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Adequacy of Prenatal Care and its Association with Low Birth Weight in Ndola and Kitwe, Zambia

David Mulenga[1*], Tambulani Nyirenda[2], Herbert Tato Nyirenda[1], Duke Mobegi[3], Brenda Mubita[4], Ronald Kapesha[4], Viviane Sakanga[4], Robert Zulu[5], Emmanuel Chongwe[6], Inambao Mubiana[6]

[1]Copperbelt University, Michael Chilufya Sata School of Medicine, Ndola, Zambia

[2]University of Zambia, Great East Rd Campus, Lusaka, Zambia

[3]Amref Health Africa HQ, Zambia

[4]Amref Health Africa, Zambia

[5]Ministry of Health, Copperbelt Provincial Health Office, Ndola, Zambia

[6]Ministry of Health, Ndola Teaching Hospital, Department of Obstetrics and Gynecology, Ndola, Zambia

[*]**Corresponding author:** David Mulenga, Copperbelt University, Michael Chilufya Sata School of Medicine, P.O Box 71191. Ndola, Zambia

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Abstract

Background: Prenatal care is one of the recommended interventions globally to improve maternal and neonatal outcomes. In most Sub-Saharan African countries, high rates of poor pregnancy outcomes coexist with high Antenatal (ANC) coverage rates. Therefore, in order to understand this inconsistency, this study was designed to explore the association between adequacy of prenatal care received and low birth weight in Ndola and Kitwe, Zambia.

Method: A cross sectional study on 384 women and their babies was conducted in Ndola and Kitwe based health facilities. Adequacy of prenatal care was evaluated according to the seven parameters defined by the Zambian Ministry of Health in the Program for Maternal and Child Health: 1. Obstetric history 2. Intermitted Presumptive Treatment of Malaria 3. Nutritional supplements (folic acid/iron) 4. Tetanus toxoid vaccination 5. Deworming 6. Health Education and 7. Screening tests. Data was analysed using Stata version 13.1; low birth weight and adequacy of prenatal care were described. Associations between adequacy of prenatal care and low birth weight were calculated and statistical significance was set at 5%.

Results: A low birth weight of 13.5% was found in the study population. The most received screening test was abdominal pelvic scan (84.9%) and the least was the blood group (19.5%) and Rhesus factor (18.0%). On average, women received 60.9% of the ANC screening tests. Based on our classification, only 2.9% of the participants received adequate content of prenatal care. Only slightly above a quarter (25.8%) of women started their ANC visit in the first trimester. The study demonstrated a statistically significant association (p value 0.001) between basic screening tests and timing of prenatal care initiation. Similarly, a statistically significant association (p value 0.001) between essential screening tests and timing of prenatal care initiation was observed. Receiving essential screening tests was statistically significantly associated (p value 0.025) with low birth weight and no association observed between prenatal care and low birth weight.

Conclusion: Evaluating the adequacy of prenatal care received by mothers using appropriate classification tools is an efficient means of identifying deficiencies in the provision of preventive services to women during pregnancy. The findings in Kitwe and Ndola, Zambia indicate that mothers who initiated prenatal care in the first trimester were more likely to receive all the screening tests compared to those that started in subsequent trimesters. Therefore, interventions to improve quality of prenatal care should target timing of ANC initiation and factors related to the availability and accessibility to screening tests during pregnancy.

Keywords: prenatal care, Adequacy, Basic and essential screening test, Antenatal care

Introduction

Prenatal care is one of the most popular public health interventions aimed at improving birth outcomes worldwide [1,2]. It is defined as a package of regular medical and nursing care services recommended during pregnancy that comprise of preventive strategies [3] and this includes identifying mothers who are at risk of having an adverse birth outcome such as a preterm or a growth-retarded infant providing them with an array of available medical, nutritional, and educational interventions intended to reduce the determinants and incidence of low birth weight [4]. Although there is a general consensus among researchers that prenatal care is necessary for both mother and child, the indices for measuring adequacy of prenatal care differs for instance, the Adequacy of Prenatal Care Utilization (APNCU) index does not assess quality of the prenatal care that is delivered, only its utilization while the Revised-Graduated Prenatal Care Utilization Index (R-GINDEX), is a revised version of the GINDEX and relies on case-specific prenatal care information, including the number of prenatal visits, gestational age of the newborn, and the date when prenatal care began. It is useful in monitoring trends in the proportion of cases with intensive use of prenatal care [5-7].

