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1   **Determinant of Vaccination Status among Children Under Five years in Mattu Town,**

2   **Oromia Regional State, Ethiopia**

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12   **Abstract**

13   *Background: vaccination prevents 2-3 million deaths from diphtheria, tetanus, and measles. The*

14   *research conducted in Ethiopia showed that only 50% of under-five year-old-children fully*

15   *complete their vaccination. Therefore, this study aimed to assess vaccination status and*

16   *associated factors among under-five year-old-children in* Mattu *town.*

17   *Methods: The structured questionnaires were used to collect data from 118 children in the study*

18   *area. To assess the determinant factors of vaccination status among children under-five year, the*

19   *Chi-square test of association and Binary logistic regression were used, and data was analyzed*

20   *using SPSS 20.*

21   *Results: Of a total of 118 children, only 68 (57.6%) completed the vaccination, and 50(42.4%)*

22   *of them did not complete their vaccination. The result from logistic regression revealed that*

23   *vaccination status children under-five year was significantly related to the marital status*

mother's (Widowed: p-value: 0.007; CI:1.701, 28.818), educational status of the household head (illiterate: p-value: 0.032; CI:0.024, 0.848), monthly income of the household (income>154.9 USD: p-value: 0.024; CI: 1.322, 48.460), and residence area of the household (Urban: p-value: 0. 015; CI: 1.297, 10.981).

Conclusions*: The findings of this study showed that marital status, educational status, income, and residence were the major factors associated with incomplete vaccination status among under-five age children. Therefore, there is urgent need to fill the immunization gap in the area through vaccination campaigns by health offices and public health education and by extension workers.*

Keywords: Caretaker, Children, Mother, Under-five year, Vaccination status

Introduction

Vaccination is an intervention that can be used to save children from vaccine avertable diseases at an early age. Immunization programs have improved the primary care infrastructure in developing countries, lowered mortality in childhood, and empowered women to better plan their families, with consequent health, social and economic benefits. Immunization benefits individuals, communities, countries, and the world. The vaccine platform was established in 1974 against six vaccine-preventable diseases: diphtheria, polio, tuberculosis, measles, Pertussis, and tetanus. Currently, vaccine continues to save children against 14 diseases. These are diphtheria, pertussis, tetanus, measles, polio, tuberculosis, hepatitis B, Haemophilus influenza type B. (Hib), rubella, meningococcal disease, pneumococcal, rotavirus diarrhea, and Japanese encephalitis and yellow fever **(1)**.

For the first time, a vaccine program was established in Ethiopia in 1980 with the objective of 100% vaccination coverage for all children under the age of two years by 1990. The national

47 vaccine calendar targets children under one year providing Bacillus Calmette-Guerin (BCG)

48 vaccine given at birth, three doses of oral polio vaccine given at 6, 10, and 14 weeks of age; two

49 doses of Rota vaccine given at 6 and 10 weeks, and measles vaccine given at 9 months of age,

50 respectively **(2)**. In the updated Ethiopian vaccine policy of 2007, children under one year and

51 women of 15-49 years are the targets for the vaccine services in Ethiopia **(3)**.

52 Vaccine-preventable diseases account for around 25% of the 10 million deaths each year

53 in children under five years of age **(4)**. The research conducted in Indonesia **(5)** showed that 32%

54 of the children were fully immunized in 2012. The result also showed that this coverage was

55 significantly lower among children who lived in Maluku and Papua region, who were 36–47

56 months old, who had higher birth order, who had greater family size, whose mothers had no

57 education, and from the poorest households.

