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Analysis of Health Demand Model for Kenya

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Abstract: ***To ensure health service delivery system is more effective and accessible to many people as possible, focus has been redirected to increased preventive health care. This study aimed at establishing the effects of socioeconomic status, and increased demand for preventive health services on demand of health and demand for health care. Using the household health and utilization survey data for 2003, an ordered probit and poisson regression models were estimated to determine the factors which influence health demand and demand for health care respectively. The study found that, the wealthy are healthier though they demand less health care; increase in literacy rate had a significant favourable effect on health status; married male and female have better health than their single counterparts; socioeconomic status like being single or widowed, monthly income, age and gender had effect on individuals' health, while employment status did not. The demand for health care was not influenced by the area of residence, individual's employment status, health education and consumption of tobacco. But, an individual who came from a remote place had worse health compared to one in an urban area while, someone who consumed tobacco either through smoking, chewing or sniffing had worse health than one who did not use. The study recommends that people be encouraged to seek preventive health care services in health facilities through provision of preventive subsidies especially to low-income groups and the widowed. Health education be emphasised, increased and promoted. This ought to change the lifestyle of people as it seemed to impact positively on persons who consumed tobacco. The government ought to continue with its program of free primary education, since this would increase the demand for health care especially for those with no education and in turn improve health status of Kenyans.***

Keywords: Socioeconomic Status, Preventive Health Services, Health Education, Demand for Health

1. Introduction

1.1 Background

The determinants of health constitute an issue of vital importance to health policy [28]. Health policy which may focus on provision of health services, family planning programs, and emergency aids and ignores marginal efficiencies of the services, and other socio-economic aspects may do little in efforts directed to improving the existing health status of the region [4]. Grossman made a distinction between the demand for health and demand for health care. According to [6, 7 and 23] the demand for medical care is a *derived* demand, due to the presumed connection between medical care and health. Consumers, consume health care not as an end in itself but because they wish to be healthy [22].

[20] added that whereas health care is tradable in markets, there are no markets in which sellers and buyers can exchange health, even though individuals trade health against other commodities over time. [8] constructed a model where individuals use health care and their own time to produce health. In his model individuals are assumed to invest in health production until the marginal cost of health production equaled the marginal benefits of improved health status. Health status is assumed to affect utility directly by the value that individual place on good health per se, and indirectly through increasing healthy time and, hence, labour income [8].

Investments in health by reducing morbidity and prolonging life increase the amount of time available to produce money earnings and commodities [9]. Good health is demanded and supplied as a commodity by individuals and households. The input of both market and non- market goods and services, and the individual's own time, determine the production of the health commodity, which increases the health capital of an individual [12]. This commodity may allow the person to achieve an increase in wages by allowing them to apply less time to sickness [27]. Hence, the health production process depends, in part, on the health-care system and its resource input but also on the non-medical, social, economic and physical conditions [21].

The Kenya vision 2030 puts emphasis on disease prevention and health promotion in which one of the health sectors flagship projects for 2012 is to revitalize community health centers in order to promote preventive health care and promote healthy individual lifestyles [14].

1.2 Problem Statement

To ensure health service delivery system is more effective and accessible to many people as possible, there is need to bring the existing essential packages to collaborate more closely and intensively. In line with this, the NHSSP II incorporated among others these two principles. First, a shift from disease burden (curative and vertical) to human capital development focusing on individual health promotion and providing support to the various life cycles of a human being. Second, scale up interventions by re-orienting the emphasis from facility-based (curative) services to increased preventive and promotive community-based care through, strengthening and expanding the role of Community Owned Resource Persons (CORPs) and Community Health Extension Workers (CHEWs) working at grassroots levels.

The objectives of Kenya Essential Package for Health (KEPH) which are part of the overall policy objectives of the NHSSP II are among others, to enhance the promotion of individual and community health. Strategy to attain this objective is revitalising community health structures, with an

emphasis on prevention, health promotion and promotion of healthy life-styles [16]. The specific role of health education as one of the main elements of health promotion strategies is not given adequate consideration in health production studies.

Behavioural change such as overcoming drug and substance abuse, alcohol, quitting smoking, changing a sexual practice or diet is associated with better health, just as is the use of market inputs such as health care, drugs and vaccinations [20]. Thus, a behavioural change serves as input into health production. Indeed, health effects of changing behavioural inputs may be as important as effects of altering market inputs of health care [20]. Consumption of health care, particularly preventive care, like treatment of a patient with infectious illness or immunization against communicable disease is often associated with positive externalities [20].

