Some socio-economic and demographic determinants of infant and child mortality in Tanzania: A case study of Karagwe District, Kagera Region.

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Abstract

Mortality is among the demographic processes that reflect the health status of a population and hence the state of socio-economic conditions of a country. This study examines some socio-economic and demographic determinants of infant and child mortality in Karagwe District, Kagera Region. The study was undertaken in October 2005 and involved a sample of 200 mothers aged 15-49 years, 88 from urban and 112 from rural settings. The analysis was done at three levels: i) univariate ii) bivariate and iii) multivariate analysis. Of all the independent variables tested in this study, employment status, children ever born and age of mother at first birth were found to be significant in influencing infant and child mortality. Income of the mother and that of the household were not significant in influencing infant and child mortality. Age of mother was not significant only in the multivariate analysis.

Introduction

Tanzania has made a great effort to reduce infant and child mortality through various means. Significant success has been recorded with regards to the immunization program, control of communicable diseases and nutritional interventions (URT, 2000). The 1992 Tanzania Population Policy indicated that mortality has declined substantially over decades as a result of improved access to health care and environmental sanitation; these two are among the areas of this study. The infant mortality rate is normally calculated from information drawn from mothers reports (birth histories) basing on the assumption that adult mortality is not very high, and that there is little or no correlation between mortality risks of mothers and that of their children (URT, 2000).

The crude death rate in Tanzania is estimated to have fallen from about 22 in mid 1960s to 17 in mid 1980s, infant mortality rate has declined from 170 in the 1960s to 115 by mid 1980s (URT, 1991). In spite of the successes observed to improve the health status of the Tanzanian population, infant and child mortality has remained high. The National Strategy for Growth and Reduction of Poverty (NSGRP) has set operational targets to reduce infant mortality from 95 per 1000 live births in 2004 to 50 per 1000 live births by

2010, and reduce under-five mortality from 154 to 79 by 2010 per 1000 live births (URT 2005). These national targets may vary when translated to the regional and district circumstances. Though the level of infant and child mortality has been declining nationally, there are local variations between regions and districts in terms of performance related to reduction of infant and child mortality levels. In comparison with the overall average of IMR and U5MR in Tanzania Mainland, Kagera Region is among the regions with high IMR and U5MR. Infant and under five mortality stood at 115 and 191 respectively for the year 2002 in the region compared to the overall 95 and 154 respectively for Tanzania Mainland.

Karagwe is among the districts in Kagera Region that have been remarkably hit by the influx of refugees for a long time. This has in turn affected the demographic characteristics of the population and its dynamics including mortality rates.

The overall objective of this study is to investigate some factors associated with childhood mortality (socioeconomic, environmental/intervening and demographic/proximate determinants) in Karagwe District. An attempt is also made to examine the effect between one set of variables with another to influence childhood mortality. The specific objectives of the study include:

i) To ascertain the extent to which mothers education influences infant and child mortality;
ii) To find the magnitude of the effect of household income and mothers income on infant and child mortality;
iii) To examine the influence of maternal occupation and employment status on infant and child mortality;
iv) To establish the relationship between type of water and toilet used by the household and infant and child mortality;
v) To examine the effect of age of mother at birth and age at first birth on infant and child mortality; and
vi) To determine whether children of mothers age less than 20 and above 40 years experience higher mortality compared to those of mothers with age 20-40.

Conceptual framework

Based on the model by Bryman and Cramer (1990) on quantitative data analysis for social scientists and Casterline et al (1989), which build on the Mosley and Chen (1984) conceptual framework, our conceptual model shown in Figure 1 assumes that:

- Death is the final biological expression of a process that is determined basically by the economic and social structure of a country or region. These conditions influence the occurrence of the disease and its development, one of the possible outcomes of which is death.
- Structural determinants are mediated at the family level, since the child's growth and development are heavily dependent on the living environment of his /her

family. These conditions generate the biological risk factors that act directly on the child's health.

These determinants of mortality are grouped into three categories, namely;

i) The socio economic characteristics such as mother's education, occupation, residence, resources of the household, income of the mother and medical care,
ii) The intervening/housing conditions/ environmental variables such as source of water, toilet facilities and distance from home to the nearest health facility.
iii) The demographic variables such as age of mother at child birth, Birth order, previous birth interval, breastfeeding and sex of the child

From the conceptual framework shown in Figure 1, it is clear that socio-economic characteristics of mother play a key role in determining child mortality. They both directly and indirectly influence childhood mortality. Indirectly, they operate through demographic/housing conditions/environmental factors to influence infant and child mortality.