58 The research conducted in Cameroon **(6)** showed that all children had received at least one

59 routine vaccination, the Oral Polio Vaccine coverage was greater than 90 %, and 73.4 % of

60 children completed the recommended vaccinations before the age of one year. The result from

61 the multilevel logistic regression model showed that incomplete immunization status was

62 significantly associated with retention of immunization cards, lower mothers' utilization of

63 antenatal care (ANC) services, being the 3rd or more born child in the family, younger mothers'

64 age, parents' negative attitude towards immunization, poorer parents' exposure to information on

65 vaccination and longer distance from the vaccination centers. The study conducted in Ihe,

66 Nigeria showed that Out of 972 children, 63% (613/972) were immunized for DPT3 while 63.7%

67 (619/972) were immunized for DPT1 with overall dropout rates were 6% and 1%, respectively

68 **(7)**.

According to the survey conducted in Ethiopia, the result showed that only 39% of children aged 12-23 months have received all basic vaccinations. 16% of children in this age group have not received any vaccinations. The study also showed that 69% of children have received the BCG, 73% the first dose of pentavalent, 81% the first dose of polio, 67% the first dose of the pneumococcal vaccine, 64% the first dose of rotavirus vaccine, and 54% of children have received a measles vaccination(3).

The 2011 Ethiopian Demographic and Health Survey (EDHS) report also showed that only 24% of Ethiopia children in the age group of 12-13 months received all the recommended vaccines which represents a 19% increase from the level reported in the 2005 EDHS. The result also showed that 66% of children had received the BCG vaccine, and 56% had received the measles vaccine; about 64% of children received the first Diphtheria Pertussis and Tetanus (DPT) dose, and 37% received the third dose of DPT which indicated a dropout rate of 43%. The result indicated that about 82% of children received the first dose of polio and only about 44% received the third dose which showed a dropout rate of 46% **(8)**.

The 2016 EDHS report showed that about 39% of those aged 12-13 months received all basic vaccination, and 22% were vaccinated at the appropriate age. In Ethiopia, vaccination coverage was very low, among this, 38% of vaccine coverage was in the Oromia region, of Ethiopia **(8)**.

The study conducted in Sinana District, Southeast Ethiopia showed that 76.8% of the children aged 12 to 23 months were complete their vaccination. This was due to the following factors that were significantly associated with it: being with secondary and above educational level, having household family income greater than 1000 ETB or 52 USD, those whose average walking time from home to health facilities is less than an hour, etc. The study also indicated that more than half of the respondents 289(61%) knew that the vaccination program should be finished at the

92 age of nine months. The result revealed that care giver's educational level, knowledge of the

93 benefit of vaccinating a child and age to complete vaccination, ANC follow up and institutional

94 delivery were significantly associated with incomplete vaccination **(9)**.

95 The study conducted in Wadera District, South East Ethiopia showed that only 41.4% were fully

96 vaccinated and 58.6% of the children were not fully vaccinated. The study also showed that there

97 was a significant association between vaccination status and the number of ANC visits, number

98 of Tetanus Toxoid (TT) received, place of delivery, Post Natal Care follow-up, Average walking

99 time to reach vaccination services, and knowledge of mothers who had vaccine **(10)**.

100 The study conducted in Yirgalem Town, South Ethiopia indicated that 96(20.3%) of the sample

101 size didn't complete their vaccination. The study also indicated that more than half of the

102 respondents 289(61%) knew that the vaccination program should be finished at the age of nine

103 months. The result revealed that care giver's educational level, knowledge of the benefit of

104 vaccinating a child and age to complete vaccination, ANC follow up and institutional delivery

105 were significantly associated with incomplete vaccination **(11)**.

106 As the health office of Mattu town reports showed that Mattu town has a high vaccination

107 problem (by interviewing office workers). To the best of our knowledge, there were no studies

108 have been conducted in Mattu town regarding the determinant of vaccination status among

109 under-five year-old-children. Therefore, this study aimed to identify the determinant of

110 vaccination status among under-five year-old-children in Mattu town.

111 **Material and Methods**

112 **Study Design and Period**

113 A community-based cross-sectional study design was used to collect 118 samples from January

114 2020 to March 2020.

