



RESEARCH ARTICLE

Timely referral saves the lives of mothers and newborns: Midwifery led continuum of care in marginalized teagarden communities – A qualitative case study in Bangladesh [version 1; referees: 1 approved, 2 approved with reservations]

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Abstract

Background: Prompt and efficient identification, referral of pregnancy related complications and emergencies are key factors to the reduction of maternal and newborn morbidity and mortality. As a response to this critical need, a midwifery led continuum of reproductive health care was introduced in five teagardens in the Sylhet division, Bangladesh during 2016. Within this intervention, professional midwives provided reproductive healthcare to pregnant teagarden women in the community. This study evaluates the effect of the referral of pregnancy related complications.

Methods: A qualitative case study design by reviewing records retrospectively was used to explore the effect of deploying midwives on referrals of pregnancy related complications from the selected teagardens to the referral health facilities in Moulvibazar district of the Sylhet division during 2016. In depth analyses was also performed on 15 randomly selected cases to understand the facts behind the referral.

Results: Out of a total population of 450 pregnant women identified by the midwives, 72 complicated mothers were referred from the five teagardens to the facilities. 76.4% of mothers were referred to conduct delivery at facilities, and 31.1% of them were referred with the complication of prolonged labour. Other major complications were pre-eclampsia (17.8%), retention of the placenta with post-partum hemorrhage (11.1%) and premature rupture of the membrane (8.9%). About 60% of complicated mothers were referred to the primary health care centre, and among them 14% of mothers were delivered by caesarean section. 94% deliveries resulted in livebirths and only 6% were stillbirths.

Conclusions: This study reveals that early detection of pregnancy complications by skilled professionals and timely referral to a facility is beneficial in saving the majority of baby’s as well as mother’s lives in resource-poor teagardens with a considerable access barrier to health facilities.

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Introduction

Globally 830 maternal deaths occur every day, 99% of which occur in developing countries^{1,2}. According to the World Health Organization, roughly 303,000 maternal deaths are caused as a result of pregnancy and childbirth related complications^{3,4}. Globally, about 3.7 million neonatal deaths occurred within the first 28 days, with 75% in the first week of life⁵. Only 19 out of 186 countries have achieved the Millennium Development Goal-5, related to reduction in maternal mortality⁶; unfortunately, Bangladesh is not one of them. Estimations suggest that about 87% of maternal deaths occurred in South Asian and Sub-Saharan African regions⁷. According to the Demographic and Health Survey, neonatal mortality rates range from 28 to 54 per 1000 live births in Bangladesh, India and Pakistan⁸. In 2010 the Bangladesh Maternal Mortality and Health Care Survey (BMMS) claimed that the lifetime risk of maternal death is 1 in 500 due to pregnancy and delivery related complication, and two third of these deaths occurred in the postpartum period. A study in Bangladesh found that 38% of the maternal deaths occurred by haemorrhage, which is the most common cause, 20% occurred by eclampsia, and 8.1% occurred by sepsis⁹. Another study in the teagarden area of Bangladesh revealed that maternal death in teagarden areas is higher due to lack of knowledge on maternal complication. Ignorance, traditional myths, family restriction on seeking better care, and dependency on traditional birth attendants and village doctors also influence these maternal deaths in teagarden communities¹⁰.

Referral is the process of coordinated movement of health care seeker to reach a high-level care within a small window of time¹¹. The goal of timely referral is to minimize or prevent the delay for transportation (called second delay), and ensure pre-hospital care while transporting a patient to the referral facility^{12,13}. In 2014, Directorate General of Health Services (DGHS) reported that out of 120 maternal deaths 47 deaths occurred in the teagarden area of Moulvibazar district of Bangladesh. Estimations suggest that about 46.4% of maternal deaths occurred at home, and 7.1% while the women were on route towards a facility; this indicated the delay occurred as a result of delay in decision making of which facility to take the mothers for management, and arranging transport to go to the facility¹⁴. Another study stated that 22.2% of maternal deaths occurred with more than 6 hours delay in decision-making and 12.9% of deaths occurred with 1–2 hours transportation delay⁹. In light of this, it can be assumed that ensuring emergency obstetric care services, and quick referral during the perinatal period can help **reduce maternal deaths**. To safeguard the reproductive age (15–49 years) of a woman, continuous care from family and community, along with support in getting easy access to referral healthcare facilities, is needed¹⁵. Transportation support, timeliness of referral, and inter-facility transfer are major contributing factors found to reduce the rate of maternal deaths^{12,16}. A social autopsy study of maternal deaths found that very few mothers sought facility based care during complications, and that ensuring timely referral through transportation saved the lives of many of them¹⁴. It is recommended that five Emergency Obstetric and Newborn Care (EmONC) services, including four basic EmONC (BEmONC)

and one Comprehensive EmONC (CEmONC), should be available and geographically distributed for each 500,000 individuals of a population¹⁷. The component of care (consisting of antenatal care, identification of high risk mothers, safe delivery conduction by skilled birth attendant, timely referral of complicated mothers and postnatal care including essential newborn care.) with high quality services can be ensured by the good referral system at all levels, both in facilities as well as in communities by the trained health care providers⁹. A shifting process is developed after the identification of high-risk pregnancies from a risk based approach to provide skilled care during delivery, and emergency obstetric care when complications occur^{18,19}. This approach is not adequate to reduce maternal and neonatal mortality as the capacity is limited at the primary level of care, and is difficult to access in the referral facilities remaining in most of the low-income countries²⁰. Professionally, a referral transport system must be managed for providing some basic intervention to the patient before reaching the referral facility²¹.

An **intervention** named “**Bagan Mayer Jonno**” has been implemented in the selected teagardens in the Moulvibazar district. The project ran through counseling and courtyard meetings of pregnant mothers, as well as an advocacy meeting with their guardians regarding quick referral of complicated mother. This project also supported the communities in detecting high-risk mothers by the active participation of volunteer and professional midwives. It also managed the provision of transportation and assistance of volunteers to ensure a quick and safe referral procedure. The present qualitative study describes the referral system using the midwifery led service delivery in five selected teagardens of Moulvibazar district in Bangladesh.