1.3 Objectives

The general objective of this paper is to analyze the effect of diverse socioeconomic characteristics on health and health care in Kenya. Specifically the study sets out to address the following key questions:

1) What is the effect of socioeconomic status on health and health care?
2) How does increased demand for preventive health services affect health and health care?
3) What policy measures should be taken to improve the health of Kenyan households?

2. Literature Review

2.1 Health Status

Health human capital is theoretically defined as unobservable general ability of the people; and this unobservability of health greatly complicates its measurement [20]. Self assessed health (SAH) is a simple subjective measure of health that provides an ordinal ranking of perceived health status [2]. Using such a measure is advantageous, as it is based on a very simple survey question that has a high reliability [28]. The health variable (SAH) was defined as in [2] by a response to: "how is your health status compared to people of your own age, would you say that your health is 1 if poor, 2-satisfactory, 3-good or 4 if very good?" SAH should therefore be interpreted as indicating a perceived health status relative to the individuals' concept of the 'norm' for their age group.

2.2 Demand for Health Care

The most important difference between health and health care is that health care is tradable in markets while although individuals trade health against other commodities over time, there are no markets in which sellers and buyers can exchange health [20]. Household production theory suggests that the consumer's ultimate demand is for good health, and health care is the market service used to produce good health. Hence, biological changes with age alter the production function for good health so as to cause changes in the demand for health care. Health care demand is distinct from the demand for other commodities because illness incidence, the reason for medical care, is irregular and unpredictable. Consumption of health care, particularly preventive care, like treatment of a patient with infectious illness or immunization against communicable disease is often associated with positive externalities [20]. Health care utilization variables cover two broad areas of primary care and drugs. To measure the demand for health care usually the number of visits to a doctor or the utilization of medical equipment is used [28]. In this study the number of visits to a doctor in the previous four weeks was used to measure the demand for health care.

2.3 Education

The years of formal schooling completed is the most important correlate of good health according to [10] and this is irrespective of whether health levels are measured by mortality rates, morbidity rates, self-evaluation of health status, or physiological indicators of health, and whether the units of observation are individuals or groups [9]. Education has been proxied by the average number of years of schooling (NOSCHYRS) completed by individuals [11, 24] and the same was used in this study but there was dummy variables with primary education level as the reference category, for an individual with no education (NOEDUC), attained secondary education level (SECEDUC) and whose highest education attained is university (UNIVEDUC).

2.4 Tobacco Use

The decision to smoke or not to smoke is a conscious choice that directly affects the health status and ultimately the mortality of individuals [3]. Just like alcohol, tobacco consumption has been shown to be the intervening factor for deaths from cardio-vascular disease, heart attacks and chronic respiratory diseases [21]. This input has a negative marginal product in the production of health. They are purchased because they are inputs into the production of other commodities "smoking pleasure" that yield positive utility [8]. These were captured by a dummy variable with 1 if a person smokes cigarettes[1] and 0 otherwise.

2.5 Health Education

The variables would ideally capture all channels through which the health information can be forwarded to individuals and households. It can be assumed that the more often an individual searches these channels, the more likely (and earlier) it is, that he receives the information released by health authorities. Hence, these are assumed to contribute to his health knowledge even if we cannot specify the quality of the information that has been made available. Households in possession of a television or a radio are more likely to be informed on health education programmes[2] than those without. Hence a dummy variable was used with 1 if the individual had access to radio and TV and 0 otherwise.

[1] "Cigarette means any product which consists wholly or partly of cut, shredded or manufactured tobacco, or of any tobacco derivative or substitute, rolled up in paper or any other material and capable of being used immediately for smoking" ((Kenya, 2007))

[2] Like body and spirit; family doctor; alternative health; *chakula bora*; stress solution; strong medicine; body mind and soul; healthy living among others

2.6 Socio-Economic Variables

These include the respondent's age, gender (one if male), marital status (one if currently has a spouse), employment status (1 if currently employed), annual income in Kenya shillings and place of residence (one if lives in rural area).

