TMJ
Original research
Published by OJS
dx.doi.org/10.4314/tmj.v28i2
OPEN ACCESS JOURNAL

Antenatal Care and its association with birth weight in Temeke District, Dar-Es-Salaam, Tanzania

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Published by OJS
dx.doi.org/10.4314/tmj.v28i2

ABSTRACT

Background: Perinatal outcomes of infants depend on their birth weight, which in turn depend on the proper antenatal care during pregnancy. Attendance to the Antenatal clinics is therefore a proxy to delivering normal weight infants. We undertook this study to test this hypothesis.

Objectives: The objective of the study is therefore to determine the predictors of antenatal care and its association with birth weight

Materials and Methods: This cross-sectional study was done at the Temeke District Hospital among mothers attending the antenatal clinic and able to provide the details of birth weight and antenatal care. Systematic selection was done until sample size achieved. All data was captured in a structured questionnaire and included details of their pregnancies, socio-demographic characteristics, mosquito net use, previous deliveries and HIV status.

Results: Of the 463 mothers interviewed, 76.2% had up to four antenatal visits while 259 (56%) women attended their first antenatal clinic after their 20^{th} week of pregnancy. Among the single mothers, 42.4% gave birth to low birth weight babies ($p<0.001$). A total of 36.7% were primigravidae and 74.3% had only completed primary education. A total of 71 (15.3%) women had delivered babies below 2500gm and only 21.8% had their first dose of tetanus vaccination while 18.1% of the women had not been given any form of supplementation.

Conclusions: This study indicates that timing and number of antenatal visits is an important indicator for low birth weight. Intensive focused ANC should be provided to latecomers.

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INTRODUCTION

The World Health Organization defines low birth weight as weight at birth of less than 2,500 grams [1]. [2]. Low birth weight is, an important predictor of ill health [3]. Low birth weight babies face greater mortality risk and the survivors have higher probabilities of retarded motor development, neurological impairment and chronic illness [4] and lower IQ, worse educational outcomes, and even pregnancy complications [5]. Poor birth outcomes can therefore impose high health care costs on societies [6]. Benefits from reducing low birth weight in low-income countries include increases in labour productivity and reduction in costs associated with infant illness and death [7]. Early and frequent antenatal care attendance during pregnancy is important to identify and mitigate risk factors in pregnancy. It is also aimed at improving birth outcomes. However, many pregnant women in Sub- Saharan Africa start antenatal clinic late and therefore they do not fully benefit from its preventive and curative services. [8]

Pregnant women should start at attending antenatal clinic as soon as they confirm that they are pregnant. The recommended protocol for antenatal care calls for a woman with a normal pregnancy to begin visiting an antenatal clinic by 12 weeks and after that at monthly intervals until the 28th week of pregnancy, then fortnightly until the 36th week, and weekly thereafter until labour begins. If the schedule is followed consistently, it is anticipated that a total of about 12 to 13 visits will be made [9]. Antenatal care has important influences on birth-weight, since it can identify mothers at risk of delivering a preterm or growth–retarded infant and can provide an array of interventions (medical, nutritional, and educational) intended to reduce the risks of low birth weight and other adverse pregnancy outcomes [10]
Early antenatal care initiation has been associated with heavier birth weights [11].

The Focused Antenatal Care Model (FANC) of WHO as well as the Tanzanian FANC guidelines recommend at least four ANC visit for uncomplicated pregnancies with the first visit starting before 16 weeks of gestation. (12) . Since a very low percentage of pregnant women make their first visit during their first trimester, it

poses as a threat to pregnant women as sometimes it is too late to take potential preventive measures for some complications such as anaemia.

In Temeke, there is missing information on the predictors of antenatal care as well as outcomes of antenatal care and their association with birth weight, specifically the relationship between all the variables captured in the antenatal card and the association of the variables with the birth weight. These variables will include the socio-demographic factors as well the antenatal services provided.

Methods

This analytical cross-sectional study was carried out among mothers who delivered between April-July 2012 at the Temeke District Hospital.

Temeke District is the southern most of three districts in Dar Es Salaam, Tanzania, with Kinondoni district located to the far North of the city, and Ilala being located in the downtown of Dar Es Salaam. To the East is the Indian Ocean and to the South and West is the Coastal region of Tanzania. The land area of Dar Es Salaam measures approximately 1,393 square kilometres of which the Temeke is the largest district covering about 652 square Kms [(12)].

Inclusion criteria

Delivered between April 2012 and July 2012 and have records available for verification. Signed the consent forms. Delivered live babies whose birth weight has been recorded.

