



THE USE OF A MODIFIED VERSION OF PHOTOVOICE TO IDENTIFY MATERNAL DIETARY CONSUMPTION ENABLERS AND BARRIERS IN NORTHERN BANGLADESH

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ABSTRACT

Purpose: To describe what maternal nutrition means to pregnant women living in rural areas of northern Bangladesh.

Design: Photovoice methodology was modified and used in two villages in northern Bangladesh between June and July 2012. Eight skilled community nutrition volunteers were trained participants ($n = 10$) on the use of a digital camera. Participants used digital cameras to record their individual views and experiences in relation to the research question “what does maternal nutrition mean to you?” Cameras were collected and pictures printed. The participants selected 98 photographs. The community nutrition volunteers led participants through an in-depth interview process where the photographs were used to evoke a narrative. Data were analysed qualitatively using thematic analysis.

Findings: Eight major themes emerged: every day foods consumed during pregnancy; liked foods influence dietary consumption; household food production influences dietary consumption; household food production provides both sustenance and income; need for a cash income in a subsistence community; family structure influences dietary intake; understanding that ‘nutrition’ is important though not sure ‘why’ and support provided by non-governmental organisations.

Research implications: Findings highlight that maternal dietary consumption is influenced by social, cultural and economic factors. Community-based nutrition interventions require nutrition-specific and sensitive approaches to address the root causes of undernutrition.

Keywords: nutrition/malnutrition; pregnancy; qualitative research; Asia, South/Southeast; photography/photovoice.

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INTRODUCTION

Appropriate nutrition during pregnancy is essential for the survival, growth and development of the offspring (Bhutta et al., 2008; Black et al., 2013). Inadequate dietary protein and energy intake during pregnancy is a major problem in many low-income countries¹. Bangladesh has among the highest rates of maternal and child undernutrition globally. According to the 2012 Demographic Health Survey, in rural Bangladesh extreme poverty² is three times higher than in urban areas, women are less likely to access antenatal and postnatal services, and children suffer from higher rates of chronic malnutrition (stunting) (NIPORT (Bangladesh) et al., 2009). In Bangladesh, 43% of children under 59 months are stunted (NIPORT (Bangladesh) et al., 2009), low birth weight affects one in five children (Ahmed et al., 2012) and one

in three women are undernourished (defined as a Body Mass Index <18.5) during pregnancy (NIPORT (Bangladesh) et al., 2009). Maternal undernutrition increases the risk of poor foetal growth (Black et al., 2013). A fifth of childhood stunting may be attributable to poor foetal growth as shown by being born Small for Gestational Age (SGA) (Black et al., 2013).

The causes of maternal undernutrition are multifaceted. Maternal nutritional status is influenced not only by dietary preferences, but also by underlying conditions that affect household food security, care practices and access to health services such as political, economical, cultural and environmental structures (UNICEF, 1990). While food supplementation during pregnancy is proven to have a positive impact on birth weight (Imdad and Bhutta, 2011; Ota et al., 2012), understanding the context-specific root causes

¹The World Bank: Country and lending groups. Washington: World Bank; 2013. [17 July 2013]; Available from: <http://data.worldbank.org/country>.

²Defined as earning less than \$1.25 per day by the World Bank. See Ravallion et al. (2009) for further information on how the \$1.25-a-day international poverty line was derived (Ravallion et al., 2009).

of maternal undernutrition is essential for addressing systemic barriers to healthy eating (UNICEF, 1990).

In Bangladesh, strong traditional practices influence maternal food consumption (Shannon et al., 2008). Bangladeshi society is steeped in traditional beliefs, social and cultural structures and is staunchly patriarchal. Dietary taboos and food aversions are widely practiced, limiting the dietary consumption of pregnant women (Shannon et al., 2008). Women traditionally eat last at a meal, resulting in the smallest share (Shannon et al., 2008). While the purdah system of confining a woman to the home appears no longer common (Sobehart, 2009), women generally remain voiceless in household decision-making. Despite high levels of nutrition knowledge, the patriarchal society limits foods consumed, access to healthcare, access to community events and livelihood activities (Shannon et al., 2008).

This article uses a modified version of photovoice to examine the daily environment and experiences that pregnant Bangladeshi women experience, in and outside of the home, influencing their food choices. The selected communities had no prior exposure to photovoice, and a review of literature suggests that this was the first use of photovoice for nutrition research in Bangladesh (Martin et al., 2010).

The aim of this study presented here was to describe what maternal nutrition means to pregnant women living in rural areas of northern Bangladesh. These findings provide a deepened understanding of nutritional barriers and enablers for women in this context that will be used to inform future tailored nutrition interventions appropriate for this target audience.

