

Socioeconomic Determinants of Infant and Child Mortality Rate: The Case of Humbo District in Wolaita Zone, Ethiopia

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Abstract:- The study tried to analyze the socio-economic determinates of infant and child mortality rate in Humbo district. The study employed logit regression model in both IMR & CMR. The finding point out, working status of mother, level of mother education, access to health facilities, place of household residence, and access to safe water are significantly determining IMR whereas access to safe water, level of father education, household size, working status of mother, occupational status of household heads, marital status of parents, and access to health facilities are determining CMR in the district. Therefore, we concluded that socio-economic factors are significantly determined the reduction of infant and child mortality rate. This implied that to reduce infant and child mortality rate requires improvement in socio-economic status of the population as well as the basic services in Humbo district.

Keywords:- IMR, CMR, Socio-Economic Factors, Logit Model

I. INTRODUCTION

Poverty is defined as a situation where a person's income is too low to meet his/her basic needs. Thus, low household or individual ability to pay for basic services is an implication of poverty. Poverty influences health of both mother and child as it largely determines an individual's risks as well as access to resources to deal with those risks. Poorer families have low ability to pay for basic services and poor socio-economic conditions such as poor housing, poor education, poor drinking water, poor health, and less access to health services, as result higher welcoming for illness and death. According to Mutunga, 2007, one of the indicators of socioeconomic and health conditions, infant and child mortality rate is most frequently occurring the developing countries.

There are tremendous gap childhood mortality rate among low and middle income countries and the industrial world with Sub-Saharan Africa and South East Asia carrying the highest burden of under-five mortality. The highest rates of under-five mortality are still in Sub-Saharan Africa-where 1 in 8 or 125/1000 children dies before age 5, more than 17 times the average for developed regions 1 in 143 or 7/1000 and South East Asia 1 in 15 or 67/1000.

As a part of Sub-Saharan Africa countries Ethiopia still faces many social and economic problems such as high fertility which is result of low level of contraception, cultural values favoring large family size, underdeveloped socioeconomic status and high infant and child morbidity and mortality rate. Most of the population in the country is suffering from lack of basic needs of life such as food, clothing, housing, health care, education, safe and healthy environment as consequences of rapid increase of population growth (SathiyaSusuman, 2012). As literatures indicate, most of social and human development indicators in the country are ranked worsen as compared to other countries; for example the UN's human development in 2010, placed the country at 157th out of 169 countries. Even though significant efforts have been made to improve the situation, together the level of depth and severity of poverty in the rural parts of the country, substantial socioeconomic characteristics variation in childhood mortality rate would be expected (World Bank, 2010).

Reducing infant and child mortality rate to its minimum level requires improvements in socio-economic status of the population as well as improvements in the direct services provided by the health sector (FMoH, 2014). Despite, significant efforts have been made to improve the health status of population in the districts still face a high rate of morbidity and mortality of childhood. Majority of the population remain chronically food insecure and vulnerable to shocks and potential disasters. Furthermore previously, almost no studies have been done except simple Health Surveys on clinical factors only (such as CHA). The implication is that the childhood mortality rate situations of the area were not given attention. The prevalence of higher childhood mortality problem calls for special attention. Beside this, most research papers focuses on the national level determinants of childhood mortality rate than at district level. Analysis of infant and child mortality on district rural households becomes sound enough to put an agenda on the poor targeting policy in intervening on that particular study area. Bearing this in mind, this study was identified and analyzed the main causes of infant and child mortality from socio-economic perspectives in the district.

II. LITERATURE REVIEW

In this part, the study address relevant conceptual, theoretical framework and empirical review related to socio-economic determinants of infant and child mortality. Childhood mortality rates are usually defined as follows: Neonatal mortality is the probability of dying within the first month of life; Infant mortality is the probability of dying of children of age 1 month to 12 months; Child mortality is the probability of dying of children of age 12 month to 59 months; Under-five mortality is the probability of dying between birth and the fifth birthdays. The rate of childhood mortality rate is expressed as number of deaths before certain age per 1,000 live births (UNICEF, 2008).

The literature on childhood mortality rate shows that mortality is studied during two periods: neonatal and post-neonatal. Neonatal mortality is death occurring in the first month of life and is typically associated with events surrounding the neonatal periods and the infant’s delivery. The highest risk for infant death is in the neonatal period because of pre-term birth and severe infections. Post-neonatal deaths are attributed mostly to environmental, socio-economic, demographic and other factors (WHO, 2015).

