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APPLICATION OF MULTINOMIAL LOGISTIC REGRESSION TO IDENTIFY THE MAGNITUDE AND RISK FACTORS THAT ASSOCIATED WITH ORPHAN AND VULNERABLE CHILDREN IN THE ARBA MINCH TOWN (IN CASE OF NON GOVERNMENTAL ORGANIZATION FOR SOCIAL SERVICE FOR AIDS), ETHIOPIA

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ABSTRACT

Back ground: An orphan is a child who has lost one or both parents. Vulnerable children were children who has been orphaned by AIDS and affected by HIV/ AIDS pandemic. The increasing number of Orphaned and Vulnerable Children (OVC) is one of the most serious socio-economic problem affecting developing countries. This problem was primarily caused by the HIV/AIDS pandemic, poverty, conflict and longstanding poor governance. These factors contribute to the high mortality rate of parents and erode their capacity to provide support for their children.

Objective: The aim of this study was to identify the magnitude and risk factors that associated with orphan and vulnerable children in Arba Minch town in case of Non Governmental Organization for Social Service for AIDS.

Methods: All Orphan and Vulnerable Children (OVC) in Arba Minch town Nongovernmental organization for Social Service for AIDS (OSSA) were eligible to participate. Organization based sampling frame of 300 orphan students used and 73 orphaned children selected using simple random sampling. The study used primary data which was collected by distributing structured questionnaire for 73 orphaned children and analyzed using SPSS version 16.

Results: The cross tabulation result shows that problem of orphan after parent's death has statistically significant association with type of orphan, number of Children for his or her family and background of family before death. The multinomial logistic regression analysis showed that significant determinants of problems for orphaned children were : cause of parent death, Sex of child, number of children of her/his parent and background of family before death.

Conclusions and Recommendation: Based on the findings Orphans were at higher risk of psychosocial problems. It is recommended that government and non-government associations (organization) should give great attention for orphaned children to problem face like social, economical, and psychological problems. This could be through involvement of everybody to support Orphaned children.

KEYWORDS: Orphan Status, HIV/AIDS, Economic Support, Non Governmental Organization, Multinomial logistic regression.

INTRODUCTION

Orphan is a child permanently bereaved of his or her parents. In common usage, orphan is defined as a child under the age of 18 who has survived one or both parents (UNICEF, 2004 and Tsheko et al, 2006). Maternal orphans survive mothers; paternal orphans survive fathers and double orphans survive both parents.

In 2003, of the 350 million children in Sub-Saharan Africa (SSA), an estimated 6.6% of children were maternal, 8% were paternal, and 2.2%were double orphans (UNICEF, 2004). Although the utility of identifying children who have only lost one parent as orphans is frequently debated, the death of a mother or father appears to impact child vulnerability, household poverty, and residency and care giving differently.

Vulnerable child exist, including children whose parents or caregivers are ill or deceased, children in poverty or conflict, and children without caregivers (Tshekoetal, 2006 and Smart, 2003). Markers of vulnerability that allow the assessment of these children have only recently been developed and used in data collection and analyses (UNICEF and UNAIDS, 2005). This is an important advancement given that most studies only allow children to be distinguished based on orphan status so that children with sick parents are combined with non-orphans, therefore failing to identify vulnerable Children and underestimating the magnitude of the negative squeal that vulnerable children experience.

The latest report on orphans and vulnerable children (OVC) by the U.S. Government (USG) and partners estimated that, in 2008, 163 million children (age 0–17 years) across the globe were orphans (referring to loss of one or both parents to all causes) and that 17.5 million of these children lost one or both parents to AIDS (USG, 2009). The global figure of 17.5 million orphans as a consequence of AIDS represents an increase from the 2007 estimate of 15 million AIDS-related orphans. Moreover, children under age 15 living with HIV total 2 million in 2007, with 1.8 million of these children residing in sub-Saharan Africa (UNAIDS, 2008).

According to the 2010 Global Fund Innovation and Impact Report, GFATM (Global Fund to fight Aids, TB and Malaria) funded programs provided 4.9 million basic care and support services to orphans and other vulnerable children. While the reported number of child beneficiaries is sizable, international and national groups agree that more must be done to
improve the types, scale, and effectiveness of services provided to reach millions more orphans and other vulnerable children around the world (UNICEF,2008; UNAIDS, 2009).

The population of Ethiopia is young with more than a half (54 million) of the total population below the age of 18 years (CSA, 2008). In 2005, it was estimated that there were a total of 4, 885,337 orphans aged 0-17 years. Of these, 744,100 were AIDS orphans. Of the total number of AIDS orphans, 529,777 were maternal, 464,506 paternal, and 250,195 dual orphans.

The estimated number of orphans in urban areas has been greater than that in rural areas up to 2003; however, the beginning of 2004, the number of orphans in rural areas is expected to exceed that in urban areas (MoH, 2006). Over 83 % of these OVC are living in urban settings and, of these, 744,100 are children orphaned as a result of the death of one or both parents due to HIV/AIDS. The 2005 Ethiopian Demographic Health Survey estimates that 18% of all Ethiopian households are presently caring for an orphan (DHS, 2005).

Statement of the problem

The increasing number of Orphaned and Vulnerable Children (OVC) is one of the most serious socio-economic and developmental challenges affecting developing countries worldwide, including the regional state. This problem is primarily caused by the HIV/AIDS pandemic, poverty, conflict and longstanding poor governance. These factors contribute to the high mortality rate of parents and erode their capacity to provide support for their children. This study was investigated that problems and risk factors with orphan and vulnerable children in Arba Minch Town.

