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Analytical Review of the Effect of Demographic Characteristics on Maternal Health Outcomes and Ambulance Referral Network Intervention in Wajir County, Kenya

Fatuma I. Adan

Ph.D. Student, Department of Community Health and Development,
Great Lakes University of Kisumu, Kenya

Dr. Amadi A. Ndede

Vice Chancellor, Department of Community Health and Development,
Great Lakes University of Kisumu, Kenya

Dr. Dominic M. Mogere

Head, Department of Biostatistics and Epidemiology, Mt. Kenya University, Kenya

Abstract:

Maternal health is a global public health concern. Worldwide, every year more than half million women die in childbirth, mainly from haemorrhage, infection, and complications of abortion. About 99% of these maternal mortalities occur in Sub-Saharan countries including Kenya. Majority of these deaths are attributed to weak health systems, geographical location and demographic characteristics of the mother, among many other deficits including delay in accessing maternal health care. In Kenya, ambulance referral services have been provided to reduce the delay in accessing maternal health care for improved maternal health outcomes. However, their performance remains largely unevaluated. Therefore, this study was undertaken to perform analytical review of the demographic characteristics on maternal health outcomes and ambulance referral network intervention in Wajir County, Kenya. This was a longitudinal retrospective study, specifically to determine the demographic characteristics, cost and effectiveness of ambulance referral networks on maternal health outcomes. Data was collected from ambulance logbooks, patient registers, logistics records, and maternal death surveillance records. A population of 623 records of mothers who had used ambulance during referral process within the county was achieved during sourcing data for this study from records. Thus secondary data containing both quantitative data and qualitative data was analysed using both descriptive and inferential statistics. Descriptive statistics used included percentages, frequency, and mean. Inferential statistics used was chi-square. To determine effects of demographic characteristics on maternal health outcomes, multinomial regression analysis was employed. Results were presented in tables and figures. The results indicate that demographic characteristics had significant effect at 5% level of significant. Level of education for the mother was found to affect all maternal health outcomes significantly at $p < 0.05$. Therefore to reduce infant and maternal mortality rate in Wajir County, the county should improve demographic characteristics of the mother by providing formal education to the mother. Thus, from this finding, to improve maternal and infant health outcomes, its recommended that women in Wajir should be educated.

Keywords: Demographic, Ambulance, maternal health outcome, interventions, referral network

1. Introduction

Each year, more than half a million women die from pregnancy-related causes and an estimated 10 million experience injuries, infections, disease or disability that can cause lifelong suffering [1]. Nearly 99% of these deaths occur in developing countries with sub-Saharan Africa accounting for over 50% of global deaths [1]. An estimated 73% of these maternal deaths are due to direct obstetric causes while 27.5% are due to indirect causes [2]. In Kenya, maternal mortality remains high at 488 maternal deaths per 100,000 live births [1]. While this is below the Sub-Saharan average of 640 deaths per 100,000, Kenya experiences a very slow progression in maternal health with Wajir county rank highest in terms of maternal deaths estimated at 1000 per year [8]. High maternal mortality rates is also attributed to the delay on the part of the mother, family, or community not recognizing a life-threatening condition based on the demographic characteristics of the mother or people living with the mother. These include education of the mother, parity, location and failure to attend to ANC. To facilitate optimal referrals, increasing the number of ambulances is required. Therefore, distance acts as a disincentive and actual obstacle in seeking health care. The uneven distribution of health facilities has implications for travel distances between women and even the closest facility as well as specialist referral hospital. Health care access is therefore an acute problem for rural inhabitants in developing countries.