Mosley and Chen, (1984) used different conceptual frameworks to analyze the impact of different factors on childhood survivals. They classified the determinants of childhood mortality rate as exogenous (socioeconomic or extrinsic) such as cultural, social, economic, community and regional determinants and endogenous (bio-medical or intrinsic) such as maternal, environmental, nutrition, injuries and personal illness.

Conceptual framework

Mosley and Chen (1984) develop the framework of childhood survival based on the assumption of all socioeconomic factors of childhood mortality rate necessarily run by a common set of intermediate factors. Their assumptions are:-

- In an optimal setting, over 97% of newborn is expected to survive until the fifth birthday.
- Reduction in survival probability from this level in any society as result of the influence exogenous forces such as social, economic, biological and environmental.
- Socioeconomic variables must operate through basic proximate determinants that in turn influence the risk of disease and the outcome of the disease processes.
- Exogenous factors are the driving force behind the reduction of childhood mortality rate.

They categorized the socio-economic determinants of childhood mortality rate in to three; individual level, household level and community level variables.

Individual level variables

According to Mosley and Chen (1984), individual level variables refer to individual productivity (fathers’ and mothers’ skills); and attitudes/traditions/norms. Parental

skills have an important implication for childhood survivals that usually measured by fathers’ and mothers’ educational attainments. Mother’s education may improve her productivity in childhood survival through influencing care seeking behavior, morbidity and nutrition status while father’s education particularly in urban areas strongly associated with the occupation and household income, household decision taking and for father’s personal illness control. Individual level variables include; mother’s education status, father’s education status, mother’s working status and religion.

Household level-variables

According to Mosley and Chen (1984), household level variables include; marital status of parents, household income status, household heads’ occupation status and household size.

Community level-variables

According to Mosley and Chen (1984), community level-variables include ecological or regional factors, type of the residence of household, access to safe water and availability of health facilities.

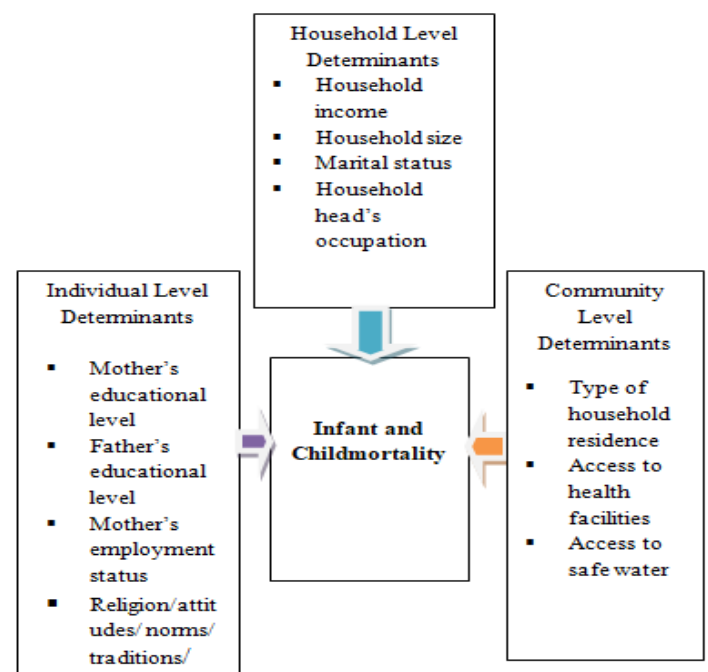


Figure 1: The Conceptual Framework of Socioeconomic Determinants of Childhood Survival(source: Mosley and Chen, 1984).

Empirical Literatures

According to Mosley and Chen (1984) analytical framework of childhood survival, the effect of socioeconomic variables is considered as indirect due to operate through biomedical factors. Klaauw and Wang (2004) in India found that socio-economic and environmental characteristics have significantly impacted on childhood mortality rates at different ages. The main recommendations of their study were that child mortality could be reduced substantially by improving the education of the mothers and reducing indoor pollution.