Research Question

1) Which type of problems can affect orphan and vulnerable children?
2) Is the background of family can be the cause of orphan children?
3) Which sex can get high risk for orphan and vulnerable children ?
4) Is the cause of parent's death can affect orphan and vulnerable children?

Objective of Study

General objective

The general objective of this study was to identify the problems and risk factors associated with orphan and vulnerable children in Arba Minch Town.

Specific objectives:

- To test the relationship of the causes of death of parents' to their orphan children's.
- To discover the nature and extent of the existing orphan and vulnerable children services in selected districts.
- To identify which sex is exposed to the situation.
- To recommend appropriate intervention strategies in relation to orphan and vulnerable children.

Significance of study
This study was important to lead or to improved service delivery that will translate into better living conditions and an improvement in welfare of orphan and vulnerable children. Additionally, it was helpful to identify the risk factors associated with orphan and vulnerable children relative to non orphaned children.

Scope of the study
This study was mainly focused on the magnitude of problems and risk factor with orphan and vulnerable children in Arba Minch town in case of Non Governmental Organization for Social Service for AIDS.

Operational definitions
- Child hood-time of orphan life when they are child.
- Maternal orphan-children who has lost their mother.
- Paternal orphan-children who have lost their father.
- Vulnerable- exposed to the risk of being attacked or harmed health of orphans.

LITERATURE REVIEW
Death of parents introduces a major change in the life of orphans. Orphan hood was predicted to increase in sub-Saharan Africa because of the AIDS epidemic (Petros-Barvazian and Merson 1990). The increase was also a result of wars and the poor state of the economy which exacerbated the spread of HIV in eastern Africa, according to Reining (1993), who stated that as many as 60 out of 1000 children were orphans.

The escalating orphan crisis is trailing the 32 million AIDS deaths that have occurred globally since the pandemic began (UNAIDS , 2005). In sub-Saharan Africa , 12.3% of all children are orphaned, while nearly one in five children are orphaned in Botswana, Swaziland and Lesotho (UNICEF, UNAIDS and USAID, 2004). Sub-Saharan Africa is now home to 64% of HIV infections worldwide, 65% of the world's new HIV infections in 2005, and 80% of the world's children orphaned by AIDS (UNAIDS, 2005).

The number of orphans in Sub-Saharan Africa over the last decade, surveillance systems should systematically collect and monitor OVC incidence and prevalence data in order to identify emerging trends, and gain insight into the circumstances of newly and previously orphaned children (Lopman et al., 2005).

Family care for OVCs is usually preferred by children and families, and highly regarded by policy makers (Bhargava et al. , 2003; Smart, 2003; UNICEF; 2004). However, in communities where the AIDS epidemic has advanced, there may be fewer available caregivers and a growing number of over whelmed and dissolving households. Nevertheless, in a convenient sample from Zimbabwe in 2003, caregivers reported that the degree of relatedness to the child and financial resources and assistance were the main factors guiding fostering decisions.

Being orphaned or made vulnerable can play a role in whether a child goes to school. OVC may lose access to school for several reasons including poverty, need for domestic labor, need for income-generating activities, stigmatization, and parental sickness or death. School enrollment inequities among all types of orphans have been documented throughout sub-Saharan Africa (2004-2006); Bicego et al. 2003). One estimate suggests that orphan is approximately 13% less likely to attend school than no orphans (Boerma, 2004).

Although street children have largely been excluded from orphan research (Panpanich, et al., 1999; Sarker et al., 2005), the emergence of greater numbers of street children also appears inevitable if the poorest households are over whelmed and unsupported. Orphans from Malawi and Lesotho revealed that they left households for a variety of reasons including abuse, because they were expected to work harder than other household members, and because of household changes related to marriage, illness, death or finances (Ansell and Young, 2004).

Ethiopia has second highest population of orphans in Africa. The HIV pandemic is not the only contributing factor in the rapidly increasing number of OVC in the country, war, famine; drought, disease, and political instability are also cause parents death (UNICEF - Ethiopia; 2007) estimated that there are 4.6 million children in the country, while 200,000 children live on streets of Addis Ababa. USAID, UNICEF and UN (2003) on HIV/AIDS estimates there will be 5,029,000 Ethiopian children suffering difficulty of orphan hood.

The child's age and gender were rarely mentioned as reasons to avoid fostering although the respondents were mostly women and it is fathers who are unlikely to remain caring for children, especially girls. Grandparents are most likely to care for orphans aged 0-4 (Phillips, et. al. 2006; Miller, 2005; Monasch and Boerma, 2004).According to caregivers, Children under the age of 2 is the least desirable given their greater care needs (Phillips et. al. , 2006).

OVC may be become at risk through a range of mechanisms, including inadequate care, psychological disturbance, the Social and economic impact of parental illness and death. Moreover, OVC may face disparities which are influenced by the child's age; gender; health, orphan, and socioeconomic status; characteristics of their caregiver; level of support from family and community members; the public sector response, and other determinants. Risk factors that further increase disparities and mechanisms by which children are become were identified wherever possible (Miller, 2007).

DATA AND METHODOLOGY

Description of Study Area

The study was conducted in Arba Minch town, which are found in Gamo Gofa zone in Southern Nation's Nationalities and People's Regional state (SNNPRS). Arba Minch is located at 505 KM to south of Addis Ababa and 280 KM far from Hawassa. Arba Minch town has natural attractions such as Forty Springs, Nech Sar National Park, Lakes of Abaya and Chamo. The study focus on Non Governmental Organization for Social Service for AIDS in Arba Minch town.

