

Association between gestational weight and inadequate antenatal care visits among third trimester low-income women: A cross-sectional study in Bangladesh

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Abstract

Objective: Inadequate number of antenatal care (ANC) visits is very common among low-income pregnant women. The study identifies the associated factors for the poor number of ANC visits among the low-income third-trimester women.

Methods: A cross-sectional study was conducted taking interview of 263 women who were in third-trimester living in a slum area of Bangladesh. We collected information on ANC visits along with socio-demographic and pregnancy-related factors of the subjects. The adequate number of ANC visits is modeled by a multivariate logistic regression model after adjusting the socio-demographic and pregnancy related factors.

Results: The study revealed from the multivariate logistic model a positive association between the adequate number of ANC visits and gestational weight (odds ratios of overweight/obese versus normal: 2.108, $p = 0.014$). Hence, the overweight or obese women were 2.108 times more likely to have the adequate number of ANC visits compared to the normal-weight women. The age (≥ 30 years) and poor income (< 10000 taka) are also found negatively associated with the adequate number of ANC visits.

Conclusion: There is a significant positive association exists between the gestational weight at third-trimester and the adequate number of ANC visits. The inadequate ANC visits for the third-trimester women in the slum regions highlight the need for attendance among poor, young and illiterate women.

Abbreviations: ANC: Antenatal care, BMI: Body mass index, OR: Odds ratio, CI: Confidence Interval, SD: Standard deviation

Background

Antenatal care (ANC) is essential for every woman either trying to conceive or for those that have just discovered they are pregnant [1]. It is vital to have ANC visits to have a routine care for the healthy pregnant woman. An ANC service practices for baseline clinical care of all pregnancies and provides comprehensive information on the care of the healthy woman with an uncomplicated singleton pregnancy. The service also provides appropriate treatment in specific circumstances. As a whole, ANC is the key entry point for pregnant women to receive a broad range of health promotion and prevention services.

Few papers published on an optimal number of ANC visits [2,3] and the content of the ANC visits [4,5]. WHO recommends a minimum of four antenatal visits at 16-24, 28, 32 and 36 weeks, comprising interventions such as tetanus toxoid vaccination, screening and treatment for infections, and identification of warning signs during pregnancy [6]. It is crucial to have early identification of underlying conditions- for example, prevention of congenital syphilis, control of anemia, and prevention of malaria complications. Hence the first ANC visit should be as early as possible in pregnancy, preferably in the first trimester. Therefore, it is important to have a minimum of two ANC visits during the first two trimesters for a pregnant woman.

Inadequate gestational weight gain is a well-recognized risk factor for both maternal and infant adverse events [7,8]. Self-reported weight gain by pregnant women could cause misclassification bias, which

could be a significant barrier in decision making to minimize weight-related adverse pregnancy outcomes. Obese or over-weight women are more likely to misclassify their weight gain. Furthermore, they were significantly more likely to overestimate the minimum and maximum target gestational weight gains for their respective BMI classes. This motivates us to study the gestational weight instead of gestational weight gain. We study the relationship between the gestational weight and the number of ANC visits by third-trimester women in a cross-sectional study. This study categorized the third-trimester women according to the World Health Organization (WHO) body mass index (BMI) classifications. The categories included women who were underweight (BMI < 18.5), normal weight (BMI 18.5-24.9), overweight or obese (BMI 25-39) [12].

The coverage of ANC is poor in Bangladesh. It is reported that about 50% and 21% pregnant women receive 1 and 4 ANC visits, respectively [11] before the delivery. Few studies have evaluated the association between ANC visits and perinatal death in both developing and developed countries [9, 10]. But it is not investigated to find the

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associated factors of inadequate ANC visits. It is our interest in this paper to find the associated factors of inadequate ANC visits among the low-income third-trimester pregnant women.