Ladusingh and Singh (2006) studied 'Place, Community Education, Gender and Child Mortality in North-East India' by using a logit model. The finding indicates that mother's education is significantly and negatively related to child mortality. They concluded that children born from working mothers have 18 percent higher probability of dying given the harsh working conditions of north-east India. Iram and Butt (2008) in Pakistan found that household variables such as improvement in environmental and socioeconomic condition tend to reduce the chance of death of children of age below five, hence inversely relates. They indicated that Mothers' employment was positively related to childhood mortality rate. They tried to explain this by the fact that working mothers spend less time to care for their kids (care including breastfeeding). It was found that access to health facilities and services during pregnancy, delivery and post-delivery are also important determinants of infant mortality as it affects the health seeking behavior of mother, hence it is inversely relates. The study also found that there is a strong negative relation between household income and child mortality.

Mustafa and Odimegwu (2008) used the 2003 DHS data set for children in Kenya by using logistic regression models. They study socioeconomic determinants of infant mortality both urban and rural settings. They found that most of the socioeconomic factors are not associated with the risk of child mortality while children born in high income households have lower probability of death relative to children born in low income households.

Kumar and Gemechis (2010) found children whose mother's educational level is high are significantly correlated to the low risk of childhood mortality rate relative to children born from illiterate mothers. Type of residence is also important determinants of child mortality in Ethiopia.

Desta Mekonnen, (2011) found that among socioeconomic variables household size and to some extent, fathers and mothers educational levels are the most significant determinants of infant and child mortality. As he pointed out, the most unexpected finding in his study concerns the relationship between household size and infant and child mortality. Infant and child mortality was high for children born in small household size and lower for children born in large household size and these needs further research to understand the relationship. Those children born in small household size and children born to mothers and fathers with no education exposed to the high risk of infant and child mortality. According to his findings, mother's education has greater contribution than father's education in reducing both infant and child mortality. This is by increasing the awareness of mother in how to care children and enabling her to change feeding and child care practices. He also found that religion has negative and significant impact for the infant death probability. He concluded that the influence of religion infant and child mortality is due to socioeconomic factors such as traditional beliefs and practices related to childbirths, infant feeding and healthcare.

Tariku D. and Eshetu G.(2013) found as there is strong negative correlation between under-five mortality and both maternal education and household income status in Ethiopia. As they indicated in their recommendation part, empowering mothers with education and making them productive for improving their income are important aspects for reducing under-five mortality.

AssefaNegera *et al* (2013) reported their findings based on the data from 2000, 2005 and 2011 EDHS as mother's education and mother's residence significantly influence infant and under-five mortality in Ethiopia. Omedi G. and Wanjiru G. (2014) pointed out in their conclusion part as the survival probability of infant and child is in better position in households in which household heads working in government office and trading of sales and services than working on farming in Ethiopia. Bereka *et al*, (2016) the study that was undertaken in Ethiopian Somali Regional State suggested that family size and source of drinking water significantly determines under-five mortality in the region.

Kanmiki, E.W, *et al*, (2014) found that the marital status of women affects child mortality in rural Northern Ghana as mothers in stable marriages would get support from their partners during child care which can reduce risk of child mortality. He also demonstrated that marriage may confer advantages such as pooling of resources to either get good health services or provide adequate care with respect to providing good nutrition to children and result in diminished mortality of children.

Clark and Hamplová (2013) shown that children born out of marriage were more likely to die as compared to those children born to married women in sub-Saharan Africa countries. Yohannes Mehretie *et al*, (2017) found as marital status and educational statuses of mother were the dominant and the most significant determinants of child mortality in Ethiopia. As they pointed out in their conclusion part, single mothers had increased child mortality compared to the married ones.

Generally, according to the above empirical literatures, socioeconomic conditions such as mother's education, mother's employment, marital status of parents, father's education, household income level, religion, family size, type of household residence, household head's occupation, household access to health facilities and access to safe water are important determinants in explaining infant and child mortality in developing countries.