Exclusion Criteria

Women who were excluded from the study were those who:

Delivered Preterm, Twins or Multiple births (because these are in the casual pathway of birth weight and a confounder)

Delivered Babies having congenital malformations

Data collection tools and techniques

Data was collected through a structured questionnaire administered to the mothers attending the postnatal clinic. The questionnaire was translated into Swahili.

Socio-Demographic factors include: Parity, Spacing between children, Age, Nutritional status, Education level, Employment, Bed net use, Underlying chronic maternal disease, Smoking, drugs or alcohol intake and Marital status

Data Management and Analysis

Regression analysis was used to understand the functional relationships between the dependent and independent variables, to try to see what might be causing the variation in the dependent variable. Certain patient characteristics were categorized. Gravidity was categorized into gravid one, two and three and above. There were very few patients with higher and university level education therefore, they were grouped under secondary education and higher. Women who were separated or divorced were only four and hence they were grouped as ever married. Certain baseline parameters were selected as explanatory variables for inclusion in the models: (i) they appeared likely to represent plausible biological or epidemiological predictors (Nutritional status, IPTp uptake) (ii) if they were associated with the outcome at the $p < 0.65$ level in a univariate analysis. The regression was performed on all selected explanatory variables, and nonsignificant ones were then progressively removed. Dropped variables were then re-added one by one and retained if they affected the model or were associated significantly with the outcome however; alternative models were also constructed without forcing these variables). Student t-test, Chi square test and P values was used to test the relationship between the variables.

Ethical Clearance

Ethical clearance was sought from the Research ethics committee of the Muhimbili University of Health and Allied Sciences. Permission was also sought from the District Medical Officer before beginning the study. All participants gave written informed consent.

RESULTS

Of the 463 mothers interviewed, 291 (62.9%) women were between the age of 19 and 29, while 10.4% were below 18 years old. Details on marital status, parity and level of education are indicated in the Table 1.

A total of 71/463 (15.3%) women had delivered babies below 2500gm and 259/463 (56%) women attended their first antenatal clinic after their 20th week of pregnancy. Only 17/463 (3.7%) of the women had one antenatal visit while 353 (76.2%) had up to four antenatal visits. However, 93 (20.1%) had five or more antenatal visits.

Of the 463 women studied, 62 (13.4%) made their first antenatal visit before 14 weeks of pregnancy while 142 (30.7%) made their first antenatal visit between 15 to 19 weeks of pregnancy. 236 (51 %) made their first visit between 20 to 28 weeks of pregnancy while 23 (5%) made their first visit after 28 weeks of pregnancy. The association between birth weight and the timing of antenatal visits was found to be statistically significant with p value being less than 0.05.
Regression analysis was performed using selected variables which were considered significant and are seen in table 2.

DISCUSSION

In this study only 62 (13.4%) respondents started their ANC before 14 weeks while the rest started after 15 weeks. This finding is lower than the Tanzania Demographic Health Survey 2010 estimates, which reports that 15% of the pregnant women make their first visit during the first trimester.

Those respondents who started their antenatal clinic after 28 weeks of gestation were nine times more likely to deliver babies with low birth weight ($p<0.001$) and those who started their antenatal clinic before 14 weeks of gestation had a reduced risk of delivering babies with low birth weight. After adjusting for other variables the adjusted odds ratio was seven while the p value was less than 0.05.

A study conducted in Ghana showed that early antenatal care was crucial to favourable outcome of pregnancy [13], likewise a study conducted in Botswana showed that women who made late bookings for antenatal care were at risk of delivering low birth weight infants [14].

Women aged 19-29 were the ones that mostly attended the clinic at least four times while the older women 35+ were least likely to attend. Those women who made only one visit were 16 times more likely to deliver babies with low birth weight ($p<0.001$)

while those women who made 5 or more visits were at a reduced risk of delivering babies with low birth weight ($p>0.01$). After adjusting for all other variables, the odds ratio was calculated to be 2 and the $p>0.05$.

However, after adjusting for Age, Tetanus immunization, Gestation age at first visit, Education level and Nutritional status, the odds ratio was calculated to be 5 and the p value was less than 0.05. Similar results have been found in Bangladesh where birth weight was positively correlated with the frequency of visits at antenatal clinics [15].

Out of the 62 respondents who started their ANC before 14 weeks, 32 (51.6%) respondents were primigravidae while 30 (48.4%) were multigravidae. Also, among the multigravidae; 146 (61.9%) reported for their first visit between 20 and 28 weeks while only 90 (38.1%) of the primigravidae reported for their first visit between 20 and 28 weeks. This suggests that the primigravidae tend to book earlier for their antenatal clinic than the multigravidae.