Methods

Qualitative method was used to collect information in this study. The referral records of 2016 in selected five teagardens were reviewed retrospectively and qualitative information of selected 15 referral cases were collected through in-depth interviews at the community.

Context of the tea gardens

The average distance between a teagarden and Upazila Health Complex (UHC) varies between 12– 20 kilometers. Approximately, a population of 25,000 people with around 300 pregnant mothers at any point in time live in these gardens.

Bagan Mayer Jonno

As part of the intervention, community volunteers called ‘Bagan Sebika’ were placed in the community, and professional midwives were situated in teagarden health facilities. Bagan Sebika (Paid Volunteer) perform community based activities including home based counseling, courtyard meetings, and advocacy meetings with the pregnant mothers and family members. Bagan Sebika also facilitated the mothers receiving antenatal care (ANC) at the facility. They also accompanying the referred mothers to the referral centre. Midwives’ role at teagarden facility includes ANC, counseling, delivery, referral, and

postnatal care (PNC). Midwives also conduct delivery, referral, and PNC at a community level. Midwives also supervised the activities of Bagan Sebika at the community level.

A total of 25 Bagan Sebikas worked in the five selected teagardens. They were assigned to conduct regular home visits to households and met to pregnant mothers. The Bagan Sebikas raised awareness on various issues such as birth preparedness, pregnancy complications, danger signs, and the importance of referral. If the Bagan Sebika identified any complicated or high-risk pregnancy case, they immediately communicated with the professional midwife over mobile phone. Professional midwives are usually experienced in identifying high-risk pregnancies through ANC checkups and previous medical history of the patient. Based on severity of the complication, the professional midwife along with the Bagan Sebika motivate family members of the high-risk pregnant mother to quickly refer to the higher referral centers including the UHC, district hospital and Teagarden central hospital. This counseling assists family members in being aware of the situation and the risk involved, provides them with information on where to seek care, and motivates them to make quick decisions. The Bagan Sebika also assists family members to organize transport, and assist them throughout the referral process. All these steps combined together helps decrease instances of delay in decision making [first delay] and transportation delay or second delay in the target population. In cases of severe complications, the midwives themselves might also help in organizing transportation.

The present study. The present study was conducted by a facility-based retrospective record review of all referral cases occurring at the referral hospital from the selected five teagardens from January to December 2016. According to 2016 records, a total of 72 high risk pregnant mothers were referred from these five teagardens to the referral centres (Upazila health complex, district hospital and teagarden central hospital). Each teagarden has both permanent workers (registered) and casual workers (unregistered). The teagarden authority provides referral

support for the registered mothers (workers), whereas, for the unregistered mothers, the referral support is very low or absent.

The professional midwives used a structured tool to document the referral history and treatment at the teagarden facilities and did follow up all referral mothers until outcome at the referral facility though Bagan Sebika. [Table 1].

To conduct the retrospective record review of referral centers, a structured tool was developed by the research team. The tool contained data on mother's particulars, current pregnancy history, antenatal care, complications, treatment history, referral details, preparedness of the facilities to **manage emergency obstetric complications** and delivery outcome. This review was carried out by the professional midwives working in the teagarden facilities. The record review included socio-demographics of the mother, medical condition of the referred mother, causes of referral, and view of the feedback of the referred mother and their family members [Table 2].

Data collection. A total of 72 referral case data were entered into **SPSS software** (version 24.0). After entry, all data was checked for missing data and consistency. Once checking was complete, the data was cleaned, and all analysis was done using software SPSS. For case scenario description, a total of 20% of cases (n=15) were purposively selected from the five teagardens (three cases from each garden). Midwives went to the household and organized a meeting for each of the cases. The Midwife invited the family members, relative and neighbours to the meeting to gather on responses from the family and community, as well as understand the referral linkage and service delivery in the facility. The Bagan Sebika in the community organized the meeting based on suitable date and time given by the community. Descriptive statistics were computed for all variables of interest. Frequencies were established to examine the demography of referred mothers, condition of mothers during referral, and documented causes of referral. The project support and remarkable findings of the

Table 1. Information of five teagardens selected for the study.

| Name of the sub-district | Name of the teagarden | Population | Distance from UHC (Km) | Distance from district hospital (Km) | Type of facilities | Referral centre | No. of referral cases in 2016 |
|--------------------------|-----------------------|------------|------------------------|--------------------------------------|--------------------|---|-------------------------------|
| Sreemongol | Amrailchara | 4641 | 20 | 45 | Hospital | Central teagarden hospital (Balisara Medical hospital), upazila health complex, Moulvibazar District Hospital, Medical college Hospital, Sylhet | 19 |
| | Rajghat | 6394 | 12 | 32 | Hospital | | 18 |
| | Khejurichara | 5171 | 11 | 31 | Hospital | | 5 |
| Kamalganj | Mirtinga | 6378 | 10 | 17 | Hospital | District Hospital, Moulvibazar | 19 |
| | Phulbari | 2876 | 3.5 | 25 | Dispensary | Upazila health complex, Kamalganj | 11 |

Table 2. Process of collecting information for case series studies.

| Process | Types of information collection |
|-----------------------|--|
| Record review | <ul style="list-style-type: none"> • Profession of Referred mother • Age of the Mother • Gravida of the referred mother • Period of Referral • Time of referral |
| Case stories analysis | <ul style="list-style-type: none"> • Support of the intervention • Description of remarkable referral cases |

cases were analyzed through review of the case stories collected from the teagarden facilities. Themes were identified after reading and re-reading of the case stories^{22,23} and finally thematic analysis was performed.

Ethics and consent

This study under “Bagan Mayer Jonno” intervention has been approved by the national ethical review committee of CIPRB (memo- CIPRB/ERC/2016/010). Verbal and written consent were received from each of the referred mothers before collecting the information for the study.