III. DATA AND METHODOLOGY

Description of the Study Area

This study was undertaken in Humbo district. Humbo district is one among the 12 districts and 3 urban administrations in Wolaita Zone. It is situated at 418 km south from Addis Ababa and 21 km south from Wolaita Sodo town at the main road to Arbaminch. The district is bordered by Lake Abaya from Southeast, Gamo Gofa Zone from South, Offa district from West, around Sodo district from North and Loke Abaya district from East. The district has 39

rural and 5 urban, totals of 44 Kebeles. According to the district’s finance and economic development office, population of the district is estimated as 162,306 in 2016; of the total population, 50.3% (81,569) and 49.7% (80,737) are males and females respectively. According to the office, the total households of the district are estimated at 20,223; of which 16,519 are rural dwellers and 3,704 are urban dwellers. According to the district’s Health Office, population in the age group of below 5 years is 15,474. The population in the district is still growing faster at an average annual rate of 2.4%.

Sampling technique and sample size

The population in the district was stratified in to two strata based on the place of household residence: rural residents’ stratum and urban residents’ stratum. As sampled kebeles, six kebeles (1 kebele from urban stratum and 5 kebeles from rural stratum) namely (Tabela 01, Koysha Wangala, Ampo Koysha, Galcha Kara, Abela Sipa, Abela Gefeta) were selected using Lottery method of simple random sampling technique. To determine the sample size, a simplified formula provided by Yemane, (1967) was used at 7% precision level & 95% confidence level.

$$n = \frac{N}{1 + N * (e)^2} \dots\dots\dots (1)$$

Where n is the total sample size of the study, N is the total households of the district which is 20,223 (3704 in urban stratum and 16,519 in rural stratum) and e is the acceptable level of sampling error in this case 7%. Based on the number of the total households in the sampling frame, the formula equated and reached a minimum of 202 respondents. This sample size was determined by taking different factors such as population size of the district, confidence level, precision level, research cost, time we have, accessibility and availability of resources in general. To select the sample respondents from citations, the household heads in these six Kebeles were identified and selected using systematic random sampling method. The study was carried out by considering homogeneity characteristics of sample households. The total sample size was distributed to each stratum and sample Kebeles proportional to their total number of households using the formula given by Dawson, (2003).

$$n_i = n * N_i / N \text{ or } n_i = n * P_i \dots\dots\dots (2)$$

Where n_i is the sample size of stratum i, n is the total sample size of the study, N_i is the total households of stratum i, N is the total households of the district (of kebele i), and P_i is the proportion of households of stratum i from the total households of the district (of Kebele i).

Method of Data Analysis

Logit regression model was used to establish the relationship between socio-economic characteristics of households and infant and child mortality rate in the district. That is to say, infant and child mortality rate is function of a

series of socio-economic characteristics of households. In this stage; the effect of socio-economic factors on infant and child survival was analyzed using logit model. Researchers use this model to predict the probabilistic estimation that the childhood survival predicted by the maximum likelihood (ML) coefficients (Gujarati, 2009). It could be written in terms of the odds and log of odds, which enables one to understand the interpretation of the coefficients. To estimate the coefficients of Logit model, we used MLE method as it is indispensable for estimating binary dependent variable models (Wooldridge, 2000). As Hosmer and Lemeshow (2008) pointed out, the logit model has advantages over the other model in the analysis of dichotomous outcome variables is that it is an extremely flexible and easily usable model from mathematical point of view, results in a meaningful interpretation, represents a close approximation to the cumulative normal distribution and easy to work with.

The model used in determining the effect of socio-economic characteristics of households on infant and child mortality was:

$$P_i / (1 - P_i) = (1 + e^{Z_i}) / (1 + e^{-Z_i}) = e^{Z_i} \dots\dots\dots (3)$$

Where P_i is the probability that a child will die; 1 - P_i is the probability that a child will not die; e is the base of the natural logarithm. Now P_i / (1 - P_i) is simply the odds in favor of survive: - the ratio of the probability that a child will die to the probability that it will survive. In this study the model has multiple explanatory variables and the dependent variables were explained by the odd ratio of the explanatory variables.

The study employed two models; the first model attempted to capture the socio-economic characteristics of households that affect IMR and the second model capture the effect of socio-economic characteristics of households on CMR by using Logit regression model.

