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Baseline report

Assessing effectiveness of a person-centered group ANC-PNC model among first-time young mothers and their partners for improving quality and use of MNCH-FP services

Healthy Women, Healthy Families

সুস্থ মা, সুস্থ পরিবার

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"Healthy Women, Healthy Families" is a three-year project led by Management Sciences for Health (MSH). With a dynamic group of partners, MSH is leading the formative research-based project to increase utilization and improve quality of maternal, newborn, and child health (MNCH) and family planning (FP) services for young Bangladeshi women and their partners in the underserved urban slums of Tongi, Gazipur City Corporation, near Dhaka. Partnering with BRAC, Scope, and the Population Council, MSH co-designs, implements, and evaluates the program for young women and their partners experiencing their first pregnancy.

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Photo Credit: Abdullah Al Mahmud Shohag, Shongkour Roy

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Acronyms

ANC	Antenatal Care
BDHS	Bangladesh Demographic and Health Survey
BF	Breastfeeding
BMC	BRAC Maternity Center
BMRC	Bangladesh Medical Research Council
BP	Blood Pressure
BPCR	Birth Preparedness and Complication Readiness
BRAC	Bangladesh Rural Advancement Committee
CHX	Chlorhexidine Di-gluconate
CSBA	Community Skilled Birth Attendant
DiD	Difference-in-Difference
ENC	Essential Newborn Care
FGD	Focus Group Discussion
FP	Family Planning
FTB	Father-To-Be
FTM	First-Time Mother
FWV	Family Welfare Visitor
GANC	Group Antenatal Care
GANC-PNC	Group Antenatal Care–Postnatal Care
GCC	Gazipur City Corporation
GPNC	Group Postnatal Care
HCD	Human-Centered Design
HWHF	Healthy Women Healthy Families
IDI	In-Depth Interview
IRB	Institutional Review Board
LMIC	Low- and Middle-income Country
MCH	Maternal and Child Health
MCH-FP	Maternal, Child Health, and Family planning
MDES	Minimum Detectable Effect Size
MNCH	Maternal, Neonatal, and Child Health
MoH&FW	Ministry of Health and Family Welfare
mCPR	Modern Contraceptive Prevalence Rate
MSH	Management Sciences for Health
MTB	Mother-To-Be
NIPORT	National Institute for Population Research and Training
PHC	Primary Health Care
PNC	Postnatal Care
POP	Progesterone Only Pill
PPFP	Postpartum Family Planning
RMC	Respectful Maternity Care
SACMO	Sub-assistant Community Medical Officer
SK	Shasthya Kormi
SS	Shasthya Shebika
SS	Social Support
TE	Tracer Element
TBA	Traditional Birth Attendant
WHO	World Health Organization

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Executive Summary

Background

The purpose of the MSH operations research "Healthy Women, Healthy Families (HWHF): Shustha Ma, Shustha Poribar" project is to improve the quality and use of maternal, newborn, and child health (MNCH) and family planning (FP) services and information among young women and their husbands in the urban municipality of Tongi, Gazipur, Bangladesh through a group ANC-PNC approach. The objectives of the baseline survey were to establish baseline values of selected HWHF project result indicators against which the impacts of the HWHF project's intervention (GANC-PNC) can be measured. The target group is young, first-time parents and the survey examined the current status of knowledge on MNCH-FP and access to services among first-time mothers (FTMs).

Methodology

This study is a quasi-experimental pre-post control group design study. Both quantitative and qualitative data-collection methods were employed to gather information. A simple random sampling procedure was employed to select respondents from BRAC FTM lists while qualitative informants were selected purposively. During January to March 2022, we interviewed 2,200 FTMs aged 15–24 years who had given birth before the survey, from November 1, 2020 to October 31, 2021. On average there were 550 FTMs from each of four urban sites: Tongi and Morkun (intervention) and Board Bazar and Chourasta (control). Qualitative data were collected from 12 focus group discussions (FGDs) and 18 in-depth interviews (IDIs). FGDs were conducted with FTMs and mothers-to-be, first-time fathers and fathers-to-be, and in-laws/relatives. IDIs were conducted with FTMs and mothers-to-be, first-time fathers and fathers-to-be, and BRAC Maternity Center's Medical Officer and Midwives. Over the course of a mother's pregnancy, MSH plans to hold five GANC sessions and two GPNC sessions, plus three group sessions with husbands. In each GANC and GPNC session, specific areas of pregnancy, delivery, postnatal period, and related topics and messages will be discussed and disseminated. International and local ethical approval for the study was gathered from the Institutional Review Board (IRB) on human research of the Population Council and Bangladesh Medical Research Council (BMRC).

Findings

Sociodemographic data show that among the selected 15–24-year-old FTMs, more than 90% are between 18-24 years of age. Almost all attended school with 75% of FTMs having attended secondary and above; around 60% married before 18 years, around 90% are housewives, and 25% of FTMs fall into the lowest wealth quintile in both intervention and control sites with no significant difference other than wealth index.

In all three stages of the pregnancy continuum (during pregnancy, childbirth, and the postpartum period), awareness on at least three of the danger signs is comparable between intervention and control sites without any significant variation, but all of the FTMs hold poor knowledge in intervention and control sites on at least three danger signs during pregnancy (4% vs 3%), delivery (18% vs 17%), and the post-partum period (5% vs 5%), respectively. With regard to the awareness of danger signs of newborns, FTMs in the control site are significantly more likely to know of at least two of the danger signs of newborns compared to the intervention site (17% vs 21%; $p<0.01$).

FTMs' knowledge of any FP method is widespread in both sites. However, knowledge of FTMs in both sites on names of at least three of the modern FP methods is low (11% vs 10%). Significantly more FTMs in the control site discussed the use of postpartum FP methods with their husbands compared to the intervention site (86% vs 89%; $p<0.03$)). The frequency of modern FP use in the first six months postpartum period is slightly higher in the control site compared to the intervention site (70% vs 68%, respectively). Qualitative data revealed a common perception among new parents of not requiring any contraceptive method until mother's menstruation returns after childbirth or the woman is amenorrheic, which might have influenced their decisions not to use PPFP.

Among the FTMs who received services from BMC—one ANC checkup with all tracer elements (BP checked, weight taken, blood grouping; urine checked for albumin, and counseled on danger signs), 4+ ANC checkups with all tracer elements, PNC within two days of delivery, at least three PNC visits within 42 days—all indicators are comparable between the intervention and control sites with no significant variation. Qualitative interviews with first-time parents demonstrated that a visit to a facility for PNC is not commonly practiced unless there is a C-section and removal of stitches is required. It was commonly perceived that a PNC visit is required only if women suffer from any problem; otherwise, it is not perceived as needed or required. Qualitative findings also reveal BRAC's widespread popularity for home visits and services and their community connection. Respondents highlighted the advice they received about pregnancy and healthy living, and the advantages of reaching BRAC by phone any time, when needed.

Among all FTMs surveyed in our study (N=2,200), 22% of FTMs in both the intervention and control sites completed all four birth preparedness elements (select a delivery place, save money for delivery, arrange blood donor, and identify mode of transportation). Those in the intervention site were significantly more likely to arrange for a blood donor compared to the control site (45% vs 40%, respectively; $p<0.01$). Findings from the FGDs and IDIs show that place of delivery, discussion around normal delivery and C-section, and saving money are the most common birth preparedness elements among the parents-to-be and close relatives. In contrast, arrangement for blood donors is often overlooked in birth preparedness. Arrangement of financial resources and saving money for emergency C-sections were found to be most common, including discussions with possible sources for borrowing additional money.

Couple communication among all FTMs surveyed at both sites is comparable (60% vs 57%). In addition, shared decision-making on which doctor should be visited in case of emergencies among first-time parents is similar in both sites (53% vs 49%, respectively).

Composite scores indicate that FTMs in the control site are more likely ($p<0.03$) to receive significant high-level social supports (SS) in all three components of SS (household, healthcare, and psychological support) during pregnancy, and healthcare and psychological support during the postnatal period compared to the intervention site ($p<0.05$ and $p<0.01$, respectively). FTMs in the intervention site are more likely to receive a significantly higher level of SS in household support during the delivery period compared to the control site ($p<0.01$). Findings from FGDs and IDIs showed that SS during pregnancy, delivery, and the postnatal period have been well received by FTMs and aligned with the quantitative findings. A contrasting picture was also found in terms of SS during the pregnancy continuum. FTMs in IDIs shared their loneliness and lack of support from husbands and in-laws. A few FTMs reported in FGDs and IDIs that mothers-in-law invested support in the newborn (as heir) whereas support for the new mothers was not a priority for the in-laws and they were often neglected.

- Efforts need to be geared to improve FTMs' knowledge on danger signs during pregnancy, delivery, the postnatal period, neonates, modern FP methods, and PPFP through GANC-PNC.
- Rigorous training, refresher training, and supportive supervision of the service providers and implementation of a checklist with quality and respectful maternity care components as well as elements of five ANC tracer elements may help the service providers remember the missing essential elements of the pregnancy continuum care.
- Health facilities and all other stakeholders should emphasize improving knowledge and skills of service providers on the standards, protocols, and components of RMC, and emphatically consider those factors identified for intervention.
- Social support needs to be discussed repeatedly among the social network members, to sensitize and improve support, especially after birth.
- Husbands should play roles in creating enabling environments among in-law family members for emotional support, using parents', in-laws', and husbands' groups.

1. Introduction

1.1 Background

The purpose of MSH's "Healthy Women, Healthy Families (HWHF): Shustha Ma, Shustha Poribar" project is to improve the quality and use of maternal, newborn, and child health (MNCH) and family planning (FP) services and information among young women and their partners in the urban municipality of Tongi subdistrict in Gazipur, Bangladesh. Tongi, the adjacent subdistrict of the capital, Dhaka, located 20–25 kilometers north of Dhaka, is an industrial area within the newly formed Gazipur City Corporation (GCC). Gazipur is densely populated, with a total population of approximately 2.5 million spread over an area of 330 square kilometers. Tongi is characterized by the presence of large informal settlements, and most of its population are migrants employed in the garment or other industries, who mostly rely on private facilities for health care with high healthcare expenditure. [1]

Bangladesh has made significant progress in improving MNCH-FP outcomes; however, maternal mortality (163/100,000 live births) and neonatal mortality (30/1000 live births) is still very high. [2, 3] This is because women in Bangladesh marry and begin bearing children early, which correlates with the highest adolescent fertility rate in Asia (81.7/1000 women aged 15–19) [4]); targeting young women and their partners could help to improve maternal and newborn health outcomes. Though the legal age of marriage for women in Bangladesh is 18, nearly 60% of women are married before that. [5] Social and family pressures usually result in childbearing soon after marriage. One study reported that one in 10 girls have a child before the age of 15, and one in three becomes a mother or pregnant by the age of 19. [6] Further, approximately half of adolescent mothers (aged 15–19 years) have another child in less than 24 months [7], putting them at increased risk of poor maternal, perinatal, and infant health outcomes such as stillbirth, babies that are small for their gestational age, and maternal and newborn mortality. [8] Postponing first births and extending the interval between births has been shown to improve MNCH outcomes including decreasing the risk of preterm birth, low birth weight, and death. The 2017–18 BDHS published in 2020 also showed that ANC and PNC visits are very low in Bangladesh. While 82% have at least one ANC visit, only 47% of women receive four. On the other hand, only 52% of mothers in Bangladesh received PNC from a medically trained provider within two days after delivery. Further, only 50% of women under age 20 in Bangladesh delivered in a facility. [5]

Young FTMs have unique psychosocial needs during pregnancy: they enter married life with limited information and awareness about their sexual and reproductive health and often lack the agency to decide the timing and spacing of their pregnancies and to use FP and other health services. [9] Following marriage, they also lose supportive networks and family care and face increased household responsibilities and limitations on their mobility, in addition to social and familial pressure to have children. One study found that young women had less decision making authority than older women and owned fewer assets. [10] This lack of agency, social support (SS), and information can result in suboptimal use of MNCH-FP services. [11] Even when accessing care, young FTMs may experience poor attitudes and disrespect from health providers and receive limited or no counseling and psychosocial support. According to the 2017–18 BDHS, less than 18% of pregnant women receive quality antenatal care (ANC), only 13% were counseled about postpartum family planning (PPFP), and 87% counseled on eastfeeding. Fewer than 6% of women younger than 20 years old and

their newborns received information on all essential newborn care practices, including drying the newborn immediately after birth, initiating skin-to-skin contact, and dry cord care, and 65% exclusively breastfeed up to six months. [5] The quality and use of health services are further compromised for this already-vulnerable group when they live in a densely populated urban slum such as Tongi, where health indicators are worse than in rural areas. [1]

WHO has called for reorganizing health services to focus on the life-course and engage and empower individuals and communities, so that services respect and respond to communities' needs and preferences. [12] Group models that provide integrated, people-centered health services are a promising approach to improve both individuals' and communities' experience of care and health outcomes, including greater levels of health-seeking behavior. Women-centered group ANC models tested in low- and middle-income countries (including Ghana, Kenya, Malawi, Nepal, Nigeria, Tanzania, and Uganda) have demonstrated positive effects on knowledge and practice of healthy behaviors—use of ANC, facility delivery, FP uptake, and birth preparedness—that can contribute to better outcomes ranging from satisfaction with care to improvements in maternal and newborn health. Group ANC programs have been shown to engender feelings of increased social support and self-efficacy and demonstrate potential to increase health providers' satisfaction and motivation. At the same time, emerging experience and evidence from first-time parent programs implemented in Africa and South Asia indicate improvements in birth spacing (or delaying second pregnancy) among young married women, knowledge and use of PPFP and other essential health services, and couples' communication and joint decision making. [13]

While group ANC and first-time parent programs have been piloted as separate interventions in Bangladesh [14], these have focused on a specific period of the MNCH continuum of care (e.g., pregnancy or postpartum), rather than using a life-cycle lens and an integrated and holistic approach to meet the needs of young women in first pregnancy and their partners for information, social support, and high-quality, responsive services. Building on MSH projects in Guatemala, Kenya, and Uganda and an in-depth analysis of the health system in Tongi to understand gaps in care, MSH proposes to bring together these promising approaches—person-centered care and a focus on first- time parents—to develop a program that focuses on the continuum of care from pregnancy to postpartum for young women, primarily targeting those under age 24.

There are several studies from high-income countries which show that group ANC offers an alternative to individual care and is associated with improved attendance, client satisfaction, and health outcomes for pregnant women and newborns. [15] However, in low- and middle-income country (LMIC) settings, evidence on key attributes of a group care model for low-resource settings remains scant. A systematic review on models of group antenatal care in LMICs by Sharma et al. showed that the group model increases the relevance, acceptability, and effectiveness of ANC use in such settings. [15]

The HWHF project aims to improve both the clinical quality of care and experience of ANC, safe delivery, newborn/infant health, and planning for healthy timing and spacing of the next pregnancy; offer social support for young MTB and FTMs, especially from their peers; and foster positive engagement from key people in their lives, such as male partners, parents, and in-laws. Using a robust and replicable co-design process with local stakeholders, HWHF aims to increase demand for high-quality services among young women in first pregnancy and their partners and improve healthy behaviors throughout pregnancy, delivery, and the postnatal period. Findings generated from an evaluation of this integrated program will identify lessons and provide concrete guidance for future expansion and replication. The evaluation will

generate evidence-based recommendations to refine and adapt MNCH-FP policies and programs for youth in Bangladesh and globally.

1.2 Study research questions

MSH in collaboration with BRAC will implement the quasi-experimental study on Group ANC-PNC (GANC-PNC) in two BRAC health facilities (Tongi and Morkun) for 21 months and the results will be compared with two other BRAC facilities (Board Bazar and Chourasta) to answer the following questions:

Primary Research Questions:

- What is the effect of the group model interventions (using a person-centered model) on the quality of ANC and PNC services in the intervention sites compared to control sites (using "classical" ANC services)?
- What is the effect of the group model interventions (using a person-centered model) on adoption of healthy behaviors in the intervention sites compared to control sites (using "classical" ANC services)?
- What is the implementation experience of the group model interventions (using a person-centered model) at the facility and community levels?
- What is the effect of the group model interventions (using a person-centered model) on the project outcomes such as ANC retention, birth spacing, and FP, etc. in intervention sites compared to control sites (using "classical" ANC services)?

Secondary Research Questions:

In addition to the primary research questions above, we aim to explore some secondary research questions through qualitative methods such as:

- What is the experience of care of the group ANC-PNC model among young mothers-to- be and first-time mothers (MTB and FTMs) and health providers?

1.3 Study design

This is a quasi-experimental pretest-posttest control group study that drew on a mixed methods approach. Human-centered design (HCD) was utilized to design the intervention and the prototype intervention was pretested with the BRAC health service providers before implementing the intervention. This pretested HCD intervention in turn aims to improve maternal and child health outcomes in Tongi subdistrict. HCD is a flexible, but systematic innovation process that enables co-creation with people who are affected by a problem or involved in its solution.

1.4 Intervention

Over the course of a woman's pregnancy, it is planned to hold five group ANC sessions and two group PNC sessions, plus three group sessions with husbands. In each group session 5–6 persons are targeted to join.

In each group ANC session, specific areas of pregnancy, delivery, the postnatal period, and related topics and messages will be discussed and disseminated (please see details in Appendix D). The first GANC session will be conducted within 16 weeks, the second session between 20–24 weeks, the third session between 24–28 weeks, the fourth session at 32 weeks, and the fifth session between 36–38 weeks. The first group PNC will be held at 14 days post-birth and the second GPNC at 42 days post-birth. Before the first GPNC session, a midwife will counsel postnatal women individually two times, within 24 hours of delivery and within seven days post-delivery. The first GANC will be run for one and half hours and the subsequent sessions for one hour.

The first group session with husbands will be held between 20–24 weeks of the woman's pregnancy, the second session between 30–32 weeks of the woman's pregnancy, and the third session between 14–20 days post-birth. Each session has specific information and messages to be discussed (please see details in Appendix D).

1.5 Objectives of the baseline survey

The objectives of the baseline survey of the HWHF project are to understand the research questions by gathering information on the status quo of selected variables and establishing reference points for tracking the project's progress; that is, to measure the degree and quality of change that occurred as a result of the implementation of GANC-PNC in two BRAC facilities (Tongi and Morkun) compared with two similar BRAC facilities (Board Bazar and Chourasta) over a 21-month intervention period. The baseline findings will also help us understand if any significant differences exist between the intervention and control sites regarding the selected variables.

This baseline survey is designed to gather information on socio-demographic profiles, knowledge, and practices on MNCH and FP, PPFP, birth planning, breastfeeding, essential newborn care (ENC), quality and respectful maternity care, couple communication and decision-making, and social support (SS) received during the continuum of care of FTMs as well as their husbands and other caregivers, particularly of those FTMs who received health services from BRAC Maternity Centers (BMCs). This survey has been designed to establish baseline measurement values for the HWHF project's results indicators.

Subsequently, the survey results will also assist in setting targets for the HWHF project's outcome-level results indicators. All of the process indicators will be gathered through ongoing project monitoring at the facility level by MSH. The following key process, performance, and outcome indicators will be measured and compared:

1. Proportion of health workers providing quality ANC-PNC, delivery, and FP services (including respectful care) according to national guidelines
2. Proportion of service providers providing group ANC reporting job satisfaction
3. Proportion of FTMs who stated satisfaction with ANC-PNC and FP services (including respectful care) received
4. Proportion of FTMs receiving four or more ANC visits
5. Proportion of FTMs who can identify at least three danger signs of pregnancy
6. Proportion of FTMs who can identify at least two danger signs of newborn complications
7. Proportion of infants who exclusively breastfeed
8. Proportion of newborns who received at least two ENC components: a) 7.1% CHX applied to cord and b) Initiation of breastfeeding within one hour of birth
9. Proportion of FTMs and newborns who received at least one PNC within two days of delivery
10. Proportion of FTMs and child who received at least three PNC visits within 42 days of delivery
11. Proportion of first-time mothers who know modern FP methods
12. Proportion of first-time mothers completing birth plans
13. Proportion of first-time parents using any modern PPFP methods
14. Proportion of women reporting improved couple communication and shared decision-making related to reproductive and child health
15. Proportion of women indicating that they had adequate social support during their pregnancy and postpartum

1.6 Study settings

Tongi and Morkun (intervention sites) and Board Bazar and Chourasta (control sites) are located approximately 20–25 kilometers north of the capital of Dhaka, an industrial, densely populated, concentrated area with mostly migrants and garment workers, and are characterized by the presence of large informal settlements. [16] All wards and slums of both the intervention and control sites are included in the baseline survey. The study area covered by the HWHF project included all slums in five wards of Tongi and four wards of Morkun for intervention. All slums in five wards of Board Bazar and six wards of Chourasta were selected for control purposes. This study covered the 111,050 Tongi population, 103,987 in Morkun, 113,495 in Board Bazar, and 113,590 in Chourasta. All of these areas are BRAC catchment areas for its existing program.

2. Methodology

This was a mixed-method study. Both quantitative and qualitative data-collection methods are used for the baseline survey. The details are further described below.

2.1 Quantitative data collection

Subject population and sample estimation

The primary subject population of the survey was FTMs 15–24 years old living in the slum areas of Tongi, Morkun, Board Bazar, and Chourasta during November 1, 2020 to October 31, 2021. Husbands, parents, in-laws, and service providers (facility providers/managers) were included in the study as the secondary population.

We reviewed the BRAC service registers in four facilities for ANC, delivery, PNC, and FP clients as well as the client's age. It was not possible to identify our intended clients (first-time mothers) from existing registers. Later a new register was introduced through MSH. Then, BRAC prepared a list of FTMs which showed that there were 1,552 FTMs within November 1, 2020 to October 31, 2021 in the two intervention sites ([1] 597 and [2] 955) and 1,381 FTMs within November 1, 2020 to October 31, 2021 in the two control sites ([1] 635 and [2] 746). We utilized Minimum Detectable Effect Size (MDES) estimation assuming 95% power, an alpha of 0.05, and a design effect of 1.5, to estimate a 10% change in the use of a contraceptive method by a married adolescent girl and young woman (50% to 60%); illustratively, the sample size required was 1,057. Accounting for about a 10% refusal rate and/or lost to follow-up, the sample size in the intervention and control groups was 1,100 each (rounded up from the MDES calculation). Thus, in total, a sample size of 2,200 was interviewed at baseline and 2,200 will be attempted at endline.