Data and methods

Study area

Dhaka is the capital city of Bangladesh. The current study is based on all the third- trimester pregnant women who lives in Mirpur slum area located in the south of Dhaka. Mirpur is a densely populated area under the Dhaka North City Corporation covering approximately 21.317 square kilometers of area. A survey was carried out to locate the slum areas in Mirpur, and we found there are six slum areas (clusters) in Mirpur. Among these 6 clusters, we randomly selected three slum areas (Porabosti, 3rd Colony, and Uttara Bishil).

The history of the women inhabiting the study areas is poor and they are mostly staying at home. The working-women were mostly either garments workers or maids in houses. The maximum family income of these women was found around 20000 taka (or approximately \$250 U.S.) per month. The education of the participants is relatively low with few of them went secondary schools but didn't complete it.

Data

Two local non-government organizations (NGOs) helped us to identify the number of pregnant women in the selected three areas. They found 1320 pregnant women during the survey in 15th September 2015 to 20th September 2015. From the history of the pregnant women profiles, we found 423 women were in third-trimester (i.e., experiencing pregnancy at least 29 weeks). We conducted a population-based cross-sectional survey of the women living in the three areas from September 21, 2015, to October 23, 2015, and collected data from 263 women. Other 160 women either declined to give the interview or they were absent in their houses during the survey.

Questionnaire survey

An interview was designed by a semi-structured questionnaire to obtain information on education (Illiterate/ Primary and above), date of birth, occupation (housewife/ employed), monthly family income (<10000 taka/ above 10000), pregnancy related complications during the first 6 months, micronutrient supplements were taken during pregnancy, history of medication during pregnancy. At the visit of the house of pregnant women, height and weight were recorded to allow calculation of body mass index (BMI=kg/m²). Any question or confusion from the women was clarified to ensure that every woman understood the questions. The completed questionnaires were checked for quality control. We collected the information on the number of ANC visits by asking the question, "How many times did you visit a health care or ANC service?". We also asked a question "When was the last visit to a health care or ANC service?" to identify the number of visits before the 3rd trimester. The visits were categorized as "no ANC visit or 1 ANC visit" (visits=1), "2 ANC visits" (visits=2) and "more than 3 ANC visits" (visits \geq 3).

Statistical analysis

We analyzed the data using the software R. Descriptive statistics were calculated for all of the categorical variables (presented as frequencies and percentages). A boxplot, which shows mean and variability, is investigated to find any relationship among age, BMI and the number of ANC visits. The differences of categorical variables were evaluated by chi-square tests. If any of the cell frequency is found

less than 5, we examined the relationship by the Fisher-exact test. We fitted a multivariate logistic regression model with the number of ANC visits categorized into two groups: the number of ANC visits at least 2 (adequate) and less than 2 (Inadequate). The results are reported by odds ratios (ORs) and corresponding p-values are also presented in a table. p-values less than 0.05 were considered statistically significant.

Results

Descriptive statistics

The data were comprised of 263 third-trimester pregnant women aged 15-49 years (mean \pm sd: 24.83 \pm 5.05 years) and BMI (mean \pm sd: 25.27 \pm 3.73). The percent of women with singleton pregnancy within the given period who attended antenatal care (ANC) three or more times are found 17.5%. Besides, 27% women were lacking adequate number of ANC visits. The baseline characteristics of the participants, such as age, BMI, education, income level along with pregnancy factors are described in Table 1. Compared among gestational weight categories, overweight or obese women had a higher number of ANC visits. The chi-squared p-value indicates gestational weight has a significant effect on the number of ANC visits (p = 0.035, Table 1). Moreover, we found income level and age have significant effect on the number of ANC visits considering 5% significance level. The boxplots for age and BMI are given in Figure 1. It appears from the Figure 1 that younger women (< 20 years) are more interested in visiting ANC compared to the older women (\geq 30 years). Again, the figure indicates that overweight or obese women were more interested in taking adequate number (\geq 2) of ANC visits compared to the normal women.