Despite variations in the definitions of what constitutes adequate prenatal care, various researchers in different countries [8-10] have demonstrated that there is empirical evidence to support the association between prenatal care and low birth weight. However, there is a lack of this kind of research in Sub-Saharan African countries where high rates of ANC coverage coexist with high rates of adverse pregnancy outcomes [11]. This lack of consistency is due to the fact that most pertinent studies of inadequate antenatal care concentrate on the risk profile of women booking late or not booking at all to antenatal care [12]. Therefore, if measurement tools for the assessment of adequacy of prenatal care are contextualized for Sub-Saharan African countries, system level approaches can be easily developed to address the "quality gap" and improve the accessibility to all the services in the prenatal care period. It is also important to note that even though many studies indicate an association between prenatal care adequacy and low birth weight, others still argue that LBW cannot be prevented only by an adequate prenatal care, as birth weight is related with complex factors, which have a multifactorial etiology [13].

Birth weight has been said to be a major determinant of morbidity and mortality [14], LBW is defined by WHO as birth weight below 2500g [15]. It is an important phenomenon with respect to birth outcomes not only in developing countries but world over and it is the most predictive factor of mortality in the first few months of life [14]. Other than being a major contributor of newborn and child death, low birth weight due to prematurity and/or restricted growth in utero, is also a major contributor of disability globally [15]. Since babies who are of low birth weight are at increased risk of mortality and neonatal morbidity [16,17], detection and clinical management of such infants remains crucial. Compared with neonates weighing 2500kg and above, low birth weight babies are at increased risk of still birth, admission to intensive care unit and very early neonatal death [18].

For Zambia, vulnerable groups such as babies of young mothers, first order births, rural women and economically disadvantaged women are reported in the Zambia Demographic Health Survey of having higher proportions of low birth weight [19]. Infant and child mortality rates are high in communities with high prevalence of adverse pregnancy outcomes such as low birth weight, preterm and small for gestational age. Low birth weight is a major cause of perinatal mortality and both short- and long-term infant and childhood morbidity. The survivors of low birth weight are more likely than their heavier counterparts to experience retarded motor development, neurological impairment, and chronic illness [20].

Our study did not make use of any of the five indicators used to measure the adequacy of prenatal care in the two previous studies [21,22] because they are not developed for low-income settings, they are not easily transferrable. Therefore this study is based on the classification in the Zambia Demographic Health Survey, 2017. Adequacy of prenatal care was defined as having received all the seven components of prenatal care services namely; obstetric history, intermitted presumptive treatment for malaria, nutritional supplements (folic acid and iron), tetanus toxoid vaccination, deworming, health education and all ANC screening tests. The assumption was that at least three trained health personnel were present to provide and record the services in the ANC record card. If any of the above components and screening tests were not recorded in the card/ missing it was assumed that the woman did not receive the service and a classification of "incomplete/inadequate" prenatal care was applied. Emphasis on the services received was the only criteria and this was thought to be very important because usually the woman would begin her antenatal visit early enough (in first trimester) and attend all the scheduled visits but the quality of these visits will depend on the availability of the intervention services at the ANC center. Therefore, adequacy of prenatal care constituted having received all the screening tests and all the seven interventions. This was considered critical in the determination of birth outcomes, as it is an objective measure of having received the recommended ANC interventions. This study has used stringent classification (conditions) to determine the adequacy of prenatal care compared to the conditions (classification) used in the previous first Zambian national wide study on ANC quality at health facilities [11]. There, it is hoped that the findings of this study will be useful in the improvement of the quality of antenatal care provided at urban primary health facilities in Ndola and

Kitwe districts of Zambia. The study focused on the assessment of adequacy of prenatal care and its association with low birth weight in the primary health care facilities of Ndola and Kitwe.