Results

From the review of records from 2016, Bagan Sebika identified the complicated mothers and immediately informed the project midwife. Then the project midwife decided whether the case needed to be referred. The project midwife also identified mothers as high risk during their routine ANC for referral. A total number of 72 complicated pregnancies (16%) were identified from a total of 450 pregnant mothers. These complicated mothers were identified at different stages during their antenatal visit, or during delivery, or immediately after delivery. Mothers informed the Bagan Sebika if any complication arose. Bagan Sebika also identified complicated mothers during their regular household visit. Then Bagan Sebika immediately informed to the project midwife. Professional midwives ensured immediate referral to the higher center after consultation, and coordinated with garden midwives, doctors and Bagan authorities. Unregistered workers in all cases directly referred to the Upazila or District facility, whereas registered workers were taken immediately to the garden’s existing referral system. In about 85% of cases, the transportation support was provided for referral of the complicated mothers, and of them in 75% of cases the Bagan Sebika (Volunteer) participated during referral of the mothers [Figure 1].

Age and occupation of the mothers

The referred mothers were mostly young. About 44% of mothers referred were in the age group 17–20 years, whereas 18% and 38% of mothers were from the age group of 21–25 years and 26–35 years, respectively. About 16.7% of referred mothers were housewives and the remaining were from other professions. Highest percentage (51.4%) of referral was among the unregistered teagarden workers (mothers), whereas only over 11% was registered teagarden workers. [Table 3].

Gravida and stage of the referred mother

39%, 54% and 7% of referred mothers were identified as 1st gravida, 2nd to 3rd gravida and 4th gravida. Most of the mothers referred were in the labour stage (76%), whereas 12.5% were referred during the pregnancy period, and 11.1% after the delivery conduction [Table 3].

Place and time of referral

With project support, about 60% mothers were referred to Upazila Health Complex and 28% referred to Sadar district hospital. Only 13% of registered mothers or dependent workers of the teagardens were referred to teagarden referral center [Figure 2]. The time range at which most of the mothers (about 42%) were referred was between 10 a.m. to 2 p.m., where usually doctors, nurses and midwives are available in the government facilities. The remaining referrals occurred at times when only nurses and midwives are available in the facilities. But about 28% and 30% of mothers were referred within the period of 6 a.m. to before 10 a.m., and after 2 p.m. to 8:30 p.m. which is the vital period when doctors or service providers may not be found at government facilities [Table 3].

Mode of delivery and outcome of referred mother

About 14% of referred mothers needed Caesarian section for complications and 86% were normal vaginal delivery conducted by a nurse or midwife in the referral center. 94% of mothers delivered livebirths and 6% delivered stillbirths (2) and intrauterine deaths (2) at referral facilities with the assistance of skilled health care providers [Table 3].

Cause of referral

Most frequent causes for referral were due to prolonged labour (31%) and after that pre-eclampsia (about 18%). Moreover, another cause of referral found were retained placenta with post-partum haemorrhage, premature rupture of membrane, severe anaemia, breech presentation, twin pregnancy and others (~11%, ~9%, ~7%, ~7%, ~4% and ~13% respectively) [Figure 3].

Delay to start treatment at referral center after complication arises

The delay includes first (decision), second (transportation) and third (treatment) delays, which started from the complication arising, up to receiving treatment. In about 46% of cases family members needed more than 4 hours to make a decision

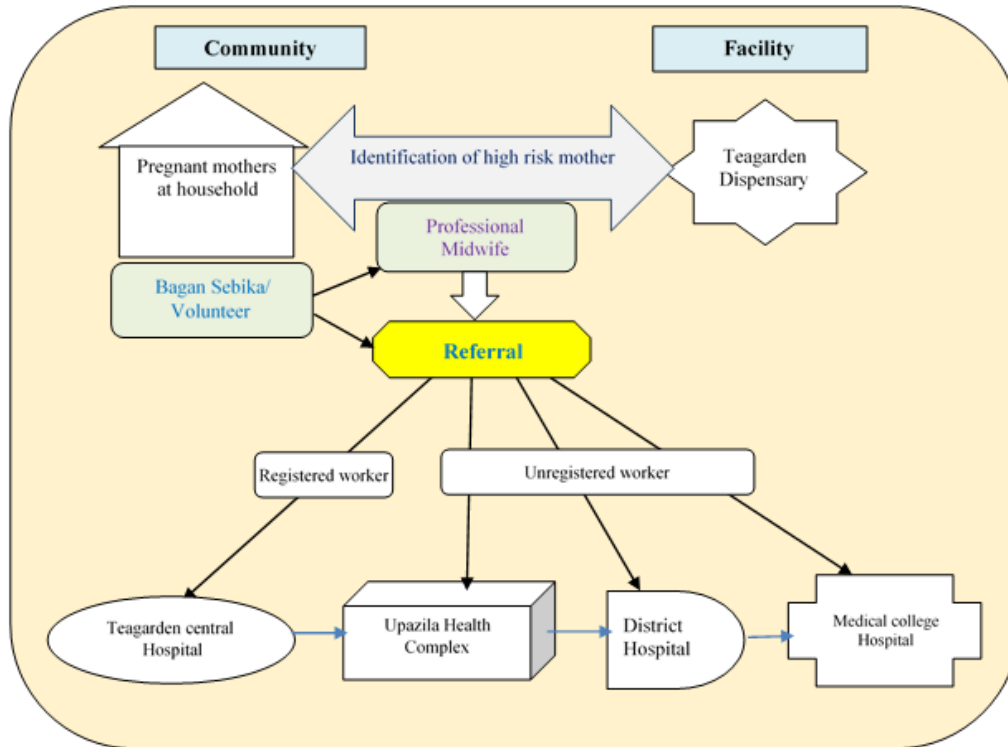


Figure 1. Referral process from the selected five teagardens to the higher referral centre.