METHODS

Photovoice

Photovoice methodology was modified and used, between June and July 2012, in northern Bangladesh. Photovoice is a qualitative action-oriented research method developed in the early 1990s (Wang and Burris, 1997). Photovoice enables women to document their daily lives through the use of photographs, and become aware of their environment to identify how

they, as an individual, can contribute to change (Catalani and Minkler, 2010). The method draws from the theoretical literature on empowerment education for critical consciousness as developed by Freire (1979), feminist theory as defined by Weiler (1988) and community-based approaches to documentary photography as defined by (Wang and Burris, 1994). The notion of education for critical consciousness empowers women to critically analyse issues in their lives and to identify shared issues that may lead to social change. Feminist theory draws attention to the subjective experiences of a woman, while recognising this experience and promoting political action. Documentary photography, has its underpinnings in photo elicitation and ethnography (Yochelson and Riis, 2001), using imagery to share a participant's story. Together, the three paradigms form a theoretical framework that enables and empowers women to share their experiences about a particular concern and to contribute to political change.

Despite being developed in a lower-middle income country (Wang and Burris, 1997) and being widely used as a method in health and public health research across high-income countries (Catalani and Minkler, 2010), photovoice has not been widely used in nutrition research in rural, low-income country contexts (Martin et al., 2010). The photovoice process consists of three main components

1. photovoice training
2. data collection and participatory analysis and
3. action.

The data collection and participatory analysis component consists of three stages which include selection (photographs to be analysed), contextualisation (photographs used to evoke a narrative in a focus group setting) and codification (participants identify issues, themes or theories) (Wang and Burris, 1997). Based on the country and socio-cultural context, we modified two components of the photovoice method to make it reflexive and inclusive ensuring that all participants had the opportunity to express themselves. Our first modification was to the training component, while the second modification was a participatory analysis component (for contextualisation and codification). The procedures section of this article discusses the modifications in more detail.

Setting and participants

The study was conducted in two villages, of a rural district in northern Bangladesh. The villages were purposively selected based on prior inclusion in a larger maternal nutrition supplementation program involving 12 villages located in the same geographical region of Bangladesh. We did not calculate a sample size as all identified pregnant women in the selected villages were invited to participate in the study. Women were:

1. confirmed to be pregnant and
2. between 14 and 48 years age.

This project had human research ethical approval from the James Cook University (Australia) Ethics committee (H4498) and the Bangladesh Medical Research Council. Trial registration: ISRCTN97447076.

Recruitment

Trained community nutrition volunteers used a snowballing approach identifying pregnant women first through community discussions, and then with participants identifying other women believed to be pregnant. Women were given a brief overview of the project and for those willing to participate, the volunteer verified that the inclusion criteria were met. The community nutrition volunteer read aloud the participant information sheet and provided the women with a copy in their local language for them to keep as part of the process of obtaining written consent to participate.

A total of eight community nutrition volunteers and two community nutrition volunteer supervisors participated in photovoice training, and then trained 10 participants. Of the 10 participants, eight completed the photovoice process. Two individuals did not take any photographs for unspecified reasons and ultimately withdrew from the project.

Reflexivity

The author had existing relationships with the communities because of prior research and did not engage with the participants during the training and data collection phases of this study as she recognised that being an outsider to the communities influenced participation of participants. To address this potential bias, existing

female community nutrition volunteers, who had former relationships with the participants, conducted all training and interviews. Volunteers, had a minimum of a primary-level education, and outside of the scope of this research, provided nutrition advice and referrals to pregnant women and mothers in their communities. For the purpose of this research, all volunteers participated in photovoice training (description below) prior to the commencement of this study.

Procedures

Figure 1 illustrates the modified photovoice process as used in this study. The first component of photovoice methodology recommends building the capacity of participants on photography prior to collecting photographs (Wang and Burris, 1997). Photovoice methodology states that training can be tailored to a community's specific goals, culture and priorities, and recommends the delivery of training programs through the use of facilitators. The literature shows that research emphasising capacity development reported higher quality participation (Catalani and Minkler, 2010). The researchers developed the capacity of the community nutrition volunteers so that the community nutrition workers could then train and work with the participants. This was required to minimise outsider researcher bias and to increase capacity of the community nutrition volunteers already working with the participants (Green and Thorogood, 2004). The training of community nutrition workers was held over a one-day period. Two nutrition supervisors attended the training to monitor the work of the community nutrition volunteers and to provide support, as required. The training consisted of an overview of photovoice; a project description; overview of the research question; the ethics of photography; the mechanical use of a camera; and the basics of photography (such as indoor and outdoor use).