Multivariate logistic model

We fitted a multivariate logistic regression model to determine how gestational weight at third-trimester and other factors contribute to the ANC visits. The women were divided into a dichotomous dependent variable (inadequate visits i.e., \leq 1 visits and adequate visits i.e., \geq 2 visits). The results are given in the Table 2. The results indicate that overweight or obese women tend to take adequate number of ANC visits by 2.102-fold (OR: 2.102; 95% CI: 1.169-3.863) compared with normal weight women. It also appears that the family income level of greater than 10000 taka (OR=3.096, 95% CI: 1.711-5.718) is positively significant to the adequate number of ANC visits. Therefore, women with higher family income (above 10000 taka) tends to take adequate number of visits 3.096 times more compared to women with poor family income (<10000 taka). Besides, age (\geq 30) is also found negatively associated with the number of ANC visits (OR=0.26; 95% CI: 0.08-0.80) which means women above 30 years old are 74% less likely to take adequate number of ANC visits.

Discussions

ANC is an opportunity for the pregnant women to get interventions like identification and management of obstetric complications such as preeclampsia, tetanus toxoid immunization, intermittent preventive treatment for malaria during pregnancy (IPTp), and identification and management of infections including HIV, syphilis and other sexually transmitted infections (STIs). Many of these opportunities are continued missing by low-income pregnant women because of not taking optimum number of ANC visits. It appears that 27% of the third-trimester low-income Bangladeshi women are not taking the adequate number of ANC visits.

Our study from third-trimester pregnant women found that the women with very poor family income (monthly income: <10000 taka)

