

Relationship Between Level Of Formal Education And Use And Ownership Of Hygiene And Sanitation Facilities In Samburu Central, Samburu County, Kenya

Wamukuru David Kuria

Faculty of Education and Community Studies, Egerton University
Corresponding Author: Wamukuru David Kuria

Abstract: *The challenge of open defecation is present in Samburu which poses public health challenges. This study sought to find out the relationship between level of formal education ownership and use of hygiene and sanitation facilities in Samburu Central, Samburu County Kenya. In this context, the study sought to determine the level of formal education among adults in Samburu East Sub-county; Establish the gender difference in level of formal education among adults in Samburu East Sub-county; Examine the relationship between level of education and ownership of latrine in Samburu East Sub-county and Examine the relationship between level of education and use of latrine in Samburu East Sub-county. The study established that majority (61.7%) of the households in Samburu East Sub-County did not own a latrine. In respect to latrine use, a majority of the households went to the bush (57.1%) while 36.5% used their own latrine. The study established that the education level of male does not significantly differ from that of female in Samburu East Sub-County. The study found that the level of education of male affected latrine usage among households in Samburu East Sub-county. The study further found that the level of education of female affected latrine usage among households in Samburu East Sub-county. At the odds ratio is 0.712 (95% C.I 0.623-0.814), the the high levels of education of male meant higher rates of latrine ownership and vice versa. At the odds ratio of 0.686 (95% C.I 0.575-0.816), the higher the education level of female was associated with increase in latrine ownership. Comparing the two odds ratio for male and female in respect their education and latrine ownership, it was established that male were more likely to own a latrine with increase in education (0.712 (95% C.I 0.623-0.814)) as compared to female (0.686 (95% C.I 0.575-0.816)). The study recommends adult education for the residents of Samburu East Sub-County in order to improve their literacy levels.*

Key Words: *Education Levles, Latrine Ownership, Latrine Use*

Date of Submission: 12-03-2019

Date of acceptance: 28-03-2019

I. Introduction

The hygiene and sanitation facilities remain a challenge across the world especially within rural areas and slums dwelling places (Gius & Subramanian, 2015; Okafo & Nwude, 2016). According to United Nations (2018) over 4.5 billion people across the world live without a safe toilet and about 892 million people practices open defecation aspects. Recognizing the importance of the ownership and use of hygiene and sanitation facilities, the sanitation aspects has been made a sustainable development goals. According to United Nations (2018), the sixth Sustainable Development Goal (SDG) aims to ensure that everyone across the world has access to safe toilet and there is no practicing of open defecation across the world by the year 2030. The use and ownership of the sanitation facilities is a critical component of healthy living. The lack of ownership and usage of latrine facilities leads to open defecation and improper disposal of human waste (Neal et al., 2016). This may lead to exposure of humans to faecal matter leading to negative impact on public health aspects (Sinha et al., 2017).

The ownership and use of hygiene and sanitation facilities remains a key aspects of public health. In discussing levels of latrine ownerships, Obeng et al., (2015) notes that different levels of latrine ownership can be present. Amongst these levels of ownership include public/communal ownership, neighborhood shared ownership, co-tenant shared ownership, and household ownership levels (Obeng et al., 2015). The public/communal ownership has the lowest level/stage in ownership ladder while household ownership is the highest level within the ownership ladder. Each of the model of ownership has implication on the hygiene conditions, terms of usage and cost implications (Obeng et al., 2015). O'Connell (2014) notes that individuals with no access to latrines at work and homes are likely to practice open defecation.

In addition to latrine ownership, latrine usage implies that there is disposal of human waste in a latrine as opposed to open defecation aspects. Key aspects of latrine usage include the type of latrine used and the users of latrine (Brhane & Worku, 2015). In this context, Brhane & Worku (2015) noted that the types of latrines that be used included Flush/pour flush, Ventilated improved pit latrine (VIPL), traditional pit latrine with slab, and composting toilet amongst others. Amongst the latrine usage practices, Anteneh & Kumie (2010) further indicates that the latrine users is a key component of latrine usage. In this context, Anteneh & Kumie (2010) noted that users could be adult women, adult men, anybody in the household, anybody in the neighborhood, and under-five child amongst other users.