Study Population

The target groups for the study are Orphan and Vulnerable Children (OVC) in Non Governmental organization for Social Service for AIDS (OSSA).

Method of Data Collection

As the source of data for the study is primary data, structured questionnaires used to collect information from Orphan and Vulnerable Children.

Sampling Design

Sampling Technique

Since Orphan and Vulnerable Children in the Organization for Social Service for AIDS were homogeneous population, then Simple Random Sampling (SRS) technique was appropriate to determine sample size of study population.

Sample size Determination

Even though it is known that more reliable information is obtained from large sample size and accurate and successful result on the finding, by considering availability of budget, time and data collectors will determine sample size by taking sample from total OVC (1977). To determine sample size we need to conduct a pilot survey since there is no previous result and difficult to guess the distribution of the population which is done by subject matter specialists experts. A pilot survey is used to determine sample size and check the appropriate usage of questions through the main variable. Then based on these we will prepare the questionnaires to the selected sample and get the proportion of samples so that we could use the formula for sample size determination. The formula to calculate the sample size in simple random sampling technique is :

$$n = \frac{n_o}{1+\frac{n_o}{N}} \qquad \text{where} \qquad \boldsymbol{n_{o=}} \frac{(z\alpha/2)^2}{d^2}\,\mathbf{(p)(q),}$$

Notation: n_o= initial sample size
At 5 % level of significant $Z_{\alpha/2}$=1.96
p = probability of success; use pilot survey to prepare question;
Question 1: Have you get problem after your parents deaths? A. yes B. no;
from 10 students 8 students are get problem after your parents 'death.
So p=0.8 and q=1-p=0.2 d=the margin of error =8%
α=level of significant=5% N= number of total population=300

$$\mathbf{n_{o=}\frac{(z\alpha/2)^2}{d^2}(p)(q)=(\frac{1.96)2(0.8)(0.2)}{(0.08)2}=96.04}$$

By using usual formula; **no/N>5%** so we need adjustment

$n=\frac{n_o}{1+\frac{n_o}{N}}=\frac{96.04}{1+\frac{96.04}{300}}=\frac{96.04}{1.3201}=73$

Variables Included in the Study

- Dependent variable

Problems of orphan and vulnerable children (Social, Economical, Psychological; problems of orphans face mostly after parents' death)

- Independent variables included in this study are: sex, age of OVC, back ground of family, Religion of orphan, type of orphan (mother, father, both), Educational level of orphans and Cause of death of parent.

Method of Statistical Analysis

The study used both descriptive and inferential statistics method of data analysis.

Descriptive Statistics

Under descriptive statistics frequency table and charts included.

Inferential Statistics

The inferential statistics analysis involves with in this study are chi-square test of independence and multinomial logistic regression.

3.6.2.1 Chi-square test

Chi-square test is method of analysis for data obtained for categorical variables. The objective of chi-square test of independence is to test whether there is a relationship between two categorical variables or not.

Test Procedure:

1: State the null and alternative hypothesis.

H_o= There is no association between the variables

H_1= There is association between the dependent and the particular independent variable

2: α-level of significant, significant level α=0.05 or 5%

3: compute critical value is $x^2_{\alpha\,(r-1)\,(c-1)}$

4: Determine the test statistic

The χ^2 statistic is given by:

$$\chi^2_{cal}=\sum_{i=1}^{r}\sum_{j=1}^{c}\left[\frac{(O_{ij}-e_{ij})^2}{e_{ij}}\right]\sim\chi^2_{(r-1)(c-1)}$$

O_{ji} = observed frequency in cell (i, j)

E_{ij} =expected frequency for cell (i, j)

The e_{ij} is given by : $e_{ij}=\frac{R_i * C_j}{n}$

Where R_i = the i^{th} row total.

C_j = the j^{th} column total.

n = total number of oservations

5: conclusion: Reject Ho if $X^2_{cal} > X^2_{\alpha}$ (r-1) (c-1), otherwise accept Ho.

Assumptions of chi-square Distribution

- ✓ The observation must be independent of each other.
- ✓ The sample must be randomly selected from the population.
- ✓ The population must be normally distributed to the variable.
- ✓ It required sufficiently large expected frequency for each cell.
- ✓ The sample is large.

Multinomial logistic regressions

Multinomial logistic regression is used to model nominal outcome variables, in which the log odds of the outcomes are modeled as a linear combination of the predictor variables the response variable are three classes or categories. In this research multinomial logistic regression was used because our dependent variable are more than two categories.

Model: $\text{Log}\left(\frac{p}{1-p}\right) = \exp(\beta_0 + \beta_1 x_1 + ... + \beta_k x_k)$

Where: p-the probability of success, 1-p:- the probability of failure.

β_0 - is constant term X_i-are independent variables

β_i - coefficients of independent variables

The ratio of probability success to probability of failure was (p/1-p) is odd ratio of success.

Assumptions of logistic regression

- Assumes little or no multicollinearity.
- Logistic regression dose not assume the linear relationship between the dependent and independent variable.
- The dependent variable need not be normally distributed (but does assume) its distribution is with the range of the exponential family such Logistic regression dose not assume the linear relationship between the dependent and independent as normal, poison, binomial and gamma.
- The dependent variable need not be homoscedastic for each level of independent variables; that is there is no homogeneity of variance assumption.
- Normally distributed errors terms are not assumed.
- Logistic regression does not require that the dependent variables be continuous.
- Logistic regressions do not require that the independent variables be unbounded.

