Maternal and child health handbook to improve continuum of maternal and child care in rural Bangladesh: Findings of a cluster randomized controlled trials

Ruoyan Gai Tobe[1], Syed Emdadul Haque [2], Sanzida Mubassara[3], Rushdana Rahman[4], Kiyoko Ikegami[5], and Rintaro Mori[6]

[1]National Institute of Population and Social Security Research
[2]Affiliation not available
[3]Jahangirnagar University Faculty of Biological Sciences
[4]Dhaka Medical College and Hospital
[5]School of Tropical Medicine and Global Health, Nagasaki University
[6]Kyoto University Graduate School of Medicine Faculty of Medicine

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Abstract

Objective: This study aimed to evaluate the effectiveness of maternal and child health handbook (MCH) enhanced by mobile tools and to generate evidence informing the adoption of the program in Bangladesh Design: Cluster randomized controlled trial Setting: Two Upazilas in Bangladesh Population or Sample: Pregnant women Methods: Unions of the study settings were randomly allocated in either one of three groups: (1) Intervention 1 using both mobile platform and MCH, (2) Intervention 2 using MCH alone, or (3) the Control. A total of 3,002 participants were recruited. The interventions were designed to promote two-way communications between pregnant women/their families and community health workers by an empowering approach. Main outcome measures: continuum of care (CoC), neonatal mortality and morbidities Results: The interventions both significantly improved the utilization of CoC, although the overall proportion of CoC was relevantly low: 2.79% in the Control (95% CI: 1.37-3.54%), 6.16% in Intervention 2 (95% CI: 4.67-7.86%), and 7.89% in Intervention 1 (95% CI: 6.29-9.90%). Neonatal mortality rate with and without CoC was 5.43 per 1,000 (95% CI: 3.63 - 9.57 per 1,000) and 34.8 per 1,000 (95% CI: 24.3 - 45.4 per 1,000), respectively. Conclusion: our study indicated the effectiveness of the interventions by leveraging MCH and a mobile platform to promote uptake of CoC throughout prepartum, intrapartum and postpartum/neonatal periods, potentially bringing long-lasting benefits to mothers and their offspring. The explicit approach is expected to guide policy makers to adopt MCH interventions in primary healthcare strengthening at the community level.

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Running title: Maternal and child health handbook in Bangladesh

Ruoyan Gai Tobe, Department of Social Security Empirical Research, National Institute of Population and Social Security Research, Japan

Department of Health Policy, National Center for Child Health and Development, Japan, gai-ruoyan@ipss.go.jp

Syed Emdadul Haque, UChicago Research Bangladesh (URB), Bangladesh, emdad91@gmail.com

Sanzida Mubassara, Department of Botany, Faculty of Biological Sciences, Jahangirnagar University, Bangladesh. Email: sanzida.botany@gmail.com

Rushdana Rahman, Department of Obstetrics & Gynecology, Dhaka Medical College Hospital, Bangladesh. Email: toma499@yahoo.com

Kiyoko Ikegami, School of Tropical Medicine and Global Health, Nagasaki University NCGM Satellite, Japan, kikegami@nagasaki-u.ac.jp

Rintaro Mori, Graduate School of Medicine, Kyoto University, rintaromori@gmail.com

Summary

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Design: Cluster randomized controlled trial

Setting : Two Upazilas in Bangladesh

Population or Sample: Pregnant women

Methods: Unions of the study settings were randomly allocated in either one of three groups: (1) Intervention 1 using both mobile platform and MCH, (2) Intervention 2 using MCH alone, or (3) the Control. A total of 3,002 participants were recruited. The interventions were designed to promote two-way communications between pregnant women/their families and community health workers by an empowering approach.

Main outcome measures: continuum of care (CoC), neonatal mortality and morbidities

Results: The interventions both significantly improved the utilization of CoC, although the overall proportion of CoC was relevantly low: 2.79% in the Control (95% CI: 1.37-3.54%), 6.16% in Intervention 2 (95% CI: 4.67-7.86%), and 7.89% in Intervention 1 (95% CI: 6.29-9.90%). Neonatal mortality rate with and without CoC was 5.43 per 1,000 (95% CI: 3.63 - 9.57 per 1,000) and 34.8 per 1,000 (95% CI: 24.3 - 45.4 per 1,000), respectively.

Conclusion: our study indicated the effectiveness of the interventions by leveraging MCH and a mobile platform to promote uptake of CoC throughout prepartum, intrapartum and postpartum/neonatal periods, potentially bringing long-lasting benefits to mothers and their offspring. The explicit approach is expected to guide policy makers to adopt MCH interventions in primary healthcare strengthening at the community level.

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Key words

Cost-effectiveness analysis, budget impact analysis, Disability Adjusted Life Years, Home-based maternal records, Bangladesh

Introduction

Although Bangladesh has achieved a significant progress on reduction of maternal and child mortality during the past decades, unmet targets on delivery and utilization of maternal and neonatal healthcare services have left the issue in an agenda of Sustainable Development Goals (SDGs). The new goals of the SDGs are to reduce the maternal mortality ratio (MMR) to less than 70 per 100,000 live births and neonatal mortality ratio (NMR) to 12 per 1,000 live births by 2030[1-3]. So far, the effectiveness of interventions for saving the lives of mothers and babies have been proven[2, 4-7], but challenges remain in health-care seeking and practices across the full continuum of maternal and child care, including the utilization of antenatal care, birth with a skilled attendant or standard facilities, emergency obstetric care in case of complications or illness for women

and newborn, essential neonatal care, and postnatal visits for women and babies in resource constrained settings [8-10].

The World Health Organization (WHO) [11, 12] recommended a home-based maternal record (HMR), an effective tool to actively link pregnant women and their families to community health workers and professional hospital staffs, raise knowledge and awareness on maternal and child health, identify complications in pregnancy and labor and common illness of mothers and babies, and consequently to improve delivery and utilization of maternal and child care services[13-20]. Among antenatal notes, immunization cards, child health books and the integrated document, the maternal and child health handbook (MCH) is the most comprehensive home-based book that encompasses all the records of the continuum of care for both mothers and children, including antenatal care, labor and delivery, postpartum care, newborn and child care, immunization and family planning. The integration of the different types of records is much more effective compared to the fragmented implementation, saving both financial and human resources for the intervention [21-22]. Besides the records, the handbook also contains guiding information on seeking care for mothers and children conveyed through ample illustrations. The recently launched WHO guideline has recommended the use of home-based records to complement facility-based records [23]. So far, its effectiveness to improve health seeking behaviors, home care practices, male involvement and communication between health professionals and women / caregivers, and feasibility has been proven by empirical epidemiological studies in various developing settings[15-20]. However, there was insufficient evidence on the type, content and implementation of HBR, which needs to be tailored to different sociocultural and epidemiological contexts[23].