115 **Study Area**

116 Mattu is a market town and separate district in south-west Ethiopia, located in the Ilu Ababor

117 zone of Oromia region, about 600 km from the capital city Addis Ababa. Mattu has been an

118 important market of the coffee trade since 1930. It is also well-known place for ever green forest

119 and a variety of tourist attractions such as Sor River.

120 **Study Population**

121 The data was obtained from the parents of children whose age is between1-5 years and live in

122 Mattu town as per the reported dates of birth, within the eligible households in the selected area.

123 Our target population is children under the age of five in the town of Mattu.

124 **Inclusion and exclusion criteria**

125 Children whose ages were above five years were excluded from the study and Children aged five

126 and fewer years were included in the study.

127 **Sample Size Determination**

128 To determine the sample size for this study, we use the proportion of fully vaccinated and not

129 fully vaccinated children. The sample size determination formula is given as follows**(12)**:

130 $\quad n_o = \dfrac{Z^2_{\alpha/2}PQ}{d^2}$ and $n = \dfrac{no}{1+\dfrac{no}{N}}$, no= $\dfrac{1.96^2(0.5)(0.5)}{0.09^2}$=118 $\qquad\qquad$ (1)

131 Since no/N<5%, we take n=no=118.

132 d=0.09 is the margin of error; $Z_{\alpha/2} = 1.96$

133   P= 0.5 is the proportion of children who were completed vaccination.

134   Q=0.5=1-p is a proportion of children who were not completed vaccination.

135   **Method of data collection**

136   The data used in this study was primary data which is collected by using administered structured

137   questionnaire from parents of children in Mattu town. The validity of the questionnaire used for

138   the study was checked through the pilot-test by taking a sample of 10% of the population **(13)**.

139   **Study Variables**

140   **Dependent Variables**: The dependent for this study was vaccination status among children

141   under five years which has two categories: who were not complete vaccination, and who were

142   complete vaccination (Y=1, complete vaccinated or Y=0, not complete vaccinated).

143   **Independent Variables were:**

Variables	Code	Values
Sex of child	Female, male	0, 1
Age of primary caretaker	15-25, 26-36, 37-47, >47	0,1,2,3
primary caretaker of the child	Father, mother, others	0,1,2
Mother marital status	Single, married, widowed, separated	0,1,2,3
Educational status of caretaker	Illiterate, Grade 1-8, Grade 9-12, College/university	0,1,2,3
Occupation of the primary caretaker	Housewife, Government employee, Merchant, Daily labor, others	0,1,2,3,4
The Religion of the primary caretaker	Orthodox, Muslim, Protestant, Other	0,1,2,3
Monthly income of household	62.2-92.9, 93-123.8, 123.9-154.8, >154.9	0,1,2,3,4
Residence area	Rural, urban	0,1

144 **Statistical Analysis**

145 The data was analyzed using descriptive statistics (percentage, frequency, graph, etc.), Chi-

146 square Test, and a Binary Logistic Regression model. SPSS version 20 was used for data

147 analysis.

148 **Binary Logistic Regression**

149 Logistic regression is a type of regression that is used when the dependent variable is Qualitative

150 and the independent variables are any type **(14)**. In this study, the most appropriate method is

151 binary logistic regression since the response variable is dichotomous (Y= 0, is incomplete

152 vaccination and Y=1, is complete vaccination).

153 The logistic regression model is given as follows:

154 $$\text{Logit(p)} = \log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_{2} + ... + \beta_k X_k \tag{2}$$

155 where P is the probability of success

158 $X_1, X_2, X_3, …, X_k$ are independent variables

156 Q=1-P is the probability of failure

159 $\beta_1, \beta_2, \beta_3 … \beta_k$ are coefficients.