The sample size is estimated using the following formula:

$$n=[z\alpha\sqrt{2p(1-p)} + z\beta\sqrt{(p1(1-p1)+p2(1-p2))}]^2 X deff$$

$$(P2-P1)^2$$

n= estimated sample size

zα= value of z for level of significance alpha; at 0.05 level of significance, value of z is 1.96

zβ= power, which indicates that changes did not occur by chance. At power level 0.95, value of zβ is 1.646

p1= current proportion of adolescents (<20 years) using FP method = 0.50

p2= expected proportion of adolescents who would use FP method after intervention = 0.60

p= (p1+p2)/2

deff= design effect for family planning, d = 1.5

Lost to follow-up 10%

BRAC's prepared lists were rechecked and renumerated by door-to-door visits. In total, 2,395 FTMs aged 15–24 years who delivered from November 1, 2020 to October 31, 2021 were interviewed from the intervention and control sites. These FTMs were selected through simple random sampling using computer-generated random numbers. In the final analysis, we dropped 195 respondents because of: a) missing value in age/not sure; b) missing value of child age; c) missing values of monthly expenditure; d) missing value in spending on health care; and e) outlier of monthly household expenditure/unrealistic monthly household expenditure compared to FTMs' profession.

Respondent eligibility criteria

The eligibility criteria for inclusion in the quantitative surveys was FTMs aged 15–24 years who delivered from November 1, 2020 to October 31, 2021. Women outside this age range, specified period, pregnant, and in the postpartum period were excluded from the survey.

A total of 2,200 FTMs who gave birth on or after November 1, 2020 to October 31, 2021 were surveyed from both intervention and control sites with an average of 550 FTMs from each of the four sites. Table A shows the number of FTMs surveyed from intervention and control sites.

Spontaneous multiple responses were gathered from FTMs if they had heard the name of an FP method that could be used so that a couple could delay or avoid pregnancy. All FTMs interviewed could mention the name of an FP method irrespective of intervention or control sites. The oral contraceptive pill was mentioned by 98% and almost 100% of FTMs in the intervention and control sites, respectively. Similarly, 85% and 89% of FTMs in the intervention and control sites, respectively, mention injectables. FTMs in the control site are significantly more likely to have better knowledge on these two methods (pill and injectables) compared to those in the intervention site ($p<0.02$ and $p<0.01$, respectively) (Table 2e).

FTMs were asked about any modern FP method they know. Among the FTMs who could name an FP method, they were asked to mention the names of modern FP methods. The pill (29% vs 34%), condom (21% vs 23%), implant (19% vs 16%), IUD (1% vs 1%), female sterilization (7% vs 3%) and male sterilization (1% vs 1%) were mentioned by FTMs in intervention and control sites, respectively. There were no significant variations in awareness between FTMs in the intervention and control sites except for the pill ($p<0.02$) and implant ($p<0.01$). FTMs in the control site are significantly more likely to know the pill and FTMs in the intervention site are significantly more likely to know the implant as modern contraceptive methods compared to the intervention and control sites, respectively. Additionally, FTMs in the intervention site are significantly less likely to know any names of modern contraceptive methods compared to those in the control site ($p<0.02$) (Table 2e).

Only about 11% and 10% of FTMs in the intervention and control sites, respectively, could mention the name of at least three of the modern methods, which is not significantly different between the control and intervention sites ($p<0.16$). Additionally, 42% and 47% of FTMs in the intervention and control sites, respectively, know at least one of the modern contraceptive methods, with no significant difference between the two sites ($p<0.11$) (Table 2e). Significantly more FTMs in the control site are also likely to discuss with their husbands the use of FP methods to delay or avoid pregnancy

compared to the intervention site (p<0.03) (Table 2e).

Among the FTMs who have children aged six months or younger, 68% vs 70% of FTMs in the intervention and control sites, respectively, reported using any modern FP method during the first six months of the postpartum period (Table 2e). Among them, 41% and 54% of FTMs used progesterone-only pills (POP) and 16% and 12% used condoms in the intervention and control sites, respectively, to avoid or delay pregnancy during the first six months of the postpartum period. While significantly more FTMs used injectables and condoms in the intervention site compared to control site (10% vs 4%; p<0.002 and 16% vs 12%; p<0.01), significantly more FTMs in the control site used POP compared to the intervention site (54% vs 41%; p<0.001) (Table 2e).

Furthermore, the qualitative data reveal a common perception among new parents of not requiring any contraceptive method until menstruation returns for mother after childbirth or the woman is amenorrheic, which might have influenced her decision not to use PPFP.

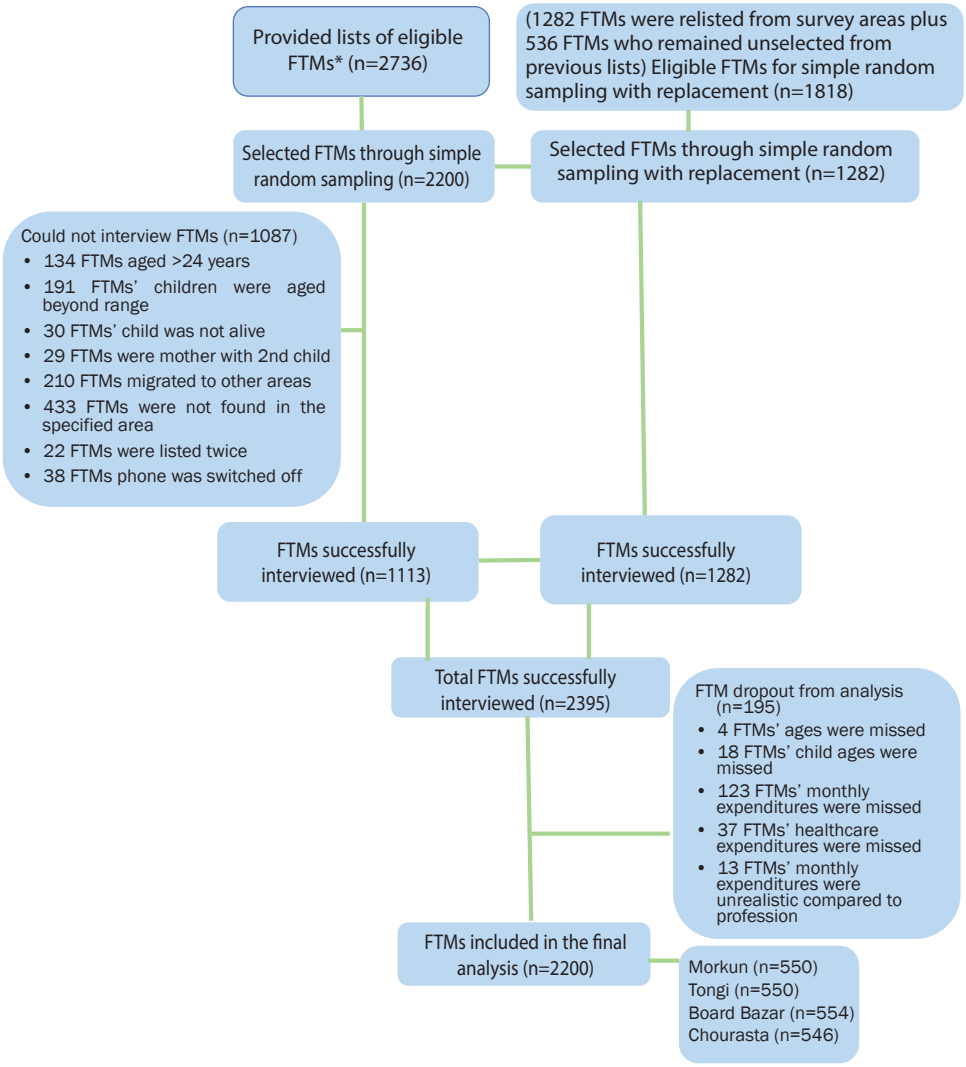
Also, less engagement in sexual activities/periodic abstinence and use of traditional method (withdrawal) were mentioned to be in practice during the early months postdelivery and use of a condom was reported in those days for infrequent sex. Perception of negative side effects of the "combined oral pill" (they may not be aware that the progesterone-only pill has a minimal influence on the quality and quantity of breast milk) on breastfeeding mothers was found to be common among new parents. In the early months of breastfeeding (after one and half months), the pill (POP), condom, and injectables were found to be in use which is also reflected in our survey findings.

Also, concerns around side effects of certain methods, such as injectables, were found among new parents. Switching from the condom to the pill in the future when the breastfeeding period is over was also frequently noted.

Table A: Number of FTMs surveyed

Site		Number of FTMs surveyed
Intervention	Tongi	550
	Morkun	550
Control	Chourasta	546
	Board Bazar	554
Total		**2200**

Figure 1: Flowchart on sampling and baseline analysis



*15–24 years, first-time mother and child with 12 months or lower and living

2.2 Qualitative data collection

Sampling procedure and sample size

FGDs were conducted with young mothers-to-be (MTB) and FTMs aged 15-24 years, and their husbands and parents/in-laws. IDIs were conducted with FTMs, their husbands, in-laws/relatives, and with service providers including medical officers. A total of 12 FGDs and 18 IDIs were conducted in the intervention site only (Table B). FTMs for FGDs and IDIs were selected purposively from the community based on their criteria of age and relevant group of respondents, and availability and willingness of them for the interview. Husbands and parents/in-laws were selected through referrals from young MTB and FTMs visiting the facilities. All service providers and Medical Officers were included in the IDIs. FGDs and IDIs were conducted to better understand nuanced issues and challenges faced by young MTB and FTMs aged 15–24 years and husbands prior to the intervention, and to enable the analysis of differences in behaviors and experiences at the endline.

Respondent eligibility criteria

The eligibility criteria for inclusion in the FGDs and IDIs includes a) young MTBs who have been pregnant for four months and more, and FTMs aged 15-24 years who have delivered within the previous 12 months (November 1, 2020 to October 31, 2021); b) spouses of MTB and FTM aged 15–24; and c) parents and in-laws of MTB and FTMs aged 15–24, and service providers working in the intervention facilities.

The following table shows the number of FGDs and IDIs conducted with type of participants:

Table B: Number of FGDs and IDIs by type and number of participants

Area	FGDs	Number of participants in FGDs	IDIs
Tongi	6 FGDs: (2) mothers/mothers-to-be, (2) fathers/fathers-to-be, (2) In-laws/relatives (1 male, 1 female)	Mothers/mothers-to-be: 14 Fathers/fathers-to-be: 13 In-laws/relatives: 16	9 IDIs: (3) mothers/mothers-to-be, (3) fathers/fathers-to-be, (3) service providers (BMC Medical Officer, midwives),
Morkun	6 FGDs: (2) mothers/mothers-to-be, (2) fathers/fathers-to-be, (2) In-laws/relatives (1 male, 1 female)	Mothers/Mothers to be: 14 Fathers/Fathers to be: 14 In laws/Relatives: 14	9 IDIs: (3) Mothers/mothers-to-be, (3) fathers/fathers-to-be, (3) service providers (BMC Medical Officer, midwives)
Total	12	85	18

Study instruments and pretesting

Four types of study tools were used in the baseline survey a) a survey questionnaire, b) FGD guides, c) in-depth interview guides, and d) a checklist for collecting service statistics. The study instruments were guided by research questions and study objectives, as well as drawing on a literature review on a first-time parents' model, and existing globally validated relevant tools. We also constructed questions from the expected outcomes of the HWHF project including various domains such as knowledge (providers and clients) on ANC and PNC, delivery, FP and PPFP; behavioral measures; quality of care; respectful care; counseling; service uptake (e.g., uptake of ANC and PNC, and PPFP uptake and continuation, ANC retention); birth spacing; newborn care; breastfeeding; social support; outreach activities; group ANC; partner communication, etc.; and guidance from first-time parent program tools used in other countries.

The draft quantitative and qualitative questionnaire guided by study goals and objectives was pretested in a setting other than intervention and control sites with a few young MTBs and FTMs 15–24 years old to correct for language inconsistencies, understanding, sequence of questions, and for adjusting the survey length and finalization. All study instruments were translated into Bangla for use in the field. Interviews were conducted in the Bengali language.

2.3 Ethical approval

International and local ethical approval for the study was sought from two institutions: the Institutional Review Board (IRB) on human research of the Population Council and the Bangladesh Medical Research Council (BMRC). PC IRB approved the protocol on November 11, 2021 (p989) and BMRC approved the protocol on January 19, 2022 (p447 12 10 2021).

2.4: Data-collector training

Eighteen female data collectors including two supervisors were recruited for collecting quantitative data. A five-day training session was organized for them. An extra day was added for field practice. The data collectors and their supervisors were trained

rigorously by the PC research team, including the Principal Investigator, on research ethics and informed consent, the study objectives, procedures to be followed, and tools. Each question was individually discussed so that the data collectors and their supervisors understood the purpose of the question. Depending on their understanding of the questionnaire content, field staff went for field practice on the last day of training. As a part of quality control, all interviewers needed to complete at least one questionnaire maintaining field procedures using the SurveyCTO form on a mobile phone, which ensured that they prepared to the extent possible before conducting the main survey.

Four data collectors with anthropology backgrounds experienced in conducting qualitative data collection were also recruited for the study. A separate four-day rigorous training was conducted for the qualitative interviewers on the study objectives, study methods, and data-collection techniques; the content of interview guides; consent forms; and research ethics. The interview guide was pretested with a small number of respondents, audio-recorded, evaluated, and revised where necessary. In doing so, the tools were adopted based on which wording or types of questions work best, and/or what is the best length of an interview with respondents who have trouble concentrating for an extended time. The same reasoning applied to the FGDs, which were pretested. To be confident in the process of the FGD and quality information-collection, mock sessions were held at the training session.

PC and MSH Covid-19 prevention protocols were followed for training, transportation, and in-person interviews. In each step of data collection, preventive measures for Covid-19 were ensured for the data collectors and the participants. In all situations (home, clinic, FGD), data collectors and the participants used masks, maintained one-meter distance (according to country guidelines), limited physical contact, did not share material between data collectors, and used hand sanitizer before and after the interactions.

The study team has made every effort to protect the privacy of the participants and maintain the confidentiality of all of the information provided by them. The interview was conducted in a private place and strict audio-visual privacy was ensured during the interview, and ample time was allowed for data collection to ensure that privacy and confidentiality could be maximized. The study team exercised the utmost discretion while engaging in data-collection activities. Research Assistants completed a training on research ethics as a part of their orientation to the study, including practice obtaining informed consent, and were given clear guidance on how to manage confidential data. Participants' names and contact information were collected during the register review. All respondents gave a signed informed consent. The information that was collected from facilities was not linked to women's identifying information. Aggregate numbers and de-identified data were collected from the registers. Data were de-identified before analysis. In this report, data that can potentially identify participants or facility have not been presented.

2.5 Data collection and analysis

Quantitative data collection started on January 22, 2022 and ended on March 27, 2022 in Tongi, Morkun, Board Bazar, and Chourasta. The data collection was conducted through mobile phones with GPS trackers using the SurveyCTO platform which allowed real time monitoring of data-collection progress with GPS location. Qualitative data collection started on January 22 and ended on February 28, 2022, with data transcription. The translation of FGDs and IDIs were completed by April 30 and analysis of the data completed by May 30, 2022.

Quantitative data collected through the SurveyCTO platform were downloaded, reviewed, coded, summarized, categorized, and edited for completeness and accuracy. Quantitative analyses include both descriptive analysis and analytics using frequency distributions, bivariate, and multivariate analyses on useful models using STATA 17. A chi-squared test was used to determine the p-value in most cases. Where sample size was small (<5 responses), Fisher's exact test was used (see Appendix C for more details).

To present results of some complex indicators (quality of care for ANC, delivery, and PNC; social support for ANC, delivery, and PNC; respectful maternity care, and couple communication), we prepared composite scores of the selected indicators. To calculate the composite indicator, initially we calculated a composite score using all selected dichotomous elements (yes=1, no=0) for each FTM then determined the median value from the composite score. First, we calculated the composite score using summation of the value of all selected elements, then we determined the median value from the composite score. Finally, the composite score of individual responses was divided into two categories: 0=low (score below median value), and 1=high (score equal to and greater than median value). The elements we have included in each composite score are described below:

Quality of last ANC: Quality of care received from BMC facilities during the last ANC (n=505) was measured through a composite score of 21 elements including respectful maternity care during ANC (respectful greetings, explanation given, consent taken, maintaining privacy); history-taking and examination (common history taking, measuring BP, measuring weight, conducting physical examination); lab test done (blood grouping & urine albumin); medication given: (iron and folic acid); counseling: (discussion of four ANC, danger signs of pregnancy, birth preparedness, PPFP, and essential newborn care). Initially, we generated a composite score variable summing up all selected dichotomous elements for each FTM and then determined the median value. We categorized the quality of the ANC score into low and high. Please see overall score, median, and categories of scores (low and high) in Table C below.

Quality of delivery services: Quality of care received from BMC facilities on the delivery services (n=188) was measured through composite score of three elements, including baby received first checkup within two days after delivery, FTMs received respect during delivery, and whether they faced any problems (such as providers pay less attention during/after delivery). Initially, we generated a composite score variable summing up all selected dichotomous elements for each FTM and then determined the median value. We categorized the quality of the ANC score into low and high. Please see overall score, median, and categories of scores (low and high) in Table C below.

Quality of last PNC: Quality of care received from BMC facilities on the last PNC (n=106) was measured through a composite score of 15 elements of quality care, including: took weight; checked BP; performed abdominal exam; checked anemia; checked urine for albumin; gave chance to ask questions; counseled on danger signs, pre-eclampsia/eclampsia, how to take care of breast, perineum, exclusive breastfeeding, baby's immunization, PPFP, newborn care; and provided iron/folic acid. Initially, we generated a composite score variable summing up all selected dichotomous elements for each FTM and then determined the median value. We categorized the quality of the ANC score into low and high. Please see overall score, median, and categories of scores (low and high) in Table C below.

Respectful maternity care: RMC during ANC and PNC is measured through using a composite score of 11 respectful maternity care elements, including: provider's greeting, warm welcoming, offering a seat, treating FTMs and their companions with

compassion, maintaining confidentiality and dignity, listening carefully and responding, providing emotional support, communicating properly, asking the purpose of the visit, taking consent before a physical exam, and maintaining privacy during service provision. Please see overall score, median, and categories of scores (low and high) in Table C below.

Social support: The elements included in social support are: assistance during day-to-day work, cooking, household chores; access to healthcare; accompaniment to hospital; monetary support; bringing medicine; arranging transportation; and emotional support. The analysis of social support received from mother, mother-in-law, husband, father-in-law, and friends is individually calculated. Please see overall score, median, and categories of scores (low and high) in Table C below.

Couple communication: Couple communication was analyzed with 14 couple-communication elements: spent time together with husband; discussed ANC, delivery, PNC, and FP; feared disagreeing with husband; told husband when she disagreed; criticized her husband when required; shouted with husband; husband shouted with her; husband admired her; she admired her husband; discussed where to go in case of health emergencies; and discussed which doctor should be visited. Details are presented in Appendix C. Please see overall score, median, and categories of scores (low and high) in Table C below.

Table C: Composite variables, number of elements in each variable and median value for cutoff value to determine low-and high-level scores

Composite indicator	Indicator elements	Score
Quality of ANC	21 elements mentioned in Table 4	Score range: 1-21; Median: 15, Low considered when score<15, High considered when score >=15.
Quality of delivery care	First three elements mentioned in Table 8	Score range: 0-3; Median: 1, Low considered when score<1, High considered when score >=1.
Quality of PNC	15 elements mentioned in Table 9	Score range: 0-15; Median: 7, Low considered when score<7, High considered when score >=7.
Respectful maternity care at ANC	11 elements mentioned in Table 14	Score range: 0- 11; Median:10, Low considered when score<10, High considered when score >=10.
Respectful maternity care at PNC	11 elements mentioned in Table 14	Score range: 0- 11; Median:10 Low considered when score<10, High considered when score >=10.
Couple-communication	14 elements mentioned in Table 17	Score range: 0-13; Median:9, Low considered when score<9, High considered when score >=9.
Social support during ANC		
Household support	15 elements mentioned in Table 16 (across all family and friend supporters) and Table A1	Score range: 0-14; Median: 6, Low considered when score<6, High considered when score >=6.
Healthcare support	15 elements mentioned in Table 16 (across all family and friend supporters) and Table A1	Score range: 0-14; Median: 5, Low considered when score<5, High considered when score >=5.
Psychological support	10 elements mentioned in Table 16 (across all family and friend supporters) and Table A1	Score range: 0-10; Median: 5, Low considered when score<5, High considered when score >=5.
Social support during delivery		
Household support	15 elements mentioned in Table 16 (across all family and friend supporters) and Table A2	Score range: 0-12; Median: 4, Low considered when score<4, High considered when score >=4.
Healthcare support	15 elements mentioned in Table 16 (across all family and friend supporters) and Table A2	Score range: 0-13; Median: 5, Low considered when score<17, High considered when score >=5.
Psychological support	10 elements mentioned in Table 16 (across all family and friend supporters) and Table A2	Score range: 0-10; Median: 5, Low considered when score<5, High considered when score >=5.

Composite indicator	Indicator elements	Score
Social support during PNC		
Household support	15 elements mentioned in Table 16 (across all family and friend supporters) and Table A3	Score range: 0-12; Median: 4, Low considered when score<4, High considered when score >=12.
Healthcare support	15 elements mentioned in Table 16 (across all family and friend supporters) and Table A3	Score range: 0-12; Median: 3, Low considered when score<3, High considered when score >=3.
Psychological support	10 elements mentioned in Table 16 (across all family and friend supporters) and Table A3	Score range: 0-10; Median: 5, Low considered when score<5, High considered when score >=5.

Qualitative data were audio recorded, transcribed, and later translated for analysis. NVivo 12 was used for data organization, coding, and thematic analysis. Qualitative data were analyzed thematically in exploring similarities and differences in the access to and use of MNCH and FP services at the baseline among young MTB/FTMs, as well as perspectives from healthcare providers and other stakeholders. The findings of qualitative analysis were triangulated with quantitative findings. Reading through the transcripts 10–15 thematic areas were identified, coded, and explored. Two coders read through all of the interview responses and then coded three interviews independently and compared results, identifying emergent themes and discussing coding decisions until consensus was reached. Qualitative analysis mainly concentrated on the use and practice of healthy behaviors of ANC, delivery, and PNC, SS, couple communication of the MTBs/FTMs, and quality of care and these findings are presented in this report where relevant.