2.6.1 1ncome

Individuals with higher income are thought to have a higher demand for health because the financial loss from illness days is higher and the time cost of health investment does not increase by the same proportion [7]. In Grossman's pure consumption and pure investment model, the wage rate is an argument in the demand function for health and in the demand function for medical care [9]. Higher combined labour incomes of husband and wife are associated with significantly lower housework hours of both husband and wife. This is consistent with a substitution of market goods for time in home production. Self reported measure of household income (INC) in Kshs per household member would be used [18].

The income variable is equivalized annual household income (LEQUINC) adjusted using OECD modified scale to take into account household size and composition. The modified OECD scale gives a weight of one to the first adult, 0.5 to other persons aged 14 or over and 0.3 to each child aged less than 14 [1]. For each person, the "equivalized total income" is calculated as its household total income divided by equivalized household size. The variable is then transformed to natural logarithms to allow for concavity of the health-income relationship [1, 2].

2.6.2 Age in Years (AGE)

Provided the rate of depreciation of health stock rises with age then ageing reduces both the amount of health stock demanded (because marginal benefits are decreased) and health capital supplied (because less health capital is left over) by individuals, so the net effect is ambiguous a priori. Age entered as a quadratic function (AGE, AGE2 = $AGE^2/10^2$, AGE3 = $AGE^3/10^4$) as defined in [1, 2]. The quadratic and cubic terms were included in order to accommodate the nonlinearity of age [29].

2.6.3 Place of Residence (RES)

The model include a dummy variable indicating where the individual live. These effects captures the quantity and distance of recreation areas, climate, variation in travel costs due to transportation infrastructure and traffic congestion, and access to health care and health information [12, 26]. Hence variables about the place of residence (like living in large towns or rural area) would take into account possible effects of time cost and supply-side conditions.

2.7 Preventive Health Services

These are services rendered by medical professionals not because of an existing problem/ complication/ illness but for preventive purposes. This category contains health services and procedures that are considered as mainly preventive in nature or which are not necessarily demanded because of an existing health problem. The use of preventive health services are assumed to have a positive direct impact on the use of health care, due to the fact that some diseases, which may not yet be perceived by the individuals themselves, are detected during the medical check-up and need to be treated. For individuals who do not use preventive care the treatment of these conditions is delayed, which may show up in lower utilization of health care [18]. A dichotomous variable with 1 if during previous four weeks the individual sought preventive out-patient services in a health facility and 0 otherwise was constructed.

3. Methodology

3.1 Theoretical Framework

We adopt the modelling approach of [25], in which the human biology approach, represented by the health production function, is integrated with an economic model of household allocations. Specifically, the production function f(.) shows how the health outcome (h) is affected by health inputs (x), conditional on observed characteristics of the individual (z_i), the household (z_{fh}), and the community (z_c), and on unobserved characteristics (v):

$$h = f\left(x; \mathbf{Z}_j, \mathbf{Z}_{fh}, \mathbf{Z}_c, v\right)$$

The household is assumed to maximize utility (u) as a function of consumption (c), leisure (l), and health, conditional on observed (z_{fu}) and unobserved (μ) household characteristics.

$$u = U\left(c, l, h; \mathbf{Z}_{fu}, \mu\right)$$

One of the results of utility maximization is a reduced-form health demand equation, in which health is a function of observed individual, family, and community characteristics, and of unobserved factors:

$$h = g\left(w, t, y, \mathbf{Z}_j, \mathbf{Z}_{fh}, \mathbf{Z}_{fu}, \mathbf{Z}_c, v, \mu\right).$$

Marginal effects of these characteristics on health, in this reduced-form apparatus, could indicate a direct effect through the health production function or an indirect effect through the household resource allocation process.

3.2 Analytical Framework

3.2.1 Demand for Health

New techniques allow us to deepen in the study of multinomial choice variables [5]. In particular, we will focus our analysis on individuals´ SAH. This variable takes four values that vary from "poor" to "very good". Since the dependent variable reflects an order, regression analysis of SAH can be achieved through specifying an ordered probit model. The ordered probit model can be used to model a discrete dependent variable that takes ordered multinomial outcomes like self-assessed health, with categorical outcomes such as excellent, good, fair, and poor [13]. Thus, our starting model is formulated through a latent health variable H^* that it is unobserved (an individual's "true" health) and which depends on a linear combination of explanatory variables:

$$H^* = \beta' X + \varepsilon, \qquad \varepsilon \mid X \sim \text{Normal}(0, 1)$$

Where X is a set of explanatory variables, β a set of coefficients and ε an error term, uncorrelated with the set of regressors with a normal distribution.