157 β_0- constant,

160 Logistic regressions work with odds so it is necessary to define both odds and odds ratio.

161 **Results**

162 Among a total of 118 children included in the study, 68(57.6%) were female and 50(42.4%) were

163 male. The result form descriptive statistics showed that, from the total of 118 children, 50

164 (42.4%) did not complete their vaccinations and 68 (57.6%) completed their vaccinations. Of a

165 total of 118 children, 67(56.8%) were living in urban areas and 51(43.2%) were living in rural

166 areas. When we mentioned marital status of the mother, from a total of 118 samples, 79(66.9%)

167 of them were married, 17 (14.4%) of them were widowed and the rest 22(18.6%) were separated.

168   The results also showed that 16(13.6%) of the respondents were illiterate, 34(28.8%) of the

169   respondents had elementary education, 44(37.3%) were between grades 9 and 12, and 24(20.3%)

170   had a high-school education. Concerning occupation, the result also showed that 13 (11.0%)

171   were housewives, 50(42.4%) were merchants, 18(15.3%) were daily laborers and 37 (31.4%)

172   were government employees. Concerning religion, 36(30.5%) were Orthodox, 33(28.0%) were

173   Protestant, 30(25.4%) were Muslim and 19 (16.1%) were other religions. Concerning the income

174   of respondents, 29 (24.6%) had a monthly income between 62.2 and 92.9 USD, 30(25.4%) were

175   with monthly income between 93.0 and 123.8 USD, 26(22.0%) were with monthly income

176   between 123.9 and 154.8 USD, 33(28.0%) were with monthly income above 154.8 USD.

177   Concerning the age of the respondents, the results revealed that 15 (12.7%) were between 15 and

178   25 years, 41(34.7%) were between 26 and 36 years, 45(38.1) were between 37 and 47 years, and

179   17(14.4%) were greater than 47 years (

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184   Table 1).

185   Pie-chart showed that among a total of 118 children included in the study, 50(42.4%) of them did

186   not complete their vaccination and 68(57.6%) completed their vaccination (Figure 1).

187   The result from Chi-square test showed that marital status, education, occupation, income, and

188   residential area were significantly associated with vaccination status at a 5% level of

189   significance. On the other hand, the sex of the child, Age of the primary caretaker, the primary

190 caretaker of the child, and religion had no association with the vaccination status at a 5% level of

191 significance (Table 2).

192 The result from Logistic regression showed that the Mother's marital status, educational status of

193 the caretaker, monthly income, and residence area were significant factors in affecting

194 vaccination status among under five years children. Whereas the sex of the child, the Age of

195 primary caretaker, the occupation of the primary caretaker, the primary caretaker of the child,

196 and the religion of the primary caretaker had no significant effect on vaccination status among

197 under five years children (Table 3).

198 The result from Hosmer and Lemeshow test indicated that the model fit the data adequately as

199 the p-value was not less than a 5% significance level. Therefore, the logistic regression model

200 fits the data very well (Table 4).

201 **Discussion**

202 This study aimed to assess incomplete vaccination and associated factors among children under

203 mefive years in Mattu town. The results of this study might be used as a source of information

204 for concerned bodies like regional, zonal and district admiration offices, and health offices as

205 well as for future researchers. This study revealed that the percentage of vaccination status for

206 those who completed vaccination was 57.6% as compared to who didn't complete (42.4%)

207 vaccination. This descriptive result is similar with the previous study conducted in Mecha

208 district, North West Ethiopia showed that about 49.3 % of children aged 12–23 months were

209 fully vaccinated, 49.1 % did not complete the vaccination, and 1.6% of children have not started

210 the vaccine(9,15).

211 The Chi-square test was employed to examine the association between vaccination status and

212 others categorical variables. The result showed that vaccination status was significantly

213 associated with marital status, education of household head, occupation of household head,

214 income household, and residential area at a 5% level of significance.