Diverse scholars have linked the aspects of education levels on the latrine ownership and latrine use. Amongst these scholars include Akter & Ali (2014); Alemu, Kumie, Medhin, & Gasana (2018); Ayalew, Mekonnen, Abaya, & Mekonnen (2018); Banerjee, Banik, & Dalmia (2016); O'Connell (2014); Obeng et al., (2015); Sulansi (2016). Banerjee et al., (2016) noted that higher education levels amongst the household heads and amongst the female members of the households is likely to be associated with latrine ownership and usage. These results have been found by others scholars such as Ayalew, Mekonnen, Abaya, & Mekonnen (2018); Banerjee, Banik, & Dalmia (2016) amongst others. The education aspects influence on the latrine ownership and usage had attributed to diverse factors. The more educated the household head, female members of the family, and higher proportion of educated family members amongst other education dynamics, the more the likelihood of these members being knowledgeable on the benefits of latrine usage. These members are also likely to be more exposed to latrine use in various institutions of learning thus acting as social cues for them to own and adopt latrine use (Alemu et al., 2018). The educated household head and other family members are able to better deal with barriers for toilet use such as general cleanliness levels, smell aspects, safety of toilet constructions, ventilation aspects, and general behavioural aspects amongst target users of the latrines (Banerjee et al., 2016). The education levels was also associated with change of attitudes and hence behavioural aspects in respect to latrine ownership and usage aspects.

This study to examine the relationship between level of formal education use and ownership of hygiene and sanitation facilities in Samburu Central, Samburu County, Kenya. The challenge of open defecation is present in Samburu which poses public health challenges. In this context, Ministry of Health (2016) puts the percentage of the population practising open defecation in Samburu at 73.4%. On the other hand, Ministry of Health (2016b) indicated the prevalence of open defecation stood at 75.5% of all the households in Samburu county. Toilet ownership remained low at 17.3% while 7.2% shared sanitary facilities or used neighbor's toilets to relieve themselves (Ministry of Health, 2016b). Waithaka (2015) citing 2009 national census had placed the levels of open defecation at 83% due to lack of latrines. Kenya National Bureau of Statistics. (2018) notes that 68.1% of the residents in Samburu County have never attended school and therefore have got no formal education. According Kenya National Bureau of Statistics. (2018), only 25.6% of the residents in Samburu county have primary level of education and only 6.3% with secondary level of education. According to a survey by Kenya National Bureau of Statistics (2018) established that Samburu west constituency had the highest share of residents with a secondary level of education (above 10%) while Samburu North constituency had lowest share of residents with a secondary level of education or above (7%). Samburu West constituency is 4 percentage points above the county average. Maralal ward has the highest share of residents with a secondary level of education or above at 17%. The importance of formal education to hygiene and sanitation practices implies that there is need to formulate basic education as a long term solution to the hygiene and sanitation challenges. The constitution of Kenya of 2010 provide to the right to basic education. The basic education act 2013 provide for free and compulsory basic education comprising of primary and secondary education which is key to hygiene and sanitation aspects.

II. Research Objectives

The objectives of the study included;

- (i) Determine the level of formal education among adults in Samburu East Sub-county
- (ii) Establish the gender difference in level of formal education among adults in Samburu East Sub-county
- (iii) Examine the relationship between level of education and ownership of latrine in Samburu East Sub-county
- (iv) Examine the relationship between level of education and use of latrine in Samburu East Sub-county

III. Literature Review

Education Level and Latrine Ownership

The influence of education levels on latrine ownership was examined in Ethiopia in a study by Alemu et al., (2018). In this study that had used a sample size of 1146 composed of household heads found that educational levels of household heads was significantly associated with latrine use. In this context, Alemu et al., (2018) notes that having a high school diploma of the household head was significantly associated with latrine ownership. The achieved statistical for the associated was cited as AOR = 1.98; 95% CI =1.34–2.87. The

educational levels of family members and its association with latrine ownership has further been examined by Shakya, Christakis, & Fowler (2014) in a study in rural India. The data for the study was collected within a two-year period and involved 75 villages in rural Karnataka, India. The study was analysed using logistic regression that revealed that education and latrine ownership was associated as evidenced by the results of OR=1.06; 95% CI 1.05-1.09). The study further revealed that the odds between someone with 12 years of education and someone with none stood at OR=2.05; 95% CI= 1.81-2.32.

Still in rural Karnataka, India, Shakya, Christakis, & Fowler (2015) undertook a study that amongst other aspects sought to link educational levels and latrine ownership. The data was from 75 villages in rural India and contained information from 16,579 individuals from 6811 households. The data had been collected over a two-year period. The study revealed that latrine ownership was higher amongst the respondents with higher education levels. For each increase in education category, the odds of owning a latrine are 1.07 (CI 1.05-1.08) times that of the lowest education level.