Methods

A cross-sectional study was conducted to assess the adequacy of prenatal care and its association with low birth weight in the primary health care facilities of Ndola and Kitwe. Quantitative research methods were used to undertake this study. The study proposal was approved by the Tropical Diseases Research Ethics Committee (TDRC) and the inception of the study was undertaken after the approval. A two-stage sampling procedure was adopted to select the health facilities and the study participants. In the first stage all the urban health facilities in Ndola and Kitwe were ranked from 1 to 46 based on the Zambian Ministry of Health facility listing. A total of twenty out of forty six urban health facilities were selected from the Ndola and Kitwe so that using convenient sampling ten urban health facilities from each city could be included in the study. Health facilities that had delivery facilities, offering both antenatal and postnatal services were selected for inclusion in the study. Approval for health facility inclusion in the study was obtained from the Copper belt provincial Health Office.

The sample size was estimated at 384 and the study recorded a 100% response rate maybe owing to the fact that this was a facility based study conveniently presented to postnatal clients. The second stage of sampling, interviews were taken for each postnatal clinic in Ndola and Kitwe. Women were recruited to the study using systematic random sampling. Every third woman that reported for postnatal services was enrolled after a random start had been determined for each clinic. Women were enrolled in the study as long as they met the eligibility criteria. The eligibility criteria included residents of Ndola and Kitwe attending postnatal clinic services and were willing to sign the consent form. A consent form was developed in the local language that was approved by Tropical Diseases Research Ethics Committee (TDRC). The Consent form for each interview was filled and signed by a witness at health facilities and its record was maintained along with other data forms. Written consent was mandatory although it was not possible for some women for the reason that they were illiterate (unable to read or write) and had to use ink thumb print.

The data was collected on objectively developed semi-structured questionnaire from October-November 2019. A total of ten research assistants were engaged for data collection and each five member team consisted of a team leader/supervisor and four surveyors/interviewers. All the research assistants were provided extensive training. Field monitoring was carried out by a Principal investigator.

The data were individually entered into a Microsoft Excel 2010 database and imported to Stata version 13.1 for analysis. Univariate analysis was done to describe statistics of the study participants and was computed as frequency distributions. Association of participant characteristics and pregnancy outcomes were assessed using chi-square. The goal of the analysis was to determine a set of variables that best explained the variation in the adequacy of prenatal care, screening tests received by women and low birth weight. Adequate prenatal care content was defined as having received all the seven components of prenatal care. The components were classified as "Complete/Adequate" if contained 1. Obstetric history (gestational age, para, gravidity, last menstrual period, expected date of delivery, blood pressure, height, weight, fundus, lie, presentation, engaged, Oedema) 2. Intermitted Presumptive Treatment of Malaria 3. Nutritional supplements (folic acid and iron) 4. Tetanus toxoid vaccination 5. Deworming 6. Health Education and 7. Screening tests. If short of any of the above components was classified as "Incomplete/Inadequate". Screening tests were categorized as basic and essential tests. A woman was considered to have received basic tests if she did not have a scan but was provided with all the other screening tests while the category of essential tests was based on having recieved all the screening tests including an abdominal scan (note: screening tests are full blood count/Hb, blood group, rhesus factor, RPR, albumin, glucose, HIV, abdominal scan). Broadly, the analysis of data was arranged by the objectives of the study.

Results

Socio-demographic characteristics

A total number of 384 women were interviewed and this represented 100% response, Table 1 provides a summary of the socio-demographic characteristics. Slightly close to half (47.1%) of the respondents were aged below 24 years old. Slightly Over three quarters (79.4%) were in a marriage relationship. Above one third of the women reported having gone only up to primary school (35.7%) and slightly more than one third reported to have attained secondary (39.3%) level of education. The paternal education profile showed that close to half (46.4%) had gone up to secondary education level. Almost three quarters (71.1%) of the respondents were housewives and similarly paternal occupation accounted for close to three quarters (73.4%).