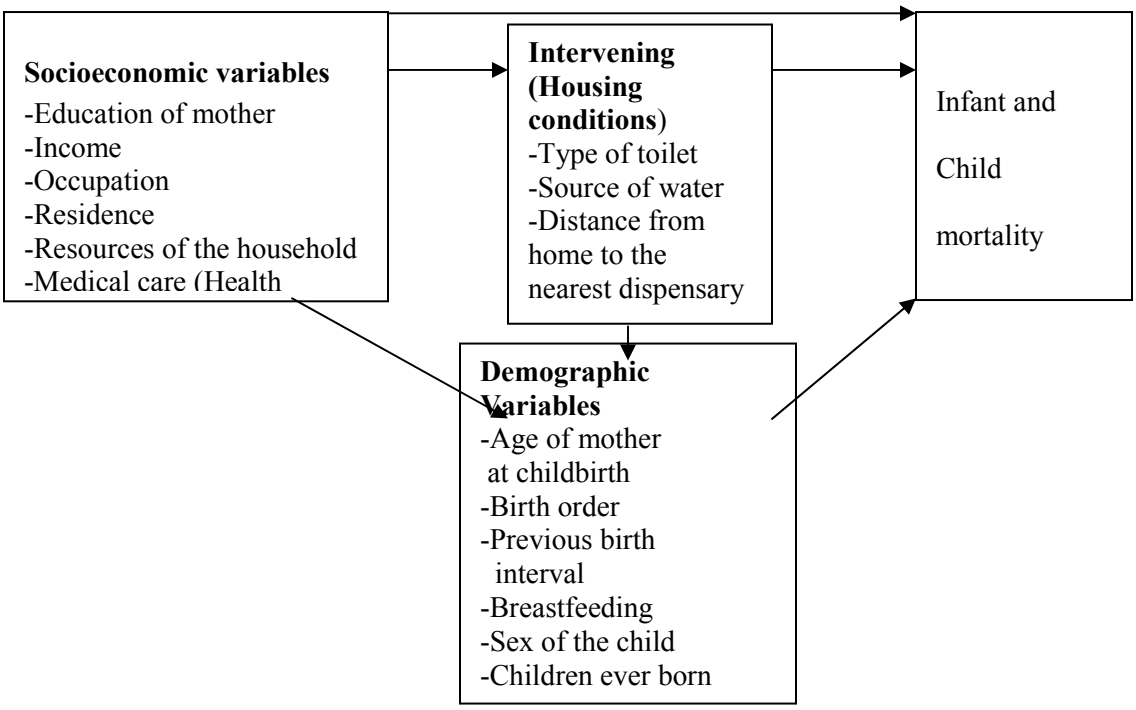

Figure 1. The conceptual Framework

Sampling and data sources

The targeted population in this study was mothers aged 15-49 years selected from Kihanga and Kayanga Wards in Karagwe district. A sample of 200 mothers from these two wards was studied. Out of these, 88 mothers represented urban setting and 112 mothers represented rural setting making 44 percent from urban and 56 percent from rural. Reasons that resulted into selecting a sample of 200 mothers to represent the population include accessibility of some villages and limited and inadequate funds for the fieldwork.

To obtain a sample the following two major assumptions were taken into consideration:

i) In rural setting almost the group is homogeneous
ii) In urban setting the population is heterogeneous

To obtain a sample from rural (Kihanga ward and Miti village) a systematic sampling technique was used. The list of households was obtained from village Executive Officers (VEOs). An element of randomness was introduced into this kind of sampling by using 2nd household in the list to be the first household and the remaining households were selected at the interval of 5. In this case counting from the second household, every 5^{th} household was selected from a list to be included in the sample making a total sample size per village. The assumption as to why this sampling technique was used is that there was no hidden periodicity in the population.

On the other hand, since the socio-economic and demographic characteristics of urban population are heterogeneous, stratified sampling was used to obtain a representative sample. Streets of Kayanga ward were ranked starting with the one with high income compared to other streets namely Bomani and Majengo mapya, Shirika, Ruzinga/Katooma, Kanyabuleza and Kayanga. Ranking procedure was done by the researcher with the Ward Executive Office. In this regard, the population was divided into several sub-populations that are individually more homogeneous than the total population and then households were selected using random sampling for each stratum to constitute a sample of 88 households with mothers in the reproductive age group.