Table 3. Referred mothers' characteristics.

| Characteristics | Number | Percentages |
|--------------------------------------|--------|-------------|
| Age of the mothers | | |
| 17–20 Years | 32 | 44.4 |
| 21–25 Years | 13 | 18.1 |
| 26–35 years | 27 | 37.5 |
| Gravidity | | |
| 1st Gravida | 28 | 38.9 |
| 2nd Gravida | 25 | 34.7 |
| 3rd Gravida | 14 | 19.4 |
| 4th Gravida | 5 | 6.9 |
| Occupation of the mothers | | |
| Registered teagarden Worker | 8 | 11.1 |
| Unregistered teagarden Worker | 37 | 51.4 |
| Housewife | 12 | 16.7 |
| Others (includes school teachers) | 15 | 20.8 |
| Period of referral | | |
| During Pregnancy | 9 | 12.5 |
| During Delivery | 55 | 76.4 |
| After Delivery | 8 | 11.1 |
| Referred from | | |
| Mother's home | 52 | 72.3 |
| Teagarden dispensary | 20 | 27.7 |
| When referred | | |
| 6 am- <10 am | 20 | 27.8 |
| 10 am- 2 pm | 28 | 38.9 |
| 2 pm- 8:30 pm | 22 | 33.3 |
| Mode of delivery of referred mothers | | |
| Normal Vaginal Delivery (NVD) | 62 | 86.1 |
| Caesarean section (CS) | 10 | 13.9 |
| Delivery outcome of referred mothers | | |
| Livebirth | 68 | 94.4 |
| Stillbirth | 4 | 5.6 |

as whether to seek care at a facility or not. Whereas about 60% cases reached from teagarden dispensary to the referral center (UHC) within one hour, and 74% cases women received treatment within one hour after arriving at the facility. Midwifery counseling as well as transportation support from the project influenced much in reducing the community delays mainly first and second delay [Figure 4].

Case scenario description

A total number of 15 cases were selected randomly out of 72 cases for in-depth analysis and case scenario description. These description includes the socio-demography of the referred mothers, condition of the mothers for referral, responses of

the family members and society, referral linkage and services delivery at referral centre [Table 4].

Discussions

The study revealed that among the referred mothers around 51% were unregistered workers who referred with the support of the project Bagan Mayer Jonno as they were not entitled to get any referral support from teagarden authorities. About 76% of mothers were referred during the period of delivery and 31% referred with the complication of prolonged labour. Most of the mothers (about 60%) were referred to the Upazila Health Complex and after referral about 14% mothers delivered by Caesarian-section at the facilities. A

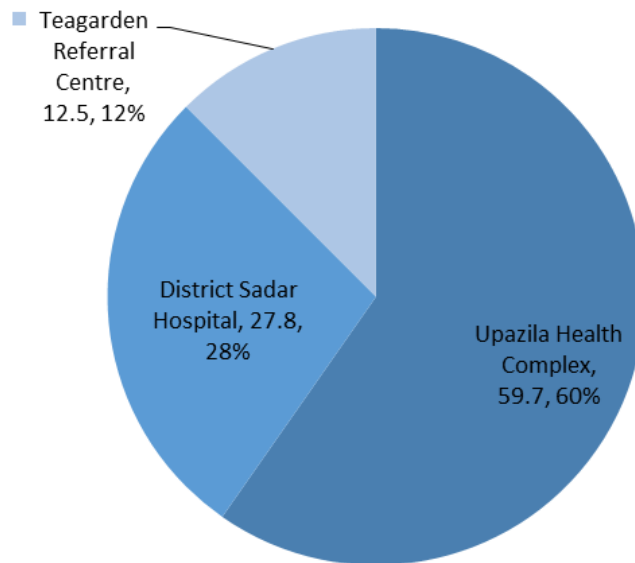


Figure 2. Place of referral of complicated women.

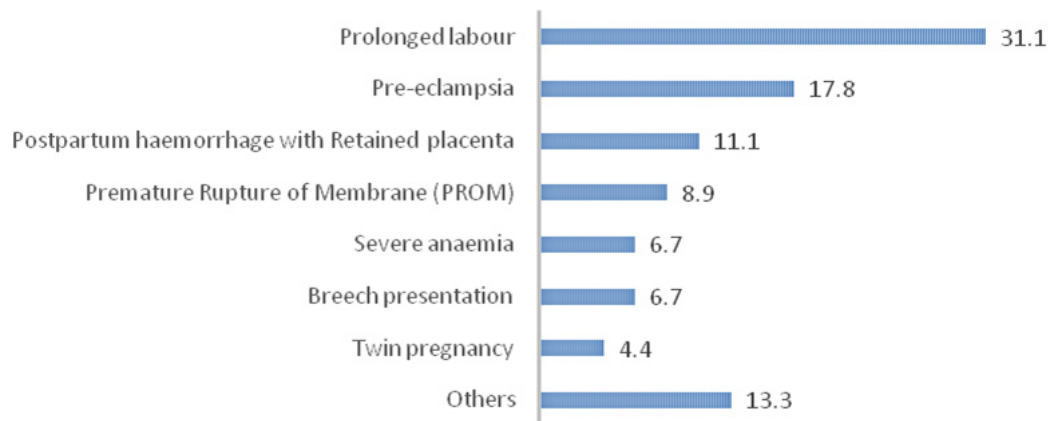


Figure 3. Distribution of referred mothers by cause of referral.

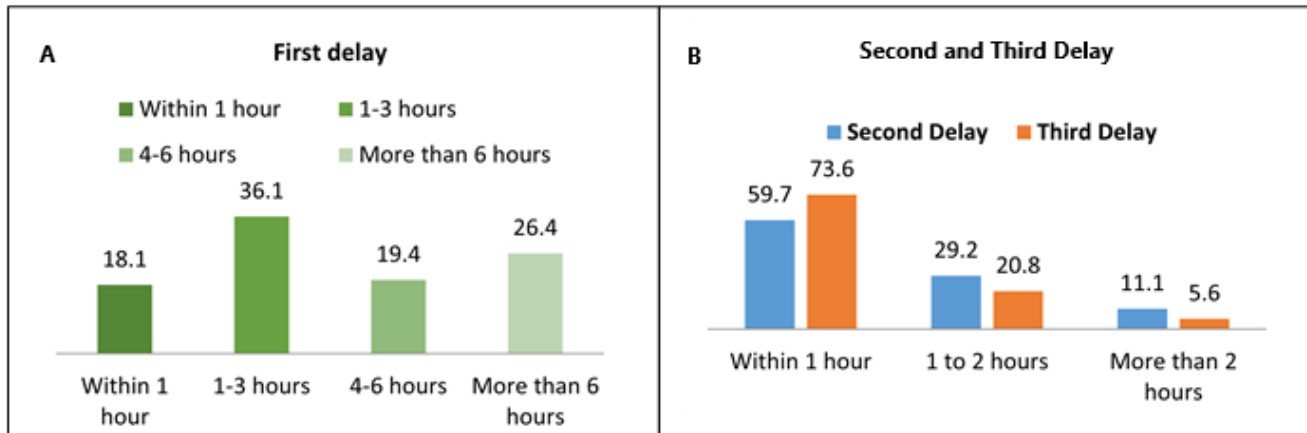


Figure 4. Analysis of the three delays reported for referral of complicated mothers. (A) First (decision) delay- delay indecision to seek care. **(B)** Second (transportation) delay- delay in reaching to the facility, Third (treatment) delay- delay in receiving treatment.

study conducted in rural Tanzania showed that about 28% of pregnant women were referred from primary level of care to tertiary level to ensure their better pregnancy outcome.