The dependent variable used is individual report of SAH. Thus, the higher value of our latent variable, the higher will be the probability that the individual reports a higher category in the self-assessed health scale. However, H^* is unobserved and what we do observe is:

$$H_i = \begin{cases} 1\ if & H_1^* \le \gamma_1 \\ 2\ if & \gamma_1 < H_1^* \le \gamma_2 \\ 3\ if & \gamma_2 < H_1^* \le \gamma_3 \\ 4\ if & H_1^* > \gamma_3 \end{cases}$$

Where $\gamma_1, \gamma_2, \gamma_3$ are unknown cut points (or threshold parameters) to be estimated with β.

The corresponding estimators are obtained maximizing the log-likelihood function:

$$\Gamma(\beta,\gamma) = \sum_{Y=1}^{Y=4} \log\left[\Pr\left(H_i = Y \middle| X_i, \beta, \gamma\right)\right]$$

The sign of the coefficients shows the tendency of the variation in the probability of belonging to the highest answer due to an increment in the corresponding explanatory variable and the marginal effect of a regressor X_K depends on the coefficient value β_K and on the values of a normal density function $\Phi(\cdot)$ for each person.

3.2.2 Demand for Health Care

Count data regression is appropriate when the dependent variable is a non-negative integer-valued count [13]. Typically these models are applied when the distribution of the dependent variable is skewed to the left, and contains a large proportion of zeros and a long right hand tail [13]. If we assume the probability of health care utilization (e.g. a GP visit), during a brief period of time (*dt*), is constant and proportional to its duration, then the probability equals *λdt*, where λ is the intensity of the process. The count of events from zero up to time *t*, setting *t*=1 gives the Poisson process and thus the probability of observing a count of y_i events, during a fixed interval.

$$P\left(y_i = h \middle| x\right) = \exp[-\exp(x\beta)]\left[\exp\left(x\beta\right)\right]^h / h!$$

3.3 Data

The study used secondary data from "the Kenya national health accounts (NHA), household health expenditure and utilization survey, (2003)". The Ministry of Health (MoH) administered the survey where the target population was all the households in Kenya. This nationally representative survey collected information from 8844 households in all the 70 districts in the country. The survey was conducted between February and March 2003. The Central Bureau of Statistics (CBS) [Currently known as Kenya National Bureau of Statistics (KNBS)] National Sample Survey Evaluation Programme IV (NASSEP IV) which is stratified by urban and rural was used to draw the sample. The six major towns (urban) in Kenya namely: Nairobi, Mombasa, Kisumu, Nakuru, Eldoret, and Thika, were further sub-stratified into five socio-economic classes. The division was based on incomes to circumvent the extensive socio-economic diversity inherent in them as follows: *upper*, *lower upper*, *middle*, *lower middle* and *lower income class*. Out of the 8844 households in the survey, 6060 were rural households while 2784 belonged to urban households. This was achieved through coverage of 737 clusters where 12 households were covered in each cluster [15].

4. Findings of the Study

4.1 Descriptive Statistics

The total number of individuals was 38,121, in which 49.36 percent were males, 74.82 percent had their domicile in rural areas. The percentage number in terms of their marital status were, 61.48 percent had never been married, 2.96 widowed, 0.73 divorced, 0.88 separated and 32.78 were by then currently living with their spouses hence married. The percentage number who had no education was 36.03, while 46.90, 15.20 and 1.39 percentages, had attained primary, secondary and university education levels respectively. On assessing their individual health status in comparison to people of their own age, the outcomes were as follows: 3.85 said their health was poor, while, 11.50, 61.48 and 23.17 percent, said their health status was satisfactory, good and very good respectively. The average age of the individuals was 22.74 years and they had on average schooled for 4.25 years. In ascertaining the demand for health care, we used the number of outpatient visits made in the previous four weeks before the data was collected. Majority (91.08 percent) had not paid even a single visit. However, 6.12 percent had one visit, 1.53 percent two visits, 0.71 three, while a small proportion 0.57 percent visited four or more times. In addition, individuals who sought preventive health care services were 5.91 percent while those who had inpatient services were 1.29 percent. Almost three quarters (75.14 percent) had access to health education, 5.52 smoked tobacco, and while 60 percent were employed in the formal or informal sectors, the rest were either students, seeking employment or retirees.