Maternal Age	n	(%)
0-24	181	(47.1)
25-34	165	(43)
45-49	38	(9.9)
Total	384	(100)
Marital Status		
Married	305	(79.4)
Single	49	(12.8)
Divorced/separated	30	(7.81)
Total	384	(100)
Maternal Education		
Primary	137	(35.7)
Secondary	151	(39.3)
Tertiary	96	(25)
Total	384	(100)
Paternal Education		
Primary	90	(23.4)
Secondary	178	(46.4)
Tertiary	55	(14.3)
Not applicable	61	(15.9)
Total	384	(100)
Maternal Occupation		
Housewife	273	(71.1)
Formal job	55	(14.3)
Informal job/business	40	(10.4)
Not applicable	16	(4.17)
Total	384	(100)
Paternal Occupation		
Formal job	282	(73.4)
Informal job/Business	36	(9.38)
Unemployed	59	(15.4)
Not applicable	7	(1.82)
Total	384	(100)

Table 1: Socio-demographic characteristics.

Components of Prenatal Care Services

Screening Tests

The mandatory ANC screening tests according to the Zambian Ministry of Health are full blood count/Hb, blood group and Rhesus factor, RPR, albumin, glucose, HIV and abdominal scan. Figure 1 is a summary of proportions of ANC screening tests received by women during prenatal care period. The most received ANC screening test was the scan (84.9%) and the least was the blood group and Rhesus factor (19.5%). None of the screening test was received by all (100%) the women during their ANC visit. However, on average, women received over half (60.9%) of the ANC screening tests. Only 8.1% and 7.8% women received basic and essential content of screening tests respectively.

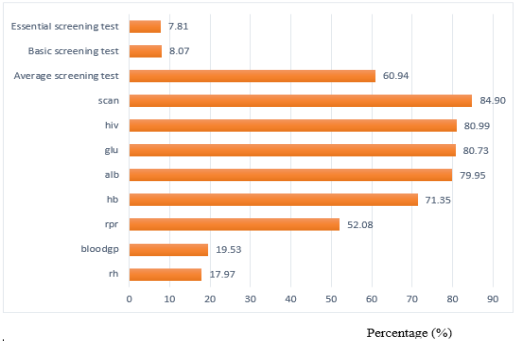

Figure 1: Screening tests received at ANC.

Obstetric History

Table 2 shows that almost all the 13 parameters of the obstetric history including physical examination were done among the respondents in varying proportions. Findings further show that over half (57.3%) of the women had a complete obstetric history taken.

Obstetric history parameter	n	(%)
Gestational Age	304	-79.2
LMP	384	-100
EDD	378	-98.4
Gravida	383	-99.7
Para	375	-97.7
Fundus	381	-99.2
Lie	367	-95.6
Presentation	355	-92.5
Engaged	376	-97.9
Oedema	363	-94.5
Blood Pressure	309	-80.5
Weight (W)	378	-98.4
Height (H)	319	-83.1

Table 2: Proportions of obstetric history parameters received.

Nutritional Supplements

The findings in Table 3 indicate that 3.9% received neither iron nor folic acid during pregnancy. While 6.5% received either iron or folic acid supplements.

Nutritional supplements	n	(%)
Neither iron nor folic acid	15	(3.91)
Either iron or folic acid only	25	(6.51)
Iron and folic acid	344	(89.58)
Total	384	(100.00)

Table 3: Nutritional supplements received.

Deworming

The study found more than three quarters (84.6%) of women received deworming tablets during the prenatal period.

Health Education

The findings show that almost all the women (99.5%) had received health education during the prenatal care period.

Tetanus Toxoid

Out of the women who were not fully protected against Tetanus, more than three quarters (83.9%) received an injection of Tetanus Toxoid.