Model (1) for IMR
 $IMR = \alpha - \beta_1 Meduc + \beta_2 Memp + \beta_3 Ms - \beta_4 Feduc - \beta_5 Hhil + \beta_6 Hhsize - \beta_7 Thhrsd - \beta_8 aswtr - \beta_9 Hhahf + \beta_{10} RI + \beta_{11} Hhoccp$
 Model (2) for CMR
 $CMR = \alpha - \beta_1 Meduc + \beta_2 Memp + \beta_3 Ms - \beta_4 Feduc - \beta_5 Hhil + \beta_6 Hhsize - \beta_7 Thhrsd - \beta_8 aswtr - \beta_9 Hhahf + \beta_{10} RI + \beta_{11} Hhoccp$

Where; α is the intercept of the model; β₁... β_i are the coefficients of the explanatory variables; IMR and CMR denote the probability of risk of infant and child mortality and takes the value 1 or 0; mother’s educational level (Meduc); mother’s employment status (Memp); marital status of parents (Ms); level father’s education (Feduc); household income level (Hhil); household size (Hhsize); place of household residence (Thhrsd); access to safe water (aswtr); access to health facilities (Hhahf); religion (RI); occupational status of household heads (Hhoccp). The study identified whether the variables were continuous, dummy, categorical or categorical; significant or not, and tested to check the presence of multicollinearity using VIF, for model adequacy using Likelihood Ratio test and Ramsey Reset test, and for heteroscedasticity using Breush Pagan test.

Table 1: The regression results of logit model of IMR

Variables	Coef.	Std. Err.	Z	P>z
Meduc**	-3.732	1.710	-2.18	0.029
Memp**	6.738	3.023	2.23	0.026
Ms	0.347	1.862	0.19	0.852
Feduc	-2.069	1.607	-1.29	0.198
Hhil	-0.008	0.032	-0.24	0.809
Hhsize	0.098	1.215	0.08	0.936
Thhrsd**	-8.683	4.207	-2.06	0.039
aswtr**	-5.512	2.761	-2.00	0.046 **
Hhahf**	-5.534	2.663	-2.08	0.038
R1	1.984	1.390	1.43	0.154
Hhoccp	0.734	1.239	0.59	0.554
_cons	3.958	6.160	0.64	0.521

Number of obs =202 Prob> chi2 =0.0000
LR chi2(11) =60.03 Log likelihood = -9.789
Pseudo R2 = 0.7541

***, ** and * indicates 1%, 5% and 10% level of significance respectively.

Source: own computation from survey data, 2018

IV. RESULT AND DISCUSSION

Result Analysis of IMR

As the final econometric output of first logit model shown (see table 14 below), there were five (5) variables that significantly determining IMR in the study area. These are, mother's education level (Meduc), Mother's working status (Memp), place of household residence (Thhrsd), access to safe water (aswtr), and access to health facilities (Hhahf).

Mother's education level (Meduc):- Based on the logistic regression result above, mother's education has shown a negative relationship with IMR. The slope coefficient -3.734 suggests that the educated mother's in the district results in a 3.734 unit reduction in the log of odds of being died of infants than uneducated one. This finding is in line with the finding of Kumar and Gemechis (2010) in national level.

Working status of mother (Memp):- has shown a positive relationship with IMR and significantly determined at 5% level of significance. The slope coefficient 6.738 suggests that the employed mother results in a 6.738 unit increase in the log of the odds of being died of children than the unemployed. This indicates as children of whose mothers were employed significantly correlating to high risk of infant mortality relative to children of whose mothers were unemployed. This finding is consistent with the research result of Iram and Butt (2008) in Pakistan and Ladusingh and Singh (2006) in North East India.

Place of household residence (Thhrsd):- Household residence, whether living in urban or rural areas has shown an inverse correlation with IMR. The slope coefficient - 8.683 suggests that the urban households result in 8.683 unit reduction in the log of the odds of being died of infants than rural household. This indicates that kids of whose households are living in rural areas correlated to high risk of death relative to who reside in urban areas. This finding is in line with the finding of Assefa Negera, et al (2013) in national level.

Access to safe water (aswtr):- The slope coefficient - 5.512 suggests that kids who have better access to safe water results in 5.512 unit reduction in the log of the odds of being died of infants than not access by suggesting a negative correlation between IMR & access to safe water holding the effect of other factors constant. This means that those kids who have better access to safe water were significantly correlating to the low risk of death relative to who have no access to safe water. This finding is consistent with the research result of Bereka et al, (2016) in Ethiopian Somali Regional State.