215 The logistic regression model (odds ratio) was used to examine the relationship between the

216 vaccination status and one or more independent variables. The result showed that the odds of

217 vaccine compliance for those whose education is College/University were 0.143 times more

218 likely than those whose education is illiterate at a 5% level of significance, keeping all other

219 factors constant. This result is consistent with the previous studies conducted in different

220 area/regions (5,9,11,15–17). This might be due to the fact that educated people have more

221 knowledge about the importance of vaccination and treat their children on time. The result also

222 showed that the odds of vaccine status for those whose income was greater than 154.8 USD were

223 0.300 times more likely than those whose income was from 62.2 and 92.9 USD at a 5% level of

224 significance, keeping all other factors constant. This result is in line with the previous studies

225 conducted in different regions (9,15). This could be explained by the fact that high-income

226 earners take their children to places where the vaccine is available. The result indicated that the

227 odds of vaccine compliance for those who live in urban areas were 3.8 times more likely than for

228 those who live in rural, keeping all other factors constant. This result is similar to the previous

229 studies conducted in different regions (5,9,10,16).

230 This research paper is limited to the Determinant of Vaccination Status among under five year-

231 old-children in Mattu town.

232 **Conclusions**

233 This study aimed to assess incomplete vaccination and associated factors among children under

234 five years in Mattu town using descriptive statistics, chi-square of association and binary logistic

235 regression model. The findings of this study showed that marital status, educational status,

236 income, and residence are major factors related to vaccination status among under-five age

237 children. Therefore, the region, zone and district administration and health offices give attention

238 through different methods like training via extension workers to complete the vaccination in the

239 study area.

240 **List of abbreviations**

241 ANC=Antenatal Care; BCG=Bacillus Calmette-Guerin; ETB=Ethiopian Birr. EDHS=Ethiopia

242 demographic and health survey; DPT=Diphtheria Pertussis and Tetanus; EPI=Expanded Program

243 on Vaccination; Hib= Haemophilus influenzae type B; OR=Odds Ratio; WHO=World Health

244 Organization; LMIC=Low and middle-income countries; TT=Tetanus Toxoid

245 **Author Declaration**

246 **Ethics approval and consent to participate**

247 Ethical approval for this study was obtained from Mattu University Ethical Review Board

248 (Reference No: Meu/925/1090)

249 **Consent for publication**

250 Not applicable

251 **Informed consent**

252 Written informed consent was obtained from legally authorized representatives before the study.

253 **Trial registration**

254 Not applicable.

255 **Availability of data and material**

256 Upon request, the data in excel format is available for this manuscript.

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259 **Competing interests**

260 The authors have declared that no competing interests exist.

261 **Authors' contributions**

262 DGA, DJD, TAB and ATZ designed the research, collect the samples, wrote the paper, and

263 analyzed data; DGA conducted the research and had primary responsibility for the final content.

264 All authors read and approved the final manuscript.

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268 **References**

269 1. **Cherian T, Mantel C. National immunization programmes. Bundesgesundheitsblatt -**
270 **Gesundheitsforschung - Gesundheitsschutz [Internet]. 2020 Jan [cited 2022 Nov**
271 **19];63(1):16–24. Available from: https://link.springer.com/10.1007/s00103-019-03062-1**

272 2. **Ref3.pdf.**

273 3. **Demographic and Health Survey 2016.**

274 4. **Brenzel L, Wolfson LJ, Fox-Rushby J, Miller M, Halsey NA. Vaccine-Preventable**
275 **Diseases. :24.**

276 5. **Munthali AC. Determinants of vaccination coverage in Malawi: Evidence from the**
277 **demographic and health surveys. Malawi Med J [Internet]. 2007 Oct 16 [cited 2022 Nov**
278 **19];19(2):79–82. Available from:**
279 **http://www.ajol.info/index.php/mmj/article/view/10934**

280 6. **Russo G, Miglietta A, Pezzotti P, Biguioh RM, Bouting Mayaka G, Sobze MS, et al.**
281 **Vaccine coverage and determinants of incomplete vaccination in children aged 12–23**
282 **months in Dschang, West Region, Cameroon: a cross-sectional survey during a polio**
283 **outbreak. BMC Public Health [Internet]. 2015 Dec [cited 2022 Nov 19];15(1):630.**
284 **Available from: http://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-**
285 **015-2000-2**