According to the 2002 Tanzania Population and Housing Census Karagwe district has a total of 28 wards (URT, 2004). Three wards were categorized as mixed; that is Kayanga, Bugene and Nyakahanga. More important on this study is that these three wards were categorized as urban since Kayanga is currently a town. The remaining 25 wards were categorized as rural.

Data collection techniques

Initially the study intended to use Enumeration Areas (EAs). However, it was not possible to get a map showing demarcation of each EA. Due to this problem, a list of wards from District Planning Officer (DPLO) was sought where a list of streets and villages were then obtained from the Ward Executive Officer's office. The study went smoothly as planned due to good cooperation accorded by the Acting Administrative Secretary and the District Executive Director.

The actual data collection was preceded by a pre-testing, which was done on the first day of the exercise. This was taken into consideration because of various reasons including:

i) Check the consistency of the questions in terms of coverage and clarity aimed at reducing non-sampling errors
ii) Assessing the attitude and acceptance of the respondents
iii) Estimating the average time spent per questionnaire

The main instrument used for data collection was a questionnaire, which was essentially divided into six major parts. These were:

- Background Characteristics of the mother
- Income and economic resources of the household
- Questions related to children
- Children born/parity
- Health facilities/centers and their services
- Intervening/environmental variables

Results and discussion

The analysis of the data was carried out at three levels. The first level provides a summary of socioeconomic and demographic characteristics (Univariate analysis) of the study population. The second level is a bivariate analysis where cross-tabulations and chi-square test of mortality by independent variables included in the study are performed. The third level is the multivariate analysis and here the logistic regression analysis is applied. A detailed discussion of the results is done and similar findings by other researchers are cited where necessary.

Socio-economic and Demographic characteristics of the study population

Table 1(a) shows the demographic characteristics of the study population while Table 1(b) provides their socio-economic and housing characteristics.

Table 1(a): Demographic characteristics of the study population

Background characteristic of mother	Number of respondents	Percentage (%)
Age of mother		
15-19	7	3.5
20-24	23	11.5
25-29	34	17.0
30-34	36	18.0
35-39	53	26.5
40-44	25	12.5
45-49	19	9.5
Don't know	3	1.5
Total	200	100.0
Age at first birth		
<20	108	54.8
20-29	85	43.1
30+	4	2.1
Total	197	100.0
Marital status		
Never married	12	6.0
Currently married	155	77.5
Divorced	16	8.0
Widowed	15	7.5
Separated	2	1.0
Total	200	100.0
Order of marriage		
First	141	70.5
Second	17	8.5
NA	42	21.0
Total	200	100.0

Table 1(b): Socio-economic and Housing characteristics of the study population

Background characteristic of mother	Number of respondents	Percentage (%)
Education of mother		
None	18	9.2
Primary	136	69.4
Not completed Primary	16	8.2
Secondary	26	13.2
Total	196	100.0
Employment status		
Employed	25	12.5
Self employed	2	1.0
Unemployed	172	86.0
Total	200	100.0
Place of Residence		
Urban	88	44.0
Rural	112	56.0
Total	200	100
Occupation		
Professional clerical/sales	48	24.0
Agriculture/farmer/peasant	144	72.0
Others	8	4.0
Total	200	100
Household Income from all farms/year		
0-<30,000/= (low)	99	49.5
30,000/= - <100,000/= (medium)	55	27.5
100,000/=+ (High)	4	2.0
NA	42	21.0
Total	200	100.0
Income of the mother per month		
Have no any income	22	11.0
0-5,000	43	21.5
5,000-30,000	92	46.0
30,000-70,000	21	10.5
70,000-100,000	15	7.5
100,000 and over	7	3.5
Total	200	100.0
Means of transport to the nearest medical service		
On foot	189	94.5
By bicycle	1	0.5
Hired motor vehicle	7	3.5
Own motor vehicle	1	0.5
Own motor cycle	1	0.5
Public transport (by bus)	1	0.5
Total	200	100.0

Source of water		
Piped into house/yard/plot	15	7.5
Public /private tap	67	33.5
Well in residence/plot/yards	5	2.5
Public/private well spring	9	4.5
Spring	5	2.5
River/stream	93	46.5
Pond/lake	6	3.0
Total	200	100.0
Type of toilet used by the household		
Flush inside the house	9	4.5
Flush shared with other units	2	1.0
Pit latrine	187	93.5
Flush outside the house	1	0.5
Both flush inside and outside the house	1	0.5
Total	200	100.0
Distance from home to the nearest health center		
Less than 1 km	63	31.5
Between 1 and 3 km	100	50.0
Between 3 and 5 km	15	7.5
Above 5 km	22	11.0
Total	200	100.0

Note: NA = Not applicable, N≠ 200 in Age at First Birth because some mothers couldn't remember their age at first birth.
N≠200 in education level because 4 mothers did not state their education level.