Access to health facilities (Hhahf):- it has shown a negative correlation with IMR in the district. The slope coefficient -5.534 suggests that kids who have better access to health facilities make 5.534 unit reduction in the log of the odds of being died of children of age 1-12 months than kids not access it. Here, health extension service program is playing a significant role in reducing infant morbidity and mortality. health extension workers have brought about better vaccination coverage rates, improved sanitation and

hygiene and better access to nutrition in the district. This finding is consistent with the research result of Iram and Butt (2008) in Pakistan.

Result Analysis of CMR

In this model, seven (7) variables were significant at 99% and 95% confidence level. These are; working status of

mother (Memp), marital status of parents (Ms), level of father education (Feduc), household size (Hhsize), access to safe water (aswtr), access to health facilities (Hhahf), and occupational status of household heads (Hhoccp).

Table 2: The regression results of logit model of CMR

Variable	Coef.	Std. Err.	Z	P>z
Meduc	-1.197	1.258	0.95	0.341
Memp**	-7.398	3.403	2.17	0.030
Ms**	5.441	2.558	2.13	0.033
Feduc***	-6.497	2.464	2.64	0.008
Hhil	-0.0185	0.028	0.66	0.510
Hhsize**	4.314	1.774	2.43	0.015
Thhrsd	-1.866	1.876	0.99	0.320
aswtr***	-5.689	1.992	2.86	0.004
Hhahf**	-3.283	1.556	2.11	0.035
R1	1.202	0.882	1.36	0.173
Hhoccp**	3.036	1.412	2.15	0.031
_cons	0.1361	0.5007	-0.54	0.588
Number of obs =202 LR chi2(11) =71.56				
Prob> chi2 =0.0000 Log likelihood = -9.735				
Pseudo R2 = 0.7861				

***, ** and * indicates 1%, 5% and 10% level of significance respectively.

Source: Own computation from survey data, 2018

Working status of mothers (Memp): Mothers' working status has shown a negative correlation with CMR in the study area. The slope coefficient -7.398 suggests that employed mother leads to 7.398 unit reduction in the log of odds of being died of children than the unemployed by suggesting a negative correlation between CMR & the working status of mother holding the effect of other factors constant. The implication here is, as children of age 12-59 months are less dependent of their mother when compared to infants, working mothers earn additional income to improve their household income level, improves child nutrition, and hence improves the probability of children. This finding is contradictory of the previous finding by Iram and Butt (2008) in Pakistan.

Marital status of parents (Ms): - marital status has shown positive correlation with CMR in Humbo district. The slope coefficient 5.441 suggests that children of whose parents are not living in union a one unit increase results in 5.441 unit increase in the log of the odds of being died of children of age 12-59 months by suggesting a positive correlation between CMR & the marital status of parents holding the effect of other factors constant. This implies as the probability of child death is higher among children of whose parents are not living in union than those living in union with their marriage partners. This finding is consistent with the finding of Kanmiki, E.W, et al, (2014) in Northern Ghana.

Father's education level (Meduc): Based on regression result, father's education level has shown a negative correlation with the CMR in the district. The slope coefficient -6.497 suggests that a the educated father's results in a 6.497 unit reduction in the log of the odds of being died of children than uneducated by suggesting a negative correlation between CMR & father's education level holding the effect of other factors constant. This finding was consistent with the research finding of Kumar and Gemechis (2010) in national level.

Household size (Hhsize): Family size was positively correlating with the CMR in the study area. This implies as children who are living in households of large family size were significantly correlating to high risk of death relative to those in small family size. The slope coefficient 4.314 suggests that a one unit increase of family size in the district results in a 4.314 unit increase in the log of the odds of being died of children of age 12-59 months assuming a positive correlation between CMR & household size holding the effect of other factors constant. Hence, having small family size is very important for child survival in the study area. This finding was consistent with the research result of Berekaet al, (2016) in Ethiopian Somali Regional State.

Access to safe water (aswtr):- the result implies that access to safe water in the district has shown a negative

correlation with CMR. The slope coefficient -5.689 suggests that child a who have better access to safe water results in a 5.689 unit reduction in log of the odds of being died of children of age 12-59 months than not access assuming a negative correlation between CMR & access to safe water holding the effect of other factors constant. This finding is consistent with the finding of Bereka *et al*, (2016) in Ethiopian Somali Regional State.

