Ref		
Yes	115 (26.3)	3.5	2.1 to 5.8	<0.001	3.0	1.5 to 5.8	0.002
Number of total pregnancies							
1–2 pregnancies	310 (70.8)	Ref			Ref		
3 and above pregnancies	128 (29.2)	0.50	0.31 to 0.72	0.001	0.54	0.30 to 1.0	0.05

AOR, adjusted Odds Ratio; CI, Confidence Interval; OR, Odds Ratio.

women in this survey were involved in income-generating activities outside the home including daily labour; however, occupation was not an independent factor for accessing MHC services. In theory, working women are expected to have more freedom and knowledge about pregnancy and delivery, and therefore, are more likely to access healthcare facilities.<sup>36</sup> While Indigenous women in Khagrachhari were involved in income-generation activities, most were working as daily labourers and attended school up to primary level. Similar findings from China

revealed that Indigenous women's priorities are more related to income and time rather than their pregnancy which they perceived as low risk.<sup>22</sup>

Ethnicity was a significant factor in accessing MHC services, with Chakma women accessing services at a higher rate than Marma and Tripura women (52%, 28% and 20%, respectively) indicating that not all Indigenous groups enjoy equal and equitable health rights in accessing MHC services. Of the services, ANC services were accessed at the highest rate among the Indigenous



women, with lower rates for facility delivery and even lower for PNC services.

Exposure to mass media was a main reason for not accessing MHC facilities among Indigenous women in lower and middle-income countries. The cross-sectional study on Mru Indigenous community, Bangladesh, also reported that exposure to mass media positively influenced women's access to ANC services.<sup>19</sup> Although Indigenous women of Khagrachhari district had access to different electronic media, including mobile phones, using these media to access MHC services was very limited. This is an important finding for developing mobile health initiatives in rural and remote areas of Bangladesh.<sup>37</sup>

Of Indigenous women with their first pregnancy before age 20, 79% did not access any MHC services during their last pregnancy or delivery. Similar to many Indigenous groups around the world, adolescent fertility and unintended pregnancies are worryingly higher among Indigenous women in the CHT compared with the national average, requiring extra attention.<sup>38 39</sup> The adolescent pregnancy rate in this study is double the national percentage (65% vs 31%) with fewer adolescent Indigenous women accessing MHC services (16%) compared with the national rate (80%).<sup>29 39 40</sup>

Evidence from the 2004–2014 nationwide survey revealed the pooled rate of stillbirth was 28 per 1000 total births in Bangladesh.<sup>41</sup> Although negative pregnancy outcomes in this study were not statistically significantly higher among Indigenous women compared with the national average, 26% (n=113) of CHT Indigenous women experienced a negative pregnancy outcome, and of this only 21% accessed an MHC service during their last pregnancy or delivery. Miscarriage was voluntarily reported by 45 participants (10.3%, see online supplementary table 2) and was included as a negative pregnancy outcome because gender-based inequalities contribute towards reproductive health problems including miscarriages.<sup>42</sup> According to a profile report in Bangladesh, 11% of all pregnancies resulted in termination of which 7% were spontaneous miscarriages.<sup>43</sup> Accurate assessment of miscarriage is challenging because of the associated stigma; however, this survey was developed following the Bangladesh Demographic and Health Survey where data on miscarriage was collected.<sup>29</sup>

There was a knowledge gap among Indigenous women regarding pregnancy-related health problems, as three-quarters of participants experienced mild-to-severe health problems in their last pregnancies but were not aware of these potential problems. Quality MHC services provision that target this group of women may reduce negative pregnancy outcomes.<sup>44 45</sup>

Previous studies reveal that Indigenous peoples perceived pregnancy and delivery as 'natural events', and would only visit health facilities if the situation becomes out of control.<sup>21 23 25 26</sup> CHT Indigenous women with knowledge of pregnancy-related complications were more likely to access MHC services during pregnancy and delivery. Two studies from India reported Indigenous

women who delivered more than three children were less likely to attend ANC services.<sup>24 46</sup> In the current study, Indigenous women with more than three children had reduced odds of accessing MHC services.

Pregnant women receive health education regarding pregnancy and delivery including pregnancy-related complications during their ANC check.<sup>1</sup> ANC service utilisation is considered an indicator of the likelihood for accessing facility delivery services or seeking help from a skilled birth attendant at childbirth, as well as increasing awareness of PNC services.<sup>47 48</sup> Evidence suggests that Indigenous pregnant women who accessed ANC services but did not access delivery or PNC services may not have been adequately encouraged, well-treated or supported by the health system; or that MHC services were not culturally appropriate, causing dissatisfaction among Indigenous communities.<sup>48 49</sup> In a multicountry (Guatemala, Mexico and Panama) analysis, attending one or more ANC checks led to women accessing further MHC services. However, in this study, accessing ANC services did not appear to influence accessing delivery and PNC services by the Indigenous women, and the majority were unaware of pregnancy-related complications. These healthcare access inequities indicate that further research is needed to identify gaps in the MHC facility services for Indigenous women.

Most Indigenous women in this study preferred receiving free healthcare services from a known Indigenous healthcare provider; however, a limited number were aware of their nearest primary healthcare facilities. This indicates a gap between service providers and service receivers contributing to health inequality and inequity. Indigenous people express disinterest in using available healthcare services if service providers are unresponsive towards their needs, show discriminatory behaviour or are unfriendly. Evidence-based research is required in the context of Indigenous women in the CHT to identify gaps in equal and equitable health rights.

This study was conducted in the three dominant ethnic communities of the Khagrachhari district, the major ethnic groups in the two other hill districts sharing similar sociocultural status.<sup>12</sup> Data collection was designed to reduce bias and increase generalisability by attempting to recruit all eligible Indigenous women in the *para*.<sup>50</sup> Findings provide a reasonable estimate of prevalence for accessing MHC by Indigenous women generalisable within these CHT communities providing useful insights for optimising existing MHC services for Indigenous communities through addressing gaps within the system. Not using Indigenous languages for the survey may have led to some communication barriers as the questionnaire did not use Indigenous dialectic terms for pregnancy and delivery which may have restricted opportunities for transferring knowledge to participants.<sup>51</sup> As a cross-sectional study, measurements from the population were obtained at a single time point, precluding causal inference. However, observational study designs are effective in planning for healthcare services.<sup>52</sup>



## CONCLUSION

Suboptimal access to MHC services among Indigenous women in the CHT, Bangladesh, indicated by an estimated prevalence of 59% is associated with sociodemographic characteristics such as school attendance, household income and media access. Indigenous women had limited knowledge of nearby health facilities and pregnancy-related complications. Considering the importance of accessing MHC services to improve health outcomes for all, it is critical to address these gaps in access. Culturally, appropriate interventions that use health facility and community-based educational approaches are needed to reach Indigenous women in the CHT. Differences within ethnic groups should be taken into account while designing interventions to make access more inclusive. Underlying reasons for Indigenous women not accessing further MHC services after accessing ANC services need to be explored. Effective measures should be taken immediately to improve access to facility delivery and PNC services. Training Indigenous health workers to promote maternal health-care education within communities would be an effective approach and would help ensure sustainability of programme.

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