Limitations

The study has several limitations; there were not enough FTMs less than 18 years of age to allow a separate analysis for that group. One reason for not identifying married women under 18 is that these women may not wish to divulge their true age because of legal restrictions. In addition, the sample size of those who received ANC, PNC, and delivery services from BMC was small and the findings and the significance level need to be taken with caution. Additionally, with the skip logic in use, some of the composite scores were calculated using a smaller sample size, which may limit the power of probability of making a correct decision of a particular variable. These findings should be read as a caution and cannot be generalized.

The study was conducted with women who recently delivered (within the previous 12 months), and there is potential for recall bias for some questions, particularly on quality of care of ANC, delivery, and PNC. Social desirability and custom bias may also affect how some mothers report the service as positive experiences.

3. Findings

This chapter describes the findings from Quantitative survey and qualitative interviews.

More than 90% of FTMs are between 18–24 years; almost all attended school, with 65% of FTMs having attended secondary and above; around 60% married before 18 years; and around 90% in both the intervention and control sites are housewives, with

Table 1: Background/demographic characteristics of first-time mothers (FTMs)

Characteristics	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Age, years				
<18	105 (9.5)	87 (7.9)	192 (8.7)	0.17
18-24	995 (90.4)	1013 (92.1)	2008 (91.3)	
Highest level of schoolingΩ				
Never attended school	22 (2.0)	22 (2.0)	44 (2.0)	0.46
Nursery/preprimary	28 (2.5)	24 (2.2)	52 (2.4)	
Primary	335 (30.4)	345 (31.4)	680 (30.9)	
Secondary	555 (50.4)	573 (52.1)	1,128 (51.3)	
Higher secondary/college	152 (13.8)	130 (11.8)	282 (12.8)	
University	8 (0.7)	6 (0.5)	14 (0.6)	
Age at marriage				
<18	657 (59.7)	711 (64.6)	1,368 (62.2)	0.02*
18-24	443 (40.3)	389 (35.4)	832 (37.8)	
ReligionΩ				
Muslim	1,079 (98.1)	1,080 (98.2)	2,159 (98.1)	0.99‡
Hindu	20 (1.8)	19 (1.7)	39 (1.8)	
Christian	1 (0.1)	0 (0.0)	1 (0.0)	
Buddhist	0 (0.0)	1 (0.1)	1 (0.0)	
Profession*				
Housewife	976 (88.7)	971 (88.3)	1,947 (88.5)	0.74
Garment worker	114 (10.4)	134 (12.2)	248 (11.23	0.18
Student	28 (2.5)	22 (2.0)	50 (2.3)	0.39
Others (handicraft, small business & tailoring)	19 (1.7)	22 (2.0)	41 (1.9)	0.64
Husband's professionΤ				
Unemployed	27 (2.5)	16 (1.5)	43 (2.0)	0.09
Garment worker	424 (39.1)	512 (47.2)	936 (43.2)	<0.001***
Other services≠	334 (30.8)	287 (26.4)	393 (28.6)	<0.001***
Daily labor	158 (14.6)	126 (11.6)	284 (13.1)	0.04*
Small business	122 (11.3)	122 (11.2)	244 (11.2)	0.99
Others (Shopkeeping, hawker, farmer, student)	19 (1.7)	30 (2.7)	49 (2.2)	0.11
Overseas employee	7 (0.6)	5 (0.5)	12 (0.5)	0.85
Primary decision-maker on healthcare expendituresΩ				
Myself	35 (3.2)	41 (3.7)	76 (3.4)	0.02‡ *
Husband	393 (35.7)	426 (38.7)	819 (37.2)	
Both (myself and husband)	389 (35.4)	396 (36.0)	785 (35.7)	
Parents/other relatives	283 (25.7)	237 (21.5)	520 (23.6)	
Monthly household expenditure (in Taka)Ω				
<10,000	86 (8.5)	57 (5.8)	143 (7.2)	0.13‡
10,000-15,000	526 (52.0)	592 (60.2)	1,118 (56.1)	
15,001-20,000	238 (23.5)	205 (20.8)	443 (22.2)	
>20,000	161 (15.9)	129 (13.1)	290 (14.5)	
Monthly household expenditure in BDT (mean)	1,011 (16,510.9)	983 (15,957.8)	1,994 (16,238.2)	0.08†
Wealth quintilesΩ				
Lowest	251 (22.8)	293 (26.6)	544 (24.7)	<0.001***
Second	155 (14.1)	190 (17.3)	345 (15.7)	
Middle	210 (19.1)	232 (21.1)	442 (20.1)	
Fourth	234 (21.3)	213 (19.4)	447 (20.3)	
Highest	250 (22.7)	172 (15.6)	422 (19.2)	
N	**1100**	**1100**	**2200**	

ΤMultiple responses collected for this questions, ≠Other services included driver helper, auto driver, and factory workers, ‡Cochran–Armitage test, †Student's t-test, without sign p-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001; Ωloss of independence if separate p-values are provided.

no significant differences between these two sites (Table 1). Only about 3% of the FTMs make decisions on healthcare expenditure by themselves while more than one-third say decisions are made by husbands or both husband and wives, and there are significant differences between intervention and control sites ($p<0.02$). There is no significant difference between intervention and control sites ($p>0.08$) on FTMs' monthly expenditure. A majority of FTMs' monthly expenditure ranges between 10000–15000 taka (~106-160 USD as of July 13, 2022 exchange rate), and around a quarter of the FTMs fall into the lowest wealth quintile. FTMs in the intervention site are significantly more likely to be wealthier compared to FTMs in the control site ($p<0.001$) (Table 1).

Table 2a: FTMs' knowledge on danger signs during pregnancy

Danger signs†	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Severe vaginal bleeding	354 (32.2)	328 (29.8)	682 (31.0)	0.23
Convulsion	173 (15.7)	144 (13.1)	317 (14.4)	0.08
Severe headache with blurred vision	74 (6.7)	61 (5.5)	135 (6.1)	0.25
High fever	83 (7.5)	53 (4.8)	136 (6.2)	<0.01**
Prolonged labor	42 (3.8)	39 (3.5)	81 (3.7)	0.73
Other responses				
Pain in the lower abdomen	394 (35.8)	497 (45.2)	891 (40.5)	<0.001***
Water leaking	270 (24.5)	349 (31.7)	619 (28.1)	<0.001***
High blood pressure and albumin in urine	46 (4.2)	37 (3.4)	83 (3.8)	0.31
Do not know	302 (24.4)	283 (25.7)	585 (26.6)	0.35
FTMs who can tell at least one of the danger signs of pregnancy	563 (51.2)	514 (46.7)	1077 (48.9)	<0.03*
FTMs who can tell at least three of the danger signs of pregnancy	*49 (4.4)*	*33 (3.0)*	*82 (3.7)*	*0.07*
N	**1100**	**1100**	**2200**	

†Multiple responses collected for this question; without sign p-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

FTMs' knowledge on danger signs during pregnancy was assessed in addition to how many of the FTMs know three of the danger signs during pregnancy. Findings show a lack of knowledge in the "one danger sign" as well as "at least three of the danger signs" categories (Table 2a). Twenty-four percent and 26% of the FTMs in the intervention and control sites, respectively, could not mention any of the danger signs during pregnancy. While there is no significant difference in knowledge of any category of danger signs except high fever ($p<0.01$) between intervention and control sites, only about one-third of the FTMs mentioned severe vaginal bleeding in both the intervention and control sites. Only about 4% and 3% of respondents in the intervention and control sites, respectively, could mention at least three of the danger signs of pregnancy and the difference is not statistically significant ($p<0.07$).

Besides the five important danger signs during pregnancy, FTMs from the intervention and control sites also mentioned "pain in the lower abdomen," "water leaking," and high blood pressure and albumin in the urine as the danger signs during pregnancy (Table 2a).

Table 2b: FTMs' knowledge on danger signs during labor and childbirth

Danger Sign†	Intervention n (%)	Control n(%)	Total N (%)	Difference (P-value)
Prolonged delivery >12 hours	368 (33.4)	352 (32.0)	720 (32.7)	0.46
Baby in wrong position	258 (23.4)	303 (27.5)	561 (25.5)	<0.03*
Convulsion/eclampsia	255 (23.2)	269 (24.4)	524 (23.8)	0.48
Severe vaginal bleeding	315 (28.6)	291 (26.4)	606 (27.5)	0.25
Obstructed labor	233 (21.2)	263 (23.9)	496 (22.5)	0.12
Retained placenta	76 (6.9)	61 (5.5)	137 (6.2)	0.18
Rupture uterus	53 (4.8)	54 (4.9)	107 (4.9)	0.92
Do not know	254 (23.1)	231 (21.0)	485 (22.0)	0.26
FTMs who can tell at least one of the danger signs during labor and childbirth	816 (74.2)	853 (77.5)	1669 (75.9)	0.06
FTMs who can tell at least three of the danger signs during labor and childbirth	*201 (18.3)*	*192 (17.4)*	*393 (17.9)*	*0.62*
N	**1100**	**1100**	**2200**	

†Multiple responses collected for this question; without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

FTMs' knowledge of danger signs during labor and childbirth was assessed in addition to knowledge of any three of the danger signs during labor and childbirth. About one-fourth to one-third of FTMs in both the intervention and control sites, respectively, knew of delivery taking a long time (prolonged delivery, 12 hours); breech presentation; convulsion; severe vaginal bleeding; and obstructed labor as danger signs during labor and childbirth (Table 2b). There is no significant difference in the knowledge on danger signs during labor and childbirth between the intervention and control sites except breech presentation (23% vs 27%, p<0.03). Only about 18% and 17% of FTMs in the intervention and control sites, respectively, could mention at least three of the danger signs of labor and childbirth. However, this difference is not statistically significant (p<0.62). Twenty-three and 21% of the FTMs in intervention and control sites, respectively, could not mention any of the danger signs during labor and childbirth. About three quarters of the FTMs in both the intervention and control sites could mention at least one of the danger signs during labor and childbirth (Table 2b).

Table 2c: FTMs' knowledge on danger signs during postnatal period

Danger sign†	Intervention N (%)	Control N (%)	Total N (%)	Difference (P-value)
Severe vaginal bleeding	408 (37.1)	421 (38.3)	829 (37.7)	0.56
Convulsion/eclampsia	151 (13.7)	157 (14.3)	308 (14.0)	0.71
Lower abdominal pain	140 (12.7)	138 (12.5)	278 (12.6)	0.89
High blood pressure	86 (7.8)	73 (6.6)	159 (7.2)	0.28
Severe headache	47 (4.3)	43 (3.9)	90 (4.1)	0.66
High fever	46 (4.2)	38 (3.4)	84 (3.8)	0.37
Foul smelling vaginal discharge	20 (1.8)	16 (1.4)	36 (1.6)	0.50
Do not know	434 (39.4)	407 (37.0)	841 (38.2)	0.23
FTMs who can tell at least one of the danger signs during postnatal period	586 (53.3)	580 (52.7)	1166 (53.0)	0.79
FTMs who can tell at least three of the danger signs during postnatal period	***54 (4.9)***	***55 (5.0)***	***109 (4.9)***	***0.92***
N	**1100**	**1100**	**2200**	

†Multiple responses collected for this question; without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

FTMs' knowledge on danger signs during the postnatal period was assessed in addition to knowledge of at least three of the danger signs during the postnatal period. Very few (2% to 14%) FTMs at both intervention and control sites know of or were able to identify the following as danger signs during PNC: convulsion, lower abdominal pain, high blood pressure, severe headache, high fever, foul smelling vaginal discharge; the exception was severe vaginal bleeding which was mentioned by about 38% of all FTMs (Table 2c). The difference in knowledge on every category of danger signs during the postnatal period between the intervention and control sites is not statistically significant. Only about 5% of respondents in each intervention and control site could mention at least three of the danger signs during the postnatal period and the difference between the intervention and control sites is not statistically significant (p<0.92). However, 39% and 37% of the FTMs in the intervention and control sites, respectively, could not mention any of the danger signs during the postnatal period with no significant difference between sites (p<0.79) (Table 2c).

Table 2d: FTMs' knowledge on danger signs of newborns'

Danger sign†	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Breathing difficulty, irregular or fast (>60 minute)	489 (44.4)	563 (51.2)	1,052 (47.8)	0.002**
Convulsion	139 (12.6)	152 (13.8)	291 (13.2)	0.41
Feeding poorly	63 (5.7)	121 (11.0)	184 (8.4)	<0.001***
Umbilical redness	58 (5.3)	39 (3.5)	97 (4.4)	<0.05*
Hypothermia	36 (3.3)	47 (4.3)	83 (3.8)	0.22
Lethargy	42 (3.8)	57 (5.2)	99 (4.5)	0.12
Other responses				
Fever	440 (40.0)	503 (45.7)	943 (42.8)	0.91
Swollen abdomen	83 (7.5)	85 (7.7)	168 (7.6)	0.43
Pallor	25 (2.2)	31 (2.8)	56 (2.5)	0.77
Do not know	379 (34.4)	272 (24.7)	651 (29.6)	<0.001***
FTMs who can tell at least one of the danger signs of newborn	608 (55.3)	703 (63.9)	1311 (59.6)	<0.001***
FTMs who can tell at least two of the danger signs of newborn	***182 (16.5)***	***227 (20.6)***	***409 (18.6)***	***<0.01****
N	**1100**	**1100**	**2200**	

†Multiple responses collected for this question; without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

FTMs' knowledge on danger signs of newborn complications was assessed in addition to knowledge of at least two of the danger signs of newborns. Limited knowledge is seen among FTMs in both intervention and control sites on important danger signs in newborns, such as convulsion, not feeding well, umbilical redness, hypothermia, fever, and lethargy; the exception was breathing difficulty (>60/minute) which is mentioned by about half of respondents in both the intervention and control sites (Table 2d). The difference in knowledge on danger signs of newborns between intervention and control sites is not statistically significant except for breathing difficulty, irregular or fast breathing (respiration >60 minute) ($p<0.01$), poor feeding ($p<0.001$), and umbilical redness ($p<0.01$). FTMs in the control site (11%) are more likely to know poor feeding as a danger sign in newborns compared to the intervention site (6%). Only about 17% and 21% of FTMs in intervention and control sites, respectively, could mention at least two of the danger signs of newborns. FTMs in the control site are significantly more likely to know at least two of the danger signs of newborns compared to the intervention site ($p<0.01$). Similarly, FTMs in the control site are significantly more likely to know at least one of the danger signs of newborns compared to those in the intervention site (55% vs 64% [$p<0.001$] [Table 2d]).

Additionally, FTMs mentioned fever (40% vs 46%), swollen abdomen (7% vs 8%), and pallor (2% vs 3%) as the danger signs of newborns in the intervention and control sites, respectively, and the results are not significantly different between the intervention and control sites. However, significantly more FTMs in the intervention site (34.45%) are likely to have no knowledge on any of the danger signs of newborns compared to the control site (24.73%) ($p<0.001$) (Table 2d).

Table 2e: FTMs' knowledge and current practice of family planning

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs heard about FP methods				
Yes	1100 (100.0)	1100 (100.0)	2200 (100.0)	-
FTMs know the name of any FP methods†				
Pill	1083 (98.4)	1097 (99.7)	2180 (99.1)	<0.02*
Injectables	932 (84.7)	977 (88.8)	1909 (86.8)	<0.01**
Condom	767 (69.7)	765 (69.5)	1532 (69.6)	0.93
Implant	477 (43.4)	480 (43.6)	957 (43.5)	0.89
Female sterilization	219 (19.9)	265 (24.1)	484 (22.0)	<0.02*
IUD	161 (14.6)	113 (10.3)	274 (12.4)	<0.01**
Male sterilization	59 (5.4)	55 (5.0)	114 (5.2)	0.70
Safe period	84 (7.6)	68 (6.2)	152 (6.9)	0.18
LAM	16 (1.4)	2 (0.2)	18 (0.2)	0.80‡
FTMs know the name of modern FP methods†				
Pill	327 (29.7)	377 (34.3)	704 (32.0)	0.02*
Condom	232 (21.1)	258 (23.4)	490 (22.3)	0.18
Injectables	206 (18.7)	178 (16.2)	384 (17.4)	0.13
Implant	97 (8.8)	65 (5.9)	162 (7.4)	<0.01**
IUD	16 (1.4)	8 (0.7)	24 (1.1)	0.10‡
Female sterilization	40 (3.6)	33 (3.0)	73 (3.3)	0.41
Male sterilization	10 (0.9)	8 (0.7)	18 (0.8)	0.64‡
Do not know	642 (58.4)	586 (53.3)	1228 (55.8)	<0.02*
FTMs know the name of at least one of th modern FP methods	458 (41.6)	514 (46.7)	972 (44.2)	0.11
FTMs know the names of at least any three of the modern FP methods	***126 (11.4)***	***106 (9.6)***	***232 (10.5)***	***0.16***
FTMs ever discussed with their husband use of FP methods to avoid or delay pregnancy				
Yes	952 (86.5)	985 (89.5)	1937(88.0)	<0.03*
No	148 (13.4)	115 (10.4)	263 (11.9)	
N	**1100**	**1100**	**2200**	
FTMs currently using modern FP (6 months postpartum group only)†				
Injectables	41 (10.4)	14 (4.2)	55 (7.6)	0.002**
Implant	5 (1.3)	0.0	5 (0.7)	0.07‡
Progesterone only pill (POP)	162 (41.1)	178 (53.9)	340 (47.0)	0.001***
Condom	63 (16.0)	39 (11.8)	102 (14.1)	0.01**
IUD	0	0	0	-
Use any modern FP during postpartum	**268 (68.0)¤**	***230 (69.7)¤¤***	***498 (68.8)¤¤¤***	***0.63***
n	**394**	**330**	**724**	

†Multiple responses collected for these questions; ‡Fisher exact test, without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001; ¤= 3 women used POP and condom, ¤¤=one woman used POP and condom and ¤¤¤=4 women used POP and condom.

Spontaneous multiple responses were gathered from FTMs if they had heard the name of an FP method that could be used so that a couple could delay or avoid pregnancy. All FTMs interviewed could mention the name of an FP method irrespective of intervention or control sites. The oral contraceptive pill was mentioned by 98% and almost 100% of FTMs in the intervention and control sites, respectively. Similarly, 85% and 89% of FTMs in the intervention and control sites, respectively, mention injectables. FTMs in the control site are significantly more likely to have better knowledge on these two methods (pill and injectables) compared to those in the intervention site ($p<0.02$ and $p<0.01$, respectively) (Table 2e).

FTMs were asked about any modern FP method they know. Among the FTMs who could name an FP method, they were asked to mention the names of modern FP methods. The pill (29% vs 34%), condom (21% vs 23%), implant (19% vs 16%), IUD (1% vs 1%), female sterilization (7% vs 3%) and male sterilization (1% vs 1%) were mentioned by FTMs in intervention and control sites, respectively. There were no significant variations in awareness between FTMs in the intervention and control sites except for the pill ($p<0.02$) and implant ($p<0.01$). FTMs in the control site are significantly more likely to know the pill and FTMs in the intervention site are significantly more likely to know the implant as modern contraceptive methods compared to the intervention and control sites, respectively. Additionally, FTMs in the intervention site are significantly less likely to know any names of modern contraceptive methods compared to those in the control site ($p<0.02$) (Table 2e).

Only about 11% and 10% of FTMs in the intervention and control sites, respectively, could mention the name of at least three of the modern methods, which is not significantly different between the control and intervention sites ($p<0.16$). Additionally, 42% and 47% of FTMs in the intervention and control sites, respectively, know at least one of the modern contraceptive methods, with no significant difference between the two sites ($p<0.11$) (Table 2e). Significantly more FTMs in the control site are also likely to discuss with their husbands the use of FP methods to delay or avoid pregnancy compared to the intervention site ($p<0.03$) (Table 2e).

Among the FTMs who have children aged six months or younger, 68% vs 70% of FTMs in the intervention and control sites, respectively, reported using any modern FP method during the first six months of the postpartum period (Table 2e). Among them, 41% and 54% of FTMs used progesterone-only pills (POP) and 16% and 12% used condoms in the intervention and control sites, respectively, to avoid or delay pregnancy during the first six months of the postpartum period. While significantly more FTMs used injectables and condoms in the intervention site compared to control site (10% vs 4%; $p<0.002$ and 16% vs 12%; $p<0.01$), significantly more FTMs in the control site used POP compared to the intervention site (54% vs 41%; $p<0.001$) (Table 2e).

Furthermore, the qualitative data reveal a common perception among new parents of not requiring any contraceptive method until menstruation returns for mother after childbirth or the woman is amenorrheic, which might have influenced her decision not to use PPFP.

Also, less engagement in sexual activities/periodic abstinence and use of traditional method (withdrawal) were mentioned to be in practice during the early months postdelivery and use of a condom was reported in those days for infrequent sex. Perception of negative side effects of the "combined oral pill" (they may not be aware that the progesterone-only pill has a minimal influence on the quality and quantity of breast milk) on breastfeeding mothers was found to be common among new parents. In the early months of breastfeeding (after one and half months), the pill (POP), condom, and injectables were found to be in use which is also reflected in our survey findings.

Also, concerns around side effects of certain methods, such as injectables, were found among new parents. Switching from the condom to the pill in the future when the breastfeeding period is over was also frequently noted.

"Previously I used to take Femi pill (combined oral pill) but now I don't take it anymore. I mean after childbirth I did not take any measure. I do not have my menstruation back yet and that's why I am not taking any contraceptives now" - A FTM on non-use of PPFP.

"I don't know this clearly (what I can use immediately after birth, or after six months). I never used injection earlier. This is the first time I took an injection. I didn't know that before. I can't take medicine (oral pill). So, my mother-in-law told me to take an injection....for getting breast milk. I think it is better for men to use something. I lost weight after taking the injection, and now I have faced a problem. I bleed a lot" - A FTM on concern on side effects of using PPFP.

"After the birth of my child when my wife had her menstruation, we used condoms for the most time. After using condoms for 2–3 months, we switched to pills as a contraception method" - A FTF on contraception use in early months of post-partum and method switch.