With regards to age of mother, of the 197 respondents, 26.5 percent were aged between 35-39 followed by 18.0 percent in the age group 30-34, 17.0 percent aged between 25-29, 11.5 percent aged between 20-24, 9.5 percent aged 45-49 and only 1.5 percent could not remember their age. The majority of the respondents for this study were in the age group 35-39.

Now the first visible outcome of the fertility process is the birth of the first child. The first birth marks a woman's transition into motherhood. It plays a significant role in the future life of each individual woman and has a direct relationship with fertility (Ngalinda: 1998). The age at which childbearing begins influences the number of children a woman bears throughout her reproductive period in the absence of any active fertility control. For countries in sub-Saharan Africa, where contraceptive use is relatively low, younger ages at first birth tend to boost the number of children a woman will have.
In this particular study, out of 197 mothers who remembered their age at first birth about 55 percent started giving birth before age 20, about 43 percent started child bearing when they were aged between 20-29 and only 2 percent start childbearing at the age of 30+. The age of mother at first birth was considered as one among determinants of infant and

child mortality. Findings show that childbearing starts at early ages (14) and the maximum age at first birth is estimated to be 32. The estimated median age at first birth is 20 years and the more frequent age at first birth is estimated to be 19 meaning that many women are starting to give birth when they are 19 years old.

As regards marital status the results show that more than three quarters of 200 mothers interviewed in the age group 15-49 were currently married or living as a wife with her husband while 6 percent reported as "never married". Separated, widowed and divorced accounted for 1 percent, 7.5 percent and 8 percent respectively. Regarding widowhood for females the rate is about the same as the one estimated for Karagwe district (i.e. 7.5 percent Vs 8.5 percent) by the 2002 Tanzania Population and Housing Census.

As can be noted from Table 1(b), more than half (i.e. 69.4%) of the respondents had primary school level education, followed by 13.3 percent completed secondary level. Respondents who had never attended any year of schooling and not completed primary school are 9.2 percent and 8.2 percent respectively.

In this study, order of marriage was considered as one among proxy indicators of childhood mortality. The results show that, 70.5 percent of the interviewed mothers were in their first order of marriage followed by 21 percent not married and 8.5 percent in the second order of marriage.

Employment status refers to the type of employment a person is engaged in, in return for regular payment. Ideally every one should be engaged in one form of employment or another. In this study, not all mothers aged 15-49 responded to have been engaged in any form of employment for regular payment. Regarding the question used to collect information on whether the mother was employed at the time of interview, 86 percent were not employed in return of regular payment followed by 12.5 percent being employed and getting regular payment. Only 1 percent was self-employed and 0.5 was looking for job.

Occupation refers to any kind of job or profession. In this study it depends on how a woman considered her position. As indicated in Table1(b), the results show that, agriculture is the major occupation of most of respondents employing 72 percent of all respondents while professional clerical/sales employs 24 percent and 4 percent were not involved in any activity.

Mother's income per month was considered as one among socioeconomic variables influencing mortality. It can be observed from Table 1(b) that, out of 200 mothers responded to earn income; the higher proportion (46%) falls under the 5,000-30,000 Tsh category per month while about 4 percent earn 100,000 Tsh and over. On the other hand 11 percent do not earn any income.

Means of transport to the nearest health facility was included in the socioeconomic variables influencing childhood mortality. In this study the results reveal that, foot is the major means of transport used by about 95 percent of the respondents to take their sick children and attend clinics at the nearest dispensary. About 4 percent hire motor vehicle

especially when a child is seriously sick. Only 0.5 percent of respondents reported to use either bicycle, own motor vehicle, own motor cycle or public transport (by bus).
Regarding source of drinking and cooking water; out of 200 respondents, 46.5 percent get water from rivers, followed by 33.5 percent using public and/or private tap. Other include 7.5 percent, 2.5 percent, 4.5 percent, 2.5 percent and 3.0 percent using water piped into house or plot, well in plot, public well and pond respectively.