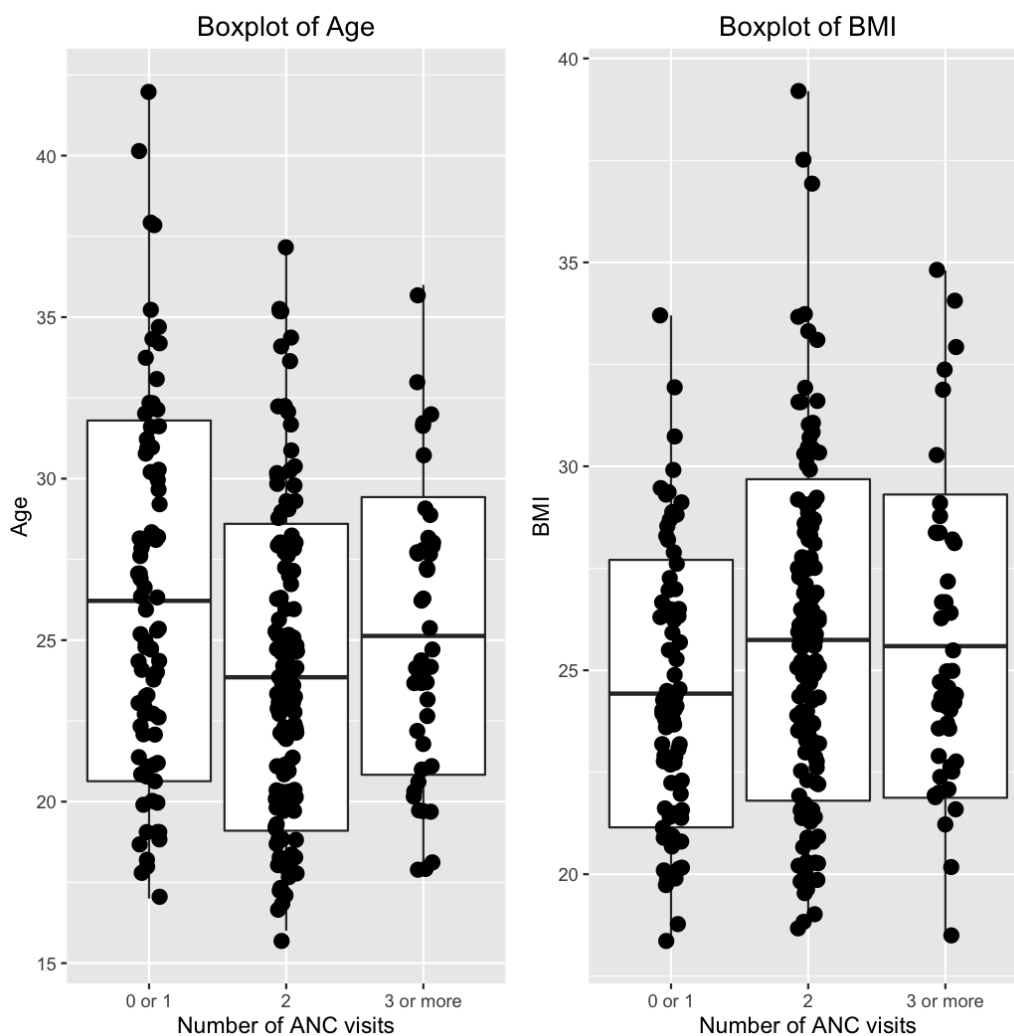


Figure 1. Boxplots of Age and BMI corresponding to number of ANC visits.

Table 1. Characteristics of the third-trimester pregnant women and chi-squared analysis

| Variables | Categories | Frequency | | | Total (%) | p-value* |
|--------------------------|-------------------|--------------|---------------|--------------|------------|----------|
| | | Visit≤1 (71) | Visit=2 (134) | Visit≥3 (46) | | |
| Education | Illiterate | 67 | 91 | 30 | 188 (71.5) | 0.074 |
| | Primary and above | 16 | 43 | 16 | 75 (28.5) | |
| Occupation | Housewife | 70 | 107 | 34 | 211 (80.2) | 0.358 |
| | Employed | 13 | 27 | 12 | 52 (19.8) | |
| Income (taka/month) | <10000 | 57 | 60 | 7 | 124 (47.4) | <0.001 |
| | ≥10000 | 26 | 74 | 39 | 139 (52.6) | |
| Pregnancy number | 1-2 | 45 | 89 | 23 | 157 (60.5) | 0.064 |
| | ≥3 | 37 | 44 | 23 | 104 (39.5) | |
| Micronutrient supplement | Yes | 48 | 85 | 34 | 167 (63.3) | 0.191 |
| | No | 35 | 49 | 12 | 96 (36.7) | |
| Bad obstetric history | Yes | 32 | 44 | 22 | 98 (37.1) | 0.184 |
| | No | 51 | 90 | 24 | 165 (62.9) | |
| Complications | Yes | 13 | 15 | 9 | 37 (14.0) | 0.326 |
| | No | 70 | 119 | 37 | 226 (86.0) | |
| Age (Years) | <20 | 10 | 26 | 3 | 39 (14.8) | 0.007 |
| | 20-30 | 53 | 96 | 37 | 187 (70.8) | |
| | ≥30 | 20 | 12 | 6 | 38 (14.4) | |
| BMI | Normal | 52 | 60 | 25 | 137 (52.1) | 0.035 |
| | Overweight/ Obese | 31 | 74 | 21 | 97 (47.9) | |

* The p-value is estimated from chi-squared value if all the cell values are greater than 5, otherwise we used Fisher-exact test.