The role of education amongst individual family members as well as the proportion of family members with high education level has a bearing on the latrine owners. Focusing on rural Ethiopia, O'Loughlin, Fentie, Flannery, & Emerson (2006) undertook a study that amongst other aspects sought to link the education level of household head and latrine ownership. In this context, the study used structured questionnaire for data collection aspects. The study revealed that in respect to the head of the household not having an education level had 57% owning latrines and 43% not owning latrines. On the other hand, O'Loughlin et al., (2006) further revealed that the households in which the household head had some level of education had 71% ownership of latrines compared to 29% who didn't own latrines. The proportion of family membership with education levels had a bearing on latrine ownership. In this context, situations in which all children attended school, some children attended school and none of the children attended school had 69%, 83%, and 67% latrine ownership levels. Commenting on the context of Malawi, Holm et al., (2016) note that education levels is associated with early adoption of corbelled latrine in the country. In this context, the early adopters of the corbelled toilets had some level of education compared to non-adopters of the corbelled toilets.

Education Level and Latrine Use

Diverse studies have examine the relationship between education level and latrine use across the world. Focusing on southwest Ethiopia, Dereje (2017) examined the determinants of latrine use in the region. The study utilized a cross sectional research design and multistage sampling technique to arrive at its sample size of 823 households in the region. The study found that factors associated with latrine use included presence of a child attending formal education (Adjusted OR=2.30, 95% CI: 1.59-4.59) and in respect to husband being literate (Adjusted OR=0.52, 95% CI: 0.25-1.06).

Using cross sectional research design and focusing on rural Ethiopia, Alemu, Kumie, Medhin, & Gasana (2018) looked at factors determining latrine use in the country. Amongst the aspects that was examined was the educational levels within the households and the manner in which it is associated with latrine use. The study was conducted in Oromia region using heads of the households as the study participants. A sample size of 1146 respondents were used for the study. Using univariate regression analysis, the study found education status was not associated with consistent latrine use.

The association between education level and latrine use was also examined by Banerjee, Banik, & Dalmia (2016) in a study undertaken in India. The study using data collected by the Government of India from 109,041 households spread across 28 states in India. The study revealed that households in which a female member has attained higher education, which was conceptualized as 18 years of education was found to be 3.1 times higher to use a latrine, compared those without this educational level. These results were further illustrated by the frequency distribution of latrine users against non users across educational levels. In this context, Banerjee et al., (2016) found that within no education/preschool educational level that 28.46% were latrine users compared to 71.54% who non latrine users. Within the households in which the highest education level held was primary school level, it was found that 36.93% were latrine users compared to 63.07% who were non-latrine users. Banerjee et al., (2016) results further revealed that within the group in which the highest education level held was secondary school education level then 62.03% were latrine users compared to 37.97% of the respondents who non latrine users. Finally, in respect to the households in which the highest education level held was higher education (more than eighteen years of schooling) the latrine users were found to be at 90.91% compared to non latrine users at 9.09%. The study attributed these results to the better educated women being able to relate with the necessity of sanitation and latrine usage.

In Thailand, Cornelio, Guterres, Yamarat, & Xenos (2014) in a study focusing on the Ermera district examined amongst other aspects the influence of education on latrine usage. The study was a cross sectional survey study undertaken in 430 households with quantitative data collected using structured questionnaires. Cornelio et al., (2014) found that in respect to the respondents who had no education, 36.4% used latrines compared to 63.6% of those that didn't use latrines. In respect to those with low education status (primary,

secondary and high school), 53.7% used latrines compared to 46.3% who didn't use latrines. Finally, in respect to the respondents with high education levels (diploma and graduate levels), 71.0% of the respondents used latrines compared to 29.0% of the respondents who didn't use latrines. Similar to Banerjee et al., (2016) that the examine the influence of the highest education level in a given household and its influence on latrine use, Cornelio et al., (2014) examined similar concept in Thailand. In this context, the study found that households that didn't have any education levels amongst its ranks had only 38.2% of the respondents using latrines compared to 63.6% of the respondents who didn't use latrines. The study further revealed that when the highest education levels of the households was low, the latrine use was at 36.0%. Finally, in respect to the highest education levels of the household being high, the use of latrines improved to 59.1% compared to 40.9% of this group that didn't use latrines. The study also indicated that there was a statistically significant relationship between education and latrine use amongst individual users. Cornelio et al., (2014) further found a statistically significant relationship between highest education level of family members and latrine use.