In Bangladesh, a pilot MCH project showed strong positive impact on mother's knowledge, practices, record keeping, service utilization and empowerment of women [24,25]. After the approval by the Government of Bangladesh, a project-based utilization of HBRs has been widely implemented by NGOs; however, the current system of HBRs is fragmented, with various types provided by different organizations. Therefore, we implemented the first cluster randomized controlled trial (RCT) to examine the effectiveness of MCH enhanced by a mobile platform in two counties of rural Bangladesh (protocol available at:*https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5902947/*)[26]. The existing version of the Bangladeshi MCH designed by Bhuiyan et al were used in the intervention. The reason for enhancing it with a mobile platform was to boost communications between pregnant women, their family and community health workers, principal healthcare providers in the rural area, and to catalyze the potential advantages of the mobile platform in knowledge dissemination, guidance and promotion of healthcare utilization [27]. We hypnotized that the proposed interventions will benefit the continuum of care and lead to better maternal and neonatal outcomes. The study aimed to assess the effectiveness of the interventions on the improvement of the target outcomes, in order to inform updates of the MCH in the context of Bangladesh and policy making for the targets of SDGs related to maternal and neonatal health.

Methods

The community-based cluster RCT (trial registration: UMIN000025628) was conducted in two upazilas (administrative regions in Bangladesh), Dhamrai in Dhaka District, Dhaka Division and Lohagora in Narail District, Khulna Division from February 2017 to August 2018. The population of each upazila ranged from 200,000 to 500,000 in Bangladesh. The study period covered the duration from the start point at which the pregnant women were identified and recruited to the end point (end of the fourth week after giving birth). The cluster, the unions in each upazila, rather than the individual, was subjected to the randomized sampling. The target population, pregnant women aged 15 to 49 years living in the selected settings and expected to give birth between 1 August 2017 and 31 July 2018, and their families, were identified by community health workers (CHWs) and enrolled in the study. We also included healthcare providers at different levels: CHWs (the key player at the primary level), skilled birth attendants (SBAs) and health professionals working at upazila hospitals to cooperate our study. We also included gynecologist in each upazila as required. The selected unions were randomly allocated to either 1) the intervention that combined mobile phone communication with MCH, 2) the intervention using MCH alone or 3) the control, where no intervention was implemented. A total of 3,002 participants were finally recruited, including 998 for the

intervention 1, 1,001 for the intervention 2 and 1,003 for the control. **Table 1** summarizes the participants in the study settings. Details of study design and sampling issues were described in our published protocol [26].

The interventions were designed to promote two-way communications between pregnant women/their families and CHWs by an empowering approach. Contents of MCH encompassed the general profile of pregnant mother, menstrual history and history of previous pregnancy (if any), records of health education and consulting, records of conditions/health status, healthcare utilization and clinical results during pregnancy, delivery and postnatal/neonatal period, as well as information on common complications and signs of danger, on health seeking for mothers and babies, and on daily care and nutrition. MCH was distributed to each participant at the point of recruitment. Every two months the enrolled pregnant women and their families and CHWs were organized for community meetings, where health education, consulting/advice and anthropometric measurements were provided to accompany the discussions on seeking health services for mothers and babies and the application of MCH. In Intervention 1, besides MCH and community meetings, user-friendly mobile messages were developed and sent according to the gestational age (GA), including reminders of antenatal and postnatal care visits and facility-based delivery, list of locations of skilled birth attendants and hospitals, GA-specific health issues, daily care and nutrition during pregnancy, intake of iron tablet and folic acid, support from husband and families during pregnancy and lactating period, signs of danger, signs of labor, and postnatal/neonatal care. Audio messages and phone call were also used for follow-up and consulting/advice, as necessary. For those participants in households with no mobile phones, trained staffs made regular visits to their home according to their GA to provide equivalent information.

The expected outcomes were neonatal death, fetal death (stillbirth/miscarriage), preterm birth, low birthweight, maternal pregnancy complications and referral, antenatal care visits for at least one time (ANC1), antenatal care visits for at least four times (ANC4), antenatal care visits for at least six times (ANC6), facility-based delivery (FBD), mode of delivery, utilization of postnatal/neonatal care (PNC), and experience of health education. The definition of neonatal deaths followed the standard employed by WHO, that is, death within the first 28 days of life. By referring Bangladesh Demographic and Health Survey (BDHS) 2014, neonatal deaths and fetal deaths were determined from the complete birth history from mothers and recorded by our trained staffs [28]. The continuum of care (COC) for mothers and babies in the study referred to healthcare services during pregnancy, at birth and after birth and the variable was created by combining that of antenatal care, facility-based delivery and postnatal care. Related data were collected by the questionnaire during the study period. At the study settings, the trained staffs tracked the participants during the study period to catch up the maternal and neonatal outcomes promptly and effectively.

For data analysis, univariate analysis was first performed to explore the characteristics of variables. In the comparison of each variable, a stratification by randomization groups was implemented to examine the equality of covariates of the two groups at baseline. Then, multivariate generalized estimating equation (GEE) analyses were implemented, considering a potential correlation in the expected outcomes within unions. Risk ratios (RR) for the targeted outcomes were assessed and 95% confidence interval (CI) were calculated. Data analysis was performed using Stata 15.0.

The study was approved by the Bangladesh Medical Research Council (BMRC), Bangladesh and National Center for Child Health and Development (NCCHD), Japan. Signed consent was taken from all participants.