The same study also concluded that the most common referral complications found were multiparity (35%), young age of mother (30%), obstetric complications mostly due to prior history of caesarean section (12%), and previous existed prenatal risks like high blood pressure, severe anaemia etc. (12%)²⁰. On the other hand, our study found that 31% of mothers referred with prolonged labour, 18% with pre-eclampsia, 11% with post-partum haemorrhage (PPH) due to retained placenta, 9% with premature rupture of membrane (PROM), 18% with severe anaemia, breech presentation & twin pregnancy, and remaining 13% with other complications.

Proper transportation with cost support along with a good communication technology is the prime concerns in establishing an **effective referral**¹⁷. Our study is also consistent with the findings that almost all referral occurs with transportation support, along with extra assistance from a midwife or volunteer, ensure the lives of many vulnerable mothers. The counseling of the midwife about the severe condition of the mother, as well as its dreadful consequences, and assistance of volunteers during referral motivated the family to quickly make their decision on referral.

Our study showed that about 50% of referred mothers received treatment within 6 hours of referral and 10.6% within 2 hours. Addressing of second delay, or transportation delay, has a significant role in reducing maternal mortalities. Many studies showed that **referral transportation** should be available within 30 minutes of worsening condition of a mother, so that the complicated mother can be taken to a referral center as early as possible to initiate her treatment²⁴. A mechanism needs to be established for the proper utilization of easily accessible functional transport services, which could be either from government, or from a private referral transport services^{24,25}. Our study found that availability of transport support and assistance of volunteers from that teagarden enhanced quick referral, which consequently reduced the first and second delay.

This study found that quality ANC support by a midwife from respective gardens not only helped to identify high-risk mothers, but also further assisted the family to make a decision and prepare to delivery at a facility. Projections show that the Government of Bangladesh (GoB) already started midwifery education in all nursing institutes from 2012 and the GoB have the mandate to **continue this midwifery led service delivery system** until 2021, with the vision to serve hard to reach communities of the country. Another study revealed that to **ensure basic and life-saving intervention** to the patient, consistent support of a skilled staff should be

Table 4. Case Scenario description of the selected 15 referral cases.

| Case Number | Key scenario | What happened | Response in the family & Society | Referral linkage | Service delivery at facility |
|-------------|---|--|---|--|---|
| Case-1 | A 30 years old woman at 4 th gravida, 9 months pregnant, lives in Lalitla Basti. She is a permanent worker & her home is, 23 Km away from the referral centre. | The volunteer visited the mother's home & informed the midwife about her condition. She felt severe abdominal pain from the eighth month. At her 9th month of pregnancy she suffered from dysentery and gradually became weak. | The previous three babies were delivered at home by an untrained attendant. The family planned for conducting the delivery at home. <i>"I visited four times at the garden dispensary & received 7 iron tablet each time. I couldn't easily go to the hospital during my complication due to the distance & lack of vehicle from my home."</i> - Mother said | After complication, the mother was carried to garden hospital with the suggestion of the volunteer and Panchayat (committee consisting of 12-15 community leaders in a teagarden). The decision delay was 10.5 hrs. Volunteers carried the mother to garden hospital by CNG (Compressed Natural Gas) vehicle. Midwife confirmed the complication & referred the mother from garden dispensary to garden central hospital. Volunteer assisted to carry her to the central hospital by the garden car. | After three days of admission the mother delivered a livebirth normally at the garden central hospital with the assistance of a nurse. <i>"It would be difficult to save the mother's life if there was further delay to come to the hospital"</i> - nurse of the referral centre said |
| Case-2 | 35 years old pregnant mother at 3 rd Gravida. Married before 15 years. The couple are un-registered garden workers. | She suffered from severe anaemia. At 9 month of pregnancy a sudden ruptured membrane occurred. They called a traditional birth attendant for delivery. Gradually her condition became worse with no progression of labour. | The traditional birth attendant who lived to next village (TBA) tried for delivery for a long time. About one & half days passed after her labour pain & first stage become prolonged. <i>"No need to go hospital for delivery. I can assist the delivery at home."</i> -TBA said The brother in law of the mother informed the Volunteer after about 2 days of complication. | The volunteer motivated the family member for quick referral & carried her to UHC. Decision delay was 7 hours. The mother delivered a live baby in CNG when they reached close to health complex but the complication started with retention of placenta. Pregnant mother said <i>"I was very weak when my labor started, that is why I could not give much pressure. The volunteer advised my family member to bring me to hospital. I delivered my baby at CNG"</i> | At UHC the umbilicus was cut with septic measurement. After 2 hours when placenta was not removed then they referred the patient to Moulvibazar district Hospital. The patient reached at Moulvibazar Dist. Hospital accordingly and the placenta was removed there with proper management. |
| Case-3 | 26 years old 36-week pregnant woman of unregistered worker at 2 nd gravida. | Prolonged labour for about 14 hours. <i>"this mother is an unconscious mother. She didn't come for ANC during pregnancy."</i> - Midwife said | The family members didn't recognize the complication. Family members delay care seeking. Spiritual and cultural beliefs made them delay more | The mother reached the referral centre after 6 hours of complication had started at home. <i>"The volunteer motivated the family member for quick referral to facility from community."</i> - Panchayat member said | Volunteer carried the mother to UHC. Due to critical condition the mother was referred to District hospital from UHC & mother delivered a livebirth there with the assistance of nurse. |
| Case-4 | 25 year old unregistered pregnant woman at 1 st gravida. The mother was at nine month of pregnancy. | The mother had high blood pressure with breech presentation of the baby. | The family member ignored the complication of mother. But panchayat member motivated them for referral. <i>"if we could not be informed about the condition of this mother by the volunteer at the proper time, the mother couldn't be referred"</i> - Panchayat said | Husband of mother informed volunteer about labor pain started at home. The volunteer informed the midwife about the condition of mother. Decision delay was about 3 hours. Volunteer carried the mother from home to garden hospital. The midwife referred the mother to UHC. Transport delay was more than ten hour. The mother further referred to district hospital. Volunteer assisted the family to go to hospital by CNG. | The family member decided to admit mother in a private clinic due to the critical condition of mother & baby. Then doctor conducted the delivery by C-section |