IV. Research Methodology

The study use descriptive survey research design to guide the study in meeting its objectives. Descriptive survey research design enabled the study to gather data directly from respondents in their natural environment and without manipulation. The accessible population for the study was 403 households in Samburu East Sub-county. From the 403 households, data was collected from both the man of the household and the women in the household using structured questionnaires. Out of the 403 sampled, feedback from 329 households. This presented a response rate of 81%. The entire data analysis was done using Statistical Package for Social Sciences (SPSS) version 22.

V. Research Findings and Discussions

Frequencies and percentages were used for the descriptive statistics. Table 1 shows the education level of male in Samburu East Sub-County.

Table 1: Male Education

Education Level	Frequency	Percent
Never went to school	187	56.8
ECDE/ Nursery	5	1.5
Dropped out at Primary	54	16.4
Primary(KCPE)	38	11.6
Secondary/High school	29	8.8
Village Polytechnic	2	0.6
Certificate/ Diploma College	11	3.3
University	3	0.9
Total	329	100.0

The study established that majority (56.8%) of the male in Samburu East Sub-County had never went to school. Some has dropped out at primary school (16.4%) and others reached at KCPE level in primary school (11.6%). This implied generally that there was low level of education among the male in Samburu East Sub-County. Table 2 on the other hand shows the education level of female.

Table 2: Female Education

Education Level	Frequency	Percent
Never went to school	223	67.8
ECDE/ Nursery	5	1.5
Dropped out at Primary	49	14.9
Primary(KCPE)	38	11.6
Secondary/High school	13	4.0
Certificate/ Diploma College	1	0.3
Total	329	100.0

Table 2 shows that majority (67.8%) of the female in Samburu East Sub-County had never went to school. It was noted that 14.9% dropped out of primary school and 11.6% dropped out of school after finishing their primary level education.

The study further sought to establish whether households in Samburu East Sub-County owned a latrine or not and whose findings are shown in Table 3.

Table 3: Latrine Ownership

Latrine Ownership	Frequency	Percent
Yes	126	38.3
No	203	61.7
Total	329	100.0

The study established that majority (61.7%) of the households in Samburu East Sub-County did not own a latrine. Only 38.3% of the households owned a latrine.

The study further sought to find out latrine usage as seen in Table 4.

Table 4: Latrine Usage

Latrine Usage	Frequency	Percent
Own	120	36.5%
Community/Neighbor	21	6.4
Bush	188	57.1
Total	329	100.0

According to Table 4, majority of the households went to the bush (57.1%) while 36.5% used their own latrine. The rest used community or neighbor's latrine.

Gender Differences in Education Level

The study further sought to establish if there were gender differences in the level of education. In respect to this, the study carried out independent-sample t-statistics as shown in Table 5.

Table 5: Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	43.096	.000	4.133	656	0.000	0.502	0.121	0.263	0.740
Equal variances not assumed			4.133	602.291	.000	0.502	0.121	.263	0.740

The null hypothesis of t-test states that the mean of the two samples are equal. The study established that the education level of male does not significantly differ from that of female in Samburu East Sub-County due to $p < 0.05$. This led to rejection of the null hypothesis of the t-test. This implied that the education level of both male and female in Samburu East Sub-County is relatively the same.

Chi-Square Tests

The study used Chi-square tests to establish the relationship between level of education and latrine usage among households in Samburu East Sub-county. Chi-Square tests whether two variables, categorically measured are independent or not. The null hypothesis of chi-square test states that two categorically measured variables are independent. Table 6 shows a cross-tabulation and Chi-Square test between male level of education and latrine usage in Samburu East Sub-county.