4.2 Econometric Models

The choice of model depends on the type of data set, especially on the nature of the dependent variable. This study used two types of economic models; an ordered probit model and a poisson model, and they are discussed in the subsequent sections.

4.2.1 Ordered Probit Models

Because SAH in the household health expenditure and utilization survey (HHEUS) was in ordinal scale from one to four, where one corresponded to poor health and four to very good health, a positive sign in the coefficients implied better health in reference to the base category. It is important to note that in both equations contained in Table 4.1, the models accounted for about 2.5 percent of the variation of the health transition probabilities, based on the values of the pseudo-*R* squared statistics.

Table 4.1: Ordered probit model estimation of individuals SAH in Kenya

Dependent is SAH Ordinal variable (1 poor, 2 satisfactory, 3 good, 4 very good)		
Regressors	Equation 1	Equation 2
AGE (Age in years)	0.0110 (1.77)	0.0151 (2.54)*
AGE2	-0.0500 (3.52)*	-0.0586 (4.29)*
AGE3	0.0307 (3.07)*	0.0353 (3.65)*
MALE (1 if Male)	0.0631 (3.91)*	0.0624 (3.88)*
MARRIED (1 if Married)	0.1239 (5.84)*	_
NVRMRD (1 if Never- married)	_	-0.1127 (4.70)*
SEPARATED (1 if Separated)	_	-0.0257 (0.38)
DIVORCED (1 if Divorced)	_	0.0033 (0.04)
WIDOW (1 if Widowed)	_	-0.1265 (3.04)*
Number of Schooling Yrs	0.0148 (6.48)*	_
NOEDUC (1 if No education)	_	-0.0559 (2.34)*
SECEDUC (1 if Secondary education)	_	0.0930 (4.54)*
UNIVEDUC (1 if University education)	_	0.2793 (5.03)*
Preventive OP services (1 if yes)	-0.3460 (10.48)*	-0.3395 (10.44)*
Inpatient services (1 if yes)	-0.3310 (5.05)*	-0.3432 (5.34)*
Remoteness (1 if lives in rural area)	-0.0556 (3.04)*	-0.0551 (3.05)*
Log Equiv Annual Income	0.0419 (7.98)*	0.0402 (7.74)*
Tobacco consumption (1 if smokes or chews tobacco)	-0.1230 (4.10)*	-0.1184 (3.99)*
Employment status (1 if employed)	0.0094 (0.38)	0.0189 (0.79)
Health education (1 if yes)	0.0868 (4.33)*	0.1046 (5.27)*
Cut 1 (γ_1)	-1.3812	-1.5161
Cut 2 (γ_2)	-0.5810	-0.7136
Cut 3 (γ_3)	1.1800	1.0516
Log likelihood	-21875.58	-22647.43
LR chi^2	1121.47*	1173.80*
Pseudo R^2	0.0250	0.0253
Number of observations	21813	22618

* denotes significance at 5% level and Z -statistics are inside the brackets

Table 4.1 also included estimates of the threshold parameters γ_1, γ_2 and γ_3 (denoted as Cut1, Cut2 and Cut3). These implied that, in the first equation, a value of the latent variable less than -1.3812 corresponded to poor health, a value between -1.3812 and -0.5810 corresponded to satisfactory health, a value between -0.5810 and 1.1800 corresponded to good health and a value above 1.1800 corresponded to very good health. So, the cut-points can be interpreted in terms of *z*-scores [5]. That is, the boundary between poor health and satisfactory health was at z = -1.3812, the boundary between satisfactory health and good health was at -0.5810 and the boundary between good health and very good health was at 1.1800. These values left Φ(-1.38) = 8.4 percent of the reference group in the poor health category, Φ(-0.58) −Φ(-1.38) = 19.7 percent of the reference group in the satisfactory health category, Φ(1.18) −Φ(-0.58) = 60.0 percent in the good health category and 1 - Φ(1.18) = 11.9 percent of the reference group in the very good health category.