Those women who had given birth once and women who had given birth five or more times were two times more likely to deliver babies with low birth weight with $p<0.05$ and $p>0.05$ respectively. However, after adjusting for all other variables primigravidae were 1.5 times more likely to deliver babies with low birth weight and women who had given birth five or more times were four times more likely to deliver babies with low birth weight ($p>0.05$).

Those women who were having their first child were three times more likely to deliver babies with low birth weight while those women who were having their babies in less than 12 months of the index pregnancy and previous pregnancy were 13 times more likely to deliver babies with low birth weight ($p<0.001$) and those women having babies after 12 months of previous pregnancy were four times more likely to deliver babies with low birth weight ($p<0.01$).

Women below 18 years were found to be five times more likely to give birth to babies with low birth weight ($p<0.001$) than women who were between 19 to 29 years old. After adjusting for variables like tetanus immunization, Gestation age at first visit, Number of visits, Education level and nutritional status, the odds ratio was found to be 4 while the p value was less than 0.05.

The bivariate analysis revealed that the co-habiting mothers were 3 times more likely to give birth to low birth weight babies ($p<0.01$) while the single mothers were 7 times more likely to give birth to low birth weight babies ($p<0.001$). After adjusting for all other variables, the marital status continued to remain significant with $p<0.01$.

There were 145 mothers who did not use ITNs. 29 (18.7%) mothers gave birth to babies having low birth weight. Regression analysis revealed that the odds ratio was 1.5 but the p value was more than 0.05 and hence not statistically significant. These findings are consistence with the study carried out in Nigeria where the findings were that there were no significant beneficial impacts of the use of ITNs on foetal condition at birth, mean birth weight and low birth weight [22].

Tetanus toxoid injections are given during pregnancy to prevent neonatal tetanus, a frequent cause of infant deaths when sterile procedures are not observed in cutting the umbilical cord following delivery. Women in their first pregnancy typically receive 2 doses (TT1–TT2) with 1month in between; subsequent doses are recommended after a minimum of half a year (TT3) or one year apart (TT4–TT5), and are in general given during ANC visits for subsequent pregnancies [10,23]. Five doses are considered to provide life-long immunity.

Our results shows that those who only had their first dose were 8 times more likely to deliver babies with low birth weight ($p<0.001$), while those women who didn't get any vaccine were 26 time more likely to deliver babies with low birth weight ($p<0.001$) compared to those women who had at least had their second dose of Tetanus. After adjusting for other variables such as age, number of visits, gestational age at first visit, education level and nutritional status, women who only had their first dose were 2 times more likely to deliver babies with low birth weight while those women who didn't get any vaccine were 23 time more likely to deliver babies with low birth weight ($p<0.05$).

These results are similar to the findings of a research conducted in Uganda whereby the author concluded that mother's tetanus immunization status has a positive and significant effect (at 1 percent significance level) on birth weight and therefore

underlying the fact that tetanus immunization is an important health input that impacts on the infant's well-being through birth weight[24].

The findings from this study also suggests that those who made 2-4 visits or 5 or more visits were more likely to receive their second, third or complete their Tetanus Toxoid vaccinations while those who made only one visit, 76.5% of the women only received their first dose of Tetanus vaccine.

Sulfadoxine-pyrimethamine was administered to the pregnant women during their antenatal visits and this was recorded in their antenatal cards, our results suggests that those who hadn't received any dose of Sulfadoxine-pyrimethamine were three times more likely to deliver babies with low birth weight compared to those who had received at least one dose. After adjusting for other variables, the odds ratio was 1.35 while the p value was more than 0.05 suggesting that the variable wasn't statistically significant.

Our main limitation was that women attending post natal clinic and those who survived their last delivery were the only ones enrolled in the study.

Conclusion

Late booking still remains significantly high in our environment indicating that the importance of early booking is yet to be appreciated. There is need for public enlightenment and incorporation of the benefits of early booking in the routine antenatal health education. This study should form a basis of reinforcing and emphasizing further the role of various authorities on early antenatal care.

Acknowledgements

A very special thank you to Prof. Zul Premji who guided me throughout the study, the Temeke District Administrator as well as to the staff of Temeke District hospital, especially the wonderful staff at the Reproductive and Child health clinic, reception and the maternity ward for their support during my study. Dr. Imran Hassam for constant support and reviewing the manuscript. Funding by the Centre for Disease Control and Prevention (CDC)- MUHAS program.

Published by OJS
dx.doi.org/10.4314/tmj.v28i2

Declaration:

The authors declare NO CONFLICT of Interest. This is the authors' original work.