As shown in Table 1(b), half of the respondents walk a distance of between 1 and 3 kilometers to get health care services at the nearest dispensary where as about 32 percent walk distances less than 1 kilometer.

Bivariate analysis: Differentials in child loss experience

The bivariate analysis involved doing cross tabulations of mortality indicators by various independent variables. A chi-square analysis was used to test and show the significance of independent variables shown in Figure 1 (the conceptual framework). The dependent variable used is mother's child death experience. In particular, child mortality differentials by socio-economic, housing conditions and demographic characteristics of mother are shown in Tables 2-4. Variables found to be significant in influencing child mortality are place of residence, distance from home to the nearest health facility (in this case dispensary/health center), education of mother (termed as years of schooling) and employment status of mother. Others include, age of mother, parity and age of mother at first birth (Table 4).

Child death experience and education of mother

From Table 2 it could be said that, years of schooling are closely related with child death experience *($p = 0.005$)*. In particular we clearly see that the smaller the years of schooling of mother, the higher the childhood mortality she experiences and vice versa (see also Figure 1).

The findings from many studies show that, children born to mothers with no education suffer the highest mortality. Like other studies (Caldwell: 1979) in this study, the findings show that children born to mothers with zero and less than 9 years of schooling suffer the highest mortality unlike their counterparts with 9 or more years of schooling (not shown here). Educated mothers are more likely to receive antenatal care from medical professionals than mothers with no or less education.

Table 2: Cross tabulations of mortality by Socio-economic Variables

Variables and category 1. Socio-economic Variables	Total number of mothers	Mothers with at least one dead child	Percentage of mothers with at least one dead child	Chi square test for significance
Years of Schooling				*p=0.005*
Zero years	34	20	58.82	*df =1*
Some years of schooling	162	54	33.30	
Total	196	74	37.78	
Place of Residence				
Rural	112	52	46.43	
Urban	88	23	26.14	*p=0.003*
Total	200	75	37.50	*df =1*
Kihanga ward	100	45	45.00	
Kishoju*	23	9	39.10	
Kihanga*	32	13	40.60	
Katanda*	22	10	45.50	
Kibwera*	23	13	56.50	
Kayanga Ward	100	30	30.00	
Kanyabuleza**	12	4	33.30	
Shirika/Gereza**	20	4	20.00	
Bomani &Majengo mapya**	18	4	22.20	
Kayanga**	18	4	22.20	
Katooma/Ruzinga**	20	7	35.00	
Miti*	12	7	58.30	
Occupation				
Professional/Clerical/Sales	21	2	9.52	
Business women	27	7	25.93	*Chi-square not valid*
Farmer/peasant	152	66	43.42	*df=2*
Income of the mother/month				
No income/poor	23	9	39.13	
Low income	152	62	40.79	
High	18	3	16.67	*p=0.137*
Total	193	74	38.34	*df=2*
Employment status				
Employed	48	9	12.3	*p=0.003*
Unemployed	149	64	87.7	*df=1*
Income of H/H from all farms/year				
0-<100,000/= (low)	85	41	48.24	*p=0.335*
100,000/=-<250,000/= (medium)	45	16	35.56	*df=2*
250,000/=+ (High)	26	10	38.46	
Total	156	67	42.95	

Table 3: Cross tabulations of mortality by Housing conditions

Housing Conditions	Total number of mothers	Mothers with at least one dead child	Percentage of mothers with at least one dead child	Chi square test for significance
Source of water				
Piped/tape water	82	26	31.7	*Chi-Square*
Well water	14	3	21.4	*not valid*
River water	93	41	44.1	*df=3*
Spring/pond	11	5	45.5	
Total	200	75	37.50	
Type of toilet used by the household				
Flush toilets	13	2	15.40	*Chi-square*
Pit latrine	187	73	39.00	*not valid*
Total	200	75	37.50	*df = 1*
Distance from home to the nearest disp/health center				
	63	11	17.46	*p=0.001*
Less than 1 km	100	49	49.00	*df=3*
Between 1 and 3 km	15	7	46.67	
Between 3 and 5 km	22	8	36.36	
Above 5 km	200	75	37.50	
Total				