2. Research Problem

Pregnant women experience delay in accessing maternal health care services, thus, seriously affecting their conditions resulting in higher rates of mortality and morbidity [3]. One of the main barriers associated with delay is being the demographic characteristics of the mother. To reduce this problem, ambulance transport have been provided to improve maternal health care coverage [4]. The main concern high level of illiteracy for the mothers in wajir county and low income for these mothers in Wajir County in Kenya hence the need to provide a clear directive the interventions of improving maternal health based on the standards of the demographic characteristics of these mothers within the County. According to a 2009 analysis of census data, the highest maternal mortality was reported in North Eastern Province (2,014 per 100,000 live births) Wajir County being one of them, followed by Nyanza Province (546 per 100,000 live births) while the lowest was in Nairobi Province (212 per 100,000 live births (NCPD. and UNFPA, 2013). Wajir County is one of the county's that is contributing to the high maternal mortality in Kenya. Its maternal mortality is estimated to be over 1600 maternal deaths per 100,000 live births in the country [5]. Therefore, this study will determine the effect of demographic characteristics on maternal health outcomes in Wajir County, Kenya.

3. Methods

The study adopted analytical longitudinal study design, quantitative data was collected. This study retrospectively reviewed demographic records related to ambulance services and maternal records collected between July 2016 and June 2019. The study was conducted in Wajir county, Kenya, which has about 661,941 inhabitants unevenly distributed over 55,840.6 km² [5]. The data collected was secondary data and it involved looking at the 623 records of mothers who had delivered within the period of the study and they had used public ambulance services during delivery. The results were processed and presented in frequency tables and charts. Multinomial regression analysis was the preferred choice with the aim of establishing the relationship between demographic characteristics and maternal health outcome in Wajir County. Correlation analysis was carried out to establish the relationship between variables and to describe the direction of the relationships.

4. Results

4.1. Demographic Characteristics of the Antenatal Mother

4.1.1. Reproductive Age

From table 1, majority (27%) of the records used were for the women between the ages of 20-24 years old. About 23% were of the age between 25-29 years, 18% for both 15-19 years and 30-34 years, this was followed by 9% of age between 35-39 years old, next 4% who were of age between 40-44 years and lastly 1% of age between 45-49 years.

Age	Frequency	Percentage
15-19	112	18%
20-24	171	27%
25-29	140	23%
30-34	113	18%
35-39	57	9%
40-44	25	4%
45-49	5	1%
Total	623	100%

Table 1: Reproductive Age

4.1.2. Education of the Mothers

From table 2 records of patients indicates that majority about 62.62% had only primary level of education.

Level	Frequency	Percentage
Primary	389	62.62
Secondary	26	4.15
Tertiary College	204	32.59
Tertiary University	1	0.16
Not Indicated	3	0.48
Total	623	100

Table 2: Education of the Mothers

4.1.3. Gestation Period in Weeks

From table 3 the records indicate that majority had gestation between 31-40 weeks who were about 92%.

Weeks	Frequency	Percentage
21-30	22	3%
31-40	574	92%
41-50	27	5%
Total	623	100

Table 3: Pregnancy Gestation in Weeks

4.1.4. Parity

From table 4, majority had between 4-7 numbers of previous deliveries. This was about 46%

Parity	Frequency	Percentage
0-3	274	44
4-7	286	46
8-11	63	10
	623	100

Table 4: Number of Previous Pregnancy

4.2. Effect of Demographich Characteristics on Maternal Health Outcomes.

From table 5, the indicators to measure demographic characteristics were age, level of education, referred by, parity, gestation period and total distance covered to go to health facility. These indicators were used to predict various maternal health outcome in Wajir county.