Similarly, in the second equation, a value of the latent variable less than -1.5161 corresponded to poor health, a value between -1.5161 and -0.7136 corresponded to satisfactory health, a value between -0.7136 and 1.0516 corresponded to good health and a value above 1.0516 corresponded to very good health. The boundary between poor health and satisfactory health was at z = -1.5161, the boundary between satisfactory health and good health was at -0.7136 and the boundary between good health and very good health was at 1.0516. These values left Φ(-1.52) = 6.4 percent of the reference group in the poor health category, Φ(-0.71) −Φ(-1.52) = 17.5 percent of the reference group in the satisfactory health category, Φ(1.05) −Φ(-0.71) = 61.4 percent in the good health category and 1 - Φ(1.05) = 14.7 percent of the reference group in the very good health category.

Hence, based on the calculated values for each of the reference groups, the second equation produces results which compares closely with the descriptive statistics on individuals self assessment of their health status. This implies that in modeling the health demand model, one ought to include the categories of education instead of using the number of schooling years. In addition, marital status ought to be included in the model using the different categories and not as a binary variable.

4.2.2 Poisson Regression Models

The poisson model was applied in the demand for health care function in Table 4.2, since the distribution of the number of out-patient visits in the previous four weeks, which was the dependent variable, contained a large proportion of zeros and a long right hand tail as required from econometrics theory. From the adjusted R^2, in the two poisson regression models, the variables explain 12 percent of the variations in the demand for health care.

Table 4.2: Poisson Regression model estimation of individuals VISIT in Kenya

Dependent is VISIT Count variable		
Regressors	Equation V1	Equation V2
AGE (Age in years)	0.0060 (0.37)	0.0012 (0.08)
AGE2	0.0233 (0.64)	0.0354 (0.98)
AGE3	-0.0209 (0.83)	-0.0302 (1.19)
MALE (1 if Male)	-0.1367 (3.22)*	-0.1207 (2.85)*
MARRIED (1 if Married)	0.0050 (0.10)	_
NVRMRD (1 if Never- married)	_	-0.0429 (0.70)
SEPARATED (1 if Separated)	_	-0.2850 (1.66)
DIVORCED (1 if Divorced)	_	0.25860 (1.70)
WIDOW (1 if Widowed)	_	0.12870 (1.57)
Number of Schooling Yrs	0.0009 (0.15)	_
NOEDUC (1 if No education)	_	-0.1057 (1.80)
SECEDUC (1 if Secondary education)	_	0.0326 (0.66)
UNIVEDUC (1 if University education)	_	-0.1947 (1.31)
Remoteness (1 if lives in rural area)	0.0028 (0.06)	0.0181 (0.40)
Preventive OP services (1 if yes)	2.0480 (48.65)*	2.0489 (49.31)*
Inpatient services (1 if yes)	0.5981 (6.39)*	0.6102 (6.72)*
Log Equiv Annual Income	-0.0311 (2.36)*	-0.0252 (1.93)
Tobacco consumption (1 if smokes or chews tobacco)	0.0595 (0.79)	0.0450 (0.60)
Employment status (1 if employed)	-0.0040 (0.06)	-0.0181 (0.29)
Health education (1 if yes)	0.0329 (0.64)	0.0273 (0.54)
Constant	-2.5132 (11.66)*	-2.4818 (10.63)*
Log likelihood	-8202.46	-8474.39
LR chi^2	2253.30*	2367.99*
Pseudo R^2	0.1208	0.1226
Number of observations	21929	22746

* denotes significance at 5 percent level and Z -statistics are inside the brackets

4.3 The Effect of Socioeconomic Status on Health and Health Care Demand

We observed that, from Table 4.1, being male, had a positive and significant impact on individuals' health, similar to findings by [28, 1, and 29]. Hence, male's health was significantly better than female's. However, Table 4.2 shows the coefficient for male dummy was negative and statistically significant, showing that the demand for health care was greater for females than males. These findings are consistent with those established by [28] using survey data from Estonia.

The effect of age was highly nonlinear as shown by statistical significance and change of signs in the coefficients for the age terms. However, the coefficient for age in the demand for health care model was positive and not statistically significant; the quadratic term for age was positive and insignificant whereas the cubed term for age had a negative and insignificant coefficient in the two equations. This clearly depicts that the stock of health capital and health investment depreciates with age.

The number of schooling years had a positive and significant impact on individual's health, showing that more education led to better health. The same was reflected in the education dummies, whereby a person with no education had worse health compared to one who had attained primary education. An individual who attained secondary education had better health compared to one who had attained primary education level; however one with university education had the best health compared to the rest. This indicates that university education is more productivity enhancing than each of the other education levels. Hence, an increase in literacy rate had significant favourable effect on health status, as more education, gives the people more awareness about their own health status and the kind of preventive measures that would increase their own health. This findings were in line with those of [28, 1and 4].