Access to health facilities (Hhahf): - household access to health facilities was negatively correlating with CMR in the district. The implication here is children who have better access to health facilities are significantly correlating to the low risk of death relative to those who have no access of health facilities. The slope coefficient -3.283 suggests that child who have better access to health facilities leads to 3.283 unit reduction in log of the odds of being died of children of age 12-59 months than others assuming a negative correlation between CMR & access to health facilities holding the effect of other factors constant. This finding is consistent with the research result of Iram and Butt (2008) in Pakistan.

Household head's occupation status (Hhoccp): - the working status of household heads was positively correlating with the death probability of children in the study area. The slope coefficient 3.036 suggests that a one unit increase in the working status of household heads leads to 3.036 unit increase in the log of the odds of being died of children of age 12-59 months by suggesting a positive correlation between CMR & the working status household heads holding the effect of other factors constant. This finding is consistent with the finding of Omedi G. & Wanjiru G. (2014) in rural areas of Kenya.

V. CONCLUSION AND POLICY RECOMMENDATIONS

Conclusion

The study was examining the effect of socio-economic factors on IMR and CMR in study area. In order to attain the stated objective the study employed logit regression model. Therefore, the result suggest that level of mother's education, working status of mother, place of household residence, access to safe water and access to health facilities are significantly determine IMR whereas working status of mother, marital status of parents, level of father's education, household size, access to safe water, access to health facilities and occupational status of household heads are significantly affect CMR in Humbo district. IMR is negatively correlating with the levels of mother's education, residing of households in urban areas, having better access to safe water and having better access to health facilities and positively correlating with the working status of mother. CMR is negatively correlating with working status of mother, levels of father's education, having better access of safe water, and having better access to health facilities while positively correlating with not living in union of parents, having large family size, and working status of household heads other than government office and trading of sale and services.

Policy recommendations

Based on the finding of the study, we have forwarded policy recommendations to improve the socio-economic characteristics of households on IMR and CMR in the study area.

The study advices the district's administration office and health development office to play their role in creating awareness on the key findings of this study; creating better opportunities for rural people to improve their living styles; insuring the benefit of rural people from the expansion of infrastructures such as; health facilities, safe water, road, and marketing facilities; giving awareness creation training on the key issues of the finding, encouraging and upgrading services given by health extension workers at health posts; creating appropriate staying room for infants at work place with full of necessary facilities, creating job opportunities for rural mothers and household heads; showing ways of developing tolerance among marriage partners at the time of conflict; creating awareness on family planning (birth spacing) especially in rural areas of the district.

Training should be given to rural community on advantages of mother & father education, to improve home environment to practice modern life, advantages of having small family size, and how to develop tolerance with marriage partners at the time of conflict.

The study suggests that the key socio-economic characteristics of households that have been identified as determining factors of IMR and CMR in the district should be addressed by the existing Health, education and economic policies.

Finally, Encourage NGOs to participate in activities that improve the socio-economic conditions of households to reduce childhood mortality rate in the district.

REFERENCES

- [1]. Amare Deribew (2016). Trends, causes and risk factors of mortality among children under five in Ethiopia, Based on 1990-2013 EDHS data.
- [2]. Assefa Negera, Gebeyehu Abelti, Terefe Bogale, and Tesfayi Gebreselassie and Roger Pearson (2013). An Analysis of the Trends, Differentials and Key Proximate Determinants of Infant and U5-Mortality in Ethiopia. Further analysis of the 2000, 2005 and 2011 Demographic and Health Surveys data. Reports No. 79.
- [3]. Bereka SG, Habtewold FG, Nebi TD. (2016). Under five Mortality of children and its Determinants in Ethiopian Somali Regional State, Eastern Ethiopia. Research Article Vol.11 No.3:507; Health Sci J 2017, 11: 3.
- [4]. Clark, S. and Hamplová, D. (2013). Single motherhood and child mortality in sub-Saharan Africa: A life course perspective. Demography 50:1521–1549.
- [5]. CSA (2016). Ethiopia Demographic and Health Survey. Addis Ababa, Ethiopia. Pp.1-33 and 123-131
- [6]. Damodar N. Gujarati (2004). Basic Econometrics, fourth Edition.