Results

Demographic and maternal characteristics of the participants

Figure 1 summarized participant flow. The average age of the participants was 23.53 years (SD: 4.67 years). Among the total 3,002 participants, 2,971 (98.97%) had at least one mobile phone in their household. There were 236 pregnant women who did not receive any education (7.86%). The average annual household incomes in the two upazilas, Lohagora and Dhamrai, were 1,796 USD (Mean; 149,100 taka) (SD: 56,374 taka) and 2,231 USD (Mean; 185,163 taka (SD: 147,618 taka), respectively. The average time from home to the nearest clinics was 27.6 minutes (SD: 16.1 minutes). **Table 2** summarizes the socio-demographical and maternal

characteristics of the participants. The average gestation age at birth and birth weight was 37.4 weeks (SD: 1.8 weeks) and 2,841.24 g (SD: 439.64 g), respectively. Socio-demographical characteristics did not significantly differ between the intervention groups and the study settings at baseline.

Mortality and morbidities

Table 3 and **Table 4** generated results from univariate and multivariate analyses to examine effects of the interventions on the expected outcomes. Among the overall participants, there were 5 maternal deaths, 116 fetal deaths (miscarriage/stillbirth) and 54 neonatal deaths reported in the study settings. The incidence of neonatal death, fetal death, preterm birth, low birthweight and severe complications during pregnancy was predicted to be 29.7 per 1,000 (95% CI: 20.7 - 38.7 per 1,000), 21.5 per 1,000 (95% CI: 13.7 - 29.3 per 1,000), 22.21% (95% CI: 20.70% - 23.72%), 12.75% (95% CI: 11.31 - 14.19%) and 2.09% (95% CI: 1.57% - 2.61%), respectively. Neonatal mortality rate (NMR) was 27.8 per 1,000 (95% CI: 19.7 - 36.0 per 1,000), 28.2 per 1,000 (95% CI: 10.5 - 45.8 per 1,000), and 34.8 per 1,000 (95% CI: 17.6 - 52.1 per 1,000) in Intervention 1, Intervention 2 and control group, respectively. Although the GEE model predicted lower incidence of these outcome indicators in general, no significant difference in the three groups was identified. The factors independently affecting neonatal survival included referral of complications during pregnancy and delivery, multiple birth, congenital malformation and CoC. NMR with and without CoC was 5.43 per 1,000 (95% CI: 3.63 - 9.57 per 1,000) and 34.8 per 1,000 (95% CI: 24.3 - 45.4 per 1,000), respectively.

Healthcare seeking during pregnancy, at birth and after birth

During pregnancy, participants in Intervention 1, Intervention 2 and control group went to 2.01 times (SD: 1.40 times), 1.97 times (SD: 1.49 times), and 1.48 times (SD: 1.29 times) of ANC on average, respectively. The proportion of ANC4, FBD, PNC and CoC was estimated to be 11.06% (95% CI: 9.90% - 12.22%), 61.23% (95% CI: 59.99% - 62.47%), 42.36% (95% CI: 40.73% - 43.99%) and 8.03% (95% CI: 7.04% - 9.03%), respectively. The indicator of CoC in Intervention 1, Intervention 2 and control group was 11.88% (95% CI: 9.91% - 13.85%), 8.00% (95% CI: 6.16% - 9.43%), and 2.79% (95% CI: 1.56 % - 4.01%), respectively. In detail, that of ANC4, FBD, and PNC was 13.36% (95% CI: 11.24% - 15.49%), 64.50% (95% CI: 62.34% - 66.65%) and 45.66% (95% CI: 42.86% - 48.46%), respectively, in Intervention 1; 12.86% (95% CI: 10.77% - 14.96%), 59.89% (95% CI: 57.76% - 62.02%) and 43.82% (95% CI: 41.07% - 46.57%), respectively, in Intervention 2, and 5.96% (95% CI: 4.32% - 7.61%), 58.90% (95% CI: 56.75% - 61.05%) and 36.37% (95% CI: 33.38% - 39.36%), respectively, in the control group. Compared to the control group, the proportions of ANC1, ANC4, ANC6, and PNC were higher in the two intervention groups, and FBD and referral for complications during pregnancy were better in Intervention 1.

The proportion of cesarean delivery was predicted to be 51.56% (95% CI: 50.46% - 52.67%). Significantly lower proportion of cesarean delivery (45.45%, (95% CI: 43.29% - 47.61%)) were observed in Intervention 1.

Experience of Health Education

In the two intervention groups, all participants reported that health education was provided during pregnancy, while in the control group, there 36.5% participants reported no relevant experience. Regarding the (potential) usefulness of MCH for knowledge dissemination for mothers and babies, 99.9% and 81.2% of participants in the intervention and the control group, respectively, had a positive attitude.

Discussion

To our knowledge, this study is the first cluster randomized controlled trial to assess the effect of the MCH program enhanced by mobile platform This is also the first cluster randomized design for HBR to improve CoC for mothers and babies in Bangladesh. Our findings indicated that the application of MCH improved uptake of multiple healthcare services, including antenatal care and postnatal/neonatal care, among rural pregnant women. The interventions increased ANC visits, from 1.48 visits in the control group to 1.97 times and 2.01 times in the intervention groups by using MCH and combining MCH and mobile platform, respectively. Although the overall proportion of at least four visits of ANC as recommended was relevantly low in the study settings, the figure in the two intervention groups, especially in the combined intervention,

were better. A similar tendency was also observed in PNC. The combined intervention further improved facility-based delivery and utilization of healthcare facility for complications during pregnancy and delivery. The multilevel GEE models identified statistical significance of these intervention effects, after adjusting potential confounders.

Compared to the monitoring data of UNICEF which targeted the overall population during the study period in Bangladesh [29], our study which targeted pregnant women living in rural areas identified higher NMR of 29.7 per 1,000 (95% CI: 21.6 - 37.8 per 1,000). Although the estimated figure was lower in the two intervention groups, no statistical significance on the immediate efforts to reduce mortality and morbidities was identified. A possible reason for this could be the calculation of the study sample size was based on an NMR of 24.4 per 1,000 (derived from the final MDG report), while the indicator has been substantially reduced since then. We also acknowledged that unlike obstetric care practices, MCH does not have an immediate life-saving effect and that the universal access to good-quality obstetric and neonatal healthcare plays a key role in reducing NMR based on the success observed in Bangladesh and other developing settings[30,31]. On the other hand, consistent with the findings of a systematic review, [32] our analysis confirmed that a crucial determinant in reducing NMR was CoC; both interventions showed a significant improvement. This suggests that MCH has a potential to improve neonatal survival through the promotion of utilization of CoC for mothers and the newborn,.