Table 2. Adjusted relationship between covariates and adequate number of ANC visits that is analyzed using multivariate logistic regression model(odds ratio, 95% confidence interval, p-value).

| Variable | Reference | Estimate | OR | LCL | UCL | P value |
|-----------------------------------|-------------------|----------|-------|-------|-------|---------|
| Education- Illiterate | Primary and above | -0.524 | 0.591 | 0.292 | 1.158 | 0.133 |
| Occupation- Housewife | Employed | -0.147 | 0.863 | 0.39 | 1.84 | 0.707 |
| Income \geq 10000 | Income < 10000 | 1.13 | 3.096 | 1.711 | 5.718 | < 0.001 |
| BMI- Overweight/ Obese | Normal | 0.746 | 2.108 | 1.169 | 3.863 | 0.014 |
| Pregnancy number- 1-2 | \geq 3 | 0.01 | 1.01 | 0.475 | 2.134 | 0.979 |
| Micronutrient supplementation- No | Yes | -0.208 | 0.812 | 0.447 | 1.484 | 0.495 |
| Bad obstetrical history- No | Yes | 0.054 | 1.056 | 0.526 | 2.102 | 0.877 |
| Complications-No | Yes | -0.029 | 0.971 | 0.418 | 2.157 | 0.943 |
| Age (yrs) 20-30 | <20 | -0.614 | 0.541 | 0.215 | 1.276 | 0.173 |
| Age (yrs) \geq 30 | <20 | -1.345 | 0.261 | 0.08 | 0.802 | 0.021 |

were not taking any ANC visits or at least one ANC visits. This could be because these groups of women are not well informed about low-cost ANC services. Besides, we found older aged women (\geq 30 years) are not taking adequate ANC visits. Older pregnant women may had experience of previous pregnancy and for this, there is a tendency among them to avoid ANC visits and want to experience their current pregnancy without visiting ANC. It is now a success story of Bangladesh that a significant proportion of younger women are taking adequate number of ANC visits.

Our study indicates that more overweight or obese women are taking adequate ANC visits compared to the normal-weight women. This could be because over- weight or obese women are in increased risk of several pregnancy complications, including gestational diabetes mellitus, hypertension, preeclampsia, cesarean delivery, and postpartum weight retention. The normal-weight women may underestimate the importance of ANC because of fewer complications during pregnancy. In addition, the low-income women may simply lack knowledge about danger signs in pregnancy and will not know how to seek care when a complication occurs during pregnancy.

An article from WHO mentioned that ANC coverage is lower among women in Africa who need it the most: those who are poor, less educated, and living in rural areas. Our study finds education as an associated factor of ANC visits at 10% significance level. The odds ratio implies the illiterate women are 41% less likely to take adequate number of ANC visits compared to the women who completed at least primary education (OR: 0.59, CI= 0.29-1.16). The study involves a relatively small number of participants, which means additional studies need to be conducted to define more precisely the group of women who don't take optimum ANC visit during their pregnancy.

Conclusion

The benefit of adequate number of ANC visits is to improve the health of mothers and babies. The WHO recommends that essential interventions can be provided over four visits at specified intervals in ANC, at least for healthy women with no underlying medical problems. But one fourth of the third-trimester pregnant women are still lacking to take adequate number of ANC visits in Bangladesh. Therefore, it is important to give attention to the specific group women during pregnancy so that they can take an adequate number of ANC visits: older women (above 30 years of age), less BMI during pregnancy, poor family income and less educated. To maximize opportunities for low-income pregnant women in Bangladesh, ANC services should be informed especially targeting older, less BMI, poor and illiterate women to increase the coverage of adequate number of ANC visits during the first two trimesters.

Declarations

Ethical approval

Ethical approval for the study protocol was obtained from the North South University Review Committee. A written informed consent was obtained from all the study participants. The members of ethics committee were:

1. Dr. Akhter Hossain, Chair, Department of Public Health, North South University.
2. Dr. G. U. Ahsan, Dean, School of Health and Life Sciences, North South University.

Competing interests

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Author's contributions

AH participated in study conception, design and coordination, performed statistical analysis, data interpretation and drafted the manuscript. TA contributed in study conception, design, and data collection. TA also helped to draft the manuscript. All authors approved of the final manuscript.

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Availability of data

Click here for the data file http://individual.utoronto.ca/ahmed_3/index_files/data/data.html.

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Consent for publication

Not applicable.

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