Parameter estimation of multinomial logistic regression

Maximum likelihood estimation, MLE, is the method used to calculate the log it coefficients this contrasts to the use of OLS estimation of coefficients in regression. ML methods seek to maximize the log likelihood, LL, which reflects how likely it is (the odds) that the observed values of the dependent may be predicted from the observed values of the independents. The likelihood function (L) measures the probability observing the particular set of dependent variables values (P_1, P_2 , P_3, …, P_n) that occur in the sample. It is written as the probability of the dependent variables: L = Prob(P_1, P_2 , P_3, …, P_n)

The higher the higher likelihood function, the higher the probability of the observing the p's in the sample. MLE involves finding the coefficients (α,β)that makes log of the likelihood function(LL<0) as large as possible or -2 times the log likelihood function(-2LL) as small as possible.

Goodness of fit of the multinomial logistic model

After fitting the logistic model to a set of data it is reasonable to determine how well the fitted values under the model compare with the observed values.

The likelihood ratio test

Referred as deviance the likelihood ratio statistic is obtained by subtracting the deviance (-2LL) for the final (full) model from the deviance for the intercept only model.

Is given by:

$$-2\log(\frac{L_o}{L_1}) = -2[\log(L_o) - \log(L_1)]$$

Where, L_0 is the likelihood value of the model which has the intercept term only and L_1log likelihood value of the full model. The likelihood ratio statistic has a chi-square distribution and it tests the null hypothesis that all population logistic regression coefficients the constant are zero.

The degree of freedom in this test is equal number of terms in the full model minus 1(for the constant).Rejecting the null hypothesis of likelihood test implies at least one of the predictors is significantly related to the response variable.

Hosmer-Lemeshow Test

The Hosmer-Lemeshow test is used to check the overall model fit. In this approach, data are divided into g (usually10) groups. From each group, the observed and expected number of events will be computed. Then, the Hosmer-Lemeshow test statistic is given by:

$$\hat{C} = \frac{\sum_{j}^{g}(O_j - E_j)^2}{V_j}$$

Where: $E_j = np_j, V_j = np_j(1-p_j)$, g is the number of group, O_j is observed number of events in the j[th] group, E_j is expected number of events in the j[th] group, and V_j is a variance correction factor for the j[th] group. If the observed number of events differs from what is expected by the model, the statistic $\hat{C}$ will be large and there will be evidence against the null hypothesis that the model is adequate to fit the data. This statistic has an approximate chi-square distribution with (g-2) degrees of freedom (Agresti, 1996).

Wald Test

A Wald test is used to test the statistical significance of each coefficient (β) in the model. The test statistic is a chi-square statistic with a desirable outcome of non-significance, indicating that the model prediction does not significantly differ from the observed.

The hypothesis to be tested is:

$H_0: \beta = 0$ Versus $H_A: \beta \neq 0$ at α level of significance.

The Wald test statistics, Z, for this hypothesis is

$$Z^2 = \frac{\hat{\beta}_j^{\,2}}{\text{var}(\hat{\beta}_j)} \sim \chi^2(1)$$

$\hat{\beta}_j^{\,2}$ is the square of the estimated regression coefficient and $\text{var}(\hat{\beta}_j^{\,2})$ is the variance of $\hat{\beta}_j^{\,2}$.

RESULT AND DISCUSSION

Descriptive Statistics

Table **4.1. Results of descriptive statistics for a person who usually decides on women healthcare (Appendix Table 4.1)**

Table 4.1 indicates that among the 73 respondent orphans, 43(58.9%) were males and 30 (41.1%) were females. From table we observe that about 53.4% of the respondent lost only their mother; 28.8% lost their father only and the rest 17.8% lost both mother and father. Among the respondents, 35.6% lost their parent due to AIDS , 42.5% lost their parent due to Accident and 21.9% lost their parent due to other reasons.

The bar chart (Appendix Figure 4.1) shows that 27.4 percent of the respondents are affected by social problems, 46.6 percent of the respondents are economical problems and 26.0 percent are psychological problems of orphan children after parent's death. It indicates that more orphan children are gets economical problems.

Inferential Statistics

Result of Chi-Square Test

Chi-square test is used to assess whether two descriptive variables are associated or not.

Here chi-square test was used for the test of association (i.e. problem of orphan children with significant explanatory variables).

H_O: There is no association between problems of orphan after parent's death and independent variable

H_1: There is association between problems of orphan after parent's death and independent variable

Decision: If p – value greater than α level of significance (0.05) accept the null hypothesis and

p – value less than α level of significance (0.05) reject the null hypothesis.

Table 4. 2 (Appendix) shows that problem of orphan after parent's death has association with type of orphan, number of Children for his or her family and background of family before death.

Multinomial Logistic Regression

It provides a set of coefficients for each of the two comparisons. It is used to analyze relationships between a non-metric dependent variable and metric or dichotomous independent variables. To check the variables using Bivarate analysis and then enter multivariable analyzes of the significance test of α-value 25% less than p-value. Hence the variables enter in to the multivariable analyses.

Table 4.2.2 Multinomial regression of Bivarate analysis

Problem of orphan after parents death	B	Std Error	wald	df	SIG	Exp(B)	95% Confidence Interval for Exp(B)	
							lower bound	upper bound
Social intercept	-.619	.469	1.744	1	.187			
Sex=male	1.392	.681	4.183	1	.041	4.024	1.060	15.278
Economical intercept	-.262	.421	.389	1	.533			
Sex=male	1.649	.621	7.055	1	.088	5.20	1.541	17.552
Social intercept	-1.099	1.155	.905	1	.341			
cause of death =HIV/AIDS	1.455	1.255	1.344	1	.246	4.286	.366	50.197
cause of death=accident	1.099	1.247	.776	1	.378	3.00	.260	34.575
Social intercept	-.470	.570	.600	1	.410			
Educational level=9-10	.780	.695	1.261	1	.261	2.182	.559	8.5
Economical intercept	.693	.433	2.562	1	.109			
Educational level=9-10	-.201	.578	.578	1	.728	.813	.264	2.54
Social intercept	-.105	.459	.053	1	.819			
Background of family=poor	20.43	.831	605.034	1	.000	0.068	146526575.188	380132585
Medium	-.300	.699	.184	1	.668	.741	.188	2.916
Economical intercept	.788	.381	3.274	1	.039			
Background of family=poor	19.026	.000		1	.	0.08	18318798	183187918
Medium	-.788	.606	1.691	1	.193	.455	.138	1.492

Reference category which is the last category of all independent variables.