In our study, MCH brought upon several benefits, such as health education, promotion of daily care awareness and practices, involvement of husband and family members and boosting communication between pregnant women and healthcare providers, especially CHWs, leading to better healthcare utilization during pregnancy, at birth and after birth. This was compatible to previous studies on MCH[16-20]. The interventions involved primary healthcare at the community as an inevitable aspect. In the intervention settings, and the local residents, including pregnant women and their families, were organized and networked, and community meetings aiming to strengthen participatory learning and action on preventive and care-seeking behaviors were also implemented regularly. Similar empowerment practices have proven to be effective in improving key behaviors and neonatal survival outcomes, although its mechanism may depend on local practices, capabilities and the responsiveness of health services [33]. In our study, during this empowerment process, MCH or MCH combined with the mobile platform were the key instruments. CHWs were mobilized to reinforce the linkage, deliver knowledge and primary care, organize the community meeting and bridge pregnant women and healthcare facilities, in order to accomplish the proposed interventions. To this end, the results suggested that MCH can be a useful tool to strengthen primary healthcare delivery in rural Bangladesh. The interventions largely filled the gap of health education during pregnancy and routine primary healthcare at the community level, and the (potential) usefulness of these interventions were definitely recognized among most participants.

Compared to MCH alone, the combined intervention achieved better utilization of CoC, especially in terms of facility-based delivery and care seeking for complications during pregnancy and delivery, as well as lower rate of cesarean section (CS) delivery. What works for this intervention were likely to be effective contacts and more frequent interactions between pregnant women and CHWs, such as sharing information and advising daily home-based care, together with seeking relevant healthcare based on individual needs and requirement. Text and voice messages complemented MCH in knowledge dissemination and deepening the understanding of the key contents of MCH. The high mobile coverage and the low costs in the study settings facilitated the intervention. The results added relevant evidence on the effectiveness of mHealth on improvement of maternal and neonatal outcomes and related care seeking by the high-quality study design, which were of lack in low- and middle-income countries [34], and suggested the value to apply these effective tools in primary healthcare at the community level.

Our study revealed the latest status of universal health coverage for mothers and neonates in rural Bangladesh. We identified the proportion of ANC4, FBD and PNC to be 11.06% (95% CI: 9.90% - 12.22%), 61.23% (95% CI: 59.99% - 62.47%) and 42.36% (95% CI: 40.73% - 43.99%), respectively, and the proportion of CoC throughout prepartum, intrapartum and postpartum/neonatal period to be 8.03% (95% CI: 7.04% -

9.03%) as the consequence. The uptake of ANC4 among rural pregnant women living in the study settings was considerably lower than that of the overall population identified by BDHS 2014 [35,36], but was comparable to that of community-based studies conducted in a rural area [37,38]. This can be explained by a substantial rural-urban gap in the uptake of maternal healthcare services [39]. Contrary to the stagnant progress in ANC uptake, our results suggested a fairly progressive uptake of PNC and FBD compared to previous surveys and estimates [40,41]. The overall low uptake of these maternal and neonatal services suggested a big room for improvement through strengthening primary healthcare as the frontline of health system [42], particularly in rural areas.

Meanwhile, we confirmed that the improved FBD led to a marked increase in CS delivery in Bangladesh. The incidence of CS identified in our study was much higher compared to that in BDHS 2014[43], and largely exceeded the optimal rate ranging from 5% to 20% [44]. Although it is a life-saving measure in obstetric care, a high level of CS indicates a substantial proportion of the practice without medical indication, leading to wasting of scarce healthcare resources and a high health and economic burden, especially in low- and middle-income countries [45-47]. The mechanism of the high-level CS tended to be complicated, mixing motivations of both the supply and demand sides, and the decision of the mothers and their family may largely affected by doctors due to poorly informed healthcare needs [43,48]. Our results suggested that this alarming phenomenon is emerging in not only urban areas, but also in rural areas recently, and an intervention by applying MCH and mobile platform had the potential to reduce the misuse. The emerging issues on CS in MCH for implementing health promotion/health education programs at community level are expected to be covered.

In interpreting these major findings, several issues should be carefully considered. The enrollment of the target pregnant women relied on self-report. Because of the variation in identifying pregnancy among the participants, gestational age at enrollment was diversified, causing differences in the participation duration. Moreover, our study was likely to be inevitably contaminated somehow, because the interventions and the outcomes cannot be masked, and there had been some previous NGO-driven health promotion campaigns and activities targeting the rural community in the study settings. However, there was no differences regarding these factors across the study settings and groups. Finally, because of the limited follow-up duration, our study did not observe the outcomes posterior to the neonatal period, potentially missing the overall effects of the target tools on maternal and child health.

In summary, our study indicated the effectiveness of the interventions by leveraging MCH and a mobile platform to promote uptake of CoC throughout prepartum, intrapartum and postpartum/neonatal periods, potentially bringing long-lasting benefits to mothers and their offspring. These tools coordinated the interactions of pregnant women, their families and CHWs and their active engagement in primary healthcare at the community level, potentially contributing to better health outcomes. It is worth including these tools in primary healthcare to achieve universal health coverage for mothers and babies in rural Bangladesh.

Contributors

Tobe RG, Haque SE, Ikegami K and Mori R conceptualized and designed the research project. Tobe RG, Haque SE, Mubassara S, and Rahman R conducted field study. Tobe RG ran the analysis. Tobe RG, Haque SE, Ikegami K and Mori R interpreted the results. Then Tobe RG drafted the first manuscript and revised it based on feedback from co-authors. All authors reviewed and approved the manuscript.

Declaration of interests

We declare no competing interests.

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Ethical approval

The study received ethical clearance from the ethical committee of Bangladesh Medical Research Council (BMRC), Bangladesh and National Center for Child Health and Development (NCCHD), Japan.