Health outcome	Coefficient	Std. Error	z	p-value	Sig
Mother alive, Infant dead(2)					
Const	1.49859	0.36921	0.9880	0.03921	**
MothersAge	-0.416494	0.24326	-1.2678	0.24326	
Levelofeducati~	0.235127	0.20536	1.2464	0.0236	**
Referredby	0.48234	0.27386	1.9420	0.27386	
Noofpreviousde~	0.583222	0.20441	1.1296	0.20441	
ANCnoIndicate	-0.503165	0.14265	-1.07864	0.04156	**
Gestationalage	-0.0733981	0.17924	-1.1334	0.01742	**
TotalDistancec~	-0.00188486	0.00639807	-0.2946	0.03786	**
Mothers Dead, Infant alive(3)					
const	2.94659	3.28144	0.8980	0.36921	
MothersAge	-0.161484	0.13839	-1.1669	0.24326	
Levelofeducati~	0.325217	0.256798	1.2664	0.00364	***
Referredby	0.248433	0.227041	1.0942	0.27386	
Noofpreviousde~	0.385444	0.303717	1.2691	0.20441	
ANCnoIndicate	-0.70163	0.478616	-1.4660	0.014265	**
Gestationalage	-0.0718933	0.0535278	-1.3431	0.03924	**
TotalDistancec~	-0.0018486	0.00639807	-0.2946	0.04830	**
Mother and Infant alive(4)					
const	2.72984	0.868254	3.1441	0.00167	***
MothersAge	-0.0332267	0.0274065	-1.2124	0.2537	
Levelofeducati~	0.0859386	0.045538	1.8872	0.05914	**
Referredby	0.148756	0.0955623	1.5566	0.01956	**
Noofpreviousde~	-0.0761342	0.0650649	-1.1701	0.24195	
ANCnoIndicate	-0.0683401	0.0465812	-1.4671	0.04234	**
Gestationalage	0.0245785	0.0160558	1.5308	0.02581	**
TotalDistancec~	-0.00325862	0.00127915	-2.5475	0.01085	**
Mother and infant tweens alive(5)					
const	-2.75016	3.16128	-0.8700	0.03843	**
MothersAge	0.0145268	0.112658	0.1289	0.89740	
Levelofeducati~	0.484843	0.268698	1.8044	0.01177	**
Referredby	0.23371	0.19117	1.2225	0.22151	
Noofpreviousde~	0.136142	0.234855	0.5797	0.56213	
ANCnoIndicate	0.0649615	0.214474	0.3029	0.76198	

Health outcome	Coefficient	Std. Error	z	p-value	Sig
Mother and infant twins alive(5)					
Gestationalage	-0.122465	0.059616	-2.0542	0.03995	**
Total Distancec~	-0.00200562	0.00538383	-0.3725	0.70950	
Mother and Infant twins dead(6)					
const	7.0848	7.3922	0.9584	0.00785	***
Mothers Age	-0.289399	0.303357	-0.9540	0.34009	
Level of educati~	0.415298	0.272549	1.5238	0.01757	**
Referred by	-1.3981	3.02929	-0.4615	0.64442	
Noofpreviousde~	0.00022	0.535472	0.0004	0.99967	
ANC no Indicate	-0.681445	0.451383	-1.5097	0.01112	**
Gestationalage	0.004097	0.0711601	0.0576	0.95408	
Total Distancec~	-0.0111381	0.0102773	-1.0838	0.02847	**

Table 5: Coefficients of Demographic Characteristics on Maternal Health Outcomes

Likelihood Ratio Test: Chi-Square (35) = 58.8499 [P-Value=0.0006]

*** Significant At $P < 0.001$, ** Significant At $P < 0.05$

5. Discussion

The study found out that demographic characteristics affects the possibility of the maternal health outcomes in Wajir County. The study found out that mother's level of education and total distance covered to pick the mother by the ambulance were significant in all possible maternal outcomes. For mother and infant alive, referred by, ANC number indicated and gestational age were also found to be significant indicators. Thus the study found that there is an association that maternal health outcomes improves with increase in level of education. These results also agreed with the study by [6] in Nigeria that found out that there is positive association between mother's education and use of maternal health services in Nigeria. Also a longitudinal study in Nepal indicated that women who were educated especially with secondary education and above were likely to deliver in hospital [7] suggesting that increasing level of education increase knowledge and awareness of obstetric danger signs [8]. In addition, the proportion of private health facility deliveries is positively linked to maternal education [9] while lower level of maternal education is associated with high morbidity and mortality [10] indicating that education influences choice of quality health care. There is also a strong association between education and poverty eradication thus women should be economically empowered so that they can afford quality health services when they are pregnant such as attending required ANC services. This study agrees with the study by [10] who found out that economic status of women influences their ability to access maternal care. Socio-economic status in women was significantly associated with institutional delivery despite the existence of delivery user fee exemptions [11]. The highest proportion of users is located close to the health facility and that the proportion of users declines as the radius increases. In addition, adverse birth outcome in pregnant women is associated with long distance travel suggesting that the longer distance travelled act as a disincentive thus delaying the caretakers' decisions to seek care until complications of the initial disease develops [10].