In the above parameter estimate output of the four independent variable at the reference category of psychological dependent variables is less than 25% or α – value 0.25. So we conclude that the variable sex, causes of death of parent's

death, educational level and background of family before death are significance, then the variable enters the multivariable analyzes.

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	150.738			
Final	91.738	59.000	28	.001

The null hypothesis states that there was no difference between the model without independent variables and the model with independent variables was rejected. The existence of a relationship between the independent variables and the dependent variable was supported.

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	91.738(a)	.000	0	.
Sex	103.906	12.168	2	.002
Type of orphan	104.495	12.757	4	.013
Cause of death of parents	106.994	15.256	4	.004
Educational level	95.232	3.494	2	.174
Number of children or his or her family	101.915	10.177	4	.038
Background of family before death	106.361	14.623	4	.006
Age	105.794	14.056	8	.080

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

A .This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

There is a statistically significant relationship between the independent variable sex of orphan, type of orphan, cause of death of parent's death, number of children for his or her family, background of family before death and the dependent variables. Since p-value=0.02, 0.013, 0.04, 0.038 and 0.006 are less than $\alpha = 0.05$.

Table 4.2.3 Multinomial Logistic Regression of Problem of Orphan

Problem Of orphan after parents death(a)	B	Std. Error	Wald	DF	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound

Social	Intercept	-5.916	3.014	3.852	1	.050			
	[male]	2.750	1.199	5.259	1	.022	15.650	1.491	164.23
	[age=14]	-2.922	1.968	2.204	1	.138	.054	.001	2.548
	[age=15]	-.786	1.729	.207	1	.649	.456	.015	13.501
	[age=16]	.427	1.772	.058	1	.809	1.533	.048	49.388
	[age=17]	-2.699	1.494	3.265	1	.071	.067	.004	1.257
	[type of orphan=mother]	3.659	1.591	5.292	1	.021	38.825	1.718	877.142
	[type of orphan=father]	1.402	1.589	.778	1	.378	4.063	.180	91.531
	[cause of death parents=HIV/ AIDES]	4.799	2.545	3.555	1	.026	121.368	.827	17807.247
	[cause of death parents=accident]	5.258	2.354	4.989	1	.039	192.122	1.905	19378.409
	[educational level=9-10]	1.769	1.190	2.212	1	.137	5.867	.570	60.391
	[number of children for his or her family=1-3]	-4.365	1.724	6.408	1	.001	.013	.000	.373
	[number of children for his or her family=4-6]	-2.177	1.599	1.853	1	.043	.113	.005	2.604
	[background of family before death=poor]	23.606	1.564	227.808	1	.000	17866161814.681	833181957.890	383109277589.978
	[background of family before death=medium]	.191	1.025	.035	1	.0252	1.210	.162	9.027
Economical	Intercept	-1.354	1.741	.605	1	.437			
	[sex=male]	2.950	1.019	8.391	1	.004	19.115	2.596	140.727
	[age=14]	-.812	1.704	.227	1	.634	.444	.016	12.520
	[age=15]	-2.172	1.622	1.793	1	.181	.114	.005	2.738
	[age=16]	.990	1.386	.510	1	.475	2.690	.178	40.684
	[age=17]	-1.813	1.206	2.259	1	.133	.163	.015	1.735
	[type of orphan=mother]	2.056	1.210	2.889	1	.089	7.816	.730	83.696
	[type of orphan=father]	2.629	1.271	4.283	1	.039	13.864	1.149	167.257
	[cause of death of parents=HIV/ AIDES]	-.952	1.265	.567	1	.451	.386	.032	4.603
	[cause of death of	.938	1.251	.563	1	.453	2.556	.220	29.647

	parents=accident]								
	[educational level=9-10]	.135	.925	.021	1	.884	1.144	.187	7.020
	[number of children for his or her family=1-3]	-1.062	1.261	.710	1	.400	.346	.029	4.092
	[number of children or his or her family=4-6]	.262	1.334	.039	1	.844	1.299	.095	17.738
	[background of family before death=poor]	20.478	.000	.	1	.	78233996 9.186	782339 969.186	78233996 9.186
	[background of family before death=medium]	-.682	.879	.602	1	.438	.506	.090	2.832

The model fitted as follows:

Logistic regression – involves fitting an equation of the form to the data:

Log it $(\frac{P}{1-P})$ = (α + B1x1 + B2x2 + B3x3 + …+ $\beta_k X_k$)

Social relative to psychological

Log it $(\frac{P}{1-P})$ = α+$\beta 1X_1$+$\beta 2X_2$ +$\beta_3 X_3$ +$\beta_4 X_4$ +$\beta_5 X_5$

Log it $(\frac{P}{1-P})$ =-5.916+2.750X1+3.659X2+5.258X3-4.365X4+23.606X5

Where Y=dependent variable (problem of orphan) and x_1=sex, x_2=type of orphan, x_3=cause of death of parents, x_4=number of children before death and x_5=back ground of family

Economical relative to Psychological

Log it $(\frac{P}{1-P})$ = a+$\beta 1X_1$+$\beta 2X_2$

Log it $(\frac{P}{1-P})$ =0.1354+2.950X1+2.629X2

Y=dependant variable and x1=sex and x2=type of orphan

Interpretation of Odds Ratio (Exp (B))

Social Relative to Psychological

This coefficient is the relative risk ratio comparing sex of male with OVC sex of female for being affected by social problems relative to psychological problems. For OVC whose sexes of male relative to that sex of female, the relative risk for being affected by social problems relative to psychological problems would be expected to increase by a factor of 15.650 given the other variables in the model are held constant. This means OVC sex of male are more likely than OVC sex of female to be affected by social problem over psychological problems.

