

The Influence of Household Income Level on Household Mortality and Life Expectancy in Dodoma Region in Tanzania

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Abstract- This study analyzed the influence of income on household mortality and life expectancy in Dodoma. Mortality and life expectancy were used as proxies for health status. The effect of income was assessed along with the social determinants of health. The study employed cross sectional design involving 150 households. Twomodels based on mortality and life expectancy were applied.

Based on mortality, the relationship with income had a negative sign as expected and was significant ($B = -0.035$; $p = 0.01$). As for life expectancy and income level, the relationship was positive as it was hypothesized and was significant ($B = 1.167$ and $p = 0.015$).

The fact that two models had significant outcome on income, there is an obvious association between income and health status in the sense that health status is determined by an individual's income level, holding other factors constant. The following social determinants also seemed to significantly affect health status along with income: meals intake, educational level, and distance to health facility.

From this study the researcher suggests that as income being the dominant factor that influence better health status therefore improving household income level would lead to better welfare as it enables household to afford and access health services easily. However lifestyle like alcohol drinking habits, smoking and bad eating habits impact negatively to household's health. The government should create awareness to households on eating balanced diet, doing physical exercises and how their lifestyles can negatively affect their health.

Index Terms- Household, Income Level, Mortality, Life expectancy, Social determinant.

I. INTRODUCTION

There is a strong positive association between income and health status that is evidenced both across countries and within countries (Case, 2004). When people in low income group are compared with those with greater income, those in low income have higher rates of disease and mortality (Case, 2004). Increasing income is thought to improve health outcomes (Liu et al., 2011). Works by McKeown (1976) and Fogel (1994) revealed that improvements in longevity in the 19th century were driven not by advancements in medicine or public health, but by improvements in nutrition, largely driven by higher incomes.

Therefore, it would seem income and social status is linked to mortality and life expectancy. The greater the gap between the richest and poorest people, the greater the differences in health status like access and use of services that influence health, for example, access to safe water and clean air, healthy workplaces, safe houses, communities and roads all contribute to good health ([www. denvernaturopathic.com/ determinants of health.html](http://www.denvernaturopathic.com/determinants_of_health.html) accessed on may 12, 2009).

Based on Thoits (2010), data suggest that income is an important determinant of health disparities among peoples. In this regard, it can be concluded that policies to help equalize income offer the greatest promise to improve health and longevity. High income determines living conditions such as safe housing and ability to buy sufficient good food. The healthiest populations are those in societies which are prosperous and have reasonable level of wealth. In many ways, income should be an important determinant of health more probable in poor countries than in rich ones. When many people do not have enough money to buy food, adults and children often suffer the short and long-term effects of a poor diet, and parents who do not have enough money to feed their children report severe consequences for their own wellbeing (Deaton,2001). Though it may seem obvious that severe poverty might erode physical health through the effects of poor nutrition, crowded and dirty living conditions, not only those above the poverty line have better health than those in poverty, but those in the highest income level have better health than those just below them (Marmot et al., 1991).

In most middle and high income noncommunicable diseases (NCDs) affecting mostly people in their middle and older years and are the leading cause of death. Many NCDs were associated with economic development and so called "diseases of the rich". However, today an estimated 80% of the main types of NCDs are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes (Boutayeb,et al,2005). The influence of lifestyle, including diet, physical activity, smoking, and alcohol consumption, is strongly influential to the health status, the high income people are the likelihood of having a healthier lifestyle but its evidenced that people with high income use be abusing to good health by getting involved with tobacco use, physical inactivity, unhealthy diet like eating red meat, foods with high vegetable oil and the harmful use of alcohol increase the risk of or cause most NCDs. Tobacco accounts for almost 6 million deaths every year 5.1 million from direct tobacco smoking and 600 000 from exposure to second hand smoke and about 3.2

million deaths annually can be attributed to insufficient physical activity, approximately 1.7 million deaths are attributable to low fruit and vegetable consumption and half of the 2.3 million annual deaths from harmful drinking (Jamison et al.,2006).

Tanzania is a country that has shown marked improvement over the past decade in a number of health areas, including strong gains in reducing infant and under-five mortality rates.

In Tanzania although communicable diseases are still the major causes of mortality and life expectancy, non-communicable diseases also contribute significantly to the disease burden especially among adult populations(AMMP, 1997; WHO, 2005, 2010). Diseases that were once considered rare such as diabetes and cardiovascular diseases are now considered a normal phenomenon. The increase in the burden of non communicable diseases is being fuelled by the socio demographic transition that has rapidly been occurring in developing countries (WHO, 2005).