The community nutrition volunteers then trained the participants. Community nutrition volunteers asked the participants to take photographs to respond to the question "what nutrition means to you". The volunteers provided each participant with a simple "point and shoot" MiGear JNR – VGA digital camera during the training. A preview screen allowed the participant

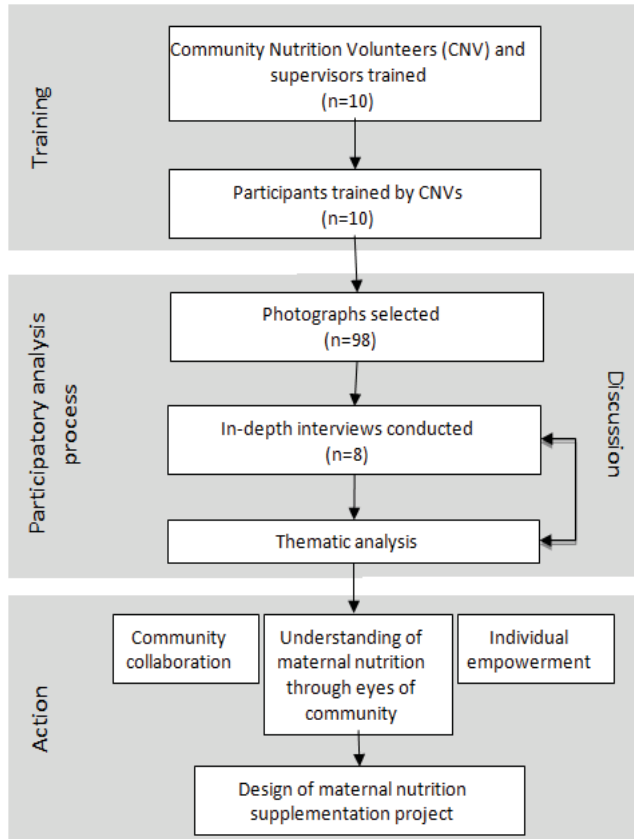


Figure 1 Modified photovoice process flow-diagram

to check their photo before taking it. The camera had no option to delete photographs once taken, and had a limited space of up to 52 VGA images. Technical advice was minimised to give freedom to the photographer, as recommended by Wang and Burris (1997). The cameras were collected after a 24-hr period.

Based on earlier research in these Bangladeshi communities it was found that semi-structured focus groups had not created an encouraging environment for the participants to freely share their thoughts. While questions were open-ended and probing techniques were used, the social structure limited participation. Thus, participants were invited to discuss their photographs through one-on-one in-depth interviews with the community nutrition volunteers. The volunteers were provided with an interview guide to assist with the interview. All participants completed the in-depth interview process within a week of cameras being collected, and the duration of interviews ranged from 20 to 35 min.

The in-depth interviews replaced Wang and Burris (1997) recommended focus group discussions, thus modifying the participatory analysis component (contextualisation and codification, respectively) of the photovoice process. This modification has been tried before in the USA (Baker and Wang, 2006). As a result of the use of in-depth interviews, the codification stage of the photovoice participatory analysis process was also modified. Emerging issues, themes and theories across participant photographs were not discussed in focus group discussion settings. Photographs were printed and in the in-depth interview setting at a local community space, participants selected from their own photographs, those to be included in the research. In total, the participants selected 98 of 124 photographs. The mean number of selected photographs per participant was 12, and ranged from 6 to 21. The photographs were used to evoke critical reflection through dialogue, and participants identified both the subject and the meaning of the photographs. All interviews were

audio-recorded and transcribed in Bangla, and later translated into English. All English transcripts were back translated into Bangla, and confirmed with the volunteers. Captions were extracted from the transcripts to accompany each photograph.

The primary author used thematic analysis as the qualitative analytic method to analyse and interpret the datasets (Liamputtong, 2007; Liamputtong and Liamputtong, 2013) using Microsoft Word®. This approach assisted to identify, analyse and report patterns within data. Qualitative analysis software was not used. Datasets were allocated initial labelling that generated singular or multiple codes (Green and Thorogood, 2004). These codes were reorganised by emergent themes. Themes were revised, analysed, redefined and renamed through discussion between two authors, and then with the community nutrition volunteers to ensure accuracy of data interpretation. While Wang and Burris (1997) recommends verification of emergent themes through participant discussion, we were unable to involve the participant because of in-country conflict limiting travel to remote areas. Therefore, emergent themes were discussed with the community nutrition volunteers that conducted the training and facilitated the in-depth interviews with the participants. To ensure comprehensive reporting of this article, we used the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (Tong et al., 2007).

RESULTS

In total, eight major themes emerged:

1. everyday foods consumed during pregnancy
2. 'liked' foods influence food intake
3. household food production influences food intake
4. household food production provides both sustenance and income
5. need for cash transfers in a subsistence community
6. family structure influences food intake
7. understanding that nutrition is important though not sure why and
8. support provided by Non-Governmental Organizations (NGOs).