Type of orphan: This coefficient of B is the relative risk ratio comparing OVC mother orphan with OVC both orphan for being affected by social problems relative to psychological problems. For OVC of mother orphan to that OVC of both orphan, the relative risk for being affected by social problems relative to psychological problems would be expected to increase by a factor of 38.825 given the other variables in the model are held constant. This means OVC mother orphan are more likely than OVC of both orphan, to be affected by social problem over psychological problems.

Cause of parent's death: This coefficient of B is the relative risk ratio comparing OVC of cause of accident with OVC cause of others for being affected by social problems relative to psychological problems. For OVC of cause of accident to that OVC of other cause, the relative risk for being affected by social problems relative to psychological problems would be expected to increase by a factor of 192.122 given the other variables in the model are held constant.

This means OVC cause of accident is more likely than OVC of cause of others to be affected by social problem over psychological problems.

Background of family: This is the relative risk ratio comparing OVC poor family with OVC rich family for being affected by social problems relative to psychological problems. For OVC of poor family to that OVC of rich family, the relative risk for being affected by social problems relative to psychological problems would be expected to increase by a factor of 17866161814.681 given the other variables in the model are held constant. This means OVC poor family is more likely than OVC of rich family to be affected by social problem over psychological problems.

Number of children for his or her family: This is the relative risk ratio comparing number of children of family 1-3 with OVC number of children>6 for being affected by social problems relative to psychological problems. For OVC of number of children 1-3 to that of number of children>6 , the relative risk for being affected by social problems relative to psychological problems would be expected to increase by a factor of 0.13 given the other variables in the model are held constant. That means number of children 1-3 is more likely than number of children >6 to be affected by social problem over psychological problems.

Economical Relative to Psychological

Sex: This exp (B) is the relative risk ratio comparing sex of male with OVC sex of female for being affected by economical problems relative to psychological problems. For OVC sexes of male relative to that sex of female, the relative risk for being affected by economical problems relative to psychological problems would be expected to increase by a factor of 19.115 given the other variables in the model are held constant. That means OVC sex of male are more likely than OVC sex of female to be affected by economical problem over psychological problems.

Type of orphan: this coefficient is the relative risk ratio comparing OVC lose father orphan with OVC loses both orphan for being affected by economical problems relative to psychological problems. For OVC of father orphan to that OVC of both orphan, the relative risk for being affected by economical problems relative to psychological problems would be expected to increase by a factor of 13.864 given the other variables in the model are held constant. That means OVC lose of father are more likely than OVC losses both orphans to be affected by economical problem than psychological problems.

Goodness-of-Fit

Pearson	124.923	108	.127
Deviance	87.579	108	.925

To test the hypothesize test of the goodness of the model at

Ho: The model was fitted in Pearson and deviance chi-square of the variable.

H1: Not HO

Interpretation: p-value of the Pearson and the deviance chi-square are greater than the =0.05 value. So it accepts the null hypothesis. So we Conclude that the model are fitted in Pearson and deviance chi-square of the variable. Because p-value 0.127and 0.925 are greater than α-value 0.05.

Pseudo R-Square

Cox and Snell	.554
Nagelkerke	.630
McFadden	.381

In this study, Cox & Snell R square equals 0.554 which indicate that 55.4% of the response variable (problem of orphan) is explained by explanatory variables (independent variables). Nagelkerke R square equals 0.630, which indicates that63% of the response variable is explained by explanatory variables (independent variable).

Discussion

The study indicated that there is problems and risk factors of orphan and vuleranable children in Arba Minch OSSA. Problems and risk Factors for sex, age, type of orphan, educational level, cause of death of parents death, number of children after parents death and background of family.

The child's age and gender were rarely mentioned as reasons to avoid fostering although the respondents were mostly women and it is fathers who are unlikely to remain caring for children, especially girls. Grandparents are most likely to care for orphans aged 0-4 (Phillips, et. al. 2006; Miller, 2005; Boerma, 2004), but in this study ages is insignificant for problem and risk factors of orphan.

Being orphaned or made vulnerable can play a role in whether a child goes to school. OVC may lose access to school for several reasons including poverty, need for domestic labor, need for income-generating activities, stigmatization, and parental sickness or death. School enrollment inequities among all types of orphans have been documented throughout sub-Saharan Africa (2004-2006); Bicego et al. 2003). One estimate suggests that orphan is approximately 13% less likely to attend school than no orphans (Boerma, 2004). But the current study of educational level is insignificance. That means educational level is not a factor of orphan children.

UNICEF provides that the vast majority of children are single orphans, maternal or paternal (UNICEF, 2008). The current study of type of orphan is significance. Hence type of orphan is factor of orphan and vulnerable children.

The number of orphans in Sub-Sahara Africa over the last decade, surveillance systems should systematically collect and monitor OVC incidence and prevalence data in order to identify emerging trends, and gain insight into the circumstances of newly and previously orphaned children (Lopman et al., 2005), then the current study are similar result. that means number of children's is significance the it is factor of orphan children.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on the findings the numbers of orphan respondent those who have economic problems after parent's death are higher than psychological problems. Chi-square result shows that, that problem of orphan after parent's death has association with type of orphan, number of Children for his or her family and background of family before death.
The multinomial logistic regression analysis showed that significant determinants of problems for orphaned children were : cause of parent death, age of child, Sex of child, number of children of her/his parent, religion of parents, wealth category, resident area of children.

RECOMMENDATIONS

- The government and non-government associations (organization) should be give great attention about the problem that orphan children face such as social, economical, and psychological problems.
- Finally, we recommend that everybody should initiate organization that support orphan by actively participate in the common good.

LIST OF ABBREVIATION

AIDS ……Acquired Immune Deficiency Syndrome
CSA……...Central Statistical Agency
DHS…….. … Demographic Health Survey
GFATM……... ….....Global Fund to fight Aids, TB and Malaria
HIV ……...Human Immunodeficiency Virus
MOH ……..... Ministry Of Health
OVC…… ...Orphan And Vulnerable Children
SSA……....Sub-Sahara Africa
UNAIDS ……....United Nations Program on HIV/AIDS
UNICEF ……..United Nations Children's Fund
US ……....United State
SPSS……...Statistical Package for Social Science

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
GM designed the study, analyzed the data and drafted the manuscript. KA was involved in the analysis of the data and critically reviewed the article. Both authors read and approved the final manuscript.

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REFERANCE

[1] Ansell, N., & Young, L. (2004). Enabling households to support successful migration of AIDS orphans in southern Africa. *AIDS Care, 16*(1), 3-10.
[2] Bicego, G, Rut stein, S, & Johnson, K. (2003). Dimensions of the emerging orphan crisis in sub- Saharan Africa. Social Science Medical, 56(6), 1235-1247.
[3] Cochran, W.G. 1977. Sampling Techniques, 3rd edition. John Wiley & Sons, Inc., Singapore
[4] CSA.2008. member demographics such as age, education, household income and ethnicity affect the demand For CSA shares and the viability of CSA farms in different places.
[5] DHS.2005. Ethiopian Demographic Health Survey
[6] MoH (2006). Antiretro virus treatment protocol for people living with HIV/AIDS. Attached to the Decision No. 2051/QD-BYT dated 9 June 2006 by the Minister of Health.
[7] Miller C.M, (2005). The orphan epidemic in Botswana. Harvard University, Boston.
[8] Boerma, J. (2004). Orphan hood and childcare patterns in sub-Saharan Africa: an analysis of national surveys from 40 countries. AIDS, 18(Suppl 2), S55-65.
[9] Panpanich, R., Brabin, B., Gonani, A., & Graham, S. (1999). Are orphans at increased risk of Malnutrition in Malawi?Ann Trop Paediatr, 19(3), 279-285.
[10] Petros-Barvazian, A. and M.H. Merson. 1990. Women and AIDS: a challenge for humanity. *World Health* Nov-Dec: 2.
[11] Reining, P. 1993. Overview. *Population and Environment* 14, 3: 207-209.
[12] Sarker, M., Neckermann, C., & Muller, O. (2005). Assessing the health status of young AIDS and other orphans in Kampala, Uganda.Tropical Medicine and International Health, 10(3), 210-215.
[13] Smart, R. 2003. "Policies for Orphans and Vulnerable Children: A Framework for Moving Ahead." Washington, DC: Futures Group, POLICY Project.
[14] Tsheko, N, Skinner, D, Mtero-Munyati, S, Segwabe, M, Chibatamoto, P, Mfecane, S, (2006). Towards a definition of orphanhood and vulnerable children
[15] USG (2009). The U.S. Government and partners released The Third Annual Report to Congress on Public Law 109-95, the Assistance for Orphans and Other Vulnerable Children in Developing Countries Act of 2005
[16] United Nations Development Program (UNDP). 2003. UNDP Operations Manual for Projects Financed by the Global Fund to Fight AIDS, Tuberculosis and Malaria. New York: UNDP.
[17] UNAIDS (2005).Global Task Team on Improving AIDS Coordination among Multilateral Institutions and International Donors, Geneva Joint United Nations.
[18] UNAIDS (2008).Report on the global AIDS epidemic. Joint United Nations Programmer on HIV/AIDS.
[19] UNAIDS. 2009. "Call for Fully Funded Global Fund to Fight AIDS, Tuberculosis, and Malaria." Availableonlineathttp://www.unaids.org/en/KnowledgeCentre/Resources/FeatureStories/archive/2009/20090331_GF.asp
[20] UNICEF (2003).Africa's orphaned generations. New York, USA: UNICEF. Retrieved on 10th April 2007 fromhttp://www.unicef.org/media/files/orphans.pdf.
[21] UNICEF UNAIDS& USAID (2004).Report on the Technical Consultation on Indicators Development for Children Orphaned and Made Vulnerable by HIV/AIDS, Gaborone, Botswana, 2-4 April 2003. New York: UNICEF. Available at www.unicef.org.
[22] UNICEF (2005).the state of the world's children: Childhood under threat. New York: UNICEF
[23] UNICEF (2006).Africa's orphaned and vulnerable generations: children affected by Aids. United Nations multilateral Institutions and International Donors, Geneva Joint United Nations.
[24] UNICEF2007. Africa's Orphaned and Vulnerable Generations: Children Affected by AIDS. New York: UNICEF, UNAIDS, and PEPFAR.
[25] UNICEF. 2008. "Orphans and Other Children Affected by HIV/AIDS: A UNICEF Fact Sheet." Paris:
[26] Watts, H, Lop man, B, Nyamukapa, C, &Greg son, S, (2005). Rising incidence and prevalence of orphan hood in Manical and, Zimbabwe, 1993 to 2003. AIDS, 19(7), 717-725.