Intermittent Presumptive Treatment of malaria

Slightly below three quarters (73.4%) of the women received intermittent presumptive treatment of malaria.

Adequacy of prenatal care and screening tests

The results summarized in Table 4 show that only 2.9% of women received all the seven ANC components (adequate prenatal care) with 1.6% of the women receiving basic content of screening tests and 1.6% essential content of screening tests.

ANC Services Received			Screening tests			
			Basic package		Essential package	
	n	(%)	n	(%)	n	(%)
Adequate ANC	11	(2.9)	6	(1.56)	5	(1.30)
Inadequate ANC	373	(97.1)	0	(0)	0	(0)
Total	384	(100)	6	(1.56)	5	(1.30)
Key Basic package – all screening tests excluding abdominal scan Essential package – all screening tests including abdominal scan Adequate ANC – Received all the 7 components Inadequate ANC – Received less than 7 components						

Table 4: Proportions of Adequacy of prenatal care and screening tests received.

Only slightly more than one quarter (25.8%) of women initiated their ANC visits in the first trimester of their pregnancy. The rest started the prenatal care visit after the first trimester (74.2%).

Chi-square test findings

Association between adequacy of prenatal care and timing of ANC initiation

Table 5 shows that there was no significant association (p value 0.607) between adequacy of prenatal care and timing of prenatal care initiation.

APNC	ANC initiation		
	Within Trimester 1	After 1st Trimester	Total
Inadequate	98 (98.99)	275 (96.49)	373 (97.14)
Adequate	1 (1.01)	10 (3.51)	11 (2.86)
Total	99 (100)	285 (100)	384 (100)
Pearson chi2(1) = 0.2646 1-sided Fisher's exact = 0.515 Fisher's exact = 1 Pr = 0.607			

Table 5: Adequacy of prenatal care versus timing of ANC initiation.

Association between timing of ANC initiation and having received basic screening tests

Tables 6 show that there was a statistically significant association between timing of prenatal care initiation and having received basic screening tests (p value 0.001).

Timing of ANC initiation					
Basic Tests	**Within1stTrimester**		**After 1st Trimester**		**Total**
	n	**(%)**	**n**	**(%)**	**n**	**(%)**
0	0	(0.00)	1	(0.35)	1	(0.26)
1	0	(0.00)	6	(2.11)	6	(1.56)
2	5	(5.05)	30	(10.53)	35	(9.11)
3	18	(18.18)	15	(5.26)	33	(8.59)
4	20	(20.20)	39	(15.36)	59	(15.36)
5	31	(31.31)	85	(29.82)	116	(30.21)
6	19	(19.19)	68	(23.86)	87	(22.66)
7	2	(2.02)	15	(5.26)	17	(4.43)
8	4	(4.04)	26	(9.12)	30	(7.81)
Total	99	(100)	285	(100)	384	(100)
Pearson chi2 (8) = 26.08 Pr = 0.001						

Table 6: Timing of ANC initiation and having received basic screening tests.

Association between low birth weight and having received basic/essential screening tests

Findings in Table 7 show that there was no significant association between basic screening tests and low birth weight (p value 0.064) while Table 8 showed a statistically significant association between essential screening tests and having a low birth weight (p value 0.025).

Basic Tests	**Birth Weight**					
	> 2500kg		**< 2500kg**		**Total**	
	n	**(%)**	**n**	**(%)**	**n**	**(%)**
0	2	(0.6)	2	(3.85)	4	(1.04)
1	27	(8.13)	4	(7.69)	31	(8.07)
2	26	(7.83)	2	(3.85)	28	(7.29)
3	55	(16.57)	2	(3.85)	57	(14.84)
4	95	(28.61)	16	(30.77)	111	(28.91)

5	86 (25.9)	19 (36.54)	105 (27.34)
6	15 (4.52)	2 (3.85)	17 (4.43)
7	26 (7.83)	5 (9.62)	31 (8.07)
Total	332 (100)	52 (100)	384 (100)
Pearson chi2(7) = 12.5867 Fisher's exact = 0.083 Pr = 0.064			

Table 7: Basic Screening Tests and Low Birth Weight.