Theme 1: every day foods consumed during pregnancy

Every day foods consumed by pregnant women emerged as a prominent theme in the participants' photographs and stories. The types of food referred to by the participants varied with the exception of rice. Rice was referred to as a staple grain and was shown to contribute toward the bulk of each meal. While the type varied, all participants referred to the daily consumption of fruit. Participants referred to fruit as a component of main meals, as well as snacks. The first meal of the day was referred to by participants as consisting of one of the following combinations

1. rice with fried potato
2. puffed rice with mango or
3. puffed rice with jackfruit seeds.

The second meal was described as a larger meal of the day, and leftovers contribute toward an evening meal. This second meal consisted of foods such as rice, green vegetables (amaranth, pumpkin-leaf and spinach), pumpkin, okra (ladies finger) and corn. Commonly consumed fruits included banana, guava and mango. A woman described the versatility of one food item, jackfruit, where it could be consumed as a fruit for breakfast and the seeds in dhal or curry: "I prepare puffed rice in the morning with boiled jackfruit seeds for my family. We keep the jackfruit seeds after eating the fruit. We cook it as a dhal and sometimes as a curry".

Theme 2: 'Liked' foods influence dietary consumption

Foods consumed by women are influenced by foods that are 'liked'. Participants shared that foods were 'liked' based on taste, identified as nutritious, and availability. Interviews with the participants identified that preferred or 'liked' foods were eaten on a frequent basis and more likely to be produced at a household level. For example, a pregnant woman took a photograph of her mango tree and shared (refer to Figure 2).

I like mangoes very much. The more mangoes in my tree, the more my happiness will be; I can't tell you how happy I will be. Fruit is a very good thing, taking fruits keep both mother and children healthy, and therefore we take fruits. Participant #2



Figure 2 Mango tree. Participant #2



Figure 3 Guava tree. Participant #8

Another woman took a photograph of her guava tree and shared (refer to Figure 3).

“This is my guava tree. I take care of the tree because I like to eat its fruit”. Participant #8

The above statements highlight that preferred foods are appreciated based on their availability, acceptance by the household, and also for their nutritional value.

Theme 3: household food production influences dietary consumption

Household food production was the primary contributor to dietary consumption. Each woman reported to have some form of household food production. The food items grown ranged from herbs, vegetables and fruit gardening to duck-egg and dairy production. While the household commonly consumed the herbs, vegetables and fruit, protein-rich foods such as cows' milk and duck-eggs were said to be reserved for important periods such as pregnancy, or sold for a cash income. A pregnant woman took a photograph of prepared food in her kitchen and shared (refer to Figure 4).

"I usually eat fruits that are available ... grown at the household. These are ours ... own production ... ginger, banana, corn, mango and deuwa [monkey jack]". Participant #4

Participants shared that while the household often consumed foods grown at the household, other foods were not financially accessible. Participants reported that foods available at the market were too expensive for purchase. A pregnant woman took a photograph of amaranth from her household garden and shared how she was financially limited in terms of what could be cooked (refer to Figure 5).

"This red and green amaranth is from my vegetable garden. I cook this without fish". Participant #7



Figure 4 Prepared kitchen foods. Participant #4



Figure 5 Financial limitations to accessing food. Participant #7

Theme 4: household food production provides both sustenance and income

Participants reported that household food production contributed not only to sustenance at a household level, but also to a household income source through the sale of food items at the market. This theme highlighted that while the communities involved in the research primarily relied on subsistence farming, there was still a need for a cash income. A woman who cultivates amaranth and ladies finger (okra) for household consumption as well as a cash income shared (refer to Figure 6).

“I cultivate green and red amaranth and ladies finger in my yard. I cook these vegetables for consumption and also sell at the market. My husband sells these to buy oil and salt with that money”. Participant #2

When discussing the need for cash, participants shared that they were unable to produce many foods at their household, and that these foods needed to be purchased at the market. Participants discussed commonly purchased items at the market, which included staples such as rice, protein-rich foods such as pulses, fortified cooking oil rich in vitamins A and D, and other commodities such as iodised salt, an essential source of iodine. To generate this needed cash income, participants explained that

their household would sell their protein-rich foods which are of high monetary value, surplus produce including fruit, vegetables and herbs or when surplus food was not available, whatever food they had.

The sale of household food production at the market contributes not only to the purchase of other food commodities but also to other household expenses. The cash income also provides an opportunity for households to pay for household and personal expenses including school fees, clothing, and foods that diversify their diets. The following statements share the experiences of three participants, cultivating and selling their produce at the market to meet certain household expenses (refer to Figure 7).