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Table 1: Characteristics of study population and association with Birth weight

Characteristics	Normal Birth weight n=392 (84.7%)	LowBirth Weight n= 71 (15.3%)	p Value
Gravidity			
1	133 (78.2%)	37(21.8%)	0.013
2	89 (87.3%)	13(12.3%)	
≥3	170 (89%)	21 (11%)	
Parity			
1	165 (78.9%)	44 (21.1%)	0.005
2-4	209 (90.1%)	23 (9.9%)	
≥5	18 (81.8%)	4 (18.2%)	
Age			
<18 years	28 (51.3%)	20 (48.7%)	0.001
29-29 years	256 (88%)	35 (12%)	
30-34 years	73 (81.3%)	7 (8.8%)	
35+	35 (79.5%)	9 (20.5%)	
Birth Interval			
First Child	131 (78%)	37 (22%)	0.001
Less than one year	5 (45.5%)	6 (54.5%)	
One year	20 (74.1%)	7 (25.9%)	
Two or more years	236 (91.8%)	21 (8.2%)	
Level of Education			
Informal	17 (77.3%)	17 (77.3%)	0.547
Primary	291 (84.6%)	53 (15.4%)	
Secondary or higher	84 (86.6%)	13 (13.4%)	
Marital Status			
Single	38 (57.6%)	28 (42.4%)	0.000
Married	299 (91.4%)	28 (8.6%)	
Co-habiting	55 (78.6%)	15 (21.4%)	
ITN use			
Yes	266 (86.4%)	42 (13.6%)	0.099
No	126 (81.3%)	29 (18.7%)	
Nutritional Status			
19-22cm	25 (50%)	25 (50%)	0.001
>22cm	367 (88.9%)	46 (11.1%)	
IPTp Uptake			
None	28 (54.9%)	23 (45.1%)	0.001
One Dose	168 (78.1%)	47 (21.9%)	
Two Doses	196 (99.5%)	1 (0.5%)	
Tetanus			
None	2 (33.3%)	4 (66.7%)	0.001
First Dose	62 (61.4%)	39 (38.6%)	
Second Dose	227 (57.9%)	17 (7%)	
Third dose or completed	101 (25.8%)	11 (9.8%)	
Supplements given			
Ferrous only	267 (88.1%)	36 (11.9%)	0.001
Folic only	8 (100%)	0 (0%)	
Folic and Ferrous	66 (97.1%)	2 (2.9%)	
None	51 (60.7%)	33 (39.3%)	
HIV Status			
Positive	26 (86.7%)	4 (13.3%)	0.065
Negative	355 (85.3%)	61 (14.7%)	
Not tested	11 (64.7%)	6 (35.5%)	

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dx.doi.org/10.4314/tmj.v28i2

Characteristics	Normal Birth weight	LowBirth Weight	p Value
	n=392 (84.7%)	n= 71 (15.3%)	
Occupation			
Teacher	13 (92.9%)	1 (7.1%)	0.654
Housewife	183 (85.5%)	31 (14.5%)	
Trader	146 (84.4%)	27 (15.6%)	
Other	50 (80.6%)	12 (19.4%)	
First Antenatal Visit			
<14 weeks	62 (100%)	0 (0%)	0.001
15- 19 weeks	141 (99.3%)	1 (0.7%)	
20 – 28 weeks	183 (77.5%)	53 (22.5%)	
>28 weeks	6 (26.1%)	17 (73.9%)	
Number of visits			
1 visit	4 (23.5%)	13 (76.5%)	0.001
2-4 visits	296 (83.9%)	57 (16.1%)	
5 or more visits	92 (98.9%)	1 (1.1%)	

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dx.doi.org/10.4314/tmj.v28i2

Table 2: Regression analysis of factors considered significant determinant of Birth Weight.

Characteristic	Adjusted OR	P Value	95% CI
Age			
19-29 (Ref)	1	.02	
30- 34 years	.64	.44	(0.21, 1.99)
<18 years	4.05	.01	(1.56, 10)
35+ years	.97	.95	(0.31, 2.9)
Tetanus			
Second Dose (ref)	1	.04	
Third /completed	1.12	.81	(0.43, 2.93)
First dose only	2.34	.04	(1.06, 5.18)
None	22.9	.04	(1.17, 450)
No. of Visits			
2-4 Visits (ref)		.03	
1 Visit	4.09	.05	(1.01, 16.6)
5 or more visits	.16	.09	(0.02, 1.31)
First Visit			
20- 28 week (ref)	1	.00	
15 – 19 weeks	.03	.00	(0.00, 0.29)
<14 weeks	.00	.99	(0.00)
>28 weeks	7.54	.00	(2.22, 25.6)
Education Level			
Primary (Ref)	1	.14	
Secondary or higher	1.68	.23	(0.72, 3.9)
Informal	3.45	.08	(0.86, 14.02)
Nutritional Status			
>22cm (Ref)	1		
19-22cm	.15	.00	(0.06, 0.34)