| Case Number | Key scenario | What happened | Response in the family & Society | Referral linkage | Service delivery at facility |
|-------------|--|--|---|--|--|
| Case-5 | 28 years old pregnant woman at 2 nd gravida with 9 month of pregnancy received 4 ANC from teagarden dispensary. She was an unregistered worker. | The mother was identified as high risk during ANC as the complication of breech presentation, twin pregnancy and pre-eclampsia | The Traditional birth attendant of that community participated as attendant of this pregnant mother with the suggestion of volunteer. <i>"We did not have any money in our hand and as I am unregistered worker, the garden will not provide anything for me."</i> - husband of the mother said | Volunteer of the garden identified mother with complication during her regular home visit. Detailed information of mother was collected previously by the volunteer. Then the volunteer immediately communicated with midwife & midwife came and identified her as high risk mother & referred to UHC. | The mother delivered livebirth by C-section in UHC conducted by the doctor of the facility |
| Case-6 | A 25-year-old unregistered pregnant worker at 2 nd gravida lived in teagarden. Her husband is also a casual worker. | During 30 weeks of her pregnancy her labour pain started. After three days of labour pain she informed family members. Deteriorating mothers condition | Their financial condition was so poor that's why her husband could not bring her in hospital. Her condition getting worse and her life and the baby's life was in danger. | After 3 days of labour pain they informed the Volunteer. After counseling with the husband and the other family member and assurance of covering of transportation cost he allowed her to be brought to the UHC. | The mother delivered normally at UHC with the assistance of nurse. <i>My son may not survive if I stay at home and delivery was performed at home"</i> . mother said |
| Case-7 | 17 years old non-worker pregnant woman at 9 month of pregnancy with 1 st gravida. Her husband is an unregistered worker. | At 36 week of pregnancy the membrane was ruptured. She also had breech presentation of the baby. | The mother received 4 ANC from bagan dispensary provided by midwife. She wanted to conduct delivery at facility but father in law did not | <i>"I had labour pain for many hours, Midwife came to my home and she found that it's not possible at home. She said to immediately go to UHC."</i> - Mother said | The mother delivered normally a livebirth in UHC with the assistance of a doctor |
| Case-8 | 18 years old non-worker mother at 1 st gravida with 9 month of pregnancy lived in garden. Her husband was a casual worker. | Prolonged labour with more than 15 hours. | The family member decided to conduct delivery at home by TBA. Lack of transport, distance and travel time to reach health facilities, lack of appropriately trained staff and negative attitudes of health workers. | Then the volunteer communicated with the midwife. They motivated the family member for quick reference of this mother to UHC & said about the transport cost support. Then mother was carried to UHC by CNG. | C-section delivery conducted by the doctor in UHC. Doctor of the referral centre said <i>"It is really a complicated case. If the mother had not arrived on time then the life of mother & neonates would have been in danger."</i> |
| Case-9 | 20 years old pregnant housewife at 1 st gravida with 9 month of pregnancy. | The mother suffered from anaemia. After delivery at garden hospital the neonate was suffered by birth asphyxia | Complication was not recognized as seriously by the family members. Family members delay care seeking Spiritual or cultural beliefs may reinforce delay | Volunteer carried the mother from home to garden hospital for delivery conduction. After delivery, the midwife referred the mother & neonate for complication to UHC. | Mother delivered at garden hospital by midwife and then referred to UHC; after 2 days of treatment from UHC again referred to district hospital. after 1 day treatment from district hospital the mother & neonates returned home safely |
| Case-10 | 19 years old un-registered worker pregnant woman at 3 rd gravida. Her husband was also an un-registered worker | Midwife conducted the delivery at home but placenta was not removed. The mother was referred for Retained placenta | The family member wanted to conduct delivery at home due to their family tradition <i>"This mother didn't come at facility for ANC during pregnancy. Her husband was also ignorant on MNH care at facility"</i> . Midwife mentioned | Guardians informed volunteer after 12 hrs of labour pain & she informed to midwife. Midwife conducted delivery at home but when placenta was not removed she carried the mother immediately to district hospital. | After admission in district hospital the placenta was removed by doctor & nurses. The mother then safely returned home after one day observation. |