[27] Williamson, J. (2004). A family is for a lifetime. USAID Office of HIV/AIDS. Washington,D.C. The Synergy Project.

APPENDIX : TABLES AND FIGURE

Table 4.1 Frequency table of the variable

Variable		Frequency	Percent
Sex	Male	43	58.9
	Female	30	41.1
Age	14	8	11.0
	15	11	15.1
	16	18	24.7
	17	21	28.8
	18	15	20.5
Type of Orphan	Mother	39	53.4
	Father	21	28.8
	Both	13	17.8
Cause of death of	HIV/AIDS	26	35.6
	Accident	31	42.5
	Other	16	21.9
Problem of orphan	Social	20	27.4
	Economical	34	46.6
	Psychological	19	26.0
Educational lev	9-10	44	60.3
	11-12	29	39.7
Number of child	1-3	39	53.4
	4-6	23	31.5
	>6	11	15.1
Economic Background	Poor	41	56.2
	Medium	24	32.9
	Rich	8	11.0

Fig 4.1 Bar chart for Problem of orphan after parent's death

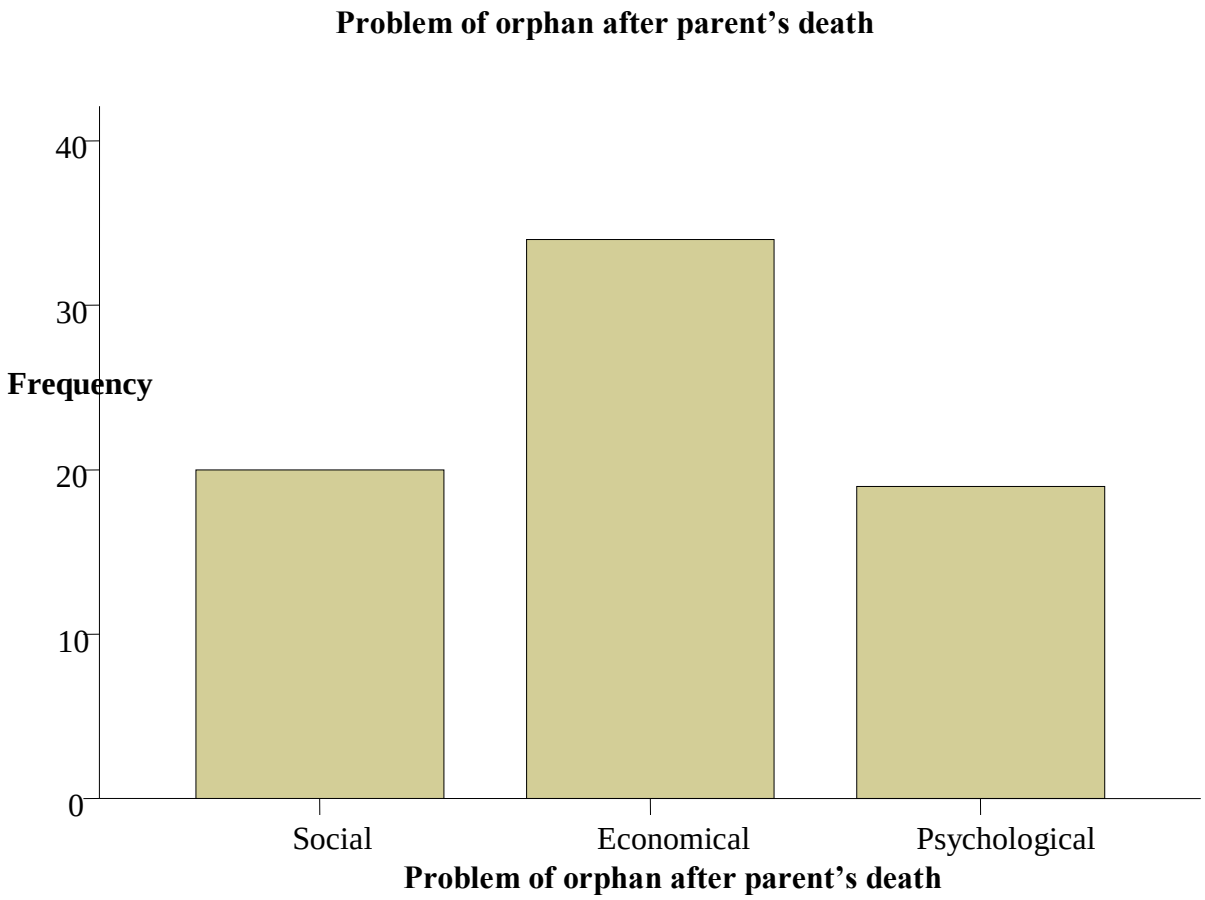

Table 4.2 Chi-square test of problem of orphan

Dependant variable	Independent variable	Chi-square	df	Sig

Problem of orphan After Parents death	Sex	2.315	1	.128
	Age	7.479	4	.113
	Type of orphan	14.575	2	.001
	Cause of Death of parents	4.795	2	.091
	Educational level of child	3.082	1	.079
	Number of Children for his or her family	16.219	2	.000
	Background of Family before	22.384	2	.000

[1] 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 36.5.