This is ... a ... guava tree. I love this tree, and I planted it with my own hands! In the first year, there were two big guavas growing on from the tree, and this year there are 10 to 15 guavas. All family members will eat guava, and we'll get nutrients after eating. When there will be more guavas, we will also sell in the market and meet some personal expenses. Participant #2

A second participant shares “When there are many guavas we sell the excess portion and use this money for our children’s’ education” and a third participant shares



Figure 6 Homestead food production. Participant #2



Figure 7 A guava tree; nutrients and cash income. Participant #2



Figure 8 A broken bicycle van, and effect on household income. Participant #8

“My husband planted this ... coconut tree. I shall eat and sell coconuts when this tree will grow. And with that money I’ll send my children to school for education, buy clothes for them and buy rice. I want plenty of coconuts from this tree.”

Theme 5: need for a cash income in a subsistence community

While the research question focused on ‘what does nutrition mean to you?’ the need for a cash income was a reoccurring theme. The importance of a cash income, or cash transfer,

was evident in the language used by participants. A woman who took a photograph of her husbands' bicycle with trailer shared (refer to Figure 8).

This is our van [bicycle with trailer]. I love this van more than I love myself. This car is the only means of our family income. My husband pulls this van and from that income he runs our family. I am now unhappy because the van is broken and we are not able to repair due to a shortage of money. Participant #2

Poverty is a basic cause of undernutrition that influenced household food security and adequate food consumption. While poverty was not referred to directly, the majority of participants referred to the daily struggle to make ends meet. Most participants referred to one main source of household income such as rickshaw pulling or day labouring. Others discussed renting land from others for cultivation, though this was at a cost of 50% of total agricultural output. A woman described why she took a photograph of a basket of corn (refer to Figure 9).



Figure 9 Household corn cultivation. Participant #7



Figure 10 Duck eggs. Participant #7

“I cultivate corn with my husband by shared cultivation. The land is not ours, but by cultivating, we get 50 percent [profit gained from sale of corn]”. Participant #7

Participants also discussed how cash is required for the purchase of additional food items from the market to diversify the community's subsistence living. Interviewed participants who did not have excess household produce to sell, discussed the struggles around purchasing vegetables (potato, eggplant, amaranth, pointed gourd), fruits (banana), staples (rice and corn) and other commodities including oil and salt. While participants reported purchasing pulses, vitamin-rich vegetables and fruits, there was no reference to the purchase of meat and eggs during the interviews. Eggs are a high source of protein, and a valuable commodity. Because of this, eggs produced by the household are often sold at the market, and not consumed, as made evident by one woman's story (refer to Figure 10).

“These ducks give eggs regularly for up to 2 months. I sell these eggs from the house or in the market. Oh, but they are not for me to eat”. Participant #7

Milk is another protein-rich food, while some participants reported its consumption during pregnancy; others shared the need to sell their

milk to purchase household essentials. One woman shared why she took a photograph of a cow (refer to Figure 11).

My husband takes care of our cow, and sometimes I provide water to the cow. We can only consume the milk on some days as we need to sell the milk to purchase domestic materials such as rice, pulse and oil. Participant #5

Theme 6: family structure influences dietary intake

A prominent theme in the participants' photographs and interviews was the social structure showing a preference toward the male and in-laws at a community and household level. Participants discussed how their husbands not only brought food back from the market, but also purchased fruit trees, seeds and seedlings for their household gardens. By having the purchasing power, participants shared that the food preferences of the husband influenced the foods grown and consumed by the household. The husband oversees all cash-related activities including the sale and purchase of household agricultural produce and the purchase of food items from the market. A woman describes each of the food items in her photograph (refer to Figure 12).



Figure 11 Cow milk. Participant #5



Figure 12 Selection of purchased household foods. Participant #2

“Potato, brinjal [eggplant], red amaranth, parwar [pointed gourd], flattened rice, rice... My husband has bought these. These will satisfy our hunger and provide nutrients on eating”. Participant #2

Participants’ photographs and stories discussed the roles of mother and father-in-laws in terms of providing support to their daughter-in-laws during pregnancy. Some participants shared that they received a ‘gift’ of cows’ milk each day during pregnancy from their mother-in-laws. The milk seemed to be a highly valued food that supplemented what appeared to be a protein-poor diet. This gift of milk reaffirms the close relationship between the mother-in-law and the daughter-in-law, as made evident by a woman discussing her photograph of a cow (refer to Figure 13).

“My mother-in-law takes care of me and gives 3–4 liters of milk each day. I know that milk contains an abundance of nutrient. I take the milk with my family”. Participant #4

Participants discussed how mother-in-laws shared their nutrition knowledge with daughter-in-laws and promoted the consumption of specific foods such as milk, banana stem, ash gourd and potato.