| Case Number | Key scenario | What happened | Response in the family & Society | Referral linkage | Service delivery at facility |
|-------------|--|---|--|--|--|
| Case-11 | 28-year-old non-worker pregnant woman at 3 rd gravida. | The mother received 2 ANC during pregnancy. She had the complication with preeclampsia, severe head pain & weakness | Family member had negative attitudes about the behavior of health worker. "I couldn't talk properly about my last menstruation period which made it difficult to proper provide EDD calculation. I even didn't follow the advice of Bagan Sebika and Midwife didi and didn't inform of my delivery pain on time. So, I had to face lots of problem. ". The referred mother mentioned | Midwife identified the mother at high risk & carried her to sadar hospital, and admit, getting medicine support from social welfare office, routinely follow-up. | After getting proper treatment the mother safely returned to home |
| Case-12 | 19 years old pregnant mother at first gravida. She was an unregistered worker. | Severe pre-eclampsia during pregnancy. "I didn't recognize that my wife had such complications. She developed swelling of legs and face. Our new Didi working in garden identified the problem and immediate carried my wife to District Sadar Hospital." Husband of the mother said | Mother mentioned that during pregnancy she visited only two times in hospital. I didn't indicate the importance of going to the hospital for checkups. | The mother referred for headache & blurred vision to district hospital. The midwife carried the mother to referral centre. Doctor conducted the checkup & suggested to take medicine properly. | "Doctors said that the patient condition is not good. Patient condition got worse due to severe anaemia and said to arrange blood. Midwife didi arranged the blood to save my wife's life". Husband of the mother said |
| Case-13 | A non-registered worker of 29 years of age was referred from the teagarden at her 4 th gravitas lived in teagarden. | The mother complication includes severe anaemia, edema and preeclampsia. At 9 month of pregnancy the mother had prolonged labour & placenta previa | The family member first carried traditional birth attendant after labour pain. When she failed then after 15 hrs they communicated with volunteer. "I had no money to transfer my wife. New Didi ensured me that transportation cost will be given. The volunteer went with my wife. ". Husband said | The volunteer identified the complicated mother & immediately communicated with Midwife. Then the midwife came and advise to refer the mother immediately after examination. She also motivated the family member for taking quick decision of referral. Volunteer immediately communicated with the CNG driver and participated with the mother during referral and stay with her up to safe referral to home | "My child was safely delivered after two days hospital stay. If I didn't get such support, my wife's and child life might have been under threat"- husband said |
| Case-14 | 20 years old registered worker at 2 nd gravida | The mother received 4 ANC from teagarden dispensary provided by midwife. At 9 month of pregnancy she had high blood pressure with Antepartum haemorrhage and trace Urine Albumin (2+) & previous history of PPH & prolonged labour. | Guardians of mother informed midwife & volunteer immediately at labour pain started. Midwife referred her to UHC Kamalganj due to complication. Panchayat president was accompanied with mother during referral. | The family members were concern to carry the mother at UHC immediately after referral. The nurse & doctor provided special care of the mother at UHC. After 6 hrs after admission the mother delivered normally a live birth with the assistance of nurse. | Continuous motivation of Midwife didi with the transportation support made my family quickly decide to go to the facility. I am very much thankful to this project for its support. "- mother said |
| Case-15 | 20 years old pregnant mother at 1 st gravida is an unregistered worker in the garden | The mother received 3 ANC from garden dispensary provided by midwife. At her 8 month of pregnancy she had the complication of membrane rupture and fluid discharge. | Family member immediately communicated with volunteer after complication arises as they informed previously. | Midwife went to mother's home after getting information & referred the mother to district hospital for complication. Volunteer carried the mother to district hospital. | Ultrasonogram was conducted & admitted in district hospital. The mother delivered a live birth by C-section with assistance of doctor & nurse. |

available until the patient reaches referral facilities. However, several studies stated that it is difficult to pre-determine complication occurrence during pregnancy or childbirth^{17,24}. The government mandate to continue the midwifery led service delivery until 2021, it is therefore necessary to regularly review the referral indicators and counsel on complication readiness, as well as birth planning by a health attendant to improve compliance on maternal referral²⁰.

Conclusions

Early detection of complicated mothers and quick transfer to the referral center can ensure the survival of many mothers and neonates. The GoB has plans to scale up the unique midwife led service delivery (both basic and emergency health care services) system to support high-risk mothers of under privileged communities including the teagardens. The teagarden board, owners of the teagardens and local government, including policy makers of every level, must come forward to work together in finding out the best possible way to support the mothers of teagarden. At the community level, professional midwives play a key role in timely referral of a complicated mother to the facility. An integrated approach based on existing government health care delivery system with support from garden health facilities for timely referral of complicated mothers can be beneficial in reducing

maternal and neonatal mortality in Bangladesh which in turn will be effective in reaching sustainable developmental goal on time.

Data availability

Data is stored at the CIPRB. Due to sensitivity of the data (contains identifying information), permission is required from the Ethical Review Committee (ERC) of CIPRB, Dhaka, Bangladesh for sharing data with a third party. Data can be requested from the CIPRB, who will contact the Ethical Committee to gain approval to share the data. The conditions for gaining data access are a formal request with a clear objective and formal permission from the Ethical Committee. Please contact the corresponding author in order to request the data though email at info@ciprb.org.

Competing interests

No competing interests were disclosed.

Grant information

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Open Peer Review

Current Referee Status:



Version 1

Referee Report 05 April 2018

doi:10.5256/f1000research.14779.r32400



Munia Islam

Save the Children (Bangladesh), Dhaka, Bangladesh

- The article is very well articulated and the findings are supporting the discussion and conclusion very strongly. Additionally, it gives deep insight and shares positive experience of a community based referral intervention in the area of maternal health to a pro-poor, marginalized and isolated community. However, minor language editing will make the article more scientific, lucid, authentic and reader friendly. For example, the author could use the word 'explore' instead of 'evaluate' in the last line of the introduction part in the abstract.
- Methodology in abstract part needs reorganizing and rephrasing where qualitative method is described. The introduction of the methodology section could commence like this-
 - o "This case study is designed as a mixed-methods retrospective assessment to explore the....."The body of the method section in the abstract can be described in this way,
 - o "In-depth interviews and retrospective document were carried out to Thematic analysis was performed to analyze the qualitative data."
- The Bangla phrase, "*Bagan Mayer Jonno*" should be mentioned in English ("garden for mothers") for the non-Bengali speakers e.g.
- Method section in the main article needs to be elaborated and re-organized to make it reader friendly and self-explanatory. This section needs revision to maintain cohesion and coherence.
- Other than midwife is there any provision of additional service providers in the center inside the tea garden?
- Do midwives conduct home delivery?
- How do they maintain referral record? How is it documented?
- What does mean by the term 'professional midwife'?
- Data processing procedure is described under 'data collection' sub-heading. It should be renamed as 'data analysis' or 'data processing'. This section needs to be revised to address the cohesion and coherence also.
- Using the term, 'case study' instead of 'case story' will shape it more scientific.
- Need elaboration in the data analysis of qualitative methods. Need to mention, especially what types of qualitative method are used here. Sometimes, 'case story' and sometimes 'IDI's were mentioned, but the reader may feel difficulty to understand.
- Case scenario description' part may go to the method section. Otherwise, you need to rephrase the sub-heading such as 'findings from the case studies' or rewrite the body of the paragraph in line with the previous sub-heading, so that it could be understood that you are describing result, not the process or method.
- The study reveals many opportunities to reduce the maternal mortality and morbidity of tea garden mothers. However, does this study uncover any challenges or obstacles that need further

attention? Additionally, one of the recommendations should be 'the scale-up of this intervention as a model for other marginalized communities in remote areas, who are experiencing 'poor' maternal health services.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Referee Expertise: Qualitative Research in the area of maternal, neonatal and child health, nutrition and family planning