Knowledge and use of health services

Table 3: Knowledge on facilities where women seek services during pregnancy

Facilities	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Government hospital†				
Medical College Hospital	452 (41.1)	466 (42.4)	918 (41.2)	0.54
District Hospital	438 (39.8)	662 (60.2)	1100 (50.0)	<0.001***
Mother and Child Welfare Center (MCWC)	546 (49.6)	704 (64.0)	1250 (56.8)	<0.001***
Shaheed Ahsan Ullah Master General Hospital	676 (61.4)	364 (33.1)	1040 (47.3)	<0.001***
Satellite Clinic/EPI center	302 (27.4)	431 (39.2)	733 (33.3)	<0.001***
City Corporation Health Center	331 (30.1)	340 (30.9)	671 (30.5)	0.67
Nongovernment hospital†				
BRAC Maternity Center	845 (76.8)	912 (82.0)	1,757 (79.9)	<0.001***
Other NGO static clinic	331 (30.1)	393 (35.7)	724 (32.9)	0.01**
Other NGO satellite clinic	144 (13.1)	232 (21.1)	376 (17.1)	<0.001***
Private hospital†				
Private hospital/clinic	1015 (93.4)	1041 (94.6)	2056 (93.4)	0.03*
Private medical college	321 (29.2)	444 (40.4)	765 (34.8)	<0.001***
Don't know	11 (1.0)	7 (0.6)	18 (0.8)	0.34
N	1100	1100	2200	

†Multiple responses collected for these questions; p-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

FTMs' knowledge on where women go for services during pregnancy were explored. Table 3 shows women's knowledge on various facilities where women go for services during pregnancy, delivery, and the postnatal period, from government facilities to NGO and private facilities. Findings indicate that more FTMs reported about those facilities which are nearer to their homes. For example, significantly more FTMs in the intervention site reported the Shaheed Ahsan Ullah Master General Hospital which is situated in the intervention areas compared to the control area (61% vs 33%; p<0.001). Similarly, about 80% of FTMs in both the intervention and control sites reported the BRAC Maternity Center which is nearer to them. However, significantly more FTMs in the control site reported BMC compared to the intervention site (82% vs 77%; p<0.001). A significant number of FTMs in both the intervention and the control site (93% vs 95%) reported that women go to a private hospital or clinic for services during pregnancy (Table 3).

Table 3a: Knowledge and use of health services from BRAC Maternity Center

Knowledge of BRAC Maternity Center	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Heard about BRAC Maternity Center				
Yes	845 (76.8)	912 (82.0)	1,757 (79.9)	<0.001***
N	**1100**	**1100**	**2200**	
Information that was heard about BMC†				
It provides ANC, PNC, delivery, and FP services to women	782 (92.5)	877 (96.2)	1,659 (94.4)	<0.001***
It provides ANC, PNC, delivery, and FP services to adolescent women	592 (70.1)	741 (81.2)	1,333 (75.9)	<0.001***
It takes less money than other facilities	502 (59.4)	660 (72.4)	1,162 (66.1)	<0.001***
It provides general health services to women	469 (55.5)	471 (51.6)	940 (53.5)	0.10
It provides FP services to women	438 (51.8)	494 (54.2)	932 (53.0)	0.32
It takes no money for the services	97 (11.5)	113 (12.4)	210 (11.9)	0.55
Use of any health services from BMC				
Yes	396 (46.9)	352 (38.6)	748 (42.6)	<0.001***
n	**845**	**912**	**1757**	
Types of services received from BMC†				
ANC	260 (65.5)	245 (69.6)	505 (67.4)	0.23
Delivery	106 (26.8)	82 (23.3)	188 (25.1)	0.27
PNC	54 (13.6)	51 (14.5)	105 (14.0)	0.73
Neonatal health services	33 (8.3)	17 (4.8)	50 (6.7)	<0.05*
Medicines	30 (7.6)	28 (7.9)	58 (7.7)	0.84
Family planning including PPFP	15 (3.8)	6 (1.7)	21 (2.8)	0.09‡
Education session	2 (0.5)	4 (1.1)	6 (0.8)	0.33‡
n	**396**	**352**	**748**	

†Multiple responses collected for these questions; ‡Fisher exact test, without sign p-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

About 80% of FTMs (77% vs 82%) in intervention and control sites, respectively, have heard about the BMC and its services, with significantly more FTMs in the control sites having heard about it (P<0.001). Most of the FTMs in the intervention and control sites heard that BMC provides ANC, PNC, delivery, and FP service to women and adolescents and that it takes less money than other facilities. Results also indicate that significantly more FTMs in the control sites are likely to hear that BMC provides ANC, delivery, PNC, and FP services to women (p<0.001); BMC provides ANC, delivery, PNC, and FP services to adolescents (p<0.001); and BMC takes less money than other facilities (p<0.001) (Table 3a).

Among the respondents who have heard about BMC, 47% and 39% from intervention and control sites, respectively, reported receiving any health services and significantly more FTMs in the intervention site are likely to have received any health services from BMC (p<0.001). The types of services received from BMC do not significantly vary between the intervention and control sites except for neonatal health services (Table 3). FTMs from intervention sites compared to control sites are significantly more likely to receive neonatal health services (p<0.05) (Table 3a).

Findings from FGDs and IDIs revealed that there are several facilities in the intervention sites where FTMs go for ANC, delivery, and PNC care. For example, BRAC, Tongi Hospital, Abeda Medical, Sheba, New Life Hospital, T&T General Hospital, Fatema Hospital, Nagor Matri Sadon, World Vision, United Hospital, Al-Karim Hospital, Imperial, and Marie Stopes Clinic, TDH hospital, etc. However, among them, BRAC is preferred because of its proximity to their homes, a wider variety of services offered, low cost, 24/7 facilities, facilities for urine tests, diabetes tests, ultrasonograms, explanation of the healthy food list, no suggestion for C-section unless needed, providers behave well, medicine is available, they go door-to-door and provide services, and people can communicate with health workers any time.

While most of the informants preferred normal delivery, they do not like episiotomies (an incision made in the perineum — the tissue between the vaginal opening and the anus — during childbirth).

Qualitative interviews reveal the complex and diverse factors that come into play regarding decisions and choice of a place for delivery and services: distance, money, concern for safety, behaviors, test facilities, push factors for C-sections, accessibility to health workers at any time, door-to-door services, etc. Negative experiences they heard about from family and friends during childbirth and voluntary C-sections also influenced their decisions. Apart from parents-to-be, family and community health workers also play vital roles in this matter.

Societal norms and traditions about the delivery place reportedly exist in this peri-urban areas similar to ones we usually see in the rural areas.

Quality of care received from BMC facilities during the last ANC (n=505) was measured through a composite score of 21 elements. We categorized the quality of the ANC score into low and high. Overall, the composite score on quality of care indicates that 55% and 49% of FTMs in intervention and control sites, respectively, received high-quality services in the last ANC from BMC with no significant difference between the two sites (p<0.17) (Table 4).

Reported quality of each individual element from the last ANC in the intervention site ranges from 45% to 93%, while in the control area it ranges from 35% to 95%. There is

"I know that pregnant women are checked up in the BRAC facility and the medicines are given at the facility. They deliver whatever service is required at the time of delivery (24/7 delivery). Apart from that, before and after delivery (ANC and PNC), the services are available here (BMC). As such, this place is most reliable for normal delivery. Everyone knows that if one expects normal delivery then they will go to the BRAC facility" - A FTF on knowledge of service availability at BMC.

"That is not a decision made by one person. Because it is a family matter, a matter of concern. If it is a normal delivery, it is often delivered at home, but if someone wants to avoid any problems during the delivery, then they go to BRAC (BMC)."

"I went there since it was closer, and we also had to consider the cost because we are poor. Normal delivery is less expensive and better for women than C-section, which is why I went there" - A FTM on parameters considered for choice of service point for delivery.

Societal norm and preference for home delivery

Respondents (MTB) in the FGD mentioned that "Most people want their baby delivered at home. When the child is delivered in the medical facility, they do not allow the family to go to the patient. But when it comes to home delivery, everyone stays close and there is support in the body and mind."

A Service provider in an IDI mentioned "There are some elders around them who say that you don't have to go to hospital. Baby would be delivered normal at home. Elders' opinion has a priority in our society, so people try to do the normal delivery at home by following their advice.... In many cases, mothers want to come to hospitals for the delivery, but guardians (parents, in- laws) don't allow them to. Also, midwives or Traditional Birth Attendants (TBA) around them encourage them to do the delivery at home. Sometimes they instill fear among mothers-to-be that in the hospital they will be tied and forcefully done C-section".

Table 4: Quality of care in last ANC services received from BRAC Maternity Center

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Elements of last ANC received				
1. Took weight	223 (86.4)	196 (81.0)	419 (83.8)	0.09
2. Checked blood pressure	224 (86.5)	204 (83.6)	428 (85.1)	0.36
3. Performed abdominal examination	243 (93.5)	233 (95.1)	476 (94.3)	0.42
4. Checked for anemia	193 (74.5)	168 (68.8)	361 (71.8)	0.15
5. Explained anemia in pregnancy	179 (92.7)	144 (85.7)	323 (89.5)	<0.03*
6. Listen to the baby's heartbeat	234 (90.0)	228 (93.8)	462 (91.8)	0.11
7. Checked urine for protein	124 (48.6)	131 (53.5)	255 (51.0)	0.27
8. Told about the progress of pregnancy	232 (89.2)	211 (86.1)	443 (87.7)	0.28
9. Gave chance to ask question	204 (78.5)	197 (80.4)	401 (79.4)	0.58
10. Told how to identify danger signs	139 (54.3)	116 (47.5)	255 (51.0)	0.13
11. Told about when to come back for PNC	182 (70.0)	156 (53.7)	338 (66.9)	0.13
12. Asked about previous medical history	139 (53.5)	145 (59.2)	284 (56.2)	0.19
13. Told about hypertensive disorder	186 (71.5)	171 (70.1)	357 (70.8)	0.71
14. Told about pre-eclampsia/eclampsia	127 (49.2)	87 (35.8)	214 (42.7)	0.002**
15. Performed blood grouping	153 (58.8)	155 (63.5)	308 (61.1)	0.28
16. Provide iron/folic acid	213 (81.9)	196 (80.0)	409 (81.0)	0.58
17. Counsel for 4 ANC visits	216 (83.1)	197 (80.4)	413 (81.8)	0.43
18. Counsel on danger signs during pregnancy	155 (59.8)	125 (51.2)	280 (55.7)	<0.05*
19. Counsel on birth preparedness	158 (60.8)	144 (59.0)	302 (59.9)	0.68
20. Counsel on PPFP	127 (48.8)	79 (35.5)	206 (40.9)	<0.001***
21. Counsel on newborn care	121 (46.7)	97 (39.6)	218 (43.2)	0.10
FTMs received quality services in the last ANC using composite score				
Low	117 (45.0)	125 (51.0)	242 (47.9)	0.17
High	143 (55.0)	120 (49.0)	263 (52.1)	
n	**260**	**245**	**505**	

P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

no significant variation in the quality of individual elements of ANC services provided in the intervention and control sites except discussion on anemia in pregnancy, pre-eclampsia/eclampsia, counseling on danger signs during pregnancy, and counseling on PPFP. The reported quality of discussion on anemia in pregnancy (p<0.03), pre-eclampsia/eclampsia (p<0.002), counseling on danger signs during pregnancy (p<0.05), and counseling on PPFP (p<0.001) is significantly better in the intervention sites compared to the control sites (Table 4).

Table 5: Association of quality of care received in the last ANC with knowledge of FTMs on danger signs and warning signs of newborn complications

Variables	FTMs know at least 3 danger signs during pregnancy				FTMs know at least 2 warning signs of newborn complications			
	Intervention		Control		Intervention		Control	
	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)
Quality of ANC care in the last ANC								
Low	ref	ref	ref	ref	ref	ref	ref	ref
High	1.9 (0.6-5.5)	1.6 (0.4-5.9)	2.1 (0.5-8.7)	2.3 (0.5-10.5)	1.8 (0.9-3.3)	1.8 (0.9-3.4)	0.6 (0.3-1.0)	0.5 (0.3-1.0)
N	260		245		260		245	

OR: odds ratio, AOR: adjusted odds ratio, CI: confidence interval, AOR adjusted with FTMs' current age, age at marriage, and wealth quintiles.

Further analyses explored the influence of quality of care provided on the FTMs' knowledge of at least three danger signs during pregnancy and at least two warning signs of newborn complications. Table 5 indicates that FTMs who received high-quality services during their last ANC visit have higher knowledge of at least three danger signs during pregnancy and at least two warning signs of newborn complications in both the intervention and control sites. However, this association of high ANC score does not hold true for knowledge of at least two warning signs of newborn complications in the control site (Table 5).

Further, FTMs who received high-quality services in the last ANC visit were more than 1.65 times as likely to know at least three danger signs during pregnancy (AOR: 1.65, 95% CI: 0.43–5.91) compared to those who received low-quality services in the last ANC visit in the intervention site. The likelihood of high-quality services on the knowledge of at least three danger signs during pregnancy was even higher, 2.32 times (AOR: 2.32, 95% CI: 0.51–10.53) in the control site compared to those who received low-quality services in the last ANC visit in the control site. However, neither of these associations is statistically significant (Table 5)

Table 6: FTMs received ANC by service providers (without tracer elements∞)

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs received at least one ANC from medically trained providers¥	899 (81.7)	901 (81.9)	1800 (81.8)	0.91
FTMs received 4+ ANC from any service providers	646 (58.7)	598 (54.4)	1244 (56.5)	<0.04*
N	**1100**	**1100**	**2200**	

P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001. ¥Medically trained providers are doctor/nurse/midwives/paramedics/FWV/SACMO/CSBA/BRAC doctor/BRAC midwives. ∞Tracer elements included BP checked, weight taken, blood grouping; urine checked for albumin, and counseled on danger signs.

Eighty-two percent of FTMs in both the intervention and control sites reported receiving at least one ANC from medically trained providers (without tracer elements). Fifty-nine percent and 54% of FTMs in the intervention and control sites, respectively, received 4+ ANC (without tracer elements) from any service providers, and the difference in receiving 4+ ANC from any service provider is statistically significant (p<0.04), which indicates a greater number of FTMs in the intervention site are likely to receive 4+ ANC from any service providers compared to the control site (Table 6). Forty-nine percent and 46% of FTMs in the intervention and control sites, respectively, received 4+ ANC from medically trained providers without any significant difference between two sites (p<0.21) (table not shown).

Table 7: FTMs received ANC with all tracer elements (TE)∞ from BRAC Maternity Center

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs received at least one ANC£ checkup from BMC (from medically trained providers) with all TEs	52 (20.0)	57 (23.3)	109 (21.6)	0.37
FTMs received 4+ ANC£ checkups from BMC (from medically trained providers) with all TEs	47 (18.1)	48 (19.6)	95 (18.8)	0.66
n	**260**	**245**	**505**	

∞Tracer elements included BP checked, weight taken, blood grouping; urine checked for albumin, and counseled on danger signs, without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001, £Doctors and midwives provide ANC at BMC.

Among the FTMs who received ANC from BMC, 20% in the intervention site and 23% in the control site received at least one ANC with all tracer elements (TEs) with no significant difference between two sites (p<0.37). Similarly, among FTMs who received ANC from BMC, 18% in the intervention site and 20% in the control site received 4+ ANC with all TEs with no significant difference between the two sites (p<0.66) (Table 7).

Qualitative findings revealed BRAC's widespread practice of home visits and services, and their community connection. Respondents highlighted the advice they receive about pregnancy and healthy living, and the advantages of reaching service providers over the phone any time as needed.

24/7 service, and community connection, access to health worker over phone

A first-time father in an IDI mentioned "The advantage is that the facility is open 24 hours a day. Health workers also remain alert. They give their numbers. You can receive services 24 hours a day. Whenever you want, whenever there is a problem, you can call the health workers of BRAC. And you are getting the service too. That's why everyone chooses BRAC. The BRAC facility in ward no. 48 is trusted by all."

Another first-time father in an IDI mentioned, "There was a lady service provider from BRAC who used to come to the home and check the blood pressure, provide medicine like iron, calcium tablets, etc. She would check the blood pressure, provide medicine and take information on the pregnancy. She would communicate through the phone also."

Further, an FTM in an IDI mentioned, "There is an ultrasonogram at the BRAC Maternity Center. There is a doctor, she checks the children's health and sees what the problems are. BRAC also has delivery services. It is better to go to BRAC in our area because their services are very good. The people of BRAC also visited our house, and it helped a lot. Since when the baby is so small, it is tough to go outside."

Table 7a: Facility delivery of FTMs

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Facility delivery	767(69.7)	748 (68.0)	1515 (68.9)	0.40
N	**1100**	**1100**	**2200**	
Type of facility				
BRAC Maternity Center	107 (13.9)	81 (10.8)	188 (12.4)	0.68
Other health facilities∞	660 (89.2)	667 (86.1)	1327 (87.6)	0.08
n	**767**	**748**	**1515**	

∞Other facilities included medical college hospitals, district hospital, MCWC, UHC, UH&FWC, private hospital/ clinic, and NGO clinic; P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

Seventy percent and 68% of FTMs in intervention and control sites, respectively, reported deliveries at facility without any difference between two sites (p<0.40). Those who had facility deliveries, among them, 14% in intervention sites and 11% in control site had their deliveries at BRAC Maternity Centers and the rest had their deliveries in other health facilities such as medical college hospitals, district hospital, MCWC, UHC, UH&FWC, private hospitals/clinics, and NGO clinics (Table 7a).

Table 8: Quality score of delivery services at BRAC Maternity Centers

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Elements of quality delivery care				
1. Baby received first checkup within 90 minutes after delivery	48 (45.3)	35 (42.7)	83 (44.1)	0.72
2. FTMs received respect during delivery	54 (50.9)	43 (52.4)	97 (51.6)	0.84
3. Faced problems (provider provides less attention during delivery/post-partum) after the delivery of first child	25 (23.6)	12 (14.6)	37 (19.7)	0.13
4. Satisfied with BMC service during delivery	98 (92.4)	75 (91.5)	173 (92.0)	0.80
5. Would recommend a friend or relative to come to BRAC for delivery	100 (94.3)	78 (95.1)	178 (94.7)	0.81
Quality of delivery care score				
Low	25 (23.6)	22(26.8)	47 (25.0)	0.61
High	81 (76.4)	60 (73.2)	141 (75.0)	
n	**106**	**82**	**188**	

P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

Overall, composite scores indicate that 76% and 73% of FTMs in the intervention and control sites, respectively, received high-quality delivery care at BMC. There is no significant difference between the intervention and control sites regarding quality delivery care (p<0.61). Furthermore, around 45% and 43% of newborn babies in the intervention and control sites, respectively, received their first checkup within 90 minutes after delivery, and the difference between the two sites is not statistically significant (p<0.15). While 92% of FTMs in both the intervention and control sites are satisfied with the BMC delivery services, only about 51% and 52% of FTMs in intervention and control sites, respectively, reported they were provided with respect during delivery care, however the difference between the two sites is not statistically significant (p<0.84) (Table 8).

Overall, composite scores indicate that 56% and 59% of FTMs received high-quality services in the last PNC in the intervention and control sites, respectively, with no significant difference between the two sites (p<0.79) (Table 9).

Quality of individual elements reported from the last PNC visit in the intervention sites ranges from 12%–82%, while in the control site it ranges from 15%–88%. There is no significant variation in any element of quality of the last PNC services provided in the intervention and control sites. For example, only 36% and 32% of FTMs in the intervention and control sites, respectively, reported that they were counseled during the last PNC on how to identify danger signs in the PNC period (p<0.67) (Table 9).

Table 9: Quality of last PNC services provided in BRAC Maternity Center

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Elements of last PNC services received				
1. Took weight	23 (45.1)	25 (53.2)	48 (49.0)	0.42
2. Checked blood pressure	33 (64.7)	28 (59.6)	61 (62.2)	0.60
3. Performed abdominal examination	28 (54.9)	26 (55.3)	54 (55.1)	0.96
4. Checked eye for anemia	25 (49.0)	22 (46.8)	47 (48.0)	0.82
5. Checked urine for protein	6 (11.8)	7 (14.9)	13 (13.3)	0.64‡
6. Gave chance to ask question	27 (54.0)	29 (61.7)	56 (57.7)	0.44
7. Told how to identify danger signs in postnatal period	18 (36.0)	15 (31.9)	33 (34.0)	0.67
8. Told about pre-eclampsia/eclampsia	16 (32.0)	12 (25.5)	28 (28.9)	0.48
9. Told how to take care of breast	25 (50.0)	28 (60.9)	53 (55.2)	0.28
10. Told how to take care of perineum	29 (58.0)	28 (59.6)	57 (58.8)	0.87
11. Told about exclusive breastfeeding	42 (82.3)	40 (85.1)	82 (83.7)	0.71
12. Told about baby's immunization	36 (70.6)	39 (83.0)	75 (76.5)	0.14
13. Provide iron/folic acid	40 (78.4)	40 (85.1)	80 (81.6)	0.39
14. Counseled on PPFP	22 (62.9)	19 (73.1)	41 (67.2)	0.40
15. Counseled on newborn care	26 (74.3)	23 (88.5)	49 (80.3)	0.16
Quality-of-care score at last PNC				
Low	24 (43.6)	21 (41.2)	45 (42.4)	0.79
High	31 (56.4)	30 (58.8)	61 (57.5)	
n	**55**	**51**	**106**	

‡Fisher exact test, without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

Data from FTMs who accessed services at any facility and from medically trained providers indicates that 64% and 66% of FTMs from intervention and control sites, respectively, received at least one PNC within two days of delivery, and the difference between the intervention and control sites is not statistically significant (p<0.42).