Participants shared how their mother-in-law would promote a food item by stating that it was ‘nutritious’ and would encourage the consumption of ‘nutritious’ foods however, details on what ‘nutritious’ means and the nutrition qualities were not shared. One woman explained why she took a photograph of particular food items (refer to Figure 14).

“My mother-in-law has good knowledge on nutrition and she encourages me to eat these [banana stem, potato, ash gourd and potato poppadum]”. Participant #4

While mother-in-laws strongly influence the maternal diet through nutrition messaging and promotion of specific foods, father-in-laws influence the maternal diet through supporting the household food production. Participants discussed how the father-in-law assists with the manual labour involved with the household food gardens as well as the purchase of plants, seeds and seedlings for the gardens. Participants shared that the father-in-laws involvement with the household food production and contribution toward foods consumed were not specific to the daughter-in-laws pregnancy but rather an on-going relationship.



Figure 13 Cow milk. Participant #4



Figure 14 Selection of foods encouraged by mother-in-law. Participant #4

Theme 7: understanding that ‘nutrition’ is important though not sure ‘why’

The word ‘nutrient’ was reoccurring throughout the interviews with the participants. Participants reported consuming specific foods for the ‘nutrients’ including fruit such as papaya, guava,

carambola (star fruit), banana and jackfruit. One woman shared that she ate sweet pumpkin-leaf twice a week for its ‘nutrients’. While references were made about the foods that had ‘nutrients’ no reference was made on which nutrients or why these nutrients were of importance. When asked what a nutrient was or what is meant by this term,



Figure 15 Household production of amaranth. Participant #7

participants shared that while they knew the word 'nutrition' and which foods were 'nutritious', they did not understand what that meant. While the nutritional qualities of foods may not be understood, participants recognised specific foods as being healthy and nutritious. Participants reported that having access to these nutritious foods made them 'happy' as they are able to bring health and life to their family. A woman growing pumpkin plants in her household garden shared

"I planted the pumpkin plants myself. Now it is growing, and I am very happy. When there are pumpkins, we will eat them. Upon eating it we shall get nutrients. I only know that I will get nutrients but don't know which nutrients".

Theme 8: support provided by NGOs

During the interviews, the majority of participants reported having received agricultural support from a NGO. Participants received agricultural training and seeds, seedlings and small trees to contribute to existing or to establish new household gardens. Participants shared success with the support received, with a thriving garden contributing toward household consumption as well as cash income by selling excess produce at the markets.

A woman who took a photograph of her amaranth beside a tube well (a type of water well with a long tube bored into an underground aquifer) shared her experience with an NGO supported agricultural training (refer to Figure 15).

"I cultivate amaranth near the tube well area as this is what was advised through my training [provided by an international NGO]. Sometimes I pluck ... the amaranth ... and cook it". Participant #7

DISCUSSION

The study findings are consistent to previous publication in other Bangladeshi settings, and add to the information available on the perspectives of maternal nutrition by pregnant women living in rural Bangladesh (Ahmed et al., 2012; Arimond et al., 2010; Nahar et al., 2009; National Institute of Population Research and Training (Bangladesh) et al., 2012; NIPORT (Bangladesh) et al., 2009; Shannon et al., 2008). Pregnant women in rural Bangladesh not only face issues with availability in terms of household food production, but with affordability of essential foods at the market place. Participants raised important concerns illustrating social determinants and socio-economic status that

limit access to nutritious foods. Difficulties ranged from farming on rented land, relying on businesses that yielded a modest income for salt, oil and other food staples, or the sale of household produce to subsidise necessary expenditures such as school fees and clothing. Food insecurity limited household protein and fat consumption. However, milk consumption during pregnancy was common. While it is evident that NGOs were contributing toward household-level food security, it is essential that NGOs integrate community initiatives to address the root causes of undernutrition. Our findings indicate that nutrition programs must integrate with other sectors such as economic development and agriculture to address the root causes of undernutrition. This aligns with the recommendations made by the 2013 Lancet series on Maternal and Child Nutrition (Bhutta et al., 2013) that highlight the need to address nutrition specific and nutrition sensitive approaches together, rather than independently.

The modified photovoice method empowered participants to share their perspectives and understanding of nutrition and the barriers and enablers to healthy food choices. The in-depth interviews proved highly beneficial, and a suitable alternative to focus group discussions, as each participant freely discussed their lived experiences resulting in rich interview data. The participants reported that they believed they were contributing toward the research in a tangible way. At the same time, participants expressed that they did not view photovoice as 'research' and that the method was new, and previously unknown by the community.