References

1. General Economics Division, Planning Commission of Government of the People's Republic of Bangladesh, UNDP Bangladesh. Millennium Development Goals Bangladesh Country Report 2013. 2014.
2. El Arifeen S, Hill K, Ahsan KZ, Jamil K, Nahar Q, Streatfield PK. Maternal mortality in Bangladesh: A countdown to 2015 country case study. The Lancet. 2014; 384 (9951): 1366-74.
3. Sustainable Development Goals. Goal 3: Ensure healthy lives and promote well-being for all at all ages. Available at : http://www.un.org/sustainabledevelopment/health/ (Accessed on August 14, 2020)
4. Lassi ZS, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. The Cochrane Database of Systematic Reviews. 2015; 3: CD007754.
5. Perry HB, Rassekh BM, Gupta S, Wilhelm J, Freeman PA. Comprehensive review of the evidence regarding the effectiveness of community-based primary healthcare in improving maternal, neonatal and child health: 1. Rationale, methods and database description. Journal of Global Health. 2017; 7(1): 010901.
6. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, et al. Can available interventions end preventable deaths in mothers, newborn babies and stillbirths, and at what cost? Lancet. 2014; 384 (9940): 347-70.
7. Van den Broek N. Happy Mother's Day? Maternal and neonatal mortality and morbidity in low- and middle-income countries. International Health. 2019; 11(5): 353-357.
8. World Health Organization. Working with individuals, families and communities to improve maternal and newborn health. 2010. Available at: http://www.who.int/maternal_child_adolescent/documents/who_fch_rhr_0311/en/ (Accessed on August 14, 2020)
9. Smith HJ, Portela AG, Maston C. Improving implementation of health promotion interventions for maternal and newborn health. BMC Pregnancy Childbirth 2017; 17: 280.
10. Mbuagbaw L, Medley N, Darzi AJ, Richardson M, HabibaGarga K, Ongolo-Zogo P. Health system and community level interventions for improving antenatal care coverage and health outcomes. The Cochrane Database Syst Rev 2015; 12: CD010994.
11. World Health Organization. Home-based maternal records: guidelines for development, adaptation and evaluation. Geneva: WHO. 2018. Available at: https://www.who.int/maternal_child_adolescent/documents/home-based-records-guidelines/en/ (Accessed on August 14, 2020)
12. Shah PM, Selwyn BJ, Shah K, Kumar V. Evaluation of the home-based maternal record: A WHO collaborative study. Bull World Health Organ 1993; 71 (5): 535-48.
13. Turner KE, Fuller S. Patient-held maternal and/or child health records: Meeting the information needs of patients and healthcare providers in developing countries? Online J Public Health Inform 2011; 3 (2): ojphi.v3i2.3631.
14. Takayanagi K, Iwasaki S, Yoshinaka Y. The role of the Maternal and Child Health Handbook system in reducing perinatal mortality in Japan. Clin Perform Qual Healthcare. 1992; 1: 29-33.
15. Hagiwara A, Ueyama M, Ramlawi A, Sawada Y. Is the Maternal and Child Health Handbook effective in improving health-related behavior? Evidence from Palestine. J Public Health Pol. 2012; 34: 31-45.
16. Kaneko K, Niyonkuru J, Juma N, Mbonabuca T, Osaki K, Aoyama A. Effectiveness of the maternal and child health handbook in Burundi for increasing notification of birth at health facilities and postnatal

care uptake. Glob Health Action 2017; 10: 1297604.
17. Osaki K, Kosen S, Indriasih E, Pritasari K, Hattori T. Factors affecting the utilization of maternal, newborn and child health services in Indonesia: the role of the maternal and child health handbook. Public health 2015; 129: 582-586.
18. Yanagisawa S, Soyano A, Igarashi H, Ura M, Nakamura Y. Effect of a maternal and child health handbook on maternal knowledge and behavior: a community-based controlled trial in rural Cambodia. Health Policy Plan 2015; 30: 1184-92.
19. Osaki K, Hattori S, Toda A, Mulati E, Hermawan L, Pritasari K, Bardosono S, et al. Maternal and child health handbook use for maternal and child care: A cluster randomized controlled study in rural Java, Indonesia. Journal of Public Health. 2019; 41: 170-182.
20. Mori R, Yonemoto N, Noma H, Ochirbat T, Barber E, Soyolgerel G, et al. The maternal and child health handbook in Mongolia: a cluster-randomized controlled trial. PLoS One. 2015; 10: e0119772.
21. Aiga H, Huy TKP, Nguyen VD. Cost savings through implementation of an integrated home-based record: A case study in Vietnam. Public Health 2018; 156: 124-31.
22. Aiga H, Nguyen VD, Nguyen CD, Nguyen TTT, Nguyen LTP. Fragmented implementation of maternal and child health home-based records in Vietnam: need for integration. Glob Health Action 2016; 9: 10.
23. World Health Organization. WHO recommendations on home-based records for maternal, newborn and child health. Available at: https://apps.who.int/iris/bitstream/handle/10665/274277/9789241550352-eng.pdf (Accessed on August 14, 2020)
24. Shafi UB, Nakamura Y, Nahid A. Study on the development and assessment of maternal and child health (MCH) handbook in Bangladesh. Journal of Public Health and Development 2006; 4: 45-60.
25. Shafi UB. Development, field testing and potential benefits of a maternal and child health (MCH) handbook in Bangladesh. Journal of International Health 2009; 24: 73-76.
26. Tobe RG, Haque SE, Ikegami K, Mori R. Mobile-health tool to improve maternal and neonatal health-care in Bangladesh: A cluster randomized controlled trial. BMC Pregnancy Childbirth. 2018; 18: 102.
27. Sondaal SF, Browne JL, Amoakoh-Coleman M, Borgstein A, Miltenburg AS, Verwijs M, et al. Assessing the effect of mHealth interventions in improving maternal and neonatal care in low- and middle-income countries: A systematic review. PLoS One. 216; 11: e0154664.
28. Akter T, Dawson A, Sibbritt D. Changes in neonatal mortality and newborn health-care practices: descriptive data from the Bangladesh Demographic and Health Surveys 2011 and 2014. Who South East Asia J Public Health. 2018; 7: 43-50.
29. United Nations Children's Fund (UNICEF). Key demographic indicators of Bangladesh, neonatal mortality rate. https://data.unicef.org/country/bgd/ (Accessed on August 14, 2020).
30. Rubayet S, Shahidullah M, Hossain A, Corbett E, Moran AC, Mannan I, et al. Newborn survival in Bangladesh: A decade of change and future implications. Health Policy and Planning. 2012; 27: iii40-iii56.
31. World Health Organization. Newborns: Reducing mortality (fact sheets). Available at: https://www.who.int/news-room/fact-sheets/detail/newborns-reducing-mortality (Accessed on August 14, 2020).
32. Kikuchi K, Ansah EK, Okawa S, Enuameh Y, Yasuoka J, Nanishi K, et al. Effective linkages of continuum of care for improving neonatal, perinatal and maternal mortality: A systematic review and meta-analysis. PLoS One. 2015; 10: e0139288.
33. Seward N, Neuman M, Colbourn T, Osrin D, Lewycka S, Azad K, et al. Effects of women's groups practicing participatory learning and action on preventive and care-seeking behaviors to reduce neonatal mortality: A meta-analysis of cluster-randomized trials. PLoS Med. 2017; 14: e1002467.
34. Amoakoh-Coleman M, Borgstein AB, Sondaal SF, Grobbee DE, Miltenburg AS, et al. Effectiveness of mHealth interventions targeting healthcare workers to improve pregnancy outcomes in low- and middle-income countries: A systematic review. J Med Internet Res. 2016; 18: e226.
35. Chanda SK, Ahammed B, Howlader MH, Ashikuzzaman M, Shovo T, Hossain MT. Factors associating