Essential Tests	**Birth Weight**		
	> 2500kg	**< 2500kg**	**Total**
	n (%)	**n (%)**	**n (%)**
0	0 (0.00)	1 (1.92)	1 (0.26)
1	5 (1.51)	1 (1.92)	6 (1.56)
2	29 (8.73)	6 (11.54)	35 (9.11)
3	32 (9.64)	1 (1.92)	33 (8.59)
4	57 (17.17)	2 (3.85)	59 (15.36)
5	98 29.52)	18 (34.62)	116 (30.21)
6	71 (21.39)	16 (30.77)	87 (22.66)
7	15 (4.52)	2 (3.85)	17 (4.43)
8	25 (7.53)	5 (9.62)	30 (7.81)
Total	332 (100)	52 (100)	384 (100)
Pearson chi2(8) = 17.56 Fisher's exact = 0.020 Pr = 0.025			

Table 8: Essential Screening Tests and Low Birth Weight.

Association between prenatal care and low birth weight

There was no significant association (p value 0.671) between prenatal care content and low birth weight.

Birth weight					
	Normal weight		**Low Birth Weight**		**Total**
	n	(%)	n	(%)	n (%)
Inadequate	323	(97.29)	50	(96.15)	373 (97.14)
Adequate	9	(2.71)	2	(3.85)	11 (2.86)
Total	332	(100)	52	(100)	384 (100)
Pearson chi2(1) = 0.0508 Pr = 0.822 Fisher's exact = 0.585 1-sided Fisher's exact = 0.822					

Discussion

The current study provides important findings regarding the relationship between prenatal care and low birth weight based on a contextualized classification of adequacy of prenatal care. The study recorded a prevalence of 13.5% low birth weight in the urban districts of Ndola and Kitwe, a finding that is slightly higher than what was obtained in Lusaka the capital city of Zambia and that of the national level for births with a reported birth weight in the 2018 Zambian Demographic Health Survey report [23]. The study examined the quality of ANC that women received during their most recent ANC visit and the findings revealed that although ANC attendance is high in Zambia, very few mothers initiate prenatal care visits in the first trimester and only a minimal proportion of women receive adequate prenatal care services in line with our classification. The majority of mothers did not receive the screening tests and insufficient provision of ANC screening tests is a challenge because this had an effect on the overall classification of adequacy of prenatal care. This result is similar to the observation made in the national scale survey on the quality of antenatal services in Zambia [11]. The unexpected result regarding screening tests is the finding that the scan was the most received screening test by the women compared to all the other tests. This finding is interesting because, while all the other screening tests are provided at no cost at the ANC, a scan is not provided free of charge. It might have scored the highest received test because of the levels of emphasis on the importance of abdominal scan during pregnancy. It is expected that the least received tests would be ABO blood group and Rhesus factor. This could be due to the fact that maybe mothers are asked to have the screening tests based on need, contingency or availability of time. This is supported by the observation in a study that assessed the implementation of action protocols dictated by antenatal risk factors noted at the initial (booking) antenatal visit [24]. Providing prenatal care services based on perceived risks has enormous negative implications on the quality of prenatal care received. Like the previous researcher, this study observed that this "quality gap" is an indication that there are still many "missed opportunities" at ANC for delivering effective interventions to improve maternal and newborn health [11].

The present study also demonstrated that although timing of first ANC attendance is an important aspect of adequate prenatal care, only slightly close to a quarter of women turned up for their first ANC in the first trimester. This is an unsatisfactory indicator because adequate prenatal care according to many classifications encompasses early initiation of ANC preferably in the first trimester so as to allow for early detection and prevention of pregnancy complications. This is demonstrated in a previous research that indicated that adequate prenatal care coupled with skilled attendance at birth can prevent maternal deaths [25].