However, higher income results to better place for mortality and life expectancy as it accelerate health needs like eating balance diet, access to safe water, health care and health knowledge and skill. On the other hand, higher income leads to change of life style habits like excessive alcohol drinking, tobacco smoking, eating junky food and sedentary life. Under this contradictory situation what precisely triggers the researcher to perform this study is to understand the role of income level on mortality and life expectancy.

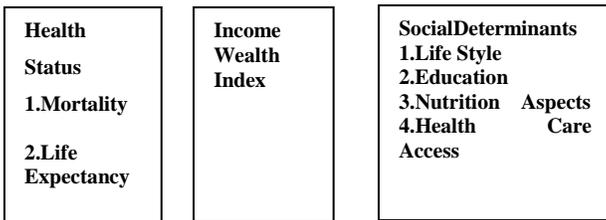


Figure 1: Conceptual Diagram of the study.

Source; Researcher’s own construct (2012)

As explained health status can be influenced by the income level and other social determinants of health status like education, nutrition aspects, health care access and life style

II. METHODOLOGY

Study Area and Research Design

This study was carried out in Dodoma region involving rural and urban areas surrounding the Municipality. The choice of the region was based on familiarity of the researcher with key people in Dodoma Region in getting permit and access to the people. Though Dodoma is the national growing capital it is among the poorest and least developed area of Tanzania and suffers the highest mother/infant mortality (www.nbs.go.tz, 5th July, 2014). This study involved a quantitative research design based on hypothesis testing, where the researcher used cross sectional approach in which the respondents were met once as recommended by Kothari (2007). In performing this study, the researcher first performed a desk literature review of issues that

were addressed by other scholars and prepared research tools for data collection.

Sample Size and Sampling Techniques

Under this study the sample were 150 respondents, this is because of the nature of selected research design known as cross sectional design. Where cross sectional type of study researcher has to choose a large sample more than 30 with a significance level of 5% for the results to bring Best Linear Unbiased Estimator (BLUE). The data were collected through structured questionnaire in which the sampling strategy was based on a simple random sampling scheme.

Data Analysis

General Econometric Model

This study used Multiple Regression model. The model used is consistent with econometric literature theory which contends that the higher the level of an individual’s per capita real income, the better his or her health status. The relative income hypothesis states that an individual’s health status is influenced adversely by the degree of income inequality within the economy (Murthy, 2007), has become a standard approach to modeling this study as his objective was to empirically examine the relationship between health status as measured by infant mortality and the degree of income inequality, given the effect of certain controlled variables where the double logarithmic econometric models were used through robust econometric method.

This study on household health status and income based on an explained conceptual framework and the Murthy (2007) modeling approach. However a modification was made to this general model Multiple Regression Models in which health status being the function of income and other social determinant of health status are regressed on two models; the first step health status was measured by mortality as its proxy and second proxy was life expectancy. These equations were estimated by using Ordinary Least Square (OLS) to estimate the coefficients of the specified regression equations mathematically illustrated as;

$$HS = F (Y)..... (1)$$

Where income is a function of health status.

Econometrical equation will be

$$HS = \alpha + Y + \mu..... (2)$$

And

HSis health status.**α** is a constant term. **μ** is the error term. **Y** is income level.

As from conceptual framework health status can’t be explained by income alone but with other factors, in this study the social determinants of health status were also used so as to capture effect of Income on health status. In this case then, the general study equation has been illustrated mathematically as follows;

SD= the social determinants of health status of individual.

$$HS= F(Y+ SD) + \mu..... (3)$$

Where: **HS** is health status which was measured by mortality and life expectancy.

Y =income in which was measured by computed wealth index.

And $SD = \{Edu + Lst + Nas + Hc\}$, **Edu** is for Education in years

Lst is for lifestyle measured by number of liters of alcohol drink, frequency of exercise and number of cigarettes smoked

Nas is for nutrition aspects measured by household intake per day

Hc is health care access measured by distance in kilometer to nearest health facility

Estimation Model

From general model, the initial model was borrowed from the idea of Murthy (2007) study of Income Distribution and Health Status Econometric Evidence from OECD countries. Researcher modified it to two steps of multiple regression models.

From the general model eq. (3)

$$HS = F(Y + SD) + \mu \dots \dots \dots (3)$$

The study equations have been extended to two multiple regression equation as follows; health status proxies are mortality, and life expectancy.

$$MT = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu \dots \dots \dots (4)$$

$$LE = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu \dots \dots \dots (5)$$

Where; **MT** is the household mortality; **LE** is household life expectancy.