different antenatal care contacts of women: A cross-sectional analysis of Bangladesh demographic and health survey 2014 data. PLoS One. 2020; 15: e0232257.
36. Bhowmik J, Biswas RK, Woldegiorgis M. Antenatal care and skilled birth attendance in Bangladesh are influenced by female education and family affordability: BDHS 2014. Public Health. 2019; 170: 113-121.
37. Shahjahan M, Chowdhury HA, Al-Hadhrami AY, Harun GD. Antenatal and postnatal care practices among mothers in rural Bangladesh: A community based cross-sectional study. Midwifery. 2017; 52: 42-48.
38. Siddique AB, Perkins J, Mazumder T, Haider MR, Banik G, Tahsina T, et al. Antenatal care in rural Bangladesh: Gaps in adequate coverage and content. PLoS One. 2018; 13: e0205149.
39. Pulok MH, Sabah MN, Uddin J, Enemark U. Progress in the utilization of antenatal and delivery care services in Bangladesh: Where does the equity gap lie? BMC Pregnancy Childbirth. 2016; 16: 200.
40. Rahman MS, Rahman MM, Gilmour S, Swe KT, Abe SK, Shibuya K. Trends in, and projections of , indicators of universal health coverage in Bangladesh, 1995-2030: A Bayesian analysis of population-based household data. Lancet Global Health. 2018; 6: e84-e94.
41. Rahman S, Choudhury AA, Khanam R, Moin SMI, Ahmed S, Begum N, et al. Effect of a package of integrated demand- and supply-side interventions on facility delivery rates in rural Bangladesh: Implications for large-scale programs. PLoS One 2017; 12: e0186182.
42. United States Agency of International Development. Effective coverage of facility delivery in Bangladesh, Haiti, Malawi, Nepal, Senegal and Tanzania. DHS analytical studies 65. Available at: https://www.dhsprogram.com/pubs/pdf/AS65/AS65.pdf (Accessed on August 14, 2020).
43. Rahman MM, Haider MR, Moinuddin M, Rahman AE, Ahmed S, Khan MM. Determinants of cesarean section in Bangladesh: Cross-sectional analysis of Bangladesh demographic and health survey 2014 data. PLoS One. 2018; 13: e0202879.
44. Molina G, Weiser TG, Lipsitz SR, et al. Relationship between cesarean delivery rate and maternal and neonatal mortality. JAMA 2015; 314: 2263-2270.
45. Lumbiganon P, Laopaiboon M, Gülmezoglu AM, et al. World Health Organization Global Survey on Maternal and Perinatal Health Research Group Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007-08. Lancet 2010; 375: 490-499.
46. Haider MR, Rahman MM, Moinuddin M, Rahman AE, Ahmed S, Khan MM. Ever-increasing cesarean section and its economic burden in Bangladesh. PLoS One. 2018; 13: e0208623.
47. Marshall NE, Fu R, Guise JM. Impact of multiple cesarean deliveries on maternal morbidity: A systematic review. American Journal of Obstetrics and Gynecology. 2011; 205: 262.e1-8.
48. Long Q, Kingdon C, Yang F, Renecle MD, Jahanfar S, Bohren MA, et al. Prevalence of and reasons for women's, family members', and health professionals' preferences for cesarean section in China: A mixed-methods systematic review. PLoS Med. 2018; 15: e1002672.

Table 1. Study settings and allocation

Upazila	Control	Intervention 1	Intervention 2	Total
Lohagora	503	506	493	**1,502**
Dhamrai	500	492	508	**1,500**
Total	**1,003**	**998**	**1,001**	**3,002**

Table 2. Demographic characteristics of participants

		n	%
Age	younger than 20	700	23.32
	aged 20-25	1,050	34.98
	aged 25-30	826	27.51

		n	%
	aged 30-35	359	11.96
	older than 35	67	2.23
Educational background	uneducated	236	7.86
	elementary	116	3.86
	incomplete secondary	788	26.25
	complete secondary	994	33.11
	incomplete high school	484	16.12
	high school and above	384	12.79
Whether or not having mobile	Yes	2,971	98.97
	No	31	1.03
Quintile of income	1st	671	22.35
	2nd	583	19.42
	3rd	830	27.65
	4th	375	12.49
	5th	543	18.09
Family's supports for child rearing	Yes	1,506	50.17
	No	1,496	49.83
Primiparity or not	Yes	1,268	42.25
	No	1,733	57.75
Experience of pregnancy	1	1,272	42.37
	2	1,015	33.81
	3	503	16.76
	4	212	7.06
experience of child death	No	2,836	94.5
	Yes	165	5.5
experience of miscarriage	No	2,818	93.87
	Yes	184	6.13
quintile of distance to healthcare facilities	1st (10.4 mins)	833	27.75
	2nd (19.9 mins)	471	15.69
	3rd (28.8 mins)	878	29.25
	4th (38.4 mins)	409	13.62
	5th (58.1 mins)	411	13.69
	Total	**3,002**	**100**

Table 3. Univariate analysis for effects of the interventions on the expected outcomes