286 7. **Chinawa J. Immunization dropout rates in Ihe, Awgu Local Government Area, Enugu**
287 **State, South East Nigeria: A 1 year review. Ann Med Health Sci Res [Internet]. 2014**

288   [cited 2022 Nov 19];4(4):642. Available from:
289   http://www.amhsr.org/text.asp?2014/4/4/642/139360

290   8.   **Ref9.pdf.**

291   9.   **Legesse E, Dechasa W. An assessment of child immunization coverage and its**
292   **determinants in Sinana District, Southeast Ethiopia. BMC Pediatr [Internet]. 2015 Dec**
293   **[cited 2022 Nov 19];15(1):31. Available from:**
294   **https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-015-0345-4**

295 10. **Udessa G, Sena L, Berhanu S. Vaccination Status and Factors Associated With It**
296   **among Children Aged 12- 23 Months in Wadera District, South East Ethiopia. Health**
297   **Care Curr Rev [Internet]. 2018 [cited 2022 Nov 19];06(02). Available from:**
298   **https://www.omicsonline.org/open-access/vaccination-status-and-factors-associated-**
299   **with-it-among-children-aged-12-23-months-in-wadera-district-south-east-ethiopia-**
300   **2375-4273-1000222-103543.html**

301 11. **Mesfin M. Incomplete vaccination and associated factors among children aged 12-23**
302   **months in Yirgalem Town, South Ethiopia. :80.**

303 12. **Cochran WG. Professor of Statistics, Emeritus Harvard University.**

304 13. **Chaudhuri A, Stenger H. Survey sampling: theory and methods. 2nd ed. Boca Raton:**
305   **Chapman & Hall/CRC; 2005. 380 p. (Statistics, textbooks and monographs).**

306 14. **Applied Logistic regression.**

307 15. **Herliana P, Douiri A. Determinants of immunisation coverage of children aged 12–59**
308   **months in Indonesia: a cross-sectional study. BMJ Open [Internet]. 2017 Dec [cited**
309   **2022 Nov 19];7(12):e015790. Available from:**
310   **https://bmjopen.bmj.com/lookup/doi/10.1136/bmjopen-2016-015790**

311 16. **Abadura SA, Lerebo WT, Kulkarni U, Mekonnen ZA. Individual and community level**
312   **determinants of childhood full immunization in Ethiopia: a multilevel analysis. BMC**
313   **Public Health [Internet]. 2015 Dec [cited 2022 Nov 19];15(1):972. Available from:**
314   **http://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-015-2315-z**

315 17. **Debie A. Assessment of Fully Vaccination Coverage and Associated Factors among**
316   **Children Aged 12-23 Months in Mecha District, North West Ethiopia: A Cross-**
317   **Sectional Study. Sci J Public Health [Internet]. 2014 [cited 2022 Nov 19];2(4):342.**
318   **Available from:**
319   **http://www.sciencepublishinggroup.com/journal/paperinfo.aspx?journalid=251&doi=1**
320   **0.11648/j.sjph.20140204.26**

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326   Table 1: Summary descriptive result for categorical data

Variable	Category	frequency	percent
Sex	Female	68	57.6
	Male	50	42.4
Age	15-25	15	12.7
	26-36	41	34.7
	37-47	45	38.1
	>47	17	14.4
Primary caretaker	Father	35	29.7
	Mother	59	50.0
	Other	24	20.3
Marital status	Married	79	66.9
	Widowed	17	14.4
	Separated	22	18.6
Education	Illiterate	16	13.6
	Grade 1-8	34	28.8
	Grade 9-12	44	37.3
	College/university	24	20.3
Occupation	Housewife	13	11.0
	Government employee	37	31.4
	Merchant	50	42.4
	Daily labor	18	15.3
Religion	Orthodox	36	30.5
	Muslim	30	25.4
	Protestant	33	28.0
	Other	19	16.1
Income status (in USD)	62.2-92.9	29	24.6
	93-123.8	30	25.4
	123.9-154.8	26	22.0
	>154.9	33	28.0
Vaccination	No	50	42.4
	Yes	68	57.6
Residence	Urban	67	56.8
	Rural	51	43.2