6. Conclusions

Education affects individuals by increasing access to health care information and thus women should be encouraged to attend school so that they can reduce maternal mortality rates. The location or distance covered to pick the mother acts as a disincentive and actual obstacle in seeking health care and should be put into consideration when working out the solution of referral networks

7. References

- WHO. (2015). Trends in maternal mortality: 1990 to 2015. Retrieved from Say, L., Chou, D., Gemmill, A., Tuncalp, O., Moller, A. B., Daniels, J., . . . Alkema, L. (2014). Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health*, 2(6), e323-333. doi:S2214-109X(14)70227-X [pii]10.1016/S2214-109X(14)70227-X
- Tsegaye, A., Somigliana, E., Alemayehu, T., Calia, F., Maroli, M., Barban, P., . . . Accorsi, S. (2016). Ambulance referral for emergency obstetric care in remote settings. *International Journal of Gynecology & Obstetrics*, 133(3), 316-319
- Broccoli, M. C., Calvillo, E. J., Skog, A. P., Wachira, B., & Wallis, L. A. (2015). Perceptions of emergency care in Kenyan communities lacking access to formalised emergency medical systems: a qualitative study. *BMJ Open*, 5(11), e009208. doi:bmjopen-2015-009208 [pii]10.1136/bmjopen-2015-009208
- KNBS. (2009). The 2009 Kenya Population and Housing Census.
- Fawole, O. I., & Adeoye, I. A. (2015). Women's status within the household as a determinant of maternal health care use in Nigeria. *Afr Health Sci*, 15(1), 217-225. doi:10.4314/ahs.v15i1.28jAFHS.v15.i1.pg217 [pii]
- Karkee, R., Binns, C. W., & Lee, A. H. (2013). Determinants of facility delivery after implementation of safer mother programme in Nepal: a prospective cohort study. *BMC Pregnancy Childbirth*, 13, 193. doi:1471-2393-13-193 [pii]10.1186/1471-2393-13-193

- vii. Hailu, D., & Berhe, H. (2014). Knowledge about obstetric danger signs and associated factors among mothers in Tsegedie district, Tigray region, Ethiopia 2013: community based cross-sectional study. *PloS one*, 9(2), e83459. doi:10.1371/journal.pone.0083459 PONE-D-13-30826 [pii]
- viii. Das, S., Alcock, G., Azad, K., Kuddus, A., Manandhar, D. S., Shrestha, B. P., . . . Osrin, D. (2016). Institutional delivery in public and private sectors in South Asia: a comparative analysis of prospective data from four demographic surveillance sites. *BMC Pregnancy Childbirth*, 16, 273. doi:10.1186/s12884-016-1069-710.1186/s12884-016-1069-7 [pii]
- ix. Exavery, A., Kante, A. M., Njozi, M., Tani, K., Doctor, H. V., Hingora, A., & Phillips, J. F. (2014). Access to institutional delivery care and reasons for home delivery in three districts of Tanzania. *Int J Equity Health*, 13, 48. doi:1475-9276-13-48 [pii]10.1186/1475-9276-13-48
- x. NCPD., & UNFPA. (2015). Reducing Maternal Deaths in Kenya. Retrieved from Nairobi: