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An analysis of socio-economic and demographic factors affecting household main source of income in Somalia using binary logistic regression approach

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Abstract

This study applied the Binary Logistic Regression model to investigate socio economic and demographic factors affecting household main source of income. The main objective of this study is to determine the socio-economic and demographic factors that affect household main source of income in Somalia. This study used secondary data of cross sectional data targeting households from household survey in 2016. The results of the four independent variables in the study which are household head education, household head sex, household residential area and age of household head show that the residence area of households is the most important factor which determines the household main source of income. The sex of the household head is revealed to be the second most important variable among the variables that have an effect on household main source of income. It has been found that the male headed households are more likely to have a salaried labour source of income than female headed households. The results show that the opportunity of getting a salaried labour source of income is not the same for both the educated and the non-educated household heads. The results, also suggest that the age of household head has a negative relationship with the salaried labour source of income. It is found that an increase of one year of the age of the household head will decrease the opportunity of the household of getting a salaried labour source of income.

Keywords: Household main source of income, chi square test, logistic regression, odds ratio

1. Introduction

A household is defined as “a group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food” (UNDESA 2008). Also, this definition mentions that households have a head and share residence, and that both head and the residents of the household have characteristics that influence their livelihood. The most important characteristics are education, age, residential area; rural and urban, and others. These characteristics have a great effect and impact on the source of the household income.

Household Main Source of Income is the major concern mostly in developing countries. The statistical reports produced by statistical offices in developing countries and developed countries illustrated employment conditions and the income sources of the households in their respective countries. Also the statistical offices inform government and citizens about livelihood changes. The source of income reflects the livelihood circumstances that surround any society in the world. The household main source of income has an effect on decision making, planning, because without knowing it the government and other institutions, will find it difficult to develop policies towards employment conditions.

The income source of the household measures the living standard differences between Male and Female Headed Households, where by the income is one of the monetary dimensions for measuring well-being of households whether in either urban or rural areas or either female or male household headed. Differences among household living standards may be due to the residence of the household, education level of the household head, the sex of the household head or the age of household head. The (UBOS 2014) ^[12] has published Average Monthly Household Income by region in either urban or rural areas. Such classification of households reveals the inequalities between urban and rural areas due to their socio-economic differences.

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(Sami Gungor *et al.* n.d., 2015) ^[9] found that the probability of a household being poor in Turkey decreased as the education level of the household head increased. (Janet Currie, 1992) ^[6] observed that male jobs are paid more than female jobs and that and female jobs are much more likely to be found in public than the private sector.

However, the Households of Somalia face many challenges concerning access to and availability and quality of the required social services, such as health, education, and opportunity of jobs. Social services need to be delivered equitably to all groups of the population, particularly to vulnerable and marginalized groups, in both rural and urban communities. Vulnerability and exclusion of households from generating income will be the cause of lack of ability within families and communities to meet required of living standard.

2. Review of literature

Household income sources are one of the key priorities for each country to stimulate the economic growth and the improvement of the living standard. This portion highlights the pertinent empirical literature on the subject investigated.

Mathebula *et al.* (2017) ^[7] have estimated household income diversification in settlement types of the poorest provinces in South Africa – the Eastern Cape, Limpopo and KwaZulu-Natal. They have used the number of income sources, the number of income earners and the Shannon Diversity Index to estimate income diversification in the study provinces. They have used 2010/2011 Income and Expenditure Survey from Statistics South Africa and Wave 3 data from the National Income Dynamics Study. They have found that the diverse of income in the provinces recommend that targeted policy initiatives aimed at enhancing household income are important in these provinces. They have shown that the households in the traditional and urban formal areas diversified income sources to a greater extent than households in urban informal and rural formal settlements. The research fails to present whether socio-economic and demographic factors have an effect diversification of income sources.

Chamicha (2015) ^[4], has studied the relationship between nonfarm activities and rural livelihood in Tanzania. The study investigated the factors that permit the rural household to involve in the nonfarm activities. The findings of the study divided the factors that the household's decision to engage in nonfarm activities into two factors which are push and pull factors. The findings showed that the income obtained from agriculture activities were used as a startup capital in nonfarm activities and the income obtained from nonfarm activities were used to finance farm activities. The study found that there is a significant share of the income from nonfarm activities to the overall household income, and also found that the income obtained from nonfarm activities were used to acquire different household needs. They have study concluded that rural nonfarm activities are significant livelihood strategy for the rural households. The research fails to indicate whether socio-economic and demographic factors influenced nonfarm activities for the livelihood of rural households.

Birthal *et al.* (2014) ^[3] has examined farm households' access to different income generating activities, and their impact on income distribution by using data from a nationally representative large scale survey in India. The authors have used a number of methods to measure economic inequalities. They used Gini index which is a widely used measure of inequality because of its certain desirable properties, such as Pigou-Dalton transfer sensitivity, mean-independence, symmetry, population homogeneity, and decomposability.

They have found evidence in the analysis that, as against the common perception of agriculture being the dominant source of income for farm households, the households earns close to half of their income from non-farm activities. Also they have found that non- farm income is more significant for the households at lower end of land distribution. They have discovered non farm income sources are accessible to a small proportion of farm households and have unbalanced effect on income distribution. In addition to that they have found that nonfarm sources are positively correlated with the total income. The research fails to indicate the effect of socio-economic and demographic factors that the households earn close to half of their income from non-farm activities.

Fadipe *et al.* (2014) ^[5] have examined the determinant of income among rural households in Kwara State, Nigeria. They have used primary data collected by using a questionnaire compiled from 90 randomly selected households. They have employed in the data analysis the analytical tools of descriptive statistics and the multiple regression analysis for the study. They have identified that the farm size and access to electricity, level of education of the household head, and sex of the household head were the main determinant of household income in the study area. They have shown that the farm income is the most significant source of income for rural households in the study area by making up 57.9% of total household income. The research fails to show whether socio-economic and demographic factors has influence that the farm income is the most significant source of income for rural households.

Talukder (2014) ^[11] has investigated the determinants of income and growth in income of rural households in Bangladesh in the post-liberalization era. He has used secondary data sources on both (1985-86) and (2005), by applying the ordinary least square (OLS) of regression models for assessing the determinants of both economic and non-economic characteristics. He has found that household size was the only non- economic factor that was statistically significant and positive determinant of household income in both 1985-86 and 2005. In addition to that, he found that endowments, household land area were the largest positive determinant while share of income from wage-salary was the largest negative determinant of income-growth in 1985-86. He also found that the endowments, change in share of income from house rent was the largest positive contributor and share of income from rice was the largest negative contributor to growth in 2005. The research didn't show whether socio-economic and demographic factors has influence the different income sources.

Ali & IsmaelRamay (2013) ^[2], have examined the determinants of income and income gap in urban and rural areas of Pakistan by using province, literacy, education, occupation, age, gender and marital status as predictors at individual level. They have use their study data for the Household Integrated Economic Survey (HIES) 2010-11 dataset. They have estimated predictions by applying the ordinary least square (OLS) method, also used Blinder-Oaxaca decomposition method to analyze the income gap between urban and rural Pakistan. They have found that literacy, education and occupation as the major determinants of income in Pakistan. They also discovered that reading and writing skill of individuals has been more important as compared to the numeracy skill. In addition to that they have found that the lower levels of education gets high returns in rural areas whereas higher levels of education gets more return in urban areas. Individual characteristics like literacy,

education, occupation and marital status have been found as the major determinants of income gap. However, this study will use a secondary data to see if the results will be that the education as the major determinant of income of the households as this research found.

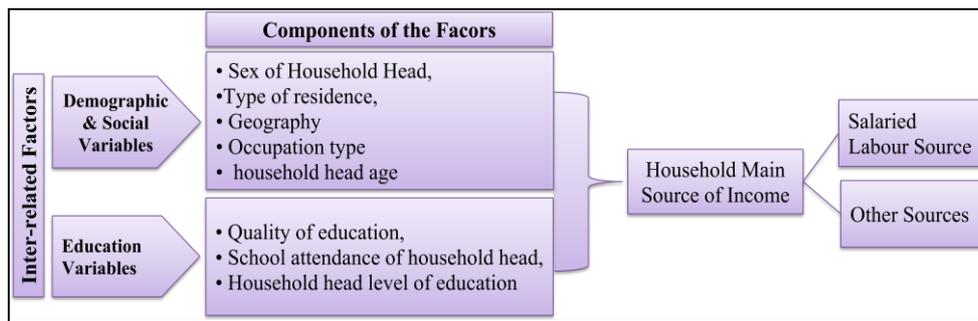
Yadollahi *et al.* (2013) [13] have determined the effect of demography variables that is, age, gender, level of education, and occupation, on family economic status in three dimensions, income, expenditure, and ownership of physical asset, by using data of 390 households Kerman city of Iran. They have used to analyze the data Pearson product moment correlation, Chi-square, Spearman rho, and independent sample t-test. They have discovered that the demography variables have effect on family economic status, and the dimensions, but this research will examine the effect of socio-economic and demographic variables on the household main sources of income.

2.1 Conceptual framework

The result of Household Main Source of Income, in of terms labour source and other source is generally is a function of a number of variables which require grasping the associations of the variable with the source of household income. Source of income has interrelation with socioeconomic and demographic characteristics of the human being and the economic development. The factors affecting household main source of income can be classified under three broad categories which are demographic & Social, Economic and Education variables as follows:

- A. Demographic & Social variables
- B. Education variables are:
- C. Economic variables

However, conceptual frame work chart is presented in Figure 1, for this study.



Source: Author’s Construction

Fig 1: Conceptual Framework Chart

3. Data Coverage of the Research

The Republic of Somalia is situated in the Horn of Africa. Its boundaries are defined by the Gulf of Aden and Djibouti in the north, Indian Ocean in the east, the Federal Democratic Republic of Ethiopia in the west, and the Kenyan Republic in the south.

The study based on the secondary data which covers Somalis living in urban and rural areas. This ad hoc approach was to create the missing sample frame aimed to ensure representativeness of the covered population but has technical limitations which could not allow collecting data from the nomadic population.

The Somali High Frequency Survey (SHFS) Survey in 2016 was designed to provide indicators and data needed to measure, monitor and analyse living standards and poverty in Somalia. The survey used a comprehensive questionnaire to collect data on the number of households and persons living in the selected areas in the sample. The survey comprised the following three data collection methods:

- A representative household survey (HHS)
- A Market Survey (MS) for prices of food and non-food items
- A Currency Exchange Rate Survey (CERS)

This research has used data from the representative household survey.

4. Research Design

The aim of the study is to find out the effect of some socio-economic and demographic variables on the household main source of income. The study has used secondary data which is obtained from the data collected in 2016 by the Directorate of Notational Statistics’ Somali (DNS) with close collaboration with World Bank and the Survey is called Somali High

Frequency Survey (SHFS). Thus, this study is attempting to determine the extent of the relationships between the dependent and independent variables using the data obtained by the method used by the Directorate of Notational Statistics’ Somali.

5. Variables

The independent variables are household head (HHH) education, which is a dummy variable derived to categorize the education variable into educated household head and non-educated household head. Second variable is sex of household head in two categories, male household head and female household head. Third variable is residential area of household which has two categories rural and urban areas and fourth variable is the age of household head which is continuous. The dependent variable is household main source of income which has two categories, salaried labour source of income and other sources of income.

Table 1: Definition and coding of study variables

Dependent variable (DV)	Variable Type	Code label
Main source of household income	Categorical	Salaried Labour Source = 1 Other Sources = 0
Independent Variable (IV)	Variable Type	Code label
Household head education	Categorical	Educated = 1 Non-educated = 0
Household head sex	Categorical	Male = 1 Female = 0
Household residential area	Categorical	Urban = 1 Rural = 0
Age of the household head	Continuous	N/A

6. Theoretical Model

Logistic regression is a popular and useful statistical method in modeling categorical dependent variable and independent variables. The logistic regression is a mathematical modeling approach used to investigate the relationship between the independent variable and dependent variable as dichotomous variables.

$$Y_i = \begin{cases} 1 & \text{if the } i^{\text{th}} \text{ household gets labour source of income} \\ 0 & \text{If the } i^{\text{th}} \text{ household gets other sources of income} \end{cases}$$

The essential aim of the study analysis is to describe the way that household main source of income varies by considering household head’s education, household head’s sex, residential area of household, and the household head’s age. Consider first the case where the response variable Y_i is binary, assuming only two outcome values, 1 or 0. This may be defined as:

The distribution of dependent Y is specified by probabilities $p(Y = 1) = \pi$ of success and $p(Y = 0) = (1 - \pi)$ of failure, and its mean is $E(Y) = \pi$. The n independent observations, the number of successes have the binomial distribution specified by the index n and parameter π . The formula is shown below in equation (3.1). So, each binary observation is a binomial variate with $n = 1$, (Agresti 1996, p.68) [1].

$$p(y) = \frac{n!}{y!(n - y)!} \pi^y (1 - \pi)^{n-y}$$

$$y = 0, 1, 2, \dots, n \tag{3.1}$$

7. Associated probabilities of the variables

Let x_1, x_2, x_3, x_4 denote the variables of household head’s education level, household head’s sex, household residential area, and household head’s age, respectively. Then the associated probabilities of the variables are computed from the equation:

$$p(x_i) = \frac{e^{\alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4}}{1 + e^{\alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4}} \tag{3.2}$$

Probabilities of individual categories are then calculated by considering:

$$x_i = k, \quad k = 1 \text{ and } 0, \text{ and } i = 1, 2, 3 \text{ and } 4,$$

for one variable holding the other three variables constant. The probability that the household main source of income of the educated household head will be a salaried labour source of income holding household head’s sex, household residential area, and household’s age constant, is then computed for:

$$x_1 = \text{HHH education level} \quad \text{and} \\ k = \text{Educated, as:}$$

$$p(x_1) = \frac{e^{\alpha + \beta_1 x_1}}{1 + e^{\alpha + \beta_1 x_1}} \tag{3.3}$$

The probability that the household main source of income of a male headed household will be a salaried labour source of income, holding household head’s education level, household residential area and household head’s age a constant, is computed for:

$$x_2 = \text{HHH sex and } k = \text{Male, as}$$

$$p(x_2) = \frac{e^{\alpha + \beta_2 x_2}}{1 + e^{\alpha + \beta_2 x_2}} \tag{3.4}$$

The probability that the main source of income of the household in the urban residential area will be a salaried labour source of income, holding household head’s education level, household head’s sex, and household head’s age constant, is computed for,

$$x_3 = \text{HH residential area} \quad \text{and} \quad k = \text{Urban}$$

$$p(x_3) = \frac{e^{\alpha + \beta_3 x_3}}{1 + e^{\alpha + \beta_3 x_3}} \tag{3.5}$$

Probability that the main source of income of the household head of a specified age will be a salaried labour source of income, holding household head’s education level, household head’s sex and household residential area constant, is computed for,

$$x_4 = \text{HHH age and } k = \text{age in years}$$

$$p(x_4) = \frac{e^{\alpha + \beta_4 x_4}}{1 + e^{\alpha + \beta_4 x_4}} \tag{3.6}$$

8. Descriptive Analyses

Descriptive statistics as a terminology is defined as Methods of organizing, summarizing, and presenting data. Descriptive statistics as computed quantities are very important in researches before proceeding to the model, because they simply enable presentation of data in a summary way, to allow simpler interpretation of the data. To report summary findings on the socio-economic and demographic profile of households in the research, simple descriptive statistics such as frequencies and percentages were generated.

9. Chi-Square Test of Independence

The outcome and independent variables are both categorical variables. In order to test the relationship between the outcome and the individual independent variable, the Pearson chi-square test for independence will be used by examining for a statistically significant relationship between two categorical variables at a time.

10. Binary logistic Regression

Binary Logit Model or Logistic Regression model is most useful when the response variable is not continuous but has only two possible outcomes (dichotomous), 1 or 0. This model is typically used when predicting an event which has two possible outcomes. Since the probability of an event must lie between 0 and 1, it is impractical to model probabilities with linear regression techniques, because the linear regression model allows the dependent variable to take values greater than 1 or less than 0. The logistic regression model is a type of generalized linear model that extends the linear regression model by linking the range of real numbers to the 0 or 1 range (Agresti 1996, p.70) [1].

11. Results

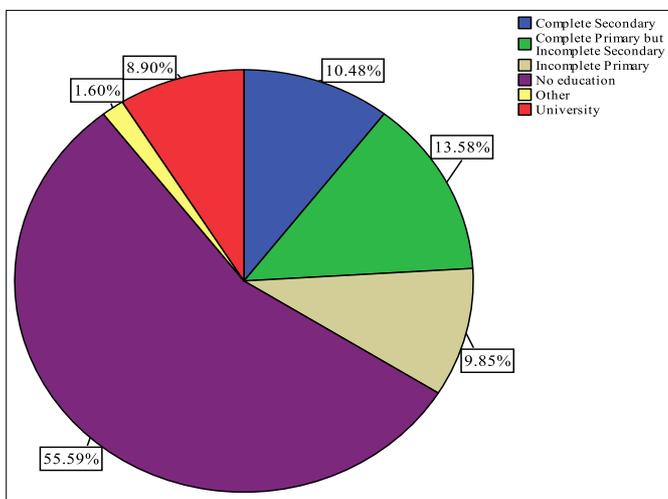
11.1 Household Head’s Education Level distribution

The survey collected data on household’s education level. The household heads or representative respondents were asked by the enumerators of Somali High Frequency survey (SHFS) the

question “what is the education level of household head?” Respondents were supposed to choose one among the listed responses:

- i) Complete secondary
- ii) Complete primary but in complete secondary
- iii) Incomplete primary
- iv) No education
- v) Other education
- vi) University

The distribution of the household head’s education level is presented in Figure 2 below. The results in Figure 2 show the percentage distribution of household head Education at all levels of education. It is noted that 55.59 % of household heads are non-educated and 44.41% of household heads are educated, computing 10.48% of household heads who have complete secondary education, 13.58% who have incomplete secondary education, and 9.85% who have incomplete primary education, and 8.9% who have university education, and 1.6% who have other education.



Source: Constructed by author using SHFS data

Fig 2: Percentage distribution of household head’s education level

For the purpose of this study only two categories of education were adopted, educated and non-educated. As detailed above the educated combines the rest of the other education levels in the above list, except no education which is labeled as non-educated.

11.2 Sex of the household head distribution

The household heads by sex are presented in Table 2. The results indicate that 51.3% of the households are female headed while 48.7% are male headed.

Table 2: Household head’s Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	1954	51.3	51.3	51.3
	Male	1854	48.7	48.7	100.0
	Total	3808	100.0	100.0	

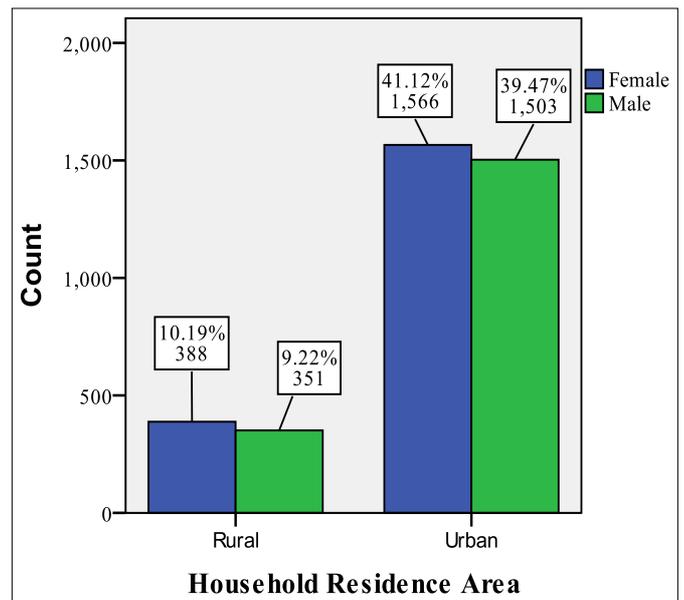
Source: Calculated by author using SHFS data

However, the pattern of household headship is inconsistent with other previous surveys. The Population Estimation Survey in 2014 showed that the households headed by men were 81.3%, and households headed by women were 18.7%. Furthermore, the distribution of households by sex of head of

households of socio-economic survey in 2002 was 87.4% male headed, and 12.6% female headed.

11.3 Household Residential area distribution

Figure 3 below displays the distribution of household heads by type of residential area and sex. The rural communities there are no more difference in the numbers and percentage of households headed by male and female, the difference is 0.97%. While urban communities are almost same to the rural communities, the observed difference in urban areas is 1.65%. In addition to that the counts of female headed household in urban communities has the highest observation at 1,566 female headed households and 1,503 male headed households in the urban, while in the rural 388 are female headed and 351 male headed.



Source: Constructed by author using SHFS data

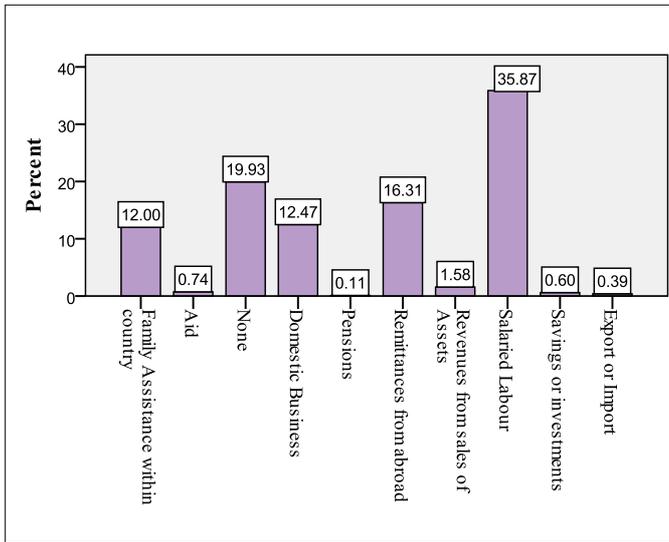
Fig 3: Percentage and counts of household heads by type of residential area and sex

11.4 Distribution of household Main Source of income

The survey collected data on household of all income sources. Household heads or representatives of household head were asked by the enumerators of Somali High Frequency survey (SHFS) the question; “What is the main source of income for the household?” Respondents were supposed to select one among the listed responses:

- i) Family assistance within country
- ii) NGO
- iii) None
- iv) Other small family business
- v) Pension
- vi) Remittance from abroad
- vii) Revenue from sales of asset
- viii) Salaried labour source
- ix) Saving, interest or other investment
- x) Trade in domestic goods/products
- xi) Trade in foreign goods/products (export or import)

The distribution of the household main source of income is presented in Figure 4 below.



Source: Constructed by author using SHFS data

Fig 4: Distribution household Main Source of income

Results in Figure 4. indicate that households that receive income from salaried labour constituted 35.87% of the total of income sources and the rest combined source of income, which is now labeled as “other sources” of income accounted 64.13%. This category is composed mainly of none out of the mentioned sources of 19.93%, income from remittances sources of 16.31%, income sources, income from domestic business of 12.47%, income from family assistance within country of 12%. Other sources of income in this category are export, import, saving, revenue from sales of asset, pension and aid which accounted for the remaining sources of income 3.42 % among household main sources of income.

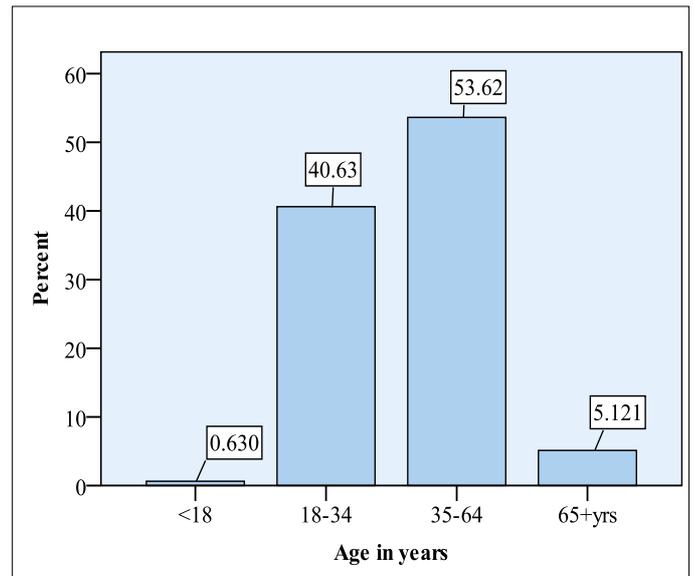
As hinted earlier in section 3.3.2, for the purpose of this study, only two categories of income sources were adopted, the salaried labour source and the other sources. The other sources of income combined the rest of the other sources of household income as detailed above.

11.5 Distribution of household heads by age

Figure 5 presents the age distribution of the household head’s for the total population in the study. The Figure shows the distribution various age brackets. The results show that out of all households 0.63% is child-headed, that is, with heads who

are less than 18 years, although the constitution of the country recognizes any person 15 years and above of age as an adult. The youth headed household that is with heads aged between (18-34) years represent 40.63% among observed household heads. The middle age headed a household that is heads aged between (35-64) years represent 53.62% of the households, while 5.121% of the households have heads aged 65 years and above.

It is noted that, the pattern of household headship age is almost consistent with other previous surveys. The Population Estimation Survey in 2014 showed that the households headed by individuals of age less than 18 years were 0.2%, and the youth headed households were 35.4%. Furthermore, the middle aged (35-64) years headed households were 55.7%, while the retired household heads were 8.6%.



Source: Constructed by author using SHFS data

Fig 5: Household heads by age

11.6 Relationship between dependent variable and the independent variables in the model

11.6.1 Relationship between household main source of income and household head’s education level

Table 3: Chi-Square tests of Household Main source of income and household head’s education level

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	67.040 ^a	1	.000		
Continuity Correction	66.484	1	.000		
Likelihood Ratio	66.918	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	67.022	1	.000		
N of Valid Cases	3808				

Source: Calculated by author using SHFS data

The relationship between the household main source of income and the household head’s education level is confirmed by the Pearson chi-square test results presented in Table 3. The Pearson Chi-Square test statistic is statistically significant at $p < 0.000$. Thus, there is a relationship between the household head’s education level and household main source of income.

11.6.2 Relationship between household main source of income and household head’s sex

Table 4 show relationship between household main source of income and head’s sex. The relationship is confirmed by the Pearson chi-square test results presented in Table 4. The large computed value of the Pearson Chi-Square test statistic of 81.970 and its small significance level $p < 0.000$ indicate that there is a relationship between household head’s sex and household main source of income.

Table 4: Chi-Square tests of household main source of income by household head

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	81.970 ^a	1	.000		
Continuity Correction	81.359	1	.000		
Likelihood Ratio	82.245	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	3808				

Source: Calculated by author using SHFS data

11.6.3 Association between household Residential area and household Main source of income

Table 5 show the relationship between household residence area and household main source of income. The relationship is confirmed by the Pearson chi square test results presented in Table 4 below. The large computed Pearson Chi-Square

test statistic of 71.670 and its small significance level $p < 0.000$ indicate that there is a relationship between the household’s residential area and the household main source of income.

Table 5: Chi-Square tests of household main source of income by household residential area

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	71.670 ^a	1	0.000		
Continuity Correction	70.949	1	0.000		
Likelihood Ratio	75.928	1	0.000		
Fisher's Exact Test				0.000	0.000
Linear-by-Linear Association	71.651	1	0.000		
N of Valid Cases	3808				

Source: Calculated by author using SHFS data

11.7 Binary logistic Regression Analyses

11.7.1 Preliminary analyses of the model

Results presented in Table 6 of variables in the baseline equation show that the intercept only model has $\ln(\text{odds ratio}) = -0.581$. Thus, the predicted odds ratio of this expression is $\text{Exp}(B) = 0.559$ which is significant

at $p < 0.000$. The interpretation of this odds ratio is that the odds ratio of salaried labour source is $(1/0.559) = 1.789$ less likely that the other sources of income. These results show only the predictions before the addition of the independent variables in the model.

Table 6: Variables in the baseline equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	-.581	.034	295.630	1	.000	.559

Source: Calculated by author using SHFS data

Results presented in Table 7 of the independent variables not yet in the model give an indication of whether or not each additional independent variable in the model improves the model performance. The all variables are significant ($p < 0.000$), and thus inclusion of these variables in the model would add to the predictive power of the model.

variables have statistically significant influences on the dependent variable of household main source of income.

Table 7: Inclusion of the variable in the model

		Score	df	Sig.
Step 0	Variables	HHH_Education (1)	67.040	1 .000
		HHH_Sex (1)	81.970	1 .000
		HH_Residential Area (1)	71.670	1 .000
		HHH_Age	26.037	1 .000
	Overall Statistics	193.820	4 .000	

Source: Calculated by author using SHFS data

11.7.2 Goodness-of-fit of the Model

11.7.3 Omnibus Tests

The Omnibus Tests of Model Coefficients in the Table 8 examine the hypothesis of whether or not there is a statistically significant impact of the independent variables on the prediction of the dependent variable. Thus, in this case the p-values are $p < 0.001$, which means that independent

Table 8: Omnibus Tests of the Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	202.163	4	.000
	Block	202.163	4	.000
	Model	202.163	4	.000

Source: Calculated by author using SHFS data

11.8 Statistical tests on individual parameters in the model

The model estimation results are presented in Table 9 below. In SPSS the estimates of the coefficients of the model are given in column ‘B’ in the ‘Variables in the Equation table. The standard way of interpreting a ‘B’ in logistic regression is using the conversion of it to an odds ratio using the corresponding $\text{exp}(B)$ value. Wald statistic and associated significance value provide an indication of the significance of each estimated coefficient in the equation. The Wald statistic has a chi-square distribution. Also the table gives a confidence interval of the $\text{exp}(B)$ column.

Table 9: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1	HHH_Education (1)	0.296	0.073	16.368	1	0.000	1.344	1.165	1.551
	HHH_Sex (1)	0.585	0.072	65.590	1	0.000	1.794	1.558	2.067
	HH_Residenatinal area (1)	0.717	0.098	53.885	1	0.000	2.049	1.692	2.482
	HHH_Age	-0.013	0.003	18.496	1	0.000	0.987	0.982	0.993
	Constant	-1.128	0.151	55.770	1	0.000	0.324		

Source: Calculated by author using SHFS data

The application of the Wald test is to take the significance values less than 0.05, to reject the null hypothesis that independent variable doesn't have a significant contribution to the relationship and instead accept the alternative hypothesis that the independent variable has a significant contribution to the relationship. In this case, all independent variables contribute significantly to the relationship because $p < 0.000$ for all independent variables.

The Exp(B) column in Table 9 presents the extent to which changing to the corresponding measure influences the odds ratio. Exp(B) is interpreted in terms of the change in odds. If the value in this column exceeds 1, it means the odds of an outcome occurring increase; if the figure is less than 1, any change in the predictor variable leads to a drop in the odds of the outcome occurring.

The Exp(B) value associated with household head's education level is 1.334 with 95% confidence interval [1.165, 1.551]. Interpretation of the coefficient associated with household head education level is that, if level of education of the household head change from non-educated to educated, the opportunity that household head will get a labour source of income as main source of income will increase by 0.296. However, when the variables are categorical the most useful interpretation is given in terms of the odds ratio which shows point of comparison between leading and the latent variable. The odds ratio of an educated household head getting a salaried source of income rather than any other source of income is 1.334. Therefore, the educated household head is 1.334 times more likely to have an opportunity of getting a salaried labour source of income than the non-educated household head. The probability that the household headed by the educated household head will get a salaried labour source of income is 0.30, which is calculated using the equation (3.3) of section 3.3.3.1, that is,

$$p(x_1 = 1) = \frac{e^{-1.128 + 0.296(1)}}{1 + e^{-1.128 + 0.296(1)}} = 0.30$$

The Wald statistic of household head's sex variable is significant ($p < 0.000$) in Table 9, and the Exp(B) value associated with household sex is 1.794 with 95% confidence interval [1.558, 2.067]. Interpretation of the coefficient associated with household head sex is that the opportunity that a male household head will get a labour source of income as the main source of income will increase by 0.585. The odds ratio of a male headed household getting a salaried labour source of income than other sources of income is 1.794. Therefore, a male household head is 1.794 times more likely to get an opportunity a salaried labour source of income than a female household head. The probability that the household headed by a male will get the opportunity of a salaried labour source of income is 0.37, which is calculated using equation (3.4), that is,

$$p(x_2 = 1) = \frac{e^{-1.128 + 0.585(1)}}{1 + e^{-1.632 + 0.585(1)}} = 0.37$$

The Wald statistic of household residence area variable is significant ($p < 0.000$) in Table 9, and the odds ratio of an urban household getting a salaried labour source of income than other sources of income is 2.049. Therefore, an urban household is 2.049 times more likely to have a chance of getting a salaried labour source of income, than a rural household. The probability that an urban household will have a chance of getting a salaried labour source of income is 0.40, which is calculated using equation (3.5), That is,

$$p(x_3 = 1) = \frac{e^{-1.128 + 0.717(1)}}{1 + e^{-1.128 + 0.717(1)}} = 0.40$$

The Wald statistic of household age variable is significant at ($p < 0.000$) in table 9. The coefficient of household age is (-0.013), which means that the odds of a household's main source of income being a salaried labour source decreases by 0.013 for each year age increase of the household head increase, holding other variables constant. A better way of interpreting this is by using the odds ratio which is included in the Exp(B) column in Table 4. The odds ratio is 0.987 with 95% confidence interval [0.982, 0.993]. The interpretation of this is that the household head is $(1/0.987) = 1.013$ less likely to get a salaried labour source of income than other sources of income for each year age increase. The probability that the main source of income of the household head of a specified age will be a salaried labour source of income is 0.24, which is calculated using equation (3.6), that is,

$$p(x_4) = \frac{e^{-1.128 - 0.013}}{1 + e^{-1.128 - 0.013}} = 0.24$$

12. References

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