Based on the findings of the study and the emergent themes, a supplementary feeding program, targeting malnourished pregnant women was designed. Information gained through photovoice contributed to the design of this study. This information included:

- village specific information on maternal dietary habits and preferences
- village specific information on food availability and affordability
- village specific information on the role of social determinants and its influence on dietary consumption and
- village specific information on the role of the husband and in-laws on dietary consumption.

Implications

The emergent themes highlight the need to contextualise nutrition programs at an individual and community level through community-based approaches. Programs designed to alleviate undernutrition must consider village-specific food preferences prior to designing interventions, as standardised approaches and introduced foods may not be acceptable, available or affordable by the participants.

Limitations

This research had a number of limitations. While costs were considerably lower in comparison to two decades ago, the purchase of lower cost cameras and printing of photographs increased the budget required. We did not take into consideration the need for access to a printing house at the onset of the research, and therefore identifying a suitable printing house proved challenging. Ultimately, travel to the district city was required. The resolution of the photographs generated proved suitable for reports, however could not be enlarged from the original size.

Photovoice provided a snap shot of the situation at the time of the study. It does not capture seasonal changes to food availability and subsequently does not identify themes that may emerge at different times of the year. Subjectivity of photographs and accompanying stories create challenges when interpreting data that may be difficult to avoid. In addition, the participant has the flexibility to judge which photographs are taken and shared, creating an opportunity to avoid or miss barriers present in communities. While we were unable to address the issue of seasonality, we dealt with subjectivity and missed barriers by discussing the identified themes with the community nutrition volunteers, who in turn verified the themes with pregnant women in their communities.

We saw a relatively high loss of participants (20%; $n = 2$) from the study. Participants did not provide reasons for dropout. Future studies may wish to explore reasons for dropout in detail as reasons may influence the acceptability of photovoice as a data collection method in rural areas of low-income countries.

We encouraged the community nutrition volunteers to collect the cameras from participants after a 24-hr period. The short time period may have influenced the quality of the photographs taken. During the data analysis process, we planned to share the identified emergent themes for verification and discussion with the participants; however, this was not possible because of national pre-election civil unrest limiting movement to and within the communities. The volunteers validated the themes with participants and other newly identified pregnant women in their communities. In addition, the interviews were conducted in the local dialect and the transcriptions were translated to English. All transcriptions were back translated to the local dialect and confirmed with the community nutrition volunteers however; keywords may have been lost in translation.

The volunteers spoke the local dialect and had existing relationships with the participants. While the volunteers had extensive experience in qualitative research, their style was influenced by their own cultural differences, beliefs and understandings. This led to volunteers being unable to deeply probe participants, which may have led to incomplete narratives by the participants.

CONCLUSION

The research findings highlighted that maternal dietary consumption is multifaceted, and that subsistence farming, cash income, and food preferences among others influence enablers and barriers to healthy eating. Clearly, community-based nutrition interventions require nutrition specific and sensitive interventions to address the root causes of undernutrition and therefore improve the nutrition status of pregnant women. We found that the modified photovoice method complements other data collection methods providing an effective tool in eliciting a response from participants that would otherwise not be heard. This was the first time photovoice was used in the selected communities, and the first time it was used for nutrition research in Bangladesh. The methods used in this article empowered women, was culturally appropriate, allowed data collection

in a short time frame and used volunteers and participants. The findings from this study have informed an acceptability study in the same area where this study was conducted.

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REFERENCES

- Ahmed, T., Mahfuz, M., Ireen, S., Ahmed, A.M., Rahman, S., Islam, M.M. and Cravioto, A. (2012) 'Nutrition of children and women in Bangladesh: trends and directions for the future', *Journal of Health, Population and Nutrition*, Vol. 30, No. 1, pp.1–11.
- Arimond, M., Wiesmann, D., Becquey, E., Carriquiry, A., Daniels, M.C., Deitchler, M. and Torheim, L.E. (2010) 'Simple food group diversity indicators predict micronutrient adequacy of Women's Diets in 5 Diverse, Resource-Poor Settings', *Journal of Nutrition*, Vol. 140, No. 11, pp.2059S–2069S, doi: Doi 10.3945/Jn.110.123414.
- Baker, T.A. and Wang, C.C. (2006) 'Photovoice: use of a participatory action research method to explore the chronic pain experience in older adults', *Qualitative Health Research*, Vol. 16, No. 10, pp.1405–1413, doi: 10.1177/1049732306294118.
- Bhutta, Z.A., Ahmed, T., Black, R.E., Cousens, S., Dewey, K., Giugliani, E. and Child Undernutrition Study, Group (2008) 'What works? Interventions