- [7]. Damodar N. Gujarati (2009). Basic Econometrics, fifth Edition.
- [8]. Dawson, C. (2003). Practical Research Methods.A User friendly Guide to Mastering Research Techniques and Projects. New Delhi.
- [9]. Desta Mekonnen (2011). Children under-five mortality in Ethiopia: The role of socioeconomic, demographic and biological factors in the previous five years period of 2000 and 2005.
- [10]. Ethiopia Child Survival Technical Working Group (2012). Can Ethiopia reduce U5MR to Below 20 per 1,000 live births by 2035?
- [11]. FMOH(2010). Health Sector Development Program IV, Final Draft.
- [12]. FMOH (2013b). Annual Performance Report of HSDP IV.EFY 2005 (2012). FMOH, Addis Ababa.
- [13]. FMOH (2014). Policy and Practice Information for Action, quarterly health bulletin, vol.6.
- [14]. Hosmer DW, Lemeshow S. (2008). Applied Survival Analysis, 2nd Edition. New York.
- [15]. Iram, U. and Butt, M. S. (2008). 'Socioeconomic Determinants of Children under-five mortality in Pakistan: Evidence from Sequential Probit Model', International Journal of Social Economics.
- [16]. Kanmiki, E.W., Bawah, A.A., Agorinya I., Achana F.S., Awoonor-Williams J.K., Oduru A.R., Philip J.F and Akazili J. (2014). Socio-economic and demographic determinants of under-five mortality in rural Northern Ghana. BMC International Health and Human Rights 14:24.
- [17]. Klaauw, B and Wang, L. (2004). Socio-economic and environmental determinants of child mortality in rural parts of North-East India'.
- [18]. Kumar, P. and Gemechis (2010). Children under-five mortality in Ethiopia: As statistical analysis Appr.
- [19]. Ladusingh, L. and Singh, C. H. (2006). 'Place, Community Education, Gender and Child Mortality in North India', Population, Space and Place 12, 65-76
- [20]. Mosley, W.H. and Chen, L.C. (1984). An analytical framework for the study of child survival in developing countries. Population and Development Review 10:25-45. Bulletin of the World Health Organization 2003, 81 (2)
- [21]. Mustafa, E. and Odimegwu, C. (2008). Socioeconomic determinants of infant mortality in Kenya: Analysis of Kenya DHS 2003.
- [22]. Mutunga, C. J. (2007). 'Environmental Determinants of Child Mortality in Kenya', World Institute for Development Economics Research, UN University, Research Paper No. 2007/83.
- [23]. Omedi Gilbert & Wanjiru Gichuhi (2014). Determinants of Infant Mortality in Rural Kenya, Research on Humanities and Social Sciences, Vol.4, No.28, 2014
- [24]. Sathiyasuman (2012). Child Mortality Rate in Ethiopia, Dept. of Statistics, Western Cape University, South Africa, Review Article 2012, Iranian J Publ Health, Vol. 41, No.3, pp.9-19
- [25]. Tariku Dejene and Eshetu Girma (2013). Social determinants of under-five mortality in Ethiopia, Based on 2011 EDHS. Research Article Vol.5, No.5, 879-884 (2013).
- [26]. Todaro and Smith (2012). Economic Development – eleventh edition.
- [27]. Transitional Government of Ethiopia (1993a). National Population Policy of Ethiopia. Addis Ababa, Ethiopia: Transitional Government of Ethiopia.
- [28]. Transitional Government of Ethiopia (1993b). Health Policy of the Transitional Government of Ethiopia. Addis Ababa, Ethiopia: Transitional Government of Ethiopia.
- [29]. UNICEF. (2008). The state of the world's children 2009: maternal and newborn health (Vol. 9). Unicef.
- [30]. Wooldridge (2000). Introductory Econometrics, A Modern Approach, 2nd Edition.
- [31]. World Bank (2010). The changing wealth of nations: Measuring sustainable development in the new millennium, Washington, DC.
- [32]. World Health Organization Report (2015). Global health observatory data.
- [33]. Yemane T. (1967). Statistics, an Introductory Analysis, 2nd Ed., New York. Harper and Row.
- [34]. Yohannes Mehretie, Senafikish Amsalu, Zelalem Birhanu, (2017). Childhood mortality rate: Trends and Determinants in Ethiopia from 1990 to 2015—A Systematic Review.