The study demonstrated a statistically significant association between screening tests and timing of prenatal care initiation. This is an essential finding as it points to the benefits of early initiation of ANC, which not only imply increased opportunities for trained health personnel to detect early any complications during pregnancy but also enough time in the ANC period for the woman to have all her recommended screening tests done if they were not done on the first ANC visit. Similar observation was made [18] in another study that more ANC protocols were followed if mothers booked early rather than after 24 weeks. Adequacy of prenatal care did not predict low birth weight in our current study probably because only a few women received adequate/complete content of ANC interventions. The finding is also supported by a study that got a similar result based on another classification of adequacy of prenatal care [18] and authors argue that LBW cannot be prevented only by an adequate ANC, as LBW is associated with factors of complex and multifactorial etiology. There was a statistically significant association between having received an abdominal scan (essential screening tests) and low birth weight. This probably indicates the important role that the abdominal scan plays in the process of prenatal care and consequently birth outcome. The important role played by the abdominal scan has been well conceptualized by healthcare providers and in this study abdominal scan is the most received screening test among women.

From our findings and available literature on the subject, it is clear that the collective evidence regarding the efficacy of prenatal care to prevent low birth weight is still mixed [18]. Other studies indicate [8-10] that the quantitative adequacy of prenatal care has an independent effect on pregnancy outcome, when assessed through the occurrence of low birth weight infants while others indicate otherwise. This difference in findings may be attributed to the difference in the definition of what constitutes prenatal care and adequate prenatal care use.

Limitations

The sample of the participants consisted only of women from government health facilities. This presents a missed opportunity to compare the quality of adequacy of prenatal care between private and government based facilities. Furthermore, this study only considered the prenatal care services provided as well as outcome and overlooked the infrastructural parameters in determining quality of ANC. The study could have been more informative if it also collected qualitative data on the research questions to obtain the actual reasons for not having received certain ANC services during pregnancy. Despite the stated limitations, the use of exit interviews for data collection as well as checking for correspondence of collected information on ANC cards enabled us to eliminate recall bias from our study hence increasing the quality of data collected.

Conclusions

Adequacy of prenatal care did not significantly explain the prevalence of low birth weight in Ndola and Kitwe based health facilities. Timing of ANC initiation was crucial in determining the amount of screening tests received. Majority of mothers did not receive all the prescribed ANC screening tests and this had a negative effect on the proportion of women that received adequate prenatal care services. Despite interplay of various factors that contribute to adequacy of prenatal care, screening tests had a larger role to play in this study and because of this; the proportion of women receiving high quality ANC was low. Therefore, interventions to increase proportions of mothers that receive adequate prenatal care services should include a system level approach that improves the accessibility to all the services in the prenatal care period including all the ANC screening tests.

Recommendations

The maternal child Health program is a very important component of the primary health care system in any health system, therefore, government should allocate adequate resources for ANC services such as screening tests if they are to improve and meet the sustainable development goals. It is recommended that women start their prenatal care visits early enough in the first trimester as this will provide them with enough time before date of delivery to receive all the recommended ANC components including screening tests. Health facilities should provide all the required ANC services and not to provide them on need basis such as only women presents with signs and symptoms of a pregnancy complication, but it should be a full ANC package. More research is needed to develop tools and methods of contextualizing adequacy and quality of prenatal care in our settings. This is important in that public health researchers will be able to objectively measure the quality of prenatal care services and link it to outcomes. This can then be used to develop targeted interventions to improve maternal and child health programs in Zambia and other countries in Sub-Saharan region.

Declarations

Competing interests

The author declares no competing interests

Authors' contributions

DM was the Principle Investigator and was involved in all stages of study and this included conceptualization, proposal writing, methodology, data collection, data analysis and final report writing. TN and EC were involved in supervising data collection, data analysis and interpretation of the study, HTN was involved in data analysis, interpretation and report writing, BM, VS, RZ and IM were involved in study supervision and data collection, DM was involved in final report editing and writing. All the authors gave their expert contributions and approval for the manuscript publication.

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