		Odds Ratio	**95% CI**
Antenatal care >=1	MCH+mobile vs. control	*1.199*	*1.142 - 1.259*
	MCH only vs. control	*1.116*	*1.060 - 1.176*
	interventions vs. control	*1.158*	*1.106 - 1.212*
Antenatal care >=4	MCH+mobile vs. control	*2.344*	*1.733 - 3.170*
	MCH only vs. control	*2.233*	*1.648 - 3.027*
	intervention vs. control	*2.289*	*1.728 - 3.030*
Antenatal care >=6	MCH+mobile vs. control	*2.344*	*1.127 - 4.876*
	MCH only vs. control	*3.509*	*1.751 - 7.031*
	intervention vs. control	*2.927*	*1.505 - 5.692*
Postnatal care>=1	MCH+mobile vs. control	*1.169*	*1.052 - 1.300*
	MCH only vs. control	*1.125*	*1.010 - 1.252*
	intervention vs. control	*1.147*	*1.044 - 1.260*

		Odds Ratio	95% CI
Facility of delivery	MCH+mobile vs. control	*1.144*	*1.064 - 1.230*
	MCH only vs. control	*1.137*	*1.057 - 1.223*
	intervention vs. control	*1.141*	*1.069 - 1.217*
Referral of complication in pregnancy and childbirth	MCH+mobile vs. control	1.025	0.999 - 1.051
	MCH only vs. control	1.014	0.987 - 1.042
	intervention vs. control	1.019	0.995 - 1.044
Cesarean section	MCH+mobile vs. control	*1.157*	*1.064 - 1.258*
	MCH only vs. control	0.941	0.858 - 1.032
	intervention vs. control	1.047	0.970 - 1.130
Survival status of mother	MCH+mobile vs. control	1.003	0.999 - 1.007
	MCH only vs. control	1.001	0.996 - 1.006
	intervention vs. control	1.002	0.998 - 1.006
Survival status of the newborn	MCH+mobile vs. control	1.006	0.994 - 1.018
	MCH only vs. control	0.997	0.984 - 1.011
	intervention vs. control	1.002	0.991 - 1.013
Low birthweight	MCH+mobile vs. control	0.879	0.699 - 1.107
	MCH only vs. control	0.869	0.690 - 1.095
	intervention vs. control	0.874	0.718 - 1.064
Continuum of care	MCH+mobile vs. control	*4.735*	*3.080 - 7.279*
	MCH only vs. control	*3.382*	*2.164 - 5.286*
	intervention vs. control	*4.069*	*2.683 - 6.171*

Table 4. Multivariate analysis for effects of the interventions on the expected outcomes

	%	95% CI	RR	95% CI	p
Antenatal care>=1	77.38	75.86 - 78.90			
MCH+mobile	84.79	82.57 - 87.01	1.848	1.617 - 2.111	0.000
MCH only	78.54	75.98 -81.09	1.450	1.276 - 1.649	0.000
Control	66.56	63.31 -69.82	ref.		
Maternal age			0.954	0.894 - 1.018	0.157
Maternal education			0.998	0.960 - 1.039	0.937
Household income			1.000	1.000 - 1.000	0.002
Primipara or not			1.053	0.915 - 1.211	0.473
Distance to the nearest facility			0.990	0.952 - 1.029	0.607
Knowledge on healthcare seeking			1.551	1.364 - 1.763	0.000
Antenatal care>=4	11.06	9.90 - 12.22			
MCH+mobile	13.36	11.24 - 15.49	1.573	1.325 - 1.869	0.000
MCH only	12.86	10.77 - 14.96	1.537	1.293 - 1.827	0.000
Control	5.96	4.32 - 7.61	ref.		
Age			0.999	0.924 - 1.080	0.980
Education			1.073	1.023 - 1.125	0.004
Household income			1.000	1.000 - 1.000	0.021
Primipara or not			1.011	0.857 - 1.192	0.895
Distance to the nearest facility			1.041	0.994 - 1.090	0.088
Knowledge on healthcare seeking			0.992	0.884 - 1.112	0.887
Antenatal care>=6	2.46	1.89 - 3.03			
MCH+mobile	3.83	2.62 - 5.03	1.806	1.324 - 2.465	0.000
MCH only	2.36	1.43 - 3.30	1.446	1.047 - 1.996	0.025
Control	0.98	0.32 - 1.65	ref.		

	%	95% CI	RR	95% CI	p
Maternal age			1.103	0.972 - 1.252	0.130
Maternal education			1.128	1.044 - 1.218	0.002
Household income			1.000	1.000 - 1.000	0.001
Primipara or not			0.924	0.703 - 1.214	0.571
Distance to the nearest facility			1.095	1.014 - 1.183	0.020
Knowledge on healthcare seeking			0.973	0.794 - 1.192	0.788
Postnatal care >=1	42.36	40.73 - 43.99			
MCH+mobile	45.66	42.86 - 48.46	1.358	1.185 - 1.555	0.000
MCH only	43.82	41.07 - 46.57	1.280	1.117 - 1.465	0.000
Control	36.37	33.38 - 39.36	ref.		
Maternal age			0.984	0.922 - 1.052	0.642
Maternal education			1.040	0.999 - 1.084	0.058
Household income			1.000	1.000 - 1.000	0.000
Primipara or not			0.889	0.773 - 1.022	0.098
Distance to the nearest facility			1.010	0.971 - 1.050	0.621
Knowledge on newborn care			1.820	1.661 - 1.996	0.000
Baby's sex			0.981	0.881 - 1.092	0.728
Singleton or multiple birth			0.818	0.423 - 1.579	0.549
Congenital malformation			0.790	0.388 - 1.610	0.516
Low birthweight			0.827	0.702 - 0.973	0.022
Health status of baby			2.436	2.194 - 2.704	0.000
Facility-based delivery	61.23	59.99 - 62.47			
MCH+mobile	64.50	62.34 - 66.65	1.280	1.087 - 1.508	0.003
MCH only	59.89	57.76 - 62.02	0.946	0.798 - 1.122	0.524
Control	58.90	56.75 - 61.05	ref.		
Maternal age			1.010	0.930 - 1.098	0.811
Maternal education			1.151	1.094 - 1.212	0.000
Household income			1.000	1.000 - 1.000	0.017
Primipara or not			0.849	0.711 - 1.013	0.069
Distance to the nearest facility			1.021	0.973 - 1.071	0.394
Antenatal care >= 4 times			2.995	2.294 - 3.911	0.000
Complications during delivery			0.060	0.048 - 0.074	0.000
Singleton or multiple birth			0.955	0.409 - 2.229	0.915
Preterm			1.652	1.419 - 1.923	0.000
Knowledge on complications / danger signs			1.048	0.902 - 1.219	0.538
Knowledge on delivery			1.289	1.101 - 1.510	0.002
Referral for complications	98.24	97.49 - 98.99			
MCH+mobile	99.01	98.13 - 99.90	1.821	1.106 - 2.999	0.018
MCH only	98.44	97.31 - 99.57	1.500	0.945 - 2.381	0.086
Control	96.26	93.80 - 98.73	ref.		
Maternal age			0.967	0.768 - 1.218	0.776
Maternal education			1.215	1.042 - 1.417	0.013
Household income			1.000	1.000 - 1.000	0.883
Primipara or not			1.017	0.609 - 1.697	0.950
Distance to the nearest facility			0.980	0.854 - 1.125	0.776
Antenatal care >= 4 times			0.592	0.382 - 0.917	0.019
Knowledge on complications / danger signs			1.128	0.813 - 1.565	0.470
Knowledge on healthcare seeking			1.011	0.749 - 1.364	0.945
Singleton or multiple birth			3.071	1.303 - 7.238	0.010
Preterm			1.252	0.713 - 2.198	0.434