Table 4: Cross tabulations of mortality by demographic variables

	Total number of mothers	Mothers with at least one dead child	Percentage of mothers with at least one dead child	Chi square test for significance
Age				
15-34	100	28	28.00	p=0.008
35-49	97	45	46.40	df=1
Total	197	73	37.10	
Parity				
1	32	2	6.25	p=0.000
2-6	138	48	34.78	df=2
7+	30	25	83.33	
Total	200	75	37.50	
Period will breastfeed if still breastfeeding				
<36 months				
36+ months	48	14	29.2	Not valid
Total	12	7	58.3	
	60	21	35.0	
Age of mother at first birth				
<20	80	40	50	p=0.002
20-35	117	33	28.2	df=1
Total	197	73	37.1	

Multivariate Analysis

This third level of analysis used logistic regression analysis approach. The independent variables included in this level of analysis are those which showed strong association with mortality ($p \leq 0.05$) at the bivariate analysis level.

The general fitted regression model is:

$$\log (p/(1-p)) = \mu + \sum_{i=1}^{k} \beta_i x_i$$

Where; log(p/(1-p)) is a linear function of the variables $x_{i,}$ p is the probability of child death experience by each woman, x_1, $x_{2,}$ x_3……x_k are independent variables; μ and $\beta_{1,} \beta_{2,} \beta_3$.....$\beta_k$ are the parameters to be estimated.

Odds ratios (exp (β_i)) were used as indicators of the risk of a child death relative to the reference category of the variable.
The following three equations were used to investigate the effects of the three sets of factors, namely socioeconomic, demographic/proximate and both socioeconomic and demographic determinants considered to influence infant and child mortality.

CDEATH = f(Socioeconomic variables)----------i
CDEATH = f(demographic variables)----------ii
CDEATH =f(socioeconomic and demographic variables)----------iii

where CDEATH stands for child death.

At this level of analysis, the category with highest frequencies (modal category) was considered to be a reference category for each variable (see Mbago, 1994).

Table 5. Results from Multivariate Logistic Regression Analysis for CDEATH

Equation Variable:	**Equation 1**		
Socioeconomic	Coeff	SE	OR
Years of schooling Zero years Some years of schooling	P=.0171 .8592** (Reference)	.4180	2.3621 1.0000
Employment status Employed Unemployed	P=.0545 -.8156* (Reference)	.4241	.4424 1.000
Place of residence Urban Rural Intercept Degrees of freedom Model Chi-Square Number of cases	(p=0.0171) .9193** (Reference) -.1738 1 18.587 193	.3239	.46200 1.0000
Demographic:	**Equation 2**		
Age of mother 15-34 35-49	P=.5132 .2485 (Reference)	.3801	1.2821 1.0000
CEB 1-3 children 4+ children	P=.0007 -1.3120** (Reference)	.3851	.2693 1.0000
Age of mother at first birth <20 20-34	 P=.0077 .8727** (Reference)	.3276	 2.3934 1.000
Intercept Model Chi-square Number of cases Degrees of freedom	-.4717 50.188 197 1		

Note: ** Significant at 0.01 level * Significant at 0.05 level
Coeff. = Coefficient, SE = Standard Error, OR = Odds Ratio

Table 6: Results from Multivariate Logistic Regression Analysis showing the effect of Socioeconomic and Demographic variables on CDEATH

Equation 3			
Variable	Coeff	SE	OR
Years of schooling	(P=.2471)		
Zero years	.150	.440	1.6736
Some years of schooling	(Reference)		1.0000
Employment status	(p=.0447)		
Employed	-.7020*	.3497	.49560
Unemployed	(Reference)		
Place of residence	(P=.2252)		
Urban	-.5551	.4577	.57400
Rural	(Reference)		1.0000
Age of mother	(P=.2108)		
15-34	.5100	.4076	1.6653
35-49	(Reference)		1.0000
CEB	(P=.0277)		
1-3 children	-.9078*	.4122	.4034
4+ children	(Reference)		1.0000
Age of mother at first birth	(P=.0216)		
<20	.8037*	.3499	2.2338
20-34	(Reference)		1.0000
Intercept	-.4413	.4221	
Model Chi-square	37.755		
Number of cases	193		
Degrees of freedom	1		

Note: ** Significant at 0.01 level * Significant at 0.05 level
Coeff. = Coefficient, SE = Standard Error, OR = Odds Ratio

Figures in Tables 5 and 6 show the results of the multivariate logistic regression analysis, which we now discuss.