- for maternal and child undernutrition and survival', *Lancet*, Vol. 371, No. 9610, pp.417–440, doi: 10.1016/S0140-6736(07)61693-6.
- Bhutta, Z.A., Das, J.K., Rizvi, A., Gaffey, M.F., Walker, N., Horton, S. and Child Nutrition Study, Group (2013) 'Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?' *Lancet*, Vol. 382, No. 9890, pp.452–477, doi: 10.1016/S0140-6736(13)60996-4.
- Black, R.E., Victora, C.G., Walker, S.P., Bhutta, Z.A., Christian, P., de Onis, M. and Child Nutrition Study, Group (2013) 'Maternal and child undernutrition and overweight in low-income and middle-income countries', *Lancet*, Vol. 382, No. 9890, pp.427–451, doi: 10.1016/S0140-6736(13)60937-X.
- Catalani, C. and Minkler, M. (2010) 'Photovoice: a review of the literature in health and public health', *Health Education and Behavior*, Vol. 37, No.3, pp.424–451, doi:10.1177/1090198109342084.
- Freire, P. (1979) *Education for Critical Consciousness*, London: Sheed and Ward.
- Green, J. and Thorogood, N. (2004) *Qualitative Methods for Health Research*, London: SAGE.
- Imdad, A. and Bhutta, Z.A. (2011) 'Effect of balanced protein energy supplementation during pregnancy on birth outcomes', *BMC Public Health*, Vol. 11, Suppl 3, p.S17. doi: 10.1186/1471-2458-11-S3-S17.
- Liamputtong, P. (2007) *Researching the Vulnerable: A Guide to Sensitive Research Methods*, London, CA: Thousand Oaks, SAGE.
- Liamputtong, P. and Liamputtong, P. (2013) *Research Methods in Health: Foundations for Evidence-Based Practice*, 2nd Edition, South Melbourne, Vic.: Oxford University Press.
- Martin, N., Garcia, A.C. and Leipert, B.R.N. (2010) 'Photovoice and its potential use in nutrition and dietetic research', *Canadian Journal of Dietetic Practice and Research*, Vol. 71, No. 2, pp.93–97.
- Nahar, S., Mascie-Taylor, C.G. and Begum, H.A. (2009) 'Impact of targeted food supplementation on pregnancy weight gain and birth weight in rural Bangladesh: an assessment of the Bangladesh Integrated Nutrition Program (BINP)', *Public Health Nutrition*, Vol. 12, No. 8, pp.1205–1212, doi: 10.1017/s1368980008003765.
- National Institute of Population Research and Training (Bangladesh), Mitra and Associates (Firm) and MEASURE DHS (Program) (2012) *Bangladesh Demographic and Health Survey 2011: Preliminary Report*, p.vii and p.46.
- NIPORT (Bangladesh), Mitra and Associates (Firm) and Macro International (2009) *Bangladesh Demographic and Health Survey, 2007*, Dhaka.
- Ota, E., Tobe-Gai, R., Mori, R. and Farrar, D. (2012) 'Antenatal dietary advice and supplementation to increase energy and protein intake', *Cochrane Database of Systematic Reviews*, p.9, CD000032, doi: 10.1002/14651858.CD000032.pub2.
- Ravallion, M., Chen, S. and Sangraula, P. (2009) 'Dollar a day revisited', *The World Bank Economic Review*.
- Shannon, K., Mahmud, Z., Asfia, A. and Ali, M. (2008) 'The social and environmental factors underlying maternal malnutrition in rural Bangladesh: implications for reproductive health and nutrition programs', *Health Care for Women International*, Vol. 29, Nos. 8–9, pp.826–840, doi: Doi 10.1080/07399330802269493.
- Sobehart, H.C. (2009) *Women Leading Education Across the Continents: Sharing the Spirit, Fanning the Flame*, Lanham, MD: Rowman & Littlefield Education.
- Tong, A., Sainsbury, P. and Craig, J. (2007) 'Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups', *International Journal for Quality in Health Care*, Vol. 19, No. 6, pp.349–357, doi: 10.1093/intqhc/mzm042.
- UNICEF (1990) *Strategy for Improved Nutrition of Children and Women in Developing Countries*, New York, NY, USA: UNICEF.
- Wang, C. and Burris, M. (1994) 'Empowerment through photovoice: portraits of participation', *Health Education Quarterly*, Vol. 21, No. 2, pp.171–186.

Wang, C. and Burris, M. (1997) 'Photovoice: concept, methodology, and use for participatory needs assessment', *Health Education and Behavior*, Vol. 24, No. 3, pp.369–387, doi: 10.1177/109019819702400309.

Weiler, K. (1988) *Women Teaching for Change: Gender, Class and Power*, New York, NY: Bergin & Garvey Publishers.

Yochelson, B. and Riis, J.A. (2001) *Jacob Riis*, London, NY: Phaidon.

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