The number of schooling years was positively but statistically insignificantly related to the demand for health care. After including, the education dummy variables, those who had no education demanded less health care compared to the base category (individuals who had attained primary education). Individuals who had attained secondary education and those who had primary education had more or less the same demand for health care as the base category. This indicates that demand for health care is not significantly influenced by the level of education.

Marital status variables, never married and widowed gave negative and statistically significant values, showing that an individual, who either had never been married or was widowed, had worse health compared to one who was currently married, similar findings were deduced by [19]. On the other hand, an individual who separated or divorced had more or less the same health, as one who was currently married. Similar to findings by [29], both married male and female had better health than their single counterparts did.

Equation V1 gave a positive but statistically insignificant coefficient, on the dummy for people living with their spouse. This showed that people, who were living with their spouses, demanded more or less the same health care, compared to those who were not living with their spouses. After disaggregating the marital status variable into four categories, it turned out that, whereas people, who had separated, demanded less health care compared to the married ones; the divorced demanded more health care, than the married ones. While, the demand for health care for those who had never been married and the widowed, was the same as for married ones.

Also, as expected, we did observe that, the income coefficient was statistically significant and had a positive effect on good health. However, from the poisson regressions, the income coefficient was negative and statistically significant, showing that the demand for health care as measured by the number of outpatient visits decreased with income. Hence, the wealthy are healthier though they demand less health care. This may indicate that the wealthy receive better medical cover/ better treatment in terms of, more in depth diagnosis, quality drugs and prescriptions compared to the poor. In addition, it may imply that, the poor, due to their low income potential get the prescribed drugs in portions and not onetime complete dosage like the wealthy.

Employment status in both models for health was not statistically significant. Hence, we were 95 percent confident that an individual, who had formal or informal employment, had as good health as students, retirees and even those seeking employment. Moreover, the demand for health care was negatively related to being employed in the formal or informal sectors. This could be attributed to low value for time, by the students, retirees and those seeking for employment. The employed would find it costly, inefficient and unproductive to frequent health care facilities. Hence, instead they would opt for a better medical package or increase their preventive non health care services, through adopting healthy lifestyles.

An individual who came from a remote place such as rural area had worse health, compared to one in an urban area. This indicated that an increase in urbanization rate may contribute to the improvement of health status. The same findings were established by [4], though; their finding was not supported by statistical test of significance. However, similar to findings by [28], the two equations, for health care demand, showed that remoteness, as measured by a dummy variable for rural area, had a positive and statistically insignificant coefficient. The positive sign indicates that, the demand for health care was more in rural areas than in urban areas. The statistical insignificance of this coefficient may be attributed to the high number of rural respondents (75 percent) relative to the urban respondents. Hence, the demand for health care cannot be conclusively said to be the same for individuals living in rural and urban areas.

A person, who consumed tobacco through smoking, chewing or sniffing, had worse health than one who did not use. This was the case, since; tobacco consumption increases the rate of depreciation. These findings are similar to those by [28]. The same could be said to have been confirmed by the positive coefficient for smoking in the poisson regression models. The increased demand for health care may have been induced by illnesses or complications associated with smoking. This implies, tobacco consumption adversely affects the health status and in turn burdens the health care system.

4.4 Effect of Increased Demand for Preventive Health Services on Health and Health Care

An individual, who sought out-patient preventive services in a health care facility, during the previous four weeks, had high probability of reporting worse health compared to one who did not. The demand for health care was positively related to demand for preventive health care services. This was established from the positive and statistically significant coefficients in the two poisson regression models. Thus, it implies increased demand for preventive health care services, increases demand for health care, and improves personal health assessment capability. A statistically higher proportion (7.2 percent) of females sought preventive health services, compared to 4.5 percent males, who sought for these services.