α = Regression constant which doesn't influenced by either income or any social determinant of individual health status. X_1 is household income; X_2 is for household years of schooling.

X_3 is for household life style measured in number of liters of alcohol drink, frequency of exercise and number of cigarettes smoked; X_4 is for nutrition aspects measured by household intake per day

X_5 is health care access measured by distance in kilometer to nearest health facility

μ = stochastic error term, which is this study assumes it normally distributed around 0 mean and constant variance i.e. $\mu \approx N [0, \sigma\mu^2]$. $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, are the differential coefficients.

The main objective of breaking down the determinants factors is to see the clear relationship between income and health status in Dodoma's households.

Estimation Techniques

The models were estimated by using the Ordinary Least Square technique (OLS), and z- test favorable for the study was used as the number of observation was above 30, and the Statistical Packages for Social Science Version11 (SPSS) was used for data entry, managements, coding and regression analysis according to study objectives and research questions which were quantitative. The Multicollinearity test and Heteroscedasticity problems were tested and the variables of the model found to be

free from these econometric problems through the use of Variance Inflation Factor (VIF) and the scatter diagram respectively.

III. RESULTS

Sample Size and Demographic Characteristics of Respondents

The study comprised 150 respondents of whom 131(87.3%) were males and the remaining were females. Household age was in three groups: < 30 years, 31-56 years, and 57-82 years. The married respondents were 126; single 7; divorced 4; and widow, 13. In education case data revealed that those with informal education were 7; those with primary education 74; secondary education 44; and 25 had college education while Income distribution was under low income group and it's was about 67 (44.7%) and high income group 83(55.3%).

The Influence of Household Income and on Mortality

The R^2 for this model was 62.1% (F stat. 0.000), the results portray that at 5% significant level household income had the expected sign which was (B -0.035) and had been observed to be significant (p= 0.001) on mortality (Table2) and it is in negative relation, the results imply that as income of household increases the mortality of household decreases, that means one unit increase in household income tends to decrease household mortality by 0.035. This has been because with high income households would manage to access and afford health services hence decline in mortality incidence. This being the case then the suggested hypothesis that household income tends to affect mortality is accepted as the findings shown. Many disciplines had established that those with lower income have poor health outcome and higher mortality rate (Kitigawa and Hauser, 1973; Duleep, 1986; Wolfson et al., 1993; Me-Donough et al., 1997, Deaton and Paxson, 1998).

Furthermore the influence of income on mortality was examined with social determinants, including Health care access, alcohol drink habits and eating grilled meat, frequency of exercise, nutrition aspect, year of schooling and smocking habit. These could have been considered as confounding variables. The results are as follows.

Nutrition Aspect and Mortality

As for nutrition aspect the model results meals intake a day has been used as a proxy for nutrition aspect. The results shows that at 5% significant level meals intake a day with (p=0.014 and B= -0.091) is significant to mortality (Table 2). This implies that household meals intake a day tends to influence household mortality with a negative relation. This means as household meals intake a day increases household mortality decreases and when decreases household mortality increase. Therefore one additional meal taking by household tends to decrease household mortality by 0.091.

Table 1: Household Income and Mortality Model Summary Health Care Access and Mortality

Model	R Square	Std. Error of the Estimate	Change Statistics				Durbin-Watson
			R Square Change	df1	df2	Sig. F Change	
2	.621	.22104	.621	7	142	.000	1.288

From the model results distance in kilometer has been used as the proxy of health care access, the results of this model portray that at 5% significant level ($p=0.000$ and $B=0.152$) has been observed to be significant on mortality (Table 2). Household health care access has significant effect on mortality and it is in positive relation, the results implies that as distance in kilometer to health facility increases means household chances to mortality increases too, which means one kilometer increase tends to increase household mortality by 0.152. This is because the distance tends to limit convenient accessibility of health services hence households face difficulties on access service in

time as the result some were dying in the process. So from these results its observed that household income tends to influence household mortality and the social determinants which includes health care access and nutritional aspect has bear a significance influence to health status.

Table one, the model shows that R square is 62.1% (Table 1) above, meaning the explanatory variable explained the model by 62.1% which is a good fit.