	%	95% CI	RR	95% CI	p
Maternal survival					
MCH+mobile	(-)		1.000		
MCH only	(-)		1.438	0.698 - 2.964	0.325
Control	(-)		ref.		
Maternal age			0.758	0.503 - 1.140	0.183
Maternal education			0.840	0.652 - 1.082	0.178
Household income			1.000	1.000 - 1.000	0.425
Primipara or not			1.461	0.587 - 3.637	0.415
Distance to the nearest facility			1.042	0.800 - 1.358	0.761
Antenatal care >= 4 times			1.000		
Complications during delivery			1.000		
Singleton or multiple birth			1.000		
Preterm			0.950	0.399 - 2.259	0.907
Knowledge on complications / danger signs			0.871	0.523 - 1.451	0.597
Knowledge on guiding delivery			0.771	0.465 - 1.278	0.313
Neonate survival	97.03	96.13 - 97.93			
MCH+mobile	97.22	95.73 - 98.71	1.139	0.725 - 1.789	0.573
MCH only	97.18	95.78 - 98.59	1.131	0.725 - 1.765	0.588
Control	96.52	94.54 - 98.50	ref.		
Maternal age			0.704	0.573 - 0.865	0.001
Maternal education			0.954	0.840 - 1.083	0.467
Household income			1.000	1.000 - 1.000	0.399
Primipara or not			1.324	0.822 - 2.131	0.248
Knowledge on daily care			1.217	0.521 - 2.842	0.649
Knowledge on healthcare seeking			0.920	0.644 - 1.313	0.646
Knowledge on complications / danger signs			1.198	0.817 - 1.758	0.355
Knowledge on delivery			1.020	0.727 - 1.429	0.910
Knowledge on newborn care			1.322	0.901 - 1.938	0.153
Referral of complication during delivery			2.620	1.170 - 5.864	0.019
Singleton or multiple birth			3.793	1.551 - 9.272	0.003
Malformation			0.106	0.050 - 0.225	0.000
Baby's sex			1.183	0.828 - 1.689	0.356
Low birthweight			1.261	0.716 - 2.218	0.422
Preterm			1.093	0.696 - 1.718	0.699
Maternal survival			4.068	0.923 - 17.934	0.064
Continuum of care			3.894	1.133 - 13.376	0.031
Low birthweight	12.75	11.52 - 13.97			
MCH+mobile	11.98	9.93 - 14.02	0.877	0.731 - 1.051	0.156
MCH only	11.52	9.46 - 13.59	0.857	0.698 - 1.051	0.138
Control	14.79	12.49 - 17.08	ref.		
Maternal age			0.961	0.893 - 1.034	0.289
Maternal education			0.961	0.916 - 1.009	0.108
Household income			1.000	1.000 - 1.000	0.512
Primipara or not			0.952	0.782 - 1.158	0.620
Antenatal care >=4 times			1.056	0.925 - 1.207	0.419
Facility-based delivery			1.136	0.903 - 1.429	0.275
Baby's sex			1.040	0.908 - 1.191	0.572
Singleton or multiple birth			0.478	0.282 - 0.808	0.006
Preterm			1.111	0.991 - 1.245	0.071
Complications during delivery			1.035	0.856 - 1.252	0.720

	%	95% CI	RR	95% CI	p
Cesarean Section	51.56	50.46 - 52.67			
MCH+mobile	45.45	43.29 - 47.61	0.609	0.516 - 0.718	0.000
MCH only	55.59	53.92 - 57.26	1.105	0.927 - 1.317	0.266
Control	54.19	52.36 - 56.02	ref.		
Maternal age			1.013	0.931 - 1.102	0.766
Maternal education			1.109	1.053 - 1.168	0.000
Household income			1.000	1.000 - 1.000	0.707
Primipara or not			1.121	0.937 - 1.340	0.211
Singleton or multiple birth			0.984	0.514 - 1.882	0.961
Preterm			0.869	0.742 - 1.018	0.083
Facility-based delivery			27.291	21.666 - 34.376	0.000
Continuum of care	8.03	7.04 - 9.03			
MCH+mobile	11.88	9.91 - 13.85	2.197	1.743 - 2.769	0.000
MCH only	7.80	6.16 - 9.43	1.701	1.340 - 2.159	0.000
Control	2.79	1.56 - 4.01	ref.		
Maternal age			1.006	0.918 - 1.104	0.891
Maternal education			1.067	1.008 - 1.130	0.025
Household income			1.000	1.000 - 1.000	0.018
Primipara or not			0.980	0.806 - 1.192	0.841
Distance to the nearest facility			1.026	0.971 - 1.083	0.361
Knowledge on healthcare seeking			0.991	0.873 - 1.124	0.886
Preterm			1.133	1.069 - 1.201	0.000
Complications during delivery			0.577	0.492 - 0.676	0.000

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