A significantly higher proportion (7.0 percent) of the respondents living in urban areas, sought preventive health services compared to the proportion (5.5 percent) seeking for these services from remote rural areas. In addition, a significantly higher proportion (7.5 percent) of individuals who were currently living with their spouses sought preventive health services, compared to proportion of 5.2 percent for those who were not living with a spouse. Moreover, a significantly higher proportion (6.0 percent) of respondents who did not smoke sought preventive health services, compared to a proportion of 3.5 percent for smokers, who sought preventive health services. As anticipated, a significantly higher proportion (7.3 percent) of those who were employed accessed preventive health services compared to 2.9 percent of the unemployed who accessed these services. The mean age was 22.7 years, for both, individuals who accessed preventive health services and those who did not access. Whereas demand for health care was negatively related to residing in urban areas; not smoking and being employed either in the formal or informal sectors; the converse holds, for access to preventive health services. This was the case since, access to preventive health services was positively related to residing in urban areas; living with a spouse; not smoking; and being employed either in the formal or informal sectors. This could depict the positive consequence of seeking preventive health care services, which may have induced the low demand for outpatient health care services, for the employed, urban area residents, and non-smokers.

An individual who had access to health education through the media like radio or television, had better health than one without, this may be due to the impact of health education programmes. Similar findings were deduced by [19] who found that empowering individuals with more health knowledge improves their health status. In addition, persons who had access to health education were more likely to demand health care, than those who were constrained. In particular, the demand for health care for an individual who had access to health education was three percent higher, compared to one who did not. This could have been induced demand, in quest for more health knowledge, through consultation with professional medical practitioner. Hence, the health care system can be said to complement the media in terms of increasing and improving individual's health knowledge.

5. Conclusions and Policy Recommendations

5.1 Conclusions

Males had better health than females, though the demand for health care was the same for both sexes. Individuals' age had a significant nonlinear relationship on individuals' health, though; it was insignificant when the number of outpatient visits was the regressand. The demand for health care did not seem to be influenced by the area of residence whether in rural or urban areas, the individual's employment status, health education and consumption of tobacco. But, an individual who came from a remote place such as rural area had worse health compared to one in an urban area while, someone who consumed tobacco either through smoking, chewing or sniffing had worse health than one who did not use.

The number of years in school had a positive and significant impact on individual's health showing that more education led to better health. The same was reflected in the education dummies, whereby a person with no education had worse health compared to one who had attained primary education. An individual with secondary education had better health compared to one who had attained primary education level; however one with university education had the best health compared to the rest. Hence, an increase in literacy rate had a significant favourable effect on health status as more education gives the people more awareness about their own health status and of what preventive measures would increase their own health.

Marital status variables, never married and widowed gave negative and statistically significant values, showing that an individual who either had never been married or was widowed had worse health compared to one who was currently married. On the other hand, an individual who separated or divorced had more or less the same health as one who was currently married. Similar to findings by [29], both married male and female have better health than their single counterparts did.

The income coefficient was statistically significant and had a positive effect on reporting good health as expected giving the concave relationship between health and income. However, from the poisson regression, the coefficient for income was negative and statistically significant, showing that the demand for health care as measured by the number of outpatient visits decreased with income. Though after, including a binary variable with one if income was less than or equal to Kshs. 10,000, the coefficients had a statistically negative sign in the two equations for health and demand for health care. This showed that individuals in the lower income group had poor health status and demanded less health care in medical facilities than the middle and upper income individuals.

In conclusion, the socioeconomic status like being single or widowed, monthly income, age and gender had effect on individuals' health, while employment status did not seem to have an effect on health. Accesses to health education through media like radio or television would more likely increase individuals' knowledge about the issues relevant to their health and make them to demand health care and better the person's health. As expected an individual, who sought out-patient preventive services in a health care facility during the previous four weeks, had a high probability of reporting poor health compared to one who did not. The demand for health care was positively related to demand for preventive health services.

5.2 Policy Measures to Improve the Health of Kenyan Households

In order for the second National Health Sector Strategic Plan (NHSSP II) and the health sector flagship goals outlined in the Kenya vision 2030 to be realized, the policy measures emanating from this study which ought to be taken to improve the health of individuals and households includes

1) Government ought to continue with its program of free primary education, since this would improve health status of Kenyans and increase the demand for health care especially for those with no education.
2) People to be encouraged to seek preventive health care services in health facilities either through provision of preventive subsidies especially to low-income groups and the widowed.
3) Health education programs through the media like radio or television be emphasised, increased and promoted. This ought to change the lifestyle of people as it seemed to impact positively on persons who consumed tobacco either through smoking, chewing or sniffing. It would not only ease the burden of health care facilities but also lead to improved service delivery by the existing health service providers.

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