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330   Table 2: Results of chi-square test of association between categorical and vaccination status

Categorical variables	chi-square value	Df	p-value
Sex	0.467	1	0.494
Age	0.777	3	0.855
Primary caretaker	2.459	2	0.292
Marital status	9.675	2	0.008
Education	14.522	3	0.002
Occupation	15.512	3	0.001
Religion	3.835	3	0.280
Income status (in USD)	21.002	3	0.00
Residence area	9.955	1	0.002

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347   Table 3: Logistic regression model results

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95%C.I.for EXP(B)	
							Lower	Upper
Female(ref) Male	.112	.549	.042	1	.838	1.119	.382	3.281
Age15-25 (ref)			.178	3	.981			
26-36	.083	1.027	.006	1	.936	1.086	.145	8.134
37-47	.290	.809	.129	1	.720	1.337	.274	6.522
>47	.263	.813	.104	1	.747	1.300	.264	6.404
Caretaker father(ref)			.317	2	.854			
Mother	.436	.808	.292	1	.589	1.547	.318	7.530
Other	.321	.704	.207	1	.649	1.378	.347	5.476
Marital status married(ref)			7.487	2	.024*			
Widowed	1.946	.722	7.266	1	.007*	7.001	1.701	28.818
Separated	1.116	.934	1.427	1	.232	3.051	.489	19.027
Education level College/ University (ref)			7.258	3	.064			
Grade 9-12	-.715	1.129	.401	1	.527	.489	.054	4.475
Grade 1-8	-2.319	1.489	2.425	1	.119	.098	.005	1.821
Illiterate	-1.942	.907	4.587	1	.032*	.143	.024	.848
Occupation house wife(ref)			.544	3	.909			
Government employee	-.166	1.291	.017	1	.897	.847	.067	10.625
Merchant	.020	.843	.001	1	.981	1.021	.196	5.324
Daily labour	.411	.754	.296	1	.586	1.508	.344	6.610
Religion orthodox(ref)			1.102	3	.777			
Muslim	.083	.969	.007	1	.932	1.087	.163	7.266
Protestant	-.626	.967	.419	1	.517	.535	.080	3.556
Other	-.231	.964	.058	1	.810	.793	.120	5.253
Income status (in USD) 62.2-92.9 (ref)			10.965	3	.012*			

93-123.8	-1.204	1.064	1.281	1	.258	.300	.037	2.413
123.9-154.8	.874	.867	1.016	1	.313	2.397	.438	13.110
>154.9	2.080	.919	5.125	1	.024*	8.004	1.322	48.460
Rural (ref)					.015*			
Urban	1.328	.545	5.938	1		3.773	1.297	10.981

348

349 Table 4: Hosmer and Lemeshow Test

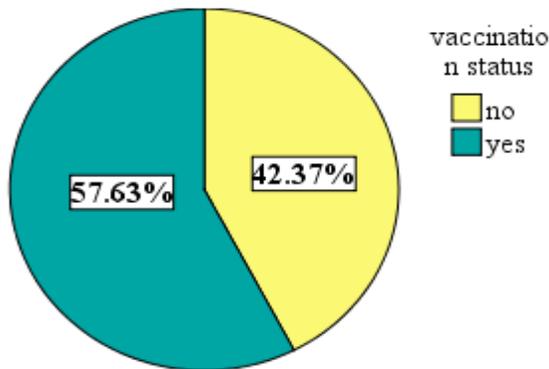| Step	Chi-square	df	Sig.
1	10.484	8	.833

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357 Figure 1: Pie chart for Vaccination status