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Referee Report 03 April 2018

doi:[10.5256/f1000research.14779.r32399](https://doi.org/10.5256/f1000research.14779.r32399)



Edwin van Teijlingen 

Centre for Midwifery, Maternal & Perinatal Health, Faculty of Health & Social Sciences, Bournemouth University, Bournemouth, UK

Timely referral saves the lives of mothers and newborns: Midwifery led continuum of care in marginalized teagarden communities – A qualitative case study in Bangladesh

This is an interesting article on the workings of midwifery, especially referral by midwives, in a district in Bangladesh. The case study approach is appropriate but the description of the Methods is slightly odd. This is a typical case study based on secondary analysis. But the authors do not mention 'secondary analysis', let alone give a reference to a methods paper /textbook on the topic. Most record studies are retrospective, i.e. researchers using the record data after it was written. "A qualitative case study design by reviewing records retrospectively..."

Also it is possible that authors used a Content Analysis (Krippendorff 2004) rather than a 'general thematic analysis'?

The Discussion needs a section on the Strengths & Limitations of this particular way of using Secondary Analysis in a Case-Study Approach. Any maternity record has incomplete data, unclear recordings, etc. None of this mentioned in the text.

Abstract

The expression "76.4% of mothers were referred to conduct delivery at facilities," is not quite right 'women perhaps don't conduct deliveries, you can say women deliver, or women give birth

I read the Abstract and wondered why randomly selected in the sentence: "In depth analyses was also performed on 15 randomly selected cases to understand the facts behind the referral." I would have expected purposively selected case, namely ones that highlight particular aspects of the case the authors would want to highlight/stress. But when I came to page 4 the authors state that the 15 cases are purposively selected. BUT on page 7 of 15 the authors repeat the Abstract "A total number of 15 cases were selected randomly out of 72" This needs to be corrected.

Introduction

Perhaps the reader needs a little bit more information about the state of midwifery in the country. In Bangladesh the three-years diploma curriculum following global ICM standards was introduced in 2010 (Bogren *et al.* 2015). It introduced a six-months post-basic advanced midwifery programme for graduate nurses. So what was the training of the midwives in this study? Where they post 2010 qualified or where some midwives trained prior to this date?

Grammar, style & typos

The authors use a mixture of American and British English. I would have preferred British English. They mix words like 'labour' (=British English) and in the Abstract 'hemorrhage' (=US English) and in the main text on page 3 'haemorrhage' (=British English)

In the title (and elsewhere in article) I would use a hyphen in '... newborns: Midwifery led continuum of ...' with a hyphen, i.e.: 'Timely ... and newborns: Midwifery-led continuum of ...'

Similarly in the Abstract and throughout I would have expected a hyphen in: "pregnancy related complications..." to read: "pregnancy-related complications..." Also page 3 "few mothers sought facility based care during" should be "...sought facility-based care ...".

It is perhaps ugly to start a sentence with a number, there are two cases in the Abstract "the facilities. 76.4% of.." AND "section. 94% deliveries..."

In Abstract I think plural is needed in the sentence "majority of baby's as well as mother's lives" to read: "majority of babies' as well as mothers' lives...."

In the Abstract I think in the word 'only' in the sentence "... and only 6% were stillbirths..." is a judgement by the authors perhaps not shared by the women/families who had a still birth. Remove the word 'only'! Page 3 of 15 there are words glued together, e.g. "maternaldeaths"

You could argue that all mothers are complicated. In the Abstract you should state something like "72 mothers with pregnancy-related complications" instead of "72 complicated mothers"
Remove capital in "The Midwife..." page 4 of 15.

References:

Krippendorff, K. (2004) Content Analysis. An Introduction to its Methodology, London: SAGE
Bogren, M.U., Wigert, H., Edgren, L., Berg, M (2015) Towards a midwifery profession in Bangladesh – a

systems approach for a complex world, *BMC Pregnancy & Childbirth* 15:325

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Partly

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Referee Expertise: Maternity care, South Asia, sociology of health & illness, qualitative research

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Referee Report 28 March 2018

doi:[10.5256/f1000research.14779.r32403](https://doi.org/10.5256/f1000research.14779.r32403)



Helen Elsey

Nuffield Centre for International Health and Development, University of Leeds, Leeds, USA

This is a valuable paper providing in-depth information on pregnancy related complications and emergencies in the context of Bangladesh. It draws on the global and Bangladesh literature and situates the study well within the existing evidence.

The main concern with the paper the presentation and description of the methods. The study is described as a 'qualitative case study'. The authors have completed a review of record of women with complications during pregnancy and delivery and present the quantitative findings of this review. They have then randomly selected 15 cases for in-depth interviews. This sounds more like a mixed methods study. Greater clarity on the qualitative interviews is required i.e. how were these conducted, by whom, where, was their an interview guide, did the women consent? The decision to randomly select women needs to be justified; with a mixed methods design, the authors could have purposively selected women from their case notes to explore particular issues in the interviews.

Greater clarification on how the interviews were analysed: were they audio-recorded and transcribed?

how did they come up with the 5 headings in the table - are these the emerging themes from the qualitative analysis?

While Table 4 is interesting and gives a good insight into the cases, the paper would be greatly strengthened if this descriptive presentation could be synthesised and reported in the results. This synthesis of the key issues emerging from the interviews should also be included in the abstract. The quotations provided in Table 4 come from various people, not just the women e.g. TBAs, nurse, panchayat etc. Does this mean these individuals were interviewed? if so details of the methods used for these qualitative interviews also need to be given.

Further details on the socio-economic situation of the tea gardens would help readers understand the context.

Acronyms and Bangladeshi-specific words should be spelt out for an international audience.

This has the potential to be an interesting and valuable paper, but greater clarity on the qualitative methods and analysis is required before being indexed.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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