Table 10: Proportion of FTMs and newborns who received PNC after delivery from any facility and medically trained providers and from BMC

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
From any facility				
FTMs who received at least one PNC checkup within 2 days of delivery from any facility and medically trained providers	709 (64.4)	727 (66.1)	1436 (65.3)	0.42
Newborns who received at least one PNC checkup within 2 days of delivery from any facility and medically trained providers	675 (61.4)	703 (63.9)	1378 (62.6)	0.21
FTMs who received at least 3 PNC checkups within 42 days of delivery from any facility	309 (28.1)	273 (24.8)	582 (26.4)	0.08
Newborns who received at least 3 PNC checkups within 42 days of delivery from any facility	268 (24.4)	211 (19.2)	479 (21.8)	<0.001***
N	**1100**	**1100**	**2200**	
From BMC				
FTMs who received at least one PNC checkup within 2 days of delivery from BMC	41 (74.5)	45 (88.2)	86 (81.1)	0.07
Newborns who received at least one PNC checkup within 2 days of delivery from BMC	38 (69.1)	42 (82.3)	80 (75.5)	0.11
FTMs who received at least 3 PNC checkups within 42 days of delivery from BMC	10 (18.2)	3 (5.9)	13 (12.3)	<0.07‡
Newborns who received at least 3 PNC checkups within 42 days of delivery from BMC	8 (14.5)	1 (2.0)	9 (8.5)	0.02‡*
n	**55**	**51**	**106**	

‡Fisher exact test, without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

Similarly, only 28% and 25% of infants from the intervention and control sites, respectively, received at least three PNC checkups within 42 days of delivery, and the difference between the intervention and control sites is not statistically significant (p<0.08). Infants alone who received at least one PNC checkup within two days of delivery from any facility and medically trained providers are 61% and 64% in the intervention and control sites, respectively, and the difference between the two sites is not statistically significant (p<0.21). Infants alone who received at least three PNC checkups within 42 days of delivery are 24% and 19% in the intervention and control

PNC findings

An FTM in an IDI mentioned, "There was no need to go anymore. Sometimes many women face problems after removal of the stitches. I did not face such kind of problems; therefore, I did not go."

Another FTM in an IDI mentioned, "Mothers do not go for PNC. They don't care as much as they do before they have a baby. Their idea is that the baby has been born and now there is no problem. The problem is gone."

An FTM in an IDI mentioned, "That sister came to our home. She checked my perineal area. It was stitched (had episiotomy). So, she saw that it was dried. 40 days later. It might be a few days later or before 40 days."

sites, respectively, and the difference between the two sites is significant (p<0.001) (Table 10).

On the other hand, among FTMs who accessed services at BMC from medically trained providers, 74% and 88% of respondents from the intervention and control sites, respectively, received at least one PNC checkup within two days of delivery from the facility and the difference between the intervention and control sites is not statistically significant (p<0.07). Similarly, 18% and 6% of FTMs from the intervention and control sites, respectively, received at least three PNC checkups from BMC within 42 days of delivery, and the difference between the two sites is not statistically significant (p<0.07). Infants alone who received at least three PNC checkups within 42 days of delivery are 14% and 2% in the intervention and control sites, respectively, and the difference between the two sites is significant (p<0.02) (Table 10).

Qualitative interviews with first-time parents demonstrated that visits to a facility for PNC is not commonly practiced unless there is a C-section and removal of the stitches is required. It was commonly perceived that a PNC visit is required only if women suffer from any problem; otherwise, it is not required.

An FTM in an FGD mentioned, “They don't go after delivery. If anything happens to the child, the child is taken to the health center. What happened to her own body no longer seems important… They go if they think that the baby is having a problem, such as if the baby has a cold or gets hurt. Mothers do not go for themselves” … “Mothers have other problems. Mothers stay busy with the child. They don’t take care of themselves. Many people neglect this. People who do work are busy with their job. They can’t make time. They also have to take care of the baby. That’s why they don’t get time."

A mother-to-be in an FGD mentioned, “Sometimes there are money issues…Delivery costs a lot of money. Later there is no money in hand. It is impossible to run a family with one's earnings…so if it is necessary, it is done, if it is not necessary, it is not done."

An FGD with mothers revealed many practical problems as well as mindset issues regarding mother’s health during the postnatal period. It is evident from the voices of the respondents that after the birth of the baby, mothers’ needs are not given priority anymore.

Financial concern and lack of awareness of the necessity of PNC also came out of the focus group discussions with FTMs and MTBs.

This analysis was conducted with only the FTMs in the intervention and control sites

Table 11: BRAC fieldworkers’ (SS* and SK) visitation during postnatal period at household level

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
BRAC workers come to your home to check at PNC				
Yes	24 (43.6)	13 (25.5)	37 (34.9)	0.05*
n	**55**	**51**	**106**	
Health workers discussed the following activities during PNC visits†				
Taking care of your health	20 (83.3)	13 (100.0)	33 (89.2)	0.27‡
Taking care of baby	23 (95.8)	13 (100.0)	36 (97.3)	0.99‡
Breastfeeding	21 (87.5)	13 (100.0)	34 (91.9)	0.53‡
Immunization	19 (79.2)	13 (100.0)	32 (86.5)	0.14‡
Contraception	15 (62.5)	10 (76.9)	25 (67.6)	0.47‡
Level of satisfaction with PNC visits				
Satisfied	23 (95.8)	13 (100.0)	36 (95.8)	0.99‡
One major reason for satisfaction				
Provided good service/no complaints	14 (58.3)	7 (53.8)	21 (56.8)	0.44‡
Providers behaved well	6 (25.0)	2 (15.4)	8 (21.6)	
Provided good advice or information	1 (4.2)	3 (23.1)	4 (10.8)	
Less expensive	3 (12.5)	1 (7.7)	4 (10.8	
n	**24**	**13**	**37**	

†Multiple responses collected for these questions; ‡Fisher exact test, without sign P-value generated using Chi-square test; *p<0.05, **p<0.01, ***p<0.001

(n=106) who delivered at BMC. Among the respondents who were visited by BRAC fieldworkers (SS* and SK) during the PNC period, 44% and 25% of FTMs from the intervention and control sites, respectively, reported that a BRAC fieldworker came to their homes for checkups during the PNC period. This finding indicates that significantly more FTMs in the intervention site are likely to be visited by a BRAC fieldworker at home compared to those in the control site (p<0.05) (Table 11).

During the PNC home-based visits, fieldworkers discussed taking care of FTMs' health (83% vs 100%), taking care of babies (96% vs 100%), breastfeeding (87% vs 100%), immunization (79% vs 100%), and contraception (62% vs 77%) in the intervention and control sites, respectively. There is no significant difference on the discussion topics between the intervention and control sites (Table 11).

FTMs who were visited by a BRAC fieldworker at home during the postnatal period—6% and 100% in the intervention and control sites, respectively—were satisfied with the service provided to them without any significant difference between the two sites (<0.99). The major reasons for satisfaction were that they were provided good services/had no complaints (58% vs 54%), the provider behaved well (25% vs 15%), provided good advice or information (4% vs 23%), and services were less expensive (12% vs 8%) compared to other facilities in both the intervention and control sites, respectively. There is no significant difference in the major reasons for satisfaction between the intervention and control sites (p<0.44) (Table 11).

Table 12: Association of quality of last PNC with newborn who received a PNC checkup within two days of birth, heard about PPFP, and know at least two breastfeeding practices

Variables	Newborn received a PNC checkup within two days of birth				FTMs/couple heard PPFP				FTMs who can identify at least three breastfeeding practices			
	Intervention		Control		Intervention		Control		Intervention		Control	
	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)
FTMs received quality PNC												
Low	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
High	3.5* (1.1-11.7)	**3.0 (0.8—10.8)**	7.0* (1.3-38.2)	**6.5 (0.9-48.6)**	0.9 (0.2-3.4)	**0.6 (0.1-3.6)**	1.6 (0.5-5.7)	**1.6 (0.4-5.6)**	3.2* (0.1.0-9.6)	**1.9 (0.5-6.8)**	1.7 (0.5-5.8)	**1.3 (0.4-4.1)**
n	55		51		55		51		55		51	

OR: odds ratio, AOR: adjusted odds ratio, CI: confidence interval, AOR adjusted with FTMs' current age and age at marriage; *p<0.05, **p<0.01, ***p<0.001

Further analyses explored the influence of the quality of the last PNC visit on the newborn's PNC checkup within two days of birth, awareness on PPFP, and knowledge of at least three breastfeeding practices. Table 12 indicates that among FTMs who received a high-quality last PNC, their babies are more likely to receive PNC checkups within two days of birth, FTMs are more likely to be aware of PPFP, and are more likely to identify at least two breastfeeding practices in both intervention and control sites (Table 12).

Further, among FTMs who provided high-quality scores during their last PNC or reported receiving high-quality PNC , their newborns were 3.03 times more likely to receive PNC checkups within two days of birth in the intervention site, and 6.48 times more likely to receive PNC checkups within two days of birth in the control site compared to those who received low-quality scores during their last PNC services (AOR: 3.03, 95%CI: 0.84-10.83 and AOR: 6.48, 95% CI: 0.86-48.59, respectively). These findings indicate that a high-quality PNC score is associated with a higher chance of receiving a PNC newborn checkup within two days of birth and are statistically significant for both the intervention and control sites. On the other hand, FTMs who provided high-quality scores during their last PNC, are less likely (0.65) to know about PPFP in the intervention site, and 1.61 times more likely to know about PPFP in the control site, compared to those who received low-quality scores during their last PNC services (AOR: 0.65, 95%CI: 0.11-3.65 and AOR:1.61, 95%CI: 0.45-5.64, respectively). These findings indicate that a high-quality PNC score in the last PNC is not associated with the high awareness of PPFP among couples and is not statistically significant for either the intervention or control sites. The high-quality last PNC services also influenced identification of at least three breastfeeding practices among FTMs in both the intervention (AOR:1.88, 95%CI: 0.52-6.85) and control sites (AOR:1.33, 95%CI: 0.43-4.09). These findings indicate that a high-quality PNC score is associated with a higher chance of identification of at least three breastfeeding practices and are not statistically significant for both the intervention and the control sites (Table 12).

Table 13: Infants' breastfeeding (BF) and essential newborn care (ENC) practices among women who delivered at BMC and any other places

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs delivered at any other places				
Infants who were exclusively BF up to 6 months	601 (54.6)	549 (49.9)	1150 (52.3)	<0.03*
Newborns received components of ENC				
7.1% chlorhexidine (CHX) applied to cord	727 (66.1)	644 (58.5)	1371 (62.3)	<0.001***
Initiated BF within 1 hour of birth	861 (78.3)	849 (77.2)	1710 (77.7)	0.65
Sterile cord cutting	1026 (93.3)	1018 (92.5)	2044 (92.9)	0.67
Drying within 0-4 minutes of births	927 (84.3)	934 (84.9)	1861 (84.6)	0.63
Bathing delayed 72 hours or more	811 (73.7)	769 (69.9)	1580 (71.8)	0.12
Combined 2 components used (applying 7.1% CHX to the cord, early initiation of BF within one hour)	***563 (51.2)***	***480 (43.6)***	***1043 (47.4)***	***<0.001******
All ENC components	432 (39.3)	355 (32.3)	787 (35.8)	<0.001*
N	1100	1100	2200	
FTMs delivered at BMC				
Infants who were exclusively BF up to 6 months	56 (52.8)	46 (56.1)	102 (54.3)	0.65
Newborns received components of ENC				
7.1% chlorhexidine (CHX) applied to cord	92 (86.8)	67 (81.7)	159 (84.6	0.34
Initiated BF within 1 hour of birth	98 (92.4)	73 (89.0)	171 (91.0)	0.42
Sterile cord cutting	100 (94.3)	80 (97.6)	180 (95.7)	0.28
Drying within 0-4 minutes of births	96 (90.6)	75 (91.5)	171 (91.0)	0.98
Bathing delayed 72 hours or more	83 (78.3)	63 (76.8)	146 (77.7)	0.96
Combined 2 components used (applying 7.1% CHX to the cord, early initiation of BF within one hour)	***87 (82.1)***	***61 (74.4)***	***148 (78.7)***	***0.20***
All ENC components	63 (59.4)	43(52.4)	106 (56.4)	0.34
n	**106**	**82**	**188**	

P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

Among all FTMs surveyed who delivered at places outside BMC, 55% and 50% of FTMs in the intervention and control sites, respectively, reported exclusive breastfeeding of their infants up to six months. FTMs in the intervention site were significantly more likely to report exclusive breastfeeding up to six months compared to those in the control site (p<0.03). On the other hand, a slightly higher percentage of FTMs (56%) in the control site who delivered at BMC reported exclusive breastfeeding of their infants up to six months compared to those in the intervention sites (53%), with no statistical difference (p<0.65) (Table 13).

Among all FTMs surveyed who delivered at places outside BMC, the five components of ENC (applying 7.1% chlorhexidine to the cord, sterile cord cutting, immediate drying after birth, bathing delayed 72 hours or more, and early initiation of breastfeeding within one hour) are similarly practiced in both the intervention and the control sites, without any significant variation, except for applying 7.1% CHX to cord. A significantly higher percentage of FTMs' infants in the intervention site received the application of 7.1% CHX to their cords compared to those in the control site (66% vs 59%; p<0.001). Collectively, all components are practiced in a higher percentage in the intervention site compared to the control site (39% vs 32%; p<0.001) (Table 13).

Among the FTMs who delivered at BMC, the five components of ENC (applying 7.1% chlorhexidine to the cord, sterile cord cutting, immediate drying after birth, bathing delayed 72 hours or more, and early initiation of breastfeeding within one hour) are similarly practiced in both the intervention and control sites with no significant difference. Collectively, all components are also practiced in a similar pattern in the intervention and control sites with no statistical difference (59% vs 52%; p<0.34). Additionally, a higher percentage of FTMs in the intervention site reported practicing two components of ENC (applying 7.1% CHX to the cord and early initiation of BF within one hour) compared to the control site, but there is no statistically significant difference (82% vs 74%; p<0.20) (Table 13).

Qualitative interviews indicate that challenges faced by new mothers in breastfeeding the newborn—such as concerns of not producing enough milk and perceptions of milk drying up due to medicine taken after C-section—were common. FGD and IDI findings revealed that support from family members and healthcare providers play a pivotal role in supporting new mothers in successful breastfeeding. Family members and social support systems contributed in many ways to healthy behaviors around newborn care and breastfeeding—from giving confidence to new mothers and guiding them on proper food intake and frequency of feeding to boost up milk production, to the right positioning for the successful breastfeeding of the newborn.

Table 14: Respectful maternity care (RMC) during ANC and PNC at BRAC Maternity Center

Elements of respectful maternity care	ANC n (%)		Difference (p-value)	PNC n (%)		Difference (p-value)
	Intervention	Control		Intervention	Control	
1. BRAC providers greeted in a friendly way	220 (84.6)	212 (86.5)	0.42	44 (80.0)	43 (84.3)	0.18
2. BRAC provider warmly welcomed with self-introduction	167 (64.2)	185 (75.5)	0.02*	34 (61.8)	31 (60.8)	0.99
3. BRAC provider offered a seat to the woman	231 (88.8)	222 (90.6)	0.54	47 (85.4)	44 (86.3)	0.53
4. BRAC provider treated the woman and her companion with compassion	227 (87.3)	230 (93.9)	0.23	50 (90.9)	47 (92.2)	0.19
5. BRAC provider maintained confidentiality and dignity of the patient	232 (89.2)	224 (91.4)	0.49	52 (94.5)	48 (94.1)	0.92
6. BRAC provider listened carefully to the patient's complaints and responded	231 (88.8)	224 (91.4)	0.33	47 (85.4)	47 (92.2)	0.20
7. BRAC provider offered emotional support that is sensitive to needs	200 (76.9)	207 (84.5)	0.09	44 (80.0)	44 (86.3)	0.31
8. BRAC provider communicated with the patients properly	229 (88.1)	222 (90.6)	0.45	48 (87.3)	45 (88.2)	0.62
9. BRAC providers asked the purpose of the patient's visit	216 (83.1)	205 (83.7)	0.62	47 (85.4)	38 (74.5)	0.16
10. BRAC providers took consent from the patients before the physical examination	191 (73.5)	196 (80.0)	0.08	43 (78.2)	40 (78.4)	0.97
11. BRAC providers maintained privacy during service provision	240 (92.3)	229 (93.5)	0.47	52 (94.5)	47 (92.2)	0.62
Respectful maternity care score						
Low	105 (40.3)	70 (28.6)	0.05*	19 (34.5)	19 (37.2)	0.77
High	155 (59.6)	175 (71.4)		36 (65.4)	32 (62.7)	
n	**260**	**245**		**55**	**51**	

Without sign P-value generated using Chi-square test; *p<0.05, **p<0.01, ***p<0.001

FTMs who received ANC and PNC from BMC were included in this analysis. Results are presented individually as well as by low- and high-score groups. In all of the individual elements of respectful maternity care of ANC and PNC presented in Table 14, there are no significant differences between the intervention and control sites, except for provider's warm welcome with self-introduction during ANC. For instance, 92% and 93% of FTMs in the intervention and control sites, respectively, reported that BMC maintained privacy during service provision during ANC visits, and the difference between intervention and control sites is not significant (p<0.47). Similarly, 95% and 92% of FTMs in the intervention and control sites, respectively, reported that BMC maintained privacy during PNC service provision, and the difference between intervention and control sites is not significant (p<0.62). Findings showed that providers in the control site are more likely to welcome warmly with self-introduction compared to the intervention site and the difference between these two sites is statistically significant (p<0.02) (Table 14).

Overall, looking at the composite scores, 60% and 71% of FTMs received high scores of respectful maternity care at BMC during ANC in the intervention and control sites, respectively, and the difference between the two sites is statistically significant (p<0.05). Similarly, 65% and 63% of FTMs received high scores of respectful maternity

"My breast milk supply was not sufficient for the baby. I'm a C-section patient who must take medicine that causes my breast milk to dry up. As a result, I have to feed the newborn supplementary milk" - A FTM on breastfeeding challenges.

"Yes, I only fed my baby breast milk. At first there was a problem. From the BRAC facility, some medicine was provided. My breast milk came after taking that medicine. That worked. The baby was getting a small amount of breast milk and it couldn't fill the baby's stomach. I did nothing but continue breastfeeding the baby. The baby was fed frequently. I ate more and fed the baby. My mother-in-law came after I gave birth. She, my husband, and my mother—they all helped me to eat more…. At one point I asked for formula milk for the baby. My husband, mother-in-law, and even my mother denied that idea. That told me those were not good for the baby and the baby will be continuously sick. They asked me to eat more so that the baby can get more milk from that. When I ate more like vegetables, pulse, whatever needed, the baby got breast milk then" - A FTM on how social support and right information led to successful breastfeeding.

care at BMC during PNC in the intervention and control sites, respectively, with no significant difference between the two sites (p<0.77) (Table 14).

Overall, encouraging behavior and a positive service experience from BMCs has been reported by the informants, and FTMs prefer female service providers. Cost of services and waiting time do not seem to be a major factor for clients or service users. FTMs value the visits service providers made to their homes as well as the environment of the facility.

While mostly positive experiences with services and healthcare worker behavior was reported, crowdedness, gender of providers, and privacy concerned some of the informants.

An FTM mentioned in an IDI that "Doctor and nurses were good to me, and they are female… They asked me to remove my Burka as soon as I reached there. Then they poured me water and said, 'You've come from a long distance, drink the water, and take some rest, then go and see the doctor.' They gave me enough time, especially sister Selina. She couldn't visit me during the lockdown because she couldn't come out at that time. How would she come as the doors of the houses were closed during the lockdown? I had to go there. They were good to me. But at the time of my sister-in-law's pregnancy, they visited her after every two days, as there is no lockdown now."

Another FTM mentioned in an IDI that "Lots of women visit there [BMC] during pregnancies. There is a place to sit, the fans are also operational, and there is no problem It's not a big issue to wait for 10–15 minutes…BMC is usually crowded on Friday and Tuesday, because gynaecologists attend patients on those days. Ultrasounds are done on that day. One has to wait for 10–15 minutes on those days, as those days are busy days. There is space to sit, and the ceiling fan is also ON, it's not problematic to sit there, but if you can't manage a seat to sit there, that's problematic."

Table 15: Birth preparedness among all FTMs

Variables	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs prepared/developed a birth plan during first pregnancy	928 (84.4)	976 (88.7)	1,904 (86.5)	0.003**
N	**1100**	**1100**	**2200**	
Elements of birth preparedness				
1. Selected a delivery place	709 (76.4)	757 (77.6)	1,466 (77.0)	0.54
2. Saved money for delivery	762 (82.1)	793 (81.2)	1,555 (81.7)	0.62
3. Arranged blood donor	421 (45.4)	388 (39.7)	809 (42.5)	<0.01**
4. Identified mode of transportation	434 (46.8)	472 (48.4)	906 (47.6)	0.48
Completed all four birth preparedness elements	***240 (21.8)***	***246 (22.4)***	***486 (22.1)***	***0.75***
n	**928**	**976**	**1904**	

Without sign P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001

Among all of the FTMs surveyed, 84% and 89% in the intervention and control sites, respectively, prepared a birth preparedness plan during their first pregnancies, and the birth preparedness difference between two sites is significant (p<0.003), which indicates that FTMs in the control site are significantly more likely to complete elements of birth preparedness before deliveries compared to intervention site (Table 15).

Among the four important selected birth preparedness elements (select a delivery place, save money for delivery, arrange blood donor, and identify mode of transportation), 45% to 82% of FTMs in the intervention site and 40% to 81% of FTMs in the control site completed the individual elements of birth preparedness, and the difference in any of the birth preparedness elements between intervention and control site is not significant, except for arranging blood donors (p<0.01). FTMs in the intervention site are significantly more likely to arrange blood donors compared to those in the control site. Collectively, 22% of FTMs in both the intervention and control sites completed all four important elements of birth preparedness, and there is no significant difference in birth preparedness between the intervention and control sites (p<0.75) (Table 15).

Findings from the FGDs and IDIs show that place of delivery, discussion around normal delivery, and C-section are the most common preparations among the parents-to-be and close relatives. Arrangement of financial resources and saving money for an emergency C-section were found to be most common; even discussions with possible sources for borrowing additional money were in place.

Making preparations and arranging for transportation were found to be common elements, and many mentioned that transportation is easily available here (considering the urban area) and they didn't require any preparation in that regard.

Findings revealed that while place of delivery and financial resources were common elements for birth preparedness, on the contrary arrangement for blood donors is often overlooked in birth preparedness.