Table 2: Mortality Results

Model	Unstandardized Coefficients		Sig.	Collinearity Statistics	
	B	Std. Error		Tolerance	VIF
2 (Constant)	.126	.132	.343		
Years of schooling	.013	.007	.055	.472	2.120
Total frequency of exercise per week	.000	.006	.897	.896	1.116
Total packet smoked per week	.007	.025	.771	.942	1.062
Total liters of alcohol household drink in a week	.006	.006	.278	.522	1.914
Total meals a day	-.091	.037	.014	.791	1.265
Household income	-.035	.010	.001	.883	1.132
Distance (km)to the health care facility	.152	.010	.000	.984	1.016

Source: Researcher Findings, 2012

Household Income impact on Life Expectancy

The R^2 for this model was 52.8% (F stat. 0.000), the results portray that at 5% significant level household income with ($p=0.015$ and $B=1.167$) had the expected sign and observed to be significant on life expectancy (Table 4). This means household income has significant effect on life expectancy and it is in positive relation, the results implies that as income of household increases the life expectancy of household increases by 1.167. This is the case because people with high income are in position to manage their health status through eating balance diet, access health service and information on how to take care and protect their health. The suggested hypothesis that household income impacts life expectancy is accepted as the findings show that household's income tends to increase with life expectancy. Synder (2004), also suggested that there is widespread and longstanding agreement that life expectancy and income are

positively correlated. Moreover, at 5% significant level, the influence of income on life expectancy was examined with social determinants, including Health care access, alcohol drink habits and eating grilled meat, frequency of exercise, nutrition aspect, year of schooling and smocking habit. These could have been considered as confounding variables. The results are as follows

Health Care Access and Life Expectancy

Distance in kilometer has been used as the proxy of health care access, the results of this model portray that at 5% significant level ($p=0.000$ and $B=-3.764$) had been observed to be significant on life expectancy (Table 4). Household health care access has significant effect on life expectancy and it is in negative relation, the results implies that as distance in kilometer to health facility increases household life expectancy decreases, that means one kilometer distance increase tends to decrease household life expectancy by 3.764. This is because whenever

people are far from health centers it limits their convenient access to health care services. The suggested hypothesis that household health care access tends to affect life expectancy is thus accepted.

Table 3: Household Income and Life Expectancy Model Summary

Model	R Square	Std. Error of the Estimate	Change Statistics				F	Durbin-Watson
			R Square Change	df1	df2	Sig. Change		
3	.528	10.199	.528	7	142	.000	1.902	

Source: Research findings, 2012

The model show that R square is 52.8% (Table 3) above, meaning the explanatory variable explained the model by 52.8% which is at least a good fit of the model

Table 4 Life Expectancy Results

Model		Unstandardized Coefficients			Collinearity Statistics	
		B	Std. Error	Sig.	Tolerance	VIF
3	(Constant)	94.417	6.086	.000		
	total frequency of exercise per week	-.171	.262	.516	.896	1.116
	total packet smoked per week	-.857	1.138	.453	.942	1.062
	household income	1.167	.472	.015	.883	1.132
	years of schooling	-.404	.315	.202	.472	2.120
	total meals a day	-1.241	1.693	.465	.791	1.265
	Total liters of alcohol household drink in a week	-.122	.273	.656	.522	1.914
	Distance (km)to the health care facility	-3.764	.477	.000	.984	1.016

Source: Research Findings, 2012

IV. CONCLUSION

Based on the results, the fact that two models had significant results it can be concluded that there is a strong relationship between income level and health status, in the sense that to a large extent health status is determined by an individual's income levels holding other factors such as social determinant constant. The social determinant have shown to influence household mortality, these variable includes health care access where the increase in distance to health facility increase incidence of household death in past one year and increase in meals intake a day lower the incidence of household mortality.

Finally is distance in kilometer to health facility and life expectancy. Health care access have influence to life expectancy, one kilometer distance increase tends to decrease household life expectancy.

V. RECOMMENDATION

From this study the researcher suggest that from the fact that the income level as the main independent variable and the confounding variables known as the social determinants of health status like meals intake, and health care access have influence in household health status particularly on mortality and life expectancy. This implies that income is main determinant of health status of household therefore strengthening the income level to an individual/community would have positive impact on welfare of the community in terms affordability and accessibility. However, this has to be taken with precaution that with strengthening household income who misbehave on lifestyle habits like alcohol drink habits ,smoking and bad eating habits would impact negatively to households health.

Also education, should be emphasized to household as level of education seem to have importance on household health status as it brings awareness and information on how to care one's health care and protection, however meals intake a day its necessary toward improving household health status by consuming balanced diet food that is good for people's health.

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