Socio-economic factors

Education of mother

Years of schooling (education of mother) was found to be significant (p=0.0171) in influencing child mortality. The results show that mothers with zero years of schooling are about 2.4 times more likely to have child death than those with some years of schooling. However, the significance of this variable disappeared when socioeconomic

variables were combined with demographic variables. This is shown in Table 6 where years of schooling is insignificant (p=0.2471) in explaining child mortality. The odds ratio also has declined from 2.4 times to about 1.7 times after we combined socioeconomic and demographic variables.

Employment status

When treated with other socioeconomic variables, this variable was found to be significant (p=0.0545) in determining child mortality. In model 3 in Table 6 the variable was still significant with p-value of 0.0447 when it was treated with other socioeconomic and demographic variables. Thus the results show that employed mothers are about 2.3 times less likely to experience child deaths compared to unemployed mothers.

Place of residence

Model 1 in Table 5 shows clearly that mothers living in rural (in this case Kihanga ward and Miti Village) are more likely to have child deaths compared to those residing in Kayanga urban. The same results are obtained when this variable is combined with demographic variables forming model 3 in Table 6. This variable was significant (p=0.0171) in model 1 but when combined with demographic variables the significance disappeared (p=0.2252).

Demographic variables

The second model included demographic variables (age of mother, parity and age at first birth) that were found to be significant in the bivariate analysis. First, these variables were combined to form equation (2). Second, a combination of these variables and socioeconomic variables formed equation (3) as stipulated in Table 6.

Age of mother

Despite being significant (p=0.008) in the bivariate analysis (Table 4), age of mother was found to have insignificant effect on child mortality in the Multivariate analysis for both Model 2 (p=0.5132) and Model 3 (p=0.2108) (Tables 5 and 6).

Children ever born

The results show that children ever born is significantly influencing child mortality (p=0.0007). The odds ratio here indicate that when this variable is treated with other demographic variables, mothers with 4+ children ever born are more likely to have child death compared to those with 1-3 children ever born. When demographic and socioeconomic variables are combined, the results show that for children ever born the significance remains the same at 5% level. Model 3 indicates the same conclusion obtained in Model 2, that mothers with 1-3 children ever born are less likely to have child death compared to those with 4 and above children ever born.

Age of mother at first birth

This variable was included in the multivariate regression, the results reveal that, age at first birth is statistically significant (p=0.0077) in explaining child mortality. The results indicate that mothers who reported to have given their first birth at age <20 years are about 2.4 more likely to have child death compared to those reported to have given birth when they were at age 20-34. Using the results obtained after we combined both socioeconomic and demographic variables, age of mother at first birth seems to be significant (P=0.0216) at 0.05 level. Moreover, the results reveal that mothers who gave birth at age <20 years are 2.2 more likely to have child death compared to those who gave birth when they were at age 20-34.

Conclusion

The findings in this study have shown that mother's employment status, parity and age at first birth have net effect on infant and child mortality in Karagwe District. The study has also found that mothers in rural areas (in this case Kihanga ward and Miti Village) experience higher mortality of their children than those living in Kayanga urban. Kishoju village seems to have the lowest percentage of mothers who experienced child death (39.1%) compared to other villages in Kihanga ward. In Kayanga Ward, the highest percent (35.0%) of mothers who reported to have experienced child death are found in Katooma/Ruzinga. The difference could be noted for mothers in Shirika/Gereza (20%) and Bomani/Majengo Mapya (22.2%). The results showed that Chaburondo (66.7%), Nyamihira (62.5%), Maguge (60%) and Kyabigere (60%) have high child mortality compared to other homesteads.

Therefore it could be concluded that child mortality remains unacceptably high in Karagwe, especially in rural areas where health services are inadequate, in addition to poor means of transport and poor infrastructure. Most villages have "foot paths" not even rough roads. For example a path from Nyarwele to Kihanga where a dispensary is located with a distance of about 3-4 kilometers people walk on foot from Katanda Village to either Kihanga or Kibwera for treatment at the dispensary.

Regarding income of the household and mother's income, the results show that this variable has no significant effect on child mortality in Karagwe district.

Employment status of mother when treated separately in the multivariate logistic regression analysis has revealed that employed mothers are less likely to have child death than unemployed mothers.

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