Table 16: Social support received during continuum of care (pregnancy, delivery, and postnatal period) for all FTMs

Type of social support received from social network #	ANC n (%)		Difference (P-value)	Delivery n (%)		Difference (P-value)	PNC n (%)		Difference (P-value)
	Intervention	Control		Intervention	Control		Intervention	Control	
Household support									
Low	558 (50.7)	498 (45.3)	0.01**	354 (32.2)	419 (38.1)	0.01**	477 (43.4)	453 (41.2)	0.3
High	542 (49.3)	602 (54.7)		746 (67.8)	681 (61.9)		623 (56.6)	647 (58.8)	
Healthcare support									
Low	505 (45.9)	453 (41.2)	0.03*	463 (42.1)	438 (39.8)	0.27	449 (40.8)	404 (36.7)	0.05*
High	595 (54.1)	647 (58.8)		637 (57.9)	662 (60.2)		651 (59.2)	696 (63.3)	
Psychological support									
Low	412 (37.4)	338 (30.7)	0.01**	494 (44.9)	481 (43.7)	0.58	524 (47.6)	464 (42.2)	0.01**
High	688 (62.5)	762 (69.3)		606 (55.1)	619 (56.3)		576 (52.4)	636 (57.8)	
Composite score of all SS									
Low	536 (48.7)	486 (44.2)	0.03*	496 (45.1)	539 (49.0)	0.06	471 (42.8)	461 (41.9)	0.67
High	564 (51.3)	614 (55.8)		604 (54.9)	561 (51.0)		629 (57.2)	639 (58.1)	
N	**1100**	**1100**		**1100**	**1100**		**1100**	**1100**	

#Social network included mother, mother-in-law, husband, father-in-law, and friends; Household support included assistance during day-to-day work, cooking, and household chores; Healthcare support included access to health care, accompaniment to hospital, bringing medicine, and arranging transportation; Psychological support included emotional and financial support; P-value generated Chi-squared test; :*p<0.05, **p<0.01, ***p<0.001

Data on social support (SS) (household support is measured by: assistance during day-to-day work, cooking, household chores; healthcare support is measured by: access to health care, accompaniment to hospital, bringing medicine, arranging transportation; and psychological support is measured by: emotional and financial support) from social network members (mother, mother-in-law, husband, father-in-law, and friends) to FTMs during pregnancy, delivery, and the postnatal period were gathered from the intervention and control sites. High and low SS during pregnancy, delivery, and the postnatal period were calculated using composite scores of all social support elements for each individual component. Table 16 shows data on the SS received during pregnancy, delivery, and the postnatal period. FTMs in the control site are more likely to receive significantly higher levels of SS in all three components of SS (household, healthcare, and psychological support) during pregnancy (55% vs 49%;

An FTM mentioned in the IDI that "The benches you guys put there. There is a room at the immediate front, so when a patient lies there, her clothes move here and there. Women and men enter and sit on those benches, and everything becomes visible to them. You'll see that if you pay attention. That would have been better if that room was placed inside. I gave birth to my baby in the room beside this, but my sister gave birth in that room….There is a curtain, but when a person enters that room, the curtain is displaced, right? Respect for women should be maintained, right? When I delivered my baby there, those benches were behind that room. Nothing was visible. But now those benches are totally face-to-face with that room, which makes everything visible."

An FTM in an IDI mentioned, "So, if I am to talk about preparation, we have already decided that if I feel anything wrong, we'll go straight to BRAC. We started saving money at the bank. Everyday my husband came home after his driving duty, and he put some money in the bank, and we even managed some promises (verbal agreements to lend money) to help us during emergencies, in case needed. Not everyone delivers babies normally, right? My boss promised to lend me 5–10 thousand if needed."

A father-to-be mentioned in an IDI that “I have prepared for that. For example, if there is a normal delivery at home, then we have a different doctor here. I have informed them. If we call, they will come. Besides, I have arranged money… there is an arrangement for transportation. An auto has been fixed; it stays there all the time. My house is on the side of the road”.

An FTM in an IDI mentioned that “No, he [husband] saved money for that (delivery)…My doctor told me I wouldn’t need any blood, but when the surgery began, they discovered I was short on blood and had to give me emergency blood. We did not make any blood preparations, but we did make financial preparations."

An FTM in an IDI mentioned that “He [husband] asked me to rest if I felt not okay. He did clean for me, dried clothes, and he did everything. You understand that, right? Everything I needed from going to the doctor or buying medicine, he took me to the doctors, and when he couldn’t go, he gave money to me or my sister-in-law and said, ‘You two go, I have some work, call me if anything is needed.’ How will he work if he keeps running for me! He has done his best."

p<0.01; 59% vs 54%; p<0.03; 69% vs 62%; p<0.01, respectively), and healthcare and psychological supports during the postnatal period (63% vs 59%; p<0.05; 58% vs 52%; p<0.01) compared to intervention site. On the other hand, FTMs in the intervention site are more likely to receive significantly higher levels of SS in household activities during delivery compared to the control site (68% vs 62%; p<0.01) (Table 16).

Considering composite score of all SS, FTMs in the control site are significantly more likely to receive high SS during ANC compared to the intervention site (56% vs 51%; p<0.03); FTMs in the intervention site are more likely to receive high SS during delivery without any significant difference compared to the control site (56% vs 51%; p<0.06); and FTMs in the control site are more likely to receive high SS during the postnatal period without any significant difference compared to the intervention site (57% vs 58%; p<0.67) (Table 16).

During the pregnancy period, mothers and husbands are the main people from the social network who provide the highest levels of SS, and the mother-in law, father-in-law, and friends provide the lowest levels of SS. Looking at each element of SS, mothers’ highest contribution is in emotional support (84% vs 87%; p<0.03), household chores (70% vs 73%; p<0.15), and day-to-day work (70% vs 73%; p<0.21); the mother-in-law’s highest contribution is in emotional support (59% vs 67%; p<0.001), cooking (44% vs 42%; p<0.32), and day-to-day work (44% vs 42%; p<0.32); the husband’s highest contribution is in emotional support (95% vs 96%; p<0.04), monetary support (88% vs 88%; p<0.74)), and access to health care (81% vs 83%; p<0.09); the father-in-law’s highest contribution is in emotional support (59% vs 70%; p<0.001), monetary support (44% vs 43%; p<0.93), access to health care (24% vs 38%; p<0.001); and friends’ highest contribution is in emotional support (11% vs 21%; p<0.001), access to health care (5% vs 14%; p<0.001), and household chores (4% vs 7%; p<0.02) in the intervention and control sites, respectively. While emotional support is common and the highest form of support from all social network members except friends, FTMs in the control site are significantly more likely to get emotional support from everybody (Appendix A, Table A1). The lowest form of SS received from mother (34% vs 30%; p<0.04) and mother-in-law (15% vs 11%; p<0.001) was related to arranging transportation in the intervention and control sites respectively; from husband (37% vs 42%; p<0.01) and father-in-law (2% vs 2%; p<0.25) in cooking; and from friends in bringing medicine (1% vs 2%; p<0.09) in the intervention and control site, respectively. During delivery and the PNC periods, almost similar patterns of SS from social network members are seen in the intervention and control sites with varying ranges (Appendix A, Table A2 and Table A3).

Findings from FGDs and IDIs showed that social support during pregnancy, delivery, and the postnatal period has been well received by FTMs and aligned with the quantitative findings. FTMs reported husbands to be helpful and supportive in accompanying them to the hospital, helping with household chores, taking care of the pregnant mother’s nutrition, and providing emotional support.

Mothers and mothers-in-law play major roles in providing support during postdelivery, through guidance and taking care of newborns. Grandmothers also came in the picture for SS during the pregnancy continuum.

A contrasting picture was also found in terms of SS during the pregnancy continuum. An FTM in an IDI shared her loneliness and lack of support from her husband and in-laws. She said, “No. I didn’t get as much as I needed. I didn’t get any support or help from my husband and in-laws. I would have to do a lot of heavy work. I used to do it even if I could not. I went to my father’s house during the six months of the pregnancy.

Then they helped me. In the first six months I was alone. I was very tense mentally. I didn't feel well. I cooked but I couldn't eat. They did not understand many things. They did not understand that I could not do work. They imposed a lot of work on me. I also didn't say anything. I remained silent. That's why I was emotionally broken. If I said that to my husband, he could not have said anything to his parents. Because he was afraid of them. He used to scold me. That's it. My husband used to go out in the morning and returned home at 11 p.m. or 12 a.m. I would have lived alone at home then also had to send food to that home [nearby in-law's house] after cooking.... I needed to walk outside then [during pregnancy]. But no one took me outside. I was imprisoned at home alone. I didn't get any type of care then."

While SS is well received by most of the FTMs from their social network during pregnancy, delivery, and the postpartum period, there are nuances of complexity of relationship and support from in-laws that prevail in the society, particularly during the postpartum period. A few FTMs in the FGDs and IDIs reported that mother-in-law support is invested in the newborn (as it is their heir) and support for them (new mothers) is not a priority for the in-laws and they are therefore neglected. In this context, husbands are the most obedient sons of their parents. FTMs shared the contrasting picture of social support if a new mother is in her parents' house as opposed to an in-law's house. An FTM in an FGD mentioned, "We need to have more of the role of husbands. Whatever the husband says, the husband's family will also listen to him. Husband's family will not listen to us." ... "If the husband is by the side of the wife, then the support of the in-laws is more available. If the husband is not with the wife, then the support of the in-laws is not available." Another FTM mentioned in an FGD that "There are many parents-in-law who send their daughter-in-law to her father's house during the seventh or eighth months of pregnancy. All the danger and pressure are put on pregnant women's mothers and parents. There are also many parents-in-law and husbands who take care of the daughter-in-law." Furthermore, another FTM mentioned in an FGD that "Yes, the mother-in-law wants to take good care of the offspring of their son...but you know, the people of the in-law's house do not help in many cases...We can't sit idle at the in-laws' house. I mean, even if a task is heavy, we must do it. However, no one says anything even if we don't do anything at our parent's house. It does not matter, if you do or if you don't. If we are with our mother, she does everything for us, we don't have to do anything." Yet, another FTM in and FGD mentioned "When the post-delivery bleeding happens to us after we have a baby, these are cleaned by the mother...The mother-in-law doesn't even touch that. The perception is the grandchild is ours, it's okay. But why would we do this to another's daughter?! On the other hand, mother thinks that she is my own daughter, and she feels and does for us. Mother doesn't think anything. She washes these."

Based on information from FGDs and IDIs, home delivery is a decision made by the mother-in-law and not a choice. Traditional beliefs and norms for delivery and PNC are still prevalent in the peri-urban areas. The dominant roles of in-laws' family members also affect the PNC from the facility. An FTM in an FGD mentioned, "As my mother-in-law's baby was delivered at home, she said my delivery would also be at home. Their idea is, if their baby delivery can be at home, why can't we? Our baby delivery must also be at home." A mother-to-be FGD participant mentioned, "There are many women when they say that they are feeling pain, but their mother-in-law doesn't allow her to go to hospital. She [mother-in-law] says that it will be okay. They say that women in the past got well by eating different leaves as medicine. But the days are changing over time....Family support is important. But they say that these are nothing."

An FTM in an IDI mentioned, "My mother-in-law took care of my baby. I could not take care of baby due to stitches in my belly. I just breastfed my child until the stitches were removed. I also changed the wet and urinated quilt of the baby. My mother-in-law used to wash the quilts."

Another FTM in an IDI mentioned, "I take care of her (newborn), but her grandmother also takes care of her a lot. She told me not to breastfeed lying down. I should breastfeed by sitting. Breastfeeding should be every two hours even if she sleeps. I didn't let her [newborn] sweat and dried her neck by air. I used to massage oil three times a day. Mother-in-law also used to do this."

Table 17: Couple communication and decision-making among all surveyed FTMs

Elements	Intervention N (%)	Control N (%)	Total N (%)	Difference (P-value)
1. Spent time together with husband	1089 (99.0)	1087 (98.8)	2176 (98.9)	0.92
2. Discussed about child health with husband	1057 (96.1)	1058 (96.2)	2115 (96.1)	0.91
3. Discussed on RH (ANC, delivery, PNC) issues with husband	874 (79.4)	869 (79.0)	1743 (79.2)	0.85
4. Discussed on FP with husband	955 (86.8)	1004 (91.3)	1959 (89.0)	<0.001***
5. Feared disagreeing with husband	346 (31.4)	230 (20.9)	576 (26.2)	<0.001***
6. Told husband when you disagree	791 (71.9)	862 (78.4)	1653 (75.1)	<0.001***
7. Criticized husband when there is an issue	506 (46.0)	403 (36.6)	909 (41.3	<0.001***
8. Husband criticized you when there is an issue	477 (43.4)	377 (34.3)	854 (38.8)	<0.001***
9. Shouted/talked loudly with husband	528 (48.0)	499 (45.4)	1027 (46.7)	0.22
10. Husband shouted/talked loudly with you	550 (50.0)	480 (43.6)	1030 (46.8)	<0.01**
11. Husband admired you when there was good work	1017 (92.4)	1030 (93.6)	2047 (93.0)	0.17
12. You admired your husband when there was good work	1045 (95.0)	1054 (95.8)	2099 (95.4)	0.35
13. Discussed with husband where to go in case of health emergencies	826 (75.1)	824 (74.9)	1650 (75.0)	0.92
14. Discussed with husband which doctor should be visited	843 (76.6)	888 (80.7)	1731 (78.7)	<0.01**
Composite score of couple communication				
Low	435 (39.5)	475 (43.2)	910 (42.0)	0.08
High	665 (60.4)	625 (56.8)	1290 (58.0)	
Decision-making on which doctor should be visited in case of health emergencies				
Self	48 (4.4)	27 (2.5)	75 (3.4)	<0.001*** Ω
Husband	268 (24.4)	302 (27.5)	570 (25.9)	
Jointly (husband and wife)	581 (52.8)	544 (49.5)	1125 (51.1)	
Parents/in-laws	142 (12.9)	187 (17.0)	329 (15.0)	
Other relatives (sister, brothers-in-law, and others)	50 (4.5)	27 (2.5)	77(3.5)	
Not sure	11 (1.0)	13 (1.2)	25 (1.1)	
N	**1100**	**1100**	**2200**	

P-value generated using Chi-square test, *p<0.05, **p<0.01, ***p<0.001 ΩLoss of independence if separate p-values are provided

Table 17 shows that among the 14 couple communication elements, some elements are discussed significantly more in the intervention site, and some are in the control site. For example, FTMs are significantly more likely to discuss FP in the control site compared to the intervention site (87% vs 91%) (p<0.001), indicating that FTMs in the control site are more likely to discuss FP with their spouses compared to the intervention site. Similarly, significantly more husbands are likely to shout at their spouse in the intervention site compared to the control site (50% vs 44%) (p<0.01). Discussion on individual elements ranges from 31%–99% vs 21%–99% in the intervention and control sites, respectively. However, couple communication composite scores indicate that higher levels of couple communication are likely to occur in the intervention site compared to the control site (60% vs 57%) with no significant difference between the two sites (p<0.08) (Table 17).

The decision-making ability of the FTMs was analyzed regarding which doctor should be visited in case of health emergencies. Table 17 shows that 53% and 49% of FTMs in the intervention and control sites, respectively, reported they make joint decisions on which doctor should be visited in case of health emergencies. Only about 4% and 2% of FTMs in the intervention and control sites can make decisions by themselves on which doctor should be visited in case of health emergencies (Table 17).

FGD and IDI findings exhibit husband's involvement throughout the pregnancy continuum and in contraception use. The role of extended family members and in-laws has been found to be quite vital as well in providing support and in decision-making. A first-time father mentioned, "We discussed where it is better to do the delivery. We wanted to do a normal delivery. In many cases, it has been seen that in the case of the

first child, people do normal delivery in the home with the assistance of the midwife. But I do not want to do that [home delivery]. I totally want to take my wife to the hospital for delivery." Another first-time father mentioned, "I forbid her from carrying heavy things. Keep an eye on whether there is ever a problem. Then, I try to keep her from catching a cold…There are so many things like this, such as taking her to the BRAC for health care and bringing her back on a regular basis. …It has been discussed with her that we will deliver the baby at home. And if any problem, there is a hospital also where we will go for emergency. I accompanied her [wife] during checkup. Most of the time my mother and aunt have gone, I may have gone twice… Both of us take the decision. But our family rule is to talk to adults. Everything must be decided with understanding. I have a mother and father. Whatever decision we make we consult with them. We came home and discussed how was ultrasound report. Alhamdulillah the report is good. These are the things we talked about generally after returning from facility."

On the other hand, an FTM mentioned, "My husband behaved rough with me. He said that his parents will take all the decisions about medical care and my baby. He cannot take any decision…His parents will take all the decisions regarding medical like admitting in medical, necessary things required in the medical, etc. I got hurt with this. I also got hurt by the attitudes of his parents." A mother-in-law mentioned in an FGD, "Yes, it's been three months since my younger daughter gave birth to her child. I asked her whether her menstruation started again or not and told her to use an implant to control birth if her menstruation starts. Taking pill hampers the production of breast milk, so I advised her to use implant, and also told her not to be engaged in sexual activity before taking the implant."

4. Discussion on Key Findings

This survey was conducted with first-time mothers aged 15–24 years who gave birth between November 1, 2020 and October 31, 2021 in intervention and control sites and where BRAC is providing healthcare services. The survey collected several sociodemographic indicators (age, schooling, age at marriage, region, profession, household expenditure, and wealth index) from FTMs (15–24 years and within 12 months postpartum) in the intervention and control sites and found that results are comparable across the two groups, except for age at marriage, monthly household expenditure, and wealth index. Findings show that FTMs in the control sites have a significantly lower wealth index compared to FTMs in the intervention sites ($p<0.001$), and FTMs are significantly more likely to be married before 18 years in control sites compared to intervention site ($p<0.02$). The wealth difference between FTMs in the intervention and control site may be due to the urbanization patterns followed for decades between these two sites. Since 1983, Tongi and Morkun were part of a Pourashaba (urbanized) while Board Bazar and Chourasta were part of a Union Parishad (rural). A Pourashaba is an urban administrative unit while a Union Parishad is a rural administrative unit, and economic development happened to be dissimilar between these two settings, which might have an impact on the wealth index. However, recently both sites have joined the Gazipur City Corporation and economic development is moving forward at the same pace. [16] These differences may not affect our interpretation of the findings in terms of knowledge and use of services, as well as social support and partner communication, as we will be using difference-in-difference (DiD) at the endline analysis. The approach will aim to remove biases in post-intervention period comparisons between the intervention and control groups that could be the result from permanent differences between those groups, as well as biases from comparisons over time in the intervention group that could be the result of trends due to other causes of the outcome.

Danger signs throughout the pregnancy continuum are warning signs that women encounter during pregnancy, childbirth, and the postpartum period. It is important that pregnant women and healthcare providers know these warning signs and can rule out impending serious complications and initiate immediate treatment. FTMs' awareness of danger signs during pregnancy, delivery, and the postnatal period was collected and analyzed. In all three stages of the pregnancy continuum, knowledge is comparable between the intervention and the control sites, but all FTMs surveyed have extremely limited knowledge of any of the three danger signs. However, knowledge on at least one danger sign was much better in the intervention and control sites, and comparable between the two sites. For example, only 4% of FTMs (4% vs 3% of FTMs in the intervention and control sites, respectively; $p<0.07$) knew at least three of the danger signs during pregnancy, 18% of FTMs (18% vs 17% of FTMs in intervention and control sites, respectively; $p<0.62$) knew at least three of the danger signs during labor and childbirth, and 5% of FTMs (5% of FTMs in both the intervention and control sites, $p<0.92$) knew at least three of the danger signs during the postpartum period. Danger sign awareness during pregnancy, delivery. and the postnatal period does not significantly vary between the intervention and control sites. Unfortunately, there are no national-level statistics to compare with these findings. About 25% to 40% of the FTMs in both the intervention and control sites do not know any of the danger signs during pregnancy, delivery, and the postnatal period (27%, 22%, 38%, respectively). Further analysis showed that a higher education level influences the knowledge of FTMs on any of the danger signs during pregnancy, labor, and childbirth, and the post-natal period in both the intervention and control sites (table not shown). A similar knowledge gap was also found on warning signs of newborn complications. While awareness of three of the danger signs during pregnancy is low in our study, a study conducted in a PHC center in India showed that all 210 ANC women interviewed in the study knew at least three danger signs: bleeding by vagina, loss of consciousness, and convulsions. [17] These findings indicate strong efforts need to be made to improve knowledge of FTMs on danger signs during pregnancy, delivery, and the postnatal period and to provide quality information.

FP helps protect women from any health risks that may occur before, during, or after childbirth including high blood pressure, gestational diabetes, infections, miscarriage, and stillbirth, as well as time the spacing of pregnancy to achieve women's reproductive goals. Women's knowledge of the name of FP methods was not collected in the previous three BDHSs except for the 2007 BDHS. [18] Our survey findings on knowledge on the name of any FP method is consistent with the 2007 BDHS, and the knowledge is widespread in both the intervention and control sites. We expect that this knowledge will be further increased due to the socioeconomic improvements of the country. While all of the FTMs knew the name of at least one FP method, 45% knew at least one of the modern methods in both the intervention and control sites (41% vs 46%; $p<0.04$). Few women were able to state three of the modern methods of FP in both the intervention and control sites (11% vs 10%, respectively; $p<0.16$). Similarly, around 20% of FTMs in both the intervention and control sites did not know about PPFP and therefore are likely not using any PPFP. However, partner communication on the use of FP to avoid or delay pregnancy is higher among all FTMs surveyed compared to the national level (88% vs 76%, respectively). [5]

Qualitative data reveal a common perception among new parents of not requiring any contraceptive method until menstruation returns for mother after childbirth or the woman is amenorrheic, which might have influenced their decisions not to use PPFP. Perceptions of low pregnancy risk due to breastfeeding and postpartum amenorrhea were commonly associated with lack of contraceptive use and use of male condoms,

withdrawal, and abstinence. This finding is supported by a systematic review and meta-analysis of postpartum contraceptive use among women in LMICs for the first 12 months. [19] This study showed that there is substantial variation in the modern contraceptive use rate (mCPR) during the first 12 months postpartum among regions. In South Asia/Southeast Asia mCPR ranged from 4.0% in Pakistan to 65.6% in India, while in East Africa it varied from 10.3% in Ethiopia to 73.7% in Uganda. [19] Secondary analysis of postpartum women aged 15–49 years in 22 DHS surveys from 21 LMICs conducted between 2005 and 2012 showed that 61% of all postpartum women across the 21 countries have an unmet need for family planning. [20] Our study findings showed that 68% and 70% of FTMs in the intervention and control sites used modern contraceptive in the first six-month postpartum period, predominately the pill 47%, condom 14%, and injectables 8%, with no significant difference between the two sites ($p<0.63$). In a secondary analysis of BDHS 17–18, data revealed that among women who were below 24 years of age and had their first child aged six months or less, 74% used modern contraceptives. Poor knowledge on modern methods and PPFP as well as their use are a signal to program implementers that the FTMs need to be made aware of the modern contraceptive methods and PPFP, particularly long-acting and reversible methods. Tailored counseling approaches may help overcome misconceptions and meet heterogeneous needs for PPFP.

While it is encouraging to note that 77% and 82% of FTMs in the intervention and control sites, respectively, have heard about BRAC Maternity Center (BMC) ($p<0.001$), there is scope for improvement. Qualitative findings also revealed that awareness on BMC is widespread. While FTMs in the control site are more likely to hear about BMC, significantly more FTMs in the intervention site (47% vs 39%) used services from BMC ($p<0.001$). The reason for more awareness about the BMC in the control site may be the result of more general community education sessions held in the control site as a part of their ongoing project compared to the intervention site. The use of increased services from the intervention site may be because of increased age at marriage, which might help improve awareness on the danger signs during the pregnancy continuum leading to service utilization, and higher socioeconomic conditions.

High-quality ANC, delivery, and PNC can reduce maternal and neonatal morbidity and mortality and stillbirths through prevention, as well as early identification and management of pregnancy complications or pre-existing conditions. [21] More than half of the FTMs received high-quality last ANC and PNC services from the BMC with no significant difference between the intervention and control sites (ANC, $p<0.17$ and PNC, $p<0.79$). However, FTMs who received 4+ ANC visits with all tracer elements (BP checked, weight taken, blood grouping; urine checked for albumin, and counseled on danger signs) from the doctor and midwives in the intervention and control sites are quite low at 18% and 20%. respectively, with no significant difference between the two sites ($p<0.66$). The finding for 4+ ANC with all tracer elements is consistent with the national figure (18%). [5] Our findings showed that if quality of care is ensured during the last ANC visit, FTMs are 1.6 and 2.3 times more likely to know at least three of the danger signs during pregnancy, compared to FTMs who received low-quality last ANC services in the intervention and control sites, respectively (Table 5). Of those who have delivered at BMCs, the quality of delivery care was high in both the intervention and control sites (84% vs 74%) with no significant difference between the two sites ($p<0.11$), although there is room for improvement. At the national level 53% of women's babies were delivered by a medically trained provider and 52% of women had a postnatal check from a medically trained provider during the first two days after birth. [5] All of the above findings indicate that there is enough breadth to improve the quality of ANC, ensuring all tracer elements, and the quality of delivery and PNC services,

which will have an impact on the FTMs' knowledge, practices, and well-being.

Digging into the qualitative findings revealed that there are places or issues implementers must work on, particularly on PNC, because first-time parents showed that visiting the facility for PNC is not commonly practiced unless there is a C-section and removal of stitches is required. It was commonly perceived that a PNC visit is required only if women suffer from any problem, otherwise it is not required. In addition, it is evident from the voices of the respondents that after the birth of the baby, mothers' needs are no longer given priority and the social support network is busy with the newborn. It is interesting to note that among those who give birth at BMC, 44% and 26% of FTMs in the intervention and control sites, respectively, were visited by a BRAC fieldworker during the postnatal period, while only 20% women at the national level were visited by a fieldworker in the last six months. [5]

Respectful maternity care (RMC) is an approach centered on an individual, based on principles of ethics and respect for human rights, and promotes practices that recognize women's preferences and women's and newborns' needs. [22, 23] Studies have shown that many women across the globe experience disrespectful and abusive treatment in institutions during labor and childbirth, which forms an important barrier to improving skilled care utilization and improving maternal health outcomes. [22, 24, 25, 23] There are no consensus lists of components of RMC, but our study considered 11 components of RMC among those who received services from BMC (please see Table 14). Our study findings show that around 60% and 71% of FTMs in the intervention and control sites, respectively, received high RMC during ANC ($p<0.05$), and 65% and 63% of FTMs in the intervention and control sites, respectively, received high RMC during PNC ($p<0.77$), which is higher than a study finding conducted in facility settings on respectful maternity care in Ethiopia (36%). [26, 23] RMC is a human rights issue, and it is expected that each RMC component be practiced by the service providers and facility staff. Although in more than 60% of cases RMC is practiced during ANC and PNC, nevertheless, the expectation is more than these figures, hence, health facilities and all other stakeholders should place due emphasis on creating awareness among the healthcare providers on the standards and categories of RMC, and emphatically consider those identified factors for intervention [23, 26]. While respectful behavior and a positive service experience from BMCs has been reported by the informants in the qualitative survey, the cost of services and waiting time likewise do not seem to be major factors for service users. FTMs value the visits service providers made at their home, availability of female service providers as well as the environment of the BMC facility. In a few cases, crowdedness and privacy concerned some of FTMs.

Professional skilled care is important for all women and newborns during labor, childbirth, and the first day after delivery. The first 48 hours after birth is a critical window of time for the survival of both mothers and their newborns, as well as to avert long-term complications. It is important that the temperature be checked, women be examined for any breast and vaginal discharge, and be counselled on danger signs. The percentage of FTMs who received at least one PNC within two days of deliveries from intervention and control sites (75% vs 88%, average 81%; $p<0.07$) is much higher than the national urban level (66%). [5] These findings need to be read with caution as the sample size was small, and the possibility of counting the visit after delivery at the BMC may reflect NGO efforts to bring FTMs to receive ANC and PNC, as well as the progressive reduction in home visitation of government fieldworkers. BDHS 2017 shows that only 20% of currently married women reported a visit by a fieldworker in the past six months, which is the same proportion as in 2014. [5] However, in all surveyed FTMs, the percentage is equal to the national urban level (65% vs 66%) (BDHS 2020), and there is

no significant difference between intervention and control sites (64% vs 66%; p<0.42).

ENC is a comprehensive strategy designed to improve the health of newborns through interventions before conception, during pregnancy, at and soon after birth, and in the postnatal period. The seven elements of ENC immediately after birth are: immediate and thorough drying (within five minutes) to keep the baby warm and for additional stimulation, skin-to-skin contact with the mother, assessment of breathing, delayed cord clamping (1–3 minutes of births) (using clean instruments to cut the umbilical cord, apply 7.1% chlorhexidine), early initiation of breastfeeding within one hour of delivery, keeping the body warm, and delaying bathing until 72 hours after birth. [27, 28, 5] For the study purpose we considered two components, 7.1% chlorhexidine and initiated breastfeeding within one hour of birth, for the analysis. Chlorhexidine di-gluconate (gel or solution, 7.1%) is a lifesaving commodity which, when properly applied to a newborn's umbilical cord, can significantly reduce neonatal infection–induced morbidity and mortality. Chlorhexidine for umbilical cord care was introduced in Bangladesh after a decade of clinical trials, implementation studies, and revisions to the ENC guidelines (2017) to include a single application of 7.1% chlorhexidine di-gluconate solution in the first 24 hours after birth. [29] Among all of the FTMs surveyed, a significantly higher percentage of infants in the intervention site (51%) received 7.1% CHX to their cords and more FTMs initiated breastfeeding within one hour of birth compared to control site (44%) (p<0.001). Additionally, 55% vs 50% of FTMs in intervention and control sites, respectively, exclusively breastfeed and the difference is significant (p<0.03).

Among the BRAC beneficiaries, 82% and 74% FTMs in the intervention and control sites, respectively, reported both application of 7.1% CHX to their baby's cords and initiating breastfeeding within one hour of birth, with no significance difference between the two sites (p<0.20). Findings from BRAC beneficiaries need to be read with caution as the level of use is extremely high compared to the national level (9%) [5] and the number of samples from BRAC was small (n=188). Differences between the national level and our findings may be due to the time gap between when the BDHS survey was conducted and the time of the HWHF project, which is about six to seven years. BDHS collects data from the preceding three years. Anecdotal evidence suggests that over the years, the use of 7.1% CHX and breastfeeding practices may have been improved. In the noninstitutional environment at the national level, breastfeeding initiated within one hour of birth is 67% [5]; this figure is higher in our surveyed population (78%). This difference may be due to the urban vs rural setting which is not available from the national level data. [5] A higher percentage of infants who are BRAC beneficiaries were exclusively breastfed (54%) compared to all FTMs in the surveyed population (52%). There was no significant difference in the intervention and control sites among infants who exclusively breastfed under six months (p<0.65) (Table 13). Qualitative findings suggest many challenges women face for exclusively breastfeeding, including: not producing enough milk and the perception of milk drying up due to medicine taken after a C-section were common issues. A few respondents noted the positive influence of supplemental food, liquid, and vegetables on breastfeeding.

Pregnancy, delivery, and the postpartum period are important but emotionally sensitive times for most women, and are also accompanied by physical, mental health, role, and lifestyle changes. [30, 31] These changes during pregnancy, delivery, and the postpartum period may be exacerbated by financial problems, relationship issues, and lack of social support. [32, 33, 34] Thus, to tackle these challenges the need for social support during pregnancy and the postpartum period is vital. [35] Social support is defined as the provision of emotional (e.g., caring), or informational (e.g., providing

important information), instrumental (e.g., helping with housekeeping), tangible (e.g., practical support like financial aid), and/or psychological support for somebody by the social network of family members, friends, and community members. [36] The vast bulk of research examined the relationship between social support and pregnancy outcomes over the past 30 years. [37] Providing strong social support improves emotional and physical well-being [38], strengthens social relationships, promotes health [39], and enhances the ability of pregnant women to cope with stress. [40, 41] Also, social support can reduce functional impairment among individuals with depressive symptoms and increase the likelihood of recovery, thereby improving the overall quality of life. [42, 43] Furthermore, social support can improve self-confidence, increase resistance to infections, and contribute to a healthier lifestyle. [44, 45]

The current study did not examine the outcomes of SS during pregnancy, delivery, and the postnatal period other than list the types of SS received and from whom during the pregnancy continuum. We included in our study assistance during day-to-day work, cooking, household chores, access to health care, accompaniment to hospital, financial support, bringing medicine, arranging transportation, and emotional support as SS during pregnancy, delivery, and the postnatal period, and the social network members included mother, mother-in law, husband, father-in-law, and friend from where these supports could come. A high level of SS was deemed when the composite score surpassed the median score. A mixture of any or all SS was received from social networks and on many occasions by FTMs during pregnancy, delivery, and the postnatal period reported from the intervention and control sites, however, there are significant differences between the intervention and control sites regarding receiving any or all SS. Overall, more than 50% of the FTMs received a high level of SS from social networks in the intervention and control sites during pregnancy, delivery, and the postnatal period and the difference between the intervention and control sites is not significant except during pregnancy ($p<0.03$). In the control sites, FTMs are significantly more likely to receive high SS from social networks during pregnancy compared to the intervention sites (56% vs 51%; $p<0.03$). This could be due to the demographic nature of the control sites where more people are local or homegrown compared to the intervention sites. As a result, populations in the intervention sites lack populations around them to support them during the pregnancy continuum.

Further analysis shows that during the ANC period, mother and husband are the main people from the social network who provide the highest levels of SS, and friends and father-in-law are the lowest contributors. While providing emotional support is common and highest from all social network members, interestingly FTMs are more likely to get emotional support in the control site. The lowest levels of SS received from mother and mother-in-law are in the categories of arranging transportation, from husband and father-in-law in cooking, and from friends in bringing medicine in the intervention and control sites, respectively. During delivery and the postnatal period, similar patterns of SS from social network members are reported in the intervention and control sites, with a mix and a range of variations. All of these findings follow the societal norms, beliefs, and traditions of Bangladesh and the intervention and control sites do not diverge in these domains.

While quantitative findings showed that over 50% of FTMs received SS, many FTMs are not receiving enough support from the social network and our qualitative findings revealed nuances of various issues. Mothers and mothers-in-law play major roles in providing support during the postdelivery period, through guidance and taking care of newborns' grandmothers also came into the picture for SS. A few FTMs reported that

mothers-in-law invested support in the newborn (as their heir) but that support for them (new mothers) was not a priority for the in-laws, and that they a neglected. FTMs shared the contrasting picture of welcoming social support if a new mother is in her parents' house as opposed to her in-law's house.

The qualitative data reveals the major roles that in-laws play in terms of decision-making regarding the delivery place and PNC checkup. Home delivery is not a choice by the mother-to-be; rather it is a decision jointly taken by family members and particularly by the in-laws in many cases. Traditional beliefs and norms for delivery place and PNC checkup still exist in the peri-urban areas. In-laws think there is no need for facility delivery as they had not needed that, and likewise with PNC checkups unless there is a problem. The dominant roles of in-laws' family members also affect the likelihood of PNC checkups from a facility.

Unexpected and often life-threatening events might occur at any stage of pregnancy, during the antepartum, intrapartum, and postpartum periods. Most maternal deaths are preventable with appropriate management and care with the assistance of a skilled birth attendant. [46, 47] Birth preparedness is a strategy to make prompt decisions to seek care from skilled birth attendants, resulting in reduced maternal and neonatal mortalities. Among all FTMs surveyed in our study, 22% of FTMs in both the intervention and control sites completed all four birth preparedness elements (select a delivery place, save money for delivery, arrange blood donor, and identify mode of transportation) whereas those in the intervention site are significantly more likely to arrange for a blood donor compared to those in the control sites (45% vs 40%, $p<0.01$). The observed birth preparedness in our study is much lower than shown in a study conducted in Karnataka, India on birth preparedness and complication readiness (BPCR) (22% vs 81%). [48] This study also included one extra component—"identified a birth companion"—in addition to the other four components. Unfortunately, there is no study or national-level data in Bangladesh to compare. However, a wide range of BPCR (16.5%–81%) has been reported from many countries like India (34.5%–81%) [49, 48]; Nepal (32%–65%) [50, 51], Ethiopia (16.5%–29.9%) [52, 53], and Uganda (35%). [54] Relatively low birth preparedness in the present study could be due to low knowledge of danger signs, low service utilization, lower proportion of institutional deliveries in the study areas, low female empowerment, spouse's education and occupation, and methodological differences in assessing birth preparedness. However, our observed data show that FTMs in the control site are significantly more likely to have a birth plan during their first pregnancies compared to the intervention site (89% vs 84%, respectively; $p<0.003$) which may be due to the vast number of samples in both sites.

5. Conclusions and Recommendations

- FTMs' knowledge of danger signs during pregnancy, delivery, and the postnatal period; warning signs of neonatal complications, modern FP method use, and PPFP are low. PPFP use in the first six months postpartum, particularly long-acting and reversible methods, is low among the surveyed FTMs. Efforts are needed to increase awareness and improve knowledge on these issues through GANC-PNC, through educational materials, or other means particularly during ANC. Clear messages on danger signs, modern FP methods, and PPFP need to be developed and disseminated through educational sessions. We recommend that all of these messages be disseminated in the first ANC group session and repeated in every session. Tailored counseling approaches may help overcome misconceptions and meet heterogeneous needs for PPFP.

- Quality of care during the pregnancy continuum is not up to the mark except during delivery. There is scope to improve the quality of care on ANC, delivery, and PNC. To guarantee quality services, facilities should provide respectful maternity care, ensuring all components as well as five ANC tracer elements (BP checked, weight taken, blood grouping; urine checked for albumin, and counseling on danger signs). Rigorous training, refresher training, supportive supervision of the service providers, and implementing a checklist with quality elements may help the service providers remember the missing essential elements. The components of quality PNC services such as checked blood pressure and urine for albumin test need to be increased.
- About 65% of FTMs received respectful maternity care during each ANC and PNC visit, considering its 11 components. We recommend emphasizing the creation of awareness and skills of service providers on the standards and categories of RMC, improving service provider–client interactions, monitoring, and reinforcing accountability mechanisms for service providers to avoid mistreatment during the pregnancy continuum. Therefore, health institutions and all other stakeholders should give due emphasis to creating awareness and skills of service providers on the standards, protocols, and components of RMC, and emphatically consider those identified factors for intervention. This can be improved substantially through classroom training, role playing, and onsite training.
- The number of FTMs and infants who received three PNC checkups within 42 days of delivery from BMC is extremely low which indicates that special efforts and monitoring should be geared toward providers as well as in the community to educate FTMs about how to make use of the services.
- Four selected elements of birth preparedness are completed only by about 20% of FTMs indicating a need for awareness-raising on the issue among the FTMs and the community. The dissemination of these messages can be initiated from the first ANC session and repeated in every session.
- A higher proportion of infants (79%) who are BRAC beneficiaries received two components of ENC (7.1% chlorhexidine [CHX] applied to cord and initiated breastfeeding within one hour of birth) compared to all FTMs (47%) surveyed. Lifesaving practices of using 7.1% chlorhexidine and immediate breastfeeding practices (within one hour) should be encouraged among FTMs and the message need to be disseminated in the community through field-workers.
- Social support from social network members follows the general societal norms, beliefs, habits, and traditions of Bangladeshi culture, which need to be discussed repeatedly among the social network members, sensitized, and improved. This can be done by the service providers at the clinic while the network members accompany FTMs, or in the community while field-workers conduct the community sessions.
- While SS from the social network is well received by most of the FTMs during pregnancy, delivery, and the postpartum period, there are nuances of complexity of relationships and support that prevail in the society, particularly during postpartum period from in-laws. A few FTMs reported that mothers-in-law provide support for their babies (as their heir), but care for the FTMs is limited and often neglected. Therefore, we recommend that essential care for FTMs (postpartum) be prioritized along with the newborns. Husbands should play roles in creating an enabling environment among the in-laws' family members for emotional support as well as PNC checkups.

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Appendix A: Table on Social Support

Table A1: Social support during pregnancy by person and study sites

Social support in ANC	Mother			Mother-in-law			Husband			Father-in-law			Friends		
	Intervention n (%)	Control N (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value
Day-to-day work	775 (70.4)	801 (72.8)	0.21	481 (43.7)	458 (41.6)	0.32	657 (59.7)	739 (67.2)	<0.001***	69 (6.3)	72 (6.5)	0.79	48 (4.4)	60 (5.4)	0.23
Cooking	757 (68.8)	796 (72.4)	0.06	484 (44.0)	461 (41.9)	0.32	404 (36.7)	466 (42.4)	0.01**	23 (2.1)	16 (1.4)	0.25	41 (3.7)	60 (5.4)	0.05*
Household chores	773 (70.3)	893 (73.0)	0.15	482 (43.8)	463 (42.1)	0.41	687 (62.4)	727 (66.1)	0.07	50 (4.5)	59 (5.4)	0.37	45 (4.1)	78 (7.1)	0.02*
Access to health care	699 (63.5)	779 (70.8)	<0.001***	411 (37.4)	461 (41.9)	0.03*	888 (80.7)	918 (83.4)	0.09	264 (24.0)	420 (38.2)	<0.001***	58 (5.3)	158 (14.4)	<0.001***
Accompany to hospital	494 (44.9)	475 (43.2)	0.41	236 (21.4)	188 (17.1)	0.01**	724 (65.8)	697 (63.4)	0.22	127 (11.5)	107 (9.7	0.16	30 (2.7)	40 (3.6)	0.22
Financial support	561 (51.0)	429 (39.0)	<0.001***	223 (20.3)	168 (15.3)	0.002**	971 (88.3)	366 (87.8)	0.74	480 (43.6)	478 (43.4)	0.93	25 (2.3)	25 (2.3)	0.99
Bring medicine	452 (41.1)	354 (32.2)	<0.001***	168 (15.3)	122 (11.1)	0.004**	872 (79.3)	866 (78.7)	0.75	279 (25.4)	255 (23.2)	0.23	13 (1.2)	23 (2.1)	0.09
Arrange transportation	373 (33.9)	329 (29.9)	0.04	169 (15.4)	117 (10.6)	<0.001***	692 (62.9)	691 (62.8)	0.96	160 (14.5)	124 (11.3)	0.02*	14 (1.3)	30 (2.7)	0.01**
Emotional support	920 (83.6)	956 (86.9)	0.03*	649 (59.0)	738 (67.1)	<0.001***	1,043 (94.8)	1,062 (96.5)	0.04*	651 (59.2)	768 (69.8)	<0.001***	126 (11.4)	231 (21.0)	<0.001***
Composite SS Score															
Low	502 (45.6)	521 (47.4)	0.42	724 (65.8)	736 (66.9)	0.56	500 (45.4)	465 (42.3)	0.11	740 (67.3)	729 (66.3)	0.62	967 (87.9)	858 (78.0)	<0.001***
High	598 (54.4)	579 (52.6)		376 (34.2)	364 (33.1)		600 (54.5)	635 (57.7)		360 (32.7)	371 (33.7)		133 (12.1)	242 (22.0)	
N	1100	1100		1100	1100		1100	1100		1100	1100		1100	1100	

Table A2: Social support during delivery by person and study sites

Social support during delivery	Mother			Mother-in-law			Husband			Father-in-law			Friends		
	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value
Day-to-day work	682 (62.0)	617 (56.1)	0.01**	238 (21.6)	203 (18.4)	0.06	274 (22.4)	222 (20.2)	0.19	49 (4.4)	60 (5.4)	0.28	30 (2.7)	49 (4.4)	0.02*
Cooking	528 (48.0)	483(43.9)	0.05*	208 (18.9)	186 (16.9)	0.22	97 (8.8)	83 (7.5)	0.27	19 (1.7)	11 (1.0)	0.14	31 (2.8)	61 (5.5)	<0.001***
Household chores	612 (55.6)	563 (51.2)	0.03*	230 (20.9)	208 (18.9)	0.24	194 (17.6)	151 (13.7)	0.01**	38 (3.4)	39 (3.5)	0.90	35 (3.2)	70 (6.4)	<0.001***
Access to health care	751 (68.3)	771 (70.1)	0.35	322 (29.3)	385 (35.0)	0.01**	582 (52.9)	617 (56.1)	0.13	328 (29.8)	459 (41.7)	<0.001***	62 (5.6)	110 (10.0)	<0.001***
Accompany to hospital	560 (50.9)	500 (45.4)	0.01**	221 (20.1)	204 (18.5)	0.35	519 (47.2)	460 (41.8)	0.01**	300 (27.3)	324 (29.4)	0.25	48 (4.4)	42 (3.8)	0.51
Financial support	576 (52.4)	394 (35.8)	<0.001***	179 (16.3)	131 (11.9)	0.01**	811 (73.7)	782 (71.1)	0.16	501 (45.5)	536 (48.7)	0.13	18 (1.6)	38 (3.4)	0.01**
Bring medicine	432 (39.3)	245 (22.3)	<0.001***	114 (10.4)	66 (6.0)	<0.001***	644 (58.5)	576 (52.4)	0.01**	364 (33.1)	385 (35.0)	0.34	24 (2.2)	54 (4.9)	0.01**
Arrange transportation	262 (23.8)	176 (16.0)	<0.001***	80 (7.3)	51 (4.6)	0.01**	464 (42.2)	400 (36.4)	0.01**	242 (22.0)	255 (23.2)	0.50	21 (1.9)	24 (2.2)	0.65
Emotional support	930 (84.5)	921 (83.7)	0.59	554 (50.4)	603 (54.8)	0.03*	897 (81.5)	925 (84.1)	0.11	633 (57.5)	758 (68.9)	<0.001***	147 (13.4)	188 (17.1)	0.02*
Composite SS score															
Low	447 (40.6)	559 (50.8)	<0.001***	772 (70.2)	777(70.6)	0.82	494 (44.9)	539 (49.0)	0.06	777 (70.6)	716 (65.1)	0.01**	948 (86.2)	893 (81.2)	0.02**
High	563 (59.4)	541 (49.2)		328 (29.8)	323 (29.4)		606 (55.1)	561 (51.0)		323 (29.4)	384 (34.9)		152 (13.8)	207 (18.8)	
N	1100	1100		1100	1100		1100	1100		1100	1100		1100	1100	

Table A3: Social support during postnatal period by person and study sites

Social support during postnatal period	Mother			Mother-in-law			Husband			Father-in-law			Friends		
	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value	Intervention n n (%)	Control n (%)	p-value	Intervention n (%)	Control n (%)	p-value
Day-to-day work	889 (80.8)	880 (80.0)	0.62	374 (34.0)	349 (31.7)	0.25	393 (35.7)	420 (38.2)	0.23	68 (6.2)	93 (8.4)	0.04*	27 (2.4)	53 (4.8)	0.01**
Cooking	859 (78.1)	843 (76.6)	0.41	353 (32.1)	333 (30.3)	0.35	171 (15.5)	178 (16.2)	0.68	26 (2.4)	12 (1.1)	0.02*	26 (2.4)	55 (5.0)	0.01**
Household chores	886 (80.5)	880 (80.0)	0.74	370 (33.6)	353 (32.1)	0.44	371 (33.7)	410 (37.3)	0.08	61 (5.5)	67 (6.1)	0.58	28 (2.5)	64 (5.8)	0.02*
Access to health care	731 (66.4)	788 (71.6)	0.01**	307 (27.9)	399 (36.3)	<0.001***	623 (56.6)	736 (66.9)	<0.001***	249 (22.6)	430 (39.1)	<0.001***	25 (2.3)	71 (6.5)	0.03*
Accompany to hospital	293 (26.6)	238 (21.6)	0.01**	87 (7.9)	57 (5.2)	0.01**	323 (29.4)	235 (21.4)	<0.001***	84 (7.6)	75 (6.8)	0.45	9 (0.8)	7 (0.6)	0.61
Financial support	485 (44.1)	306 (27.8)	<0.001***	141 (12.8)	98 (8.9)	0.01**	831 (75.5)	819 (74.4)	0.55	431 (39.2)	446 (40.5)	0.51	11 (1.0)	19 (1.7)	0.14
Bringing medicine	362 (32.9)	238 (21.6)	<0.001***	99 (9.0)	57 (5.2)	<0.001***	656 (59.6)	642 (58.4)	0.54	300 (27.3)	301 (27.4)	0.96	10 (0.9)	21 (1.9)	0.04*
Arrange transportation	192 (17.4)	110 (10.0)	<0.001***	58 (5.3)	27 (2.4)	0.02*	314 (28.5)	254 (23.1)	0.01**	114 (10.4)	98 (8.9)	0.24	7 (0.6)	8 (0.7)	0.79
Emotional support	943 (85.7)	959 (87.2)	0.31	620 (56.4)	674 (61.3)	0.01**	949 (86.3)	1,019 (92.6)	<0.001***	634 (57.6)	774 (70.4)	<0.001***	69 (6.3)	149 (13.5)	<0.001***
Composite SS score															
Low	375 (34.1)	376 (34.2)	0.96	745 (67.7)	758 (68.9)	0.55	745 (43.2)	454 (41.3)	0.37	757 (68.8)	708 (64.4)	0.03*	1027 (93.4)	934 (84.9)	<0.001***
High	725 (65.9)	724 (65.8)		355 (32.3)	342 (31.1)		625 (56.8)	646 (58.7)		343 (31.2)	392 (35.6)		73 (6.6)	166 (15.1)	
N	1100	1100		1100	1100		1100	1100		1100	1100		1100	1100	

Appendix B: HWHF Project Result Indicators List and Baseline Values

1. Proportion of health workers providing quality ANC-PNC, delivery, and FP services (including respectful care) according to national guidelines. Will come from the supervision checklist.
2. Proportion of service providers providing group ANC reporting job satisfaction. Will come from a survey of service providers at endline only.

3. Proportion of FTMs who stated satisfaction with ANC-PNC and FP services (including respectful care) received*

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
ANC including respectful care				
FTMs stated satisfaction on ANC including respectful maternity care	111 (42.7)	115 (46.9)	226 (44.7)	0.34
n	**260**	**245**	**505**	
FTMs stated satisfaction on PNC including respectful maternity care	22 (40.0)	19 (37.2)	41 (38.7)	0.77
n	**55**	**51**	**106**	
FTMs stated satisfaction on FP including respectful FP services	8 (53.3)	3 (50.0)	11 (52.4)	0.89
n	**15**	**6**	**21**	

* Among only FTMs who have received services from BMC

4. Proportion of FTMs who received one and four or more ANC visits from BMC (medically trained providers)**

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs received at least one ANC visit from medically trained providers (BRAC doctor and midwives) from BMC with all tracer elements*	52 (20.0)	57 (23.3)	109 (21.6)	0.37
FTMs received 4+ ANC visit from medically trained providers (BRAC doctor and midwives) from BMC with all tracer elements*	47 (18.01)	48 (19.6)	95 (18.8)	0.66
n	**260**	**245**	**505**	

*Tracer elements include BP checked, weight taken, blood grouping; urine checked for albumin, and counseled on danger signs.** Among only FTMs who have received services from BMC

5. Proportion of FTMs who can identify at least three of the danger signs of pregnancy

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs who can tell at least three of the danger signs of pregnancy	49 (4.4)	33 (3.0)	82 (3.7)	0.07
N	**1100**	**1100**	**2200**	

*Danger signs: severe vaginal bleeding, convulsion, severe headache with blurred vision, high fever, prolonged labor

6. Proportion of FTMs who can identify at least two of the warning signs of newborn complications*

indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs who can tell at least two of the danger signs of newborn	182 (16.5)	227 (20.6)	409 (18.6)	<0.01
N	**1100**	**1100**	**2200**	

*Warning signs of newborn complications: breathing difficulty, irregular or fast breathing(>60 minute), convulsion, feeding poorly, umbilical redness, hypothermia, and lethargy

7. Proportion of infants who exclusively breastfeed

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Infants who exclusively breastfeed up to 6 months	601 (54.6)	549 (49.9)	1150 (52.3)	<0.03
N	1100	1100	2200	

8. Proportion of newborns who received at least two ENC components: 1. 7.1% CHX applied to cord and 2. Initiation of breastfeeding within 1 hour

Newborns who received two components of ENC	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
7.1% chlorhexidine (CHX) applied to cord	727 (66.1)	644 (58.5)	1371 (62.3)	<0.001
Initiated breastfeeding within 1 hour of birth	861 (78.3)	849 (77.2)	1710 (77.7)	0.65
Combined two components used	563 (51.2)	480 (43.6)	1043 (47.4)	<0.001
N	1100	1100	2200	

9. Proportion of newborns who received at least two ENC components: 1. 7.1% CHX applied to cord and 2. Initiation of breastfeeding within 1 hour

Newborns who received two components of ENC	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
7.1% chlorhexidine (CHX) applied to cord	727 (66.1)	644 (58.5)	1371 (62.3)	<0.001
Initiated breastfeeding within 1 hour of birth	861 (78.3)	849 (77.2)	1710 (77.7)	0.65
Combined two components used	563 (51.2)	480 (43.6)	1043 (47.4)	<0.001
N	1100	1100	2200	

10 Proportion of mothers and newborns who received at least one PNC within two days of delivery (from medically trained providers)

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
FTMs who received at least one PNC checkup within two days of delivery from any facility and medically trained providers	709 (64.4)	727 (66.1)	1436 (65.3)	0.42
Newborns who received at least one PNC checkup within two days of delivery from any facility and medically trained providers	675 (61.4)	703 (63.9)	1378 (62.6)	0.21
N	1100	1100	2200	

11. Proportion of first-time mothers who know modern FP methods

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
First–time mothers who know one of the modern FP methods	458 (41.6)	514 (46.7)	972 (44.2)	0.11
N	1100	1100	2200	

12. Proportion of first-time parents completing birth plans

Indicators	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Completed all four birth-plan components*	240 (21.8)	246 (22.4)	486 (22.1)	0.75
N	1100	1100	2200	

*Select a delivery place, save money for delivery, arrange blood donor, and identify mode of transportation

13. Proportion of first-time parents using any modern PPFP methods (6 months postpartum)*

Indicator	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Use any modern PPFP	268 (68.0)	230 (69.7)	498 (68.8)	0.63
n	880	911	1791	

*Number of samples is small due to survey skip logic

14. Proportion of women reporting couple communication and shared decision-making related to reproductive and child health

Elements	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
Reported couple communication*	665 (60.4)	625 (56.8)	1290 (58.0)	0.08
Shared decisionmaking in which doctor should be visited in case of emergencies				
Jointly (husband and wife)	581 (52.8)	544 (49.5)	1125 (51.1)	0.25
N	1100	1100	2200	

*Composite score of high couple communication

15. Proportion of women indicating that they had high social support§ during their pregnancy, delivery, and postpartum period

Adequate social supports (SS)# received from person₸ at ANC, delivery, and PNC	Intervention n (%)	Control n (%)	Total N (%)	Difference (P-value)
ANC	564 (51.3)	614 (55.8)	1178 (53.5)	0.03
Delivery	604 (54.9)	561 (51.0)	1165 (52.9)	0.06
PNC	629 (57.2)	639 (58.1)	1268 (57.6)	0.67
N	1100	1100	2200	

#Social support included assistance during day-to-day work, cooking, household chores, access to health care, accompaniment to hospital, financial support, bringing medicine, arranging transportation, and emotional support.
#Mother, mother-in-law, husband, father-in-law, and friends.
§High social support deemed when composite score goes beyond median score; below median score falls into inadequate social support.

16. Number of policy briefs shared with MOHFW and other partners for expansion. Not yet shared.

17. Number of technical briefs with lessons and recommendations shared globally through presentations at conferences and external communications. Not yet shared.

Appendix C: Final Analysis Plan

Results of this study are presented as frequencies and percentages in this report. Analysis was conducted using STATA 17. Bivariate analyses for nominal-level variables conducted by Chi-square test, and if sample size is less than five per cell, we have utilized Fisher's exact test. We have used the Cochran–Armitage test for the combination-of-variables nominal and ordinal measures. To find the difference between the averages we also used Student's t-test.

Using the principal component factor analysis, we calculated the wealth quintile with 12 components. The components include electricity, radio, television, mobile phone, refrigerator, solar power, lantern, almira/wardrobe, electric fan, water pump, computer/laptop, and toilet. We have also used Cronbach alpha to measure internal consistency among the elements.

We prepared composite scores for quality of ANC care; quality of delivery care; quality of PNC care; social support for ANC, delivery, and PNC; respectful maternity care; and couple communication. To calculate the composite indicator, initially we calculated a composite score using all selected dichotomous (yes=1, no=0) elements for each FTM, then determined the median value from the composite score. First, we calculated the composite score using a summation of the value of all selected elements, then we determined the median value from the composite score. Finally, the composite score of individual responses was divided into two categories: 0=low (score below median value) and 1=high (score equal to and greater than median value). The elements we included in each composite score are described below:

To calculate the composite score for quality of ANC care, we used 21 elements of quality care including respectful maternity care during ANC (respectful greetings, explanation given, consent taken, maintain privacy); history-taking and examination (common history-taking, measure BP, measure weight, conduct physical examination); lab test done (blood grouping and urine albumin); medication given: (iron and folic acid); counseling: (discussed four ANC visits, danger signs of pregnancy, birth preparedness, PPFP, and essential newborn care listed in Table 4). These elements are dichotomous variables (yes=1, no=0). Initially, we generated a composite score variable summing up all selected dichotomous elements for each FTM and then determined the median. The range of scores was 0–21 and the median value was 15. We categorized the quality of ANC scores into low and high. Low-quality ANC care was considered to be when the composite score was <15, and high quality of ANC care was considered to be when composite score was >=15.

To calculate the composite indicator for quality of delivery care, we used three elements of quality care including baby received first checkup within two days after delivery, FTMs received respect during delivery, and whether or not they faced any problems (provider provides less attention during delivery/postpartum), from three elements listed in Table 8. These quality elements are dichotomous variables (yes=1, no=0). Initially, we generated a composite score variable summing up all selected dichotomous elements for each FTM and then determined the median value. The range of scores was 0–3 and median value was 1. We categorized quality of delivery scores into low and high. Low quality of delivery care was considered to be when the composite score was <1 and high delivery quality of care was considered to be when

composite score >=1.

To calculate the composite indicator for quality of PNC care, we used 15 elements of quality care including weight check; checked BP; performed abdominal exam; checked anemia; checked urine for albumin; gave a chance to ask questions; counseled on danger signs, pre-eclampsia/eclampsia, how to take care of breast, perineum, exclusive breastfeeding, baby's immunization; PPFP; newborn care; and provided iron/folic acid as listed in Table 9. These elements are dichotomous variables (yes=1, no=0). Initially, we generated a composite score variable summing up all of the selected dichotomous elements for each FTM and then determined the median value. The range of scores was 0–15 and the median value was 7. We categorized quality of delivery scores into low and high. Low quality of PNC care was considered to be when the composite score was <7 and high quality of PNC care was considered to be when the composite score >=7.

To calculate the composite indicator for respectful maternity care during ANC and PNC, we used 11 elements of respectful maternity care including provider's greeting, warm welcoming, offering a seat, treating FTMs and their companions with compassion, maintaining confidentiality and dignity, listening carefully and responding, providing emotional support, communicating properly, asking purpose of visit, taking consent before physical exam, and maintaining privacy during service provision, as listed in Table 14. These elements are dichotomous variables (yes=1, no=0). Initially, we generated composite score variables for ANC and PNC summing up all selected dichotomous elements for each FTM and then determined the median values. The range of scores for both ANC and PNC was 0–11 and median value was 10. We categorized RMC scores for ANC and PNC into low and high. Low respectful maternity care was considered to be when the composite score was <10 and high RMC was considered to be when the composite score >=10.

To calculate the composite indicator for social support in ANC, we have used 15 elements including 1) household supports—assistance during day-to-day work, cooking, household chores; 2) healthcare support—access to health care, accompaniment to hospital, bringing medicine, arranging transportation; and 3) psychological support—emotional support and financial support; and multiplication of these elements by five social network members including mother, mother-in-law, husband, father-in-law, and friends, as listed in Table A1 (three elements by five persons). All of these elements are dichotomous variables (yes=1, no=0). Initially, we generated composite score variables for ANC by summing up all the selected dichotomous elements for each FTM and then determined the median value. The range of scores for ANC was 0–14 for household support, median 6; 0–14 for health care support, median 5; and 0–10 for psychological support, median 5. We categorized ANC SS scores for each component into low and high. Low SS for each component of ANC was considered to be when the composite score was less than the median value (6, 5, and 5) and high SS for each component of ANC was considered to be when the composite score was greater than the median value (6, 5, and 5).

To calculate the composite indicator for social support in delivery, we used 15 elements including 1) household supports—assistance during day-to-day work, cooking, household chores; 2) healthcare support—access to health care, accompaniment to hospital, bringing medicine, arranging transportation; and 3)

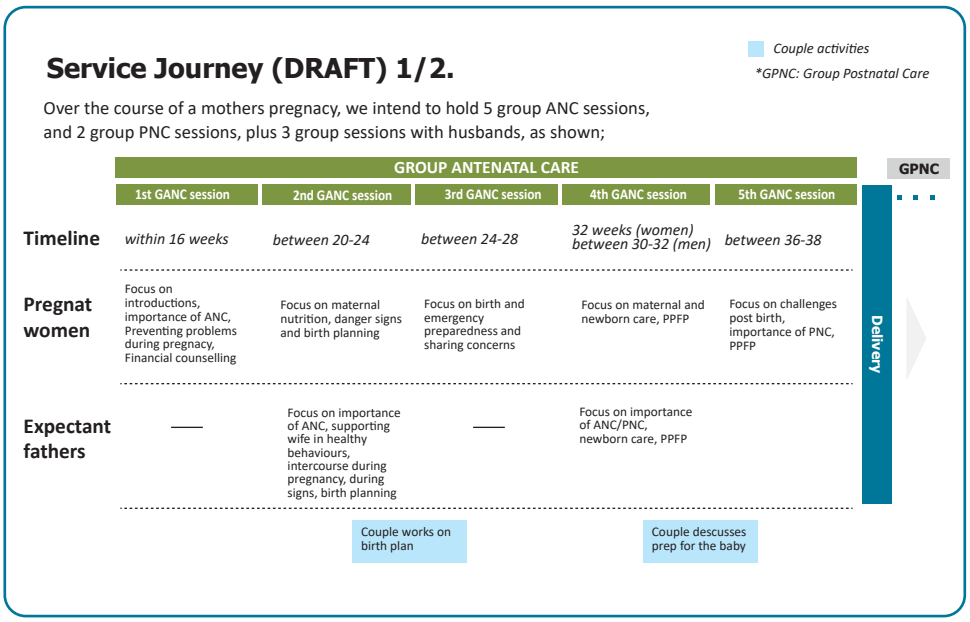
psychological support—emotional and financial support; and multiplication of these elements by five social network members including mother, mother-in-law, husband, father-in-law, and friends, as listed in Table A2 (three elements by five persons). All of these elements are dichotomous variables (yes=1, no=0). Initially, we generated composite score variables for delivery by summing up all the selected dichotomous elements for each FTM and then determined the median value. The range of scores for delivery was 0–12 for household support, median 4; 0–13 for healthcare support, median 5; and 0–10 for psychological support, median 5. We categorized delivery SS scores for each component into low and high. Low SS for each component of delivery was considered to be when the composite score was less than the median value (4, 5, and 5), and high SS for each component of delivery was considered to be when the composite score was greater than the median value (4, 5, and 5).

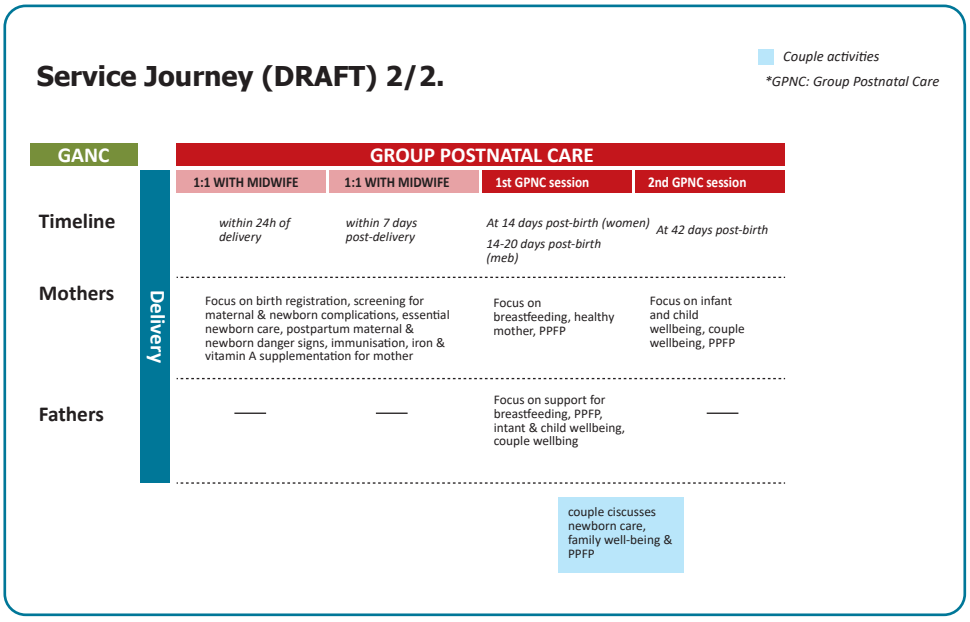
To calculate the composite indicator for social support in PNC, we used 10 elements including 1) household supports—assistance during day-to-day work, cooking, household chores; 2) healthcare support—access to health care; accompaniment to hospital; bringing medicine; arranging transportation; and 3) psychological support—emotional and financial support, and multiplication of these elements by five social network members including mother, mother-in-law, husband, father-in-law, and friends, as listed in Table A3 (three elements by five person). All of these elements are dichotomous variables (yes=1, no=0). Initially, we generated composite score variables for PNC by summing up all of the selected dichotomous elements for each FTM and then determined the median value. The range of scores for PNC was 0–12 for household support, median 4; 0–12 for healthcare support, median 3; and 0–10 for psychological support, median 5. We categorized PNC SS scores for each component into low and high. Low SS for each component of PNC was considered to be when the composite score was less than the median value (4, 3, and 5), and high SS for each component of PNC was considered to be when the composite score was greater than the median value (4, 3, and 5).

To calculate the composite indicator for couple communication, we used 15 couple-communication elements, including spent time together with husband; discussed on ANC, delivery, PNC, and FP; fear of disagreeing with husband; telling husband when disagree; criticizing husband when required; shouting with husband; husband shouting with her; husband admired her; she admired her husband; discussed where to go in case of health emergencies; and discussed which doctor should be visited, as listed in Table 17. All of these elements are dichotomous variables (yes=1, no=0). Initially, we generated composite score variables for couple communication by summing up all the selected dichotomous elements for each FTM and then determined the median value. The range of scores for couple communication was 0–13 and the median value was 9. We categorized the couple communication score into low and high. Low couple communication was considered to be when the composite score was <9, and high couple communication was considered to be when the composite score >=9.

We also used a multivariate logistic regression model to measure correlates of FTMs who received quality services in the last ANC with knowledge of FTMs on danger signs and warning signs of newborn complications. We also investigated a multivariate relationship for FTMs who received quality services in the last PNC, with a newborn who received a postnatal care checkup within two days of birth, whether FTMs had heard of PPFP, and knowledge on at least two breastfeeding practices.

Appendix D: GANC and GPNC





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