Table 6: Male Education and Latrine Usage Cross-tabulation

Male Education	Latrine Usage			Total	Fisher's Exact Test
	Own	Community /Neighbor	Bush		
Never went to school	57	8	122	187	$\chi^2 = 43.515$ P-value=0.000
ECDE/ Nursery	0	0	5	5	
Dropped out at Primary	17	2	35	54	
Primary(KCPE)	19	4	15	38	
Secondary/High school	23	1	5	29	
.Village Polytechnic	1	0	1	2	
Certificate/ Diploma College	8	0	3	11	
University	1	0	2	3	
Total	126	15	188	329	

The study revealed that majority of the male respondents (122) who never went to school usage bushes (open defecation). It was also established that those who dropped out of school at Nursery level never used a latrine and all of them used bushes. The study sought to test the null hypothesis that male education level and latrine usage were independent. The chi-Square results revealed that there was a significant relationship between the male education level and latrine usage (Fisher’s Exact Test = 43.515 and P-value=0.000). Therefore, the null hypothesis of chi-square was rejected at 5% significance level. It therefore implied that the level of education of male affected latrine usage among households in Samburu East Sub-county. The findings are in line with those by Dereje (2017) who found that factors associated with latrine use included husband being literate (Adjusted OR=0.52, 95% CI: 0.25-1.06). Similarly, Alemu, Kumie, Medhin, & Gasana (2018) found education status was not associated with consistent latrine use.

The study further sought to establish the relationship between female level of education and latrine usage and whose results are shown in Table 7.

Table 7: Female Education and Latrine Usage Cross-tabulation

Female Education	Latrine Usage			Total	Fisher’s Exact Test
	Own	Community /Neighbor	Bush		
Never went to school	72	12	139	223	$\chi^2 = 23.753$ P-value=0.000
ECDE/ Nursery	1	0	4	5	
Dropped out at Primary	18	3	28	49	
Primary(KCPE)	25	0	13	38	
Secondary/High school	9	0	4	13	
Certificate/ Diploma College	1	0	0	1	
Total	126	15	188	329	

Table 7 shows that majority of the female respondents (139) who never went to school usage bushes (open defecation). It was also established that those who have a certificate or diploma never went to bushes or community/Neighbor latrines but used their own. The study further sought to test the null hypothesis that female education level and latrine usage were independent. The chi-Square results revealed that there was a significant relationship between the female education level and latrine usage (Fisher’s Exact Test = 23.753 and P-value=0.000). Therefore, the null hypothesis of chi-square was rejected at 5% significance level. It therefore implied that the level of education of female affected latrine usage among households in Samburu East Sub-county. The study is also in line with a study by Banerjee, Banik, & Dalmia (2016) in India who attributed high latrine usage to better education for women and being able to relate with the necessity of sanitation and latrine usage. Findings in this study concur with those by Cornelio, Guterres, Yamarat, & Xenos (2014) who found that that there was statistically significant relationship between education and latrine use amongst individual users. Cornelio et al., (2014) also found a statistically significant relationship between highest education level of family members and latrine use.

Logistic Regression

Logistic regression was used to test the relationship between the education and ownership of latrines in Samburu East Sub-county. Multiple linear regression is used when the dependent variables is a dichotomous (binary) while the independent variable is categorical (either nominal, ordinal, interval or ratio). It shows the likelihood of occurrence of dependent variable using independent variable as the predictor variable. In this study, the study sought to establish the relationship between male education level and ownership of latrine as shown in Table 8.

Table 8: Logistic Model for Male Education and Latrine Ownership

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Male Education	0.339	.068	24.727	1	0.000	0.712	0.623	0.814
Constant	1.379	.207	44.545	1	0.000	3.972		

a. Variable(s) entered on step 1: Male Education

Table 8 shows that the odds ratio for latrine ownership with education level of male in Samburu East Sub County. The logistic regression was found to be statistically significant at 95% confidence interval as shown by a p<0.05. This implies that the logistic regression model provides a better fit for the data and statistically predicts latrine ownership based on the level of education of male in Samburu East Sub County. The Odds ratio of the logistic regression is shown by the exponential of beta coefficient (EXP(B)). The odds ratio is 0.712 (95% C.I 0.623-0.814) indicating that for every unit increase in education level, latrine ownership increased by 0.712 units. This implied that the high levels of education of male meant higher rates of latrine ownership and vice versa. These findings are in line with those by Alemu et al., (2018) who noted that having a

high school diploma of the household head was significantly associated with latrine ownership. Similarly, Shakya, Christakis, & Fowler (2014) using logistic regression revealed that education and latrine ownership was associated as evidenced by the results of OR=1.06; 95% CI 1.05-1.09).

The study further sought to establish the influence of education level of female and latrine ownership as shown in the logistic model in Table 9.

Table 9: Logistic Model for Female Education and Latrine Ownership

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Female Education	0.378	0.089	18.022	1	0.000	0.685	0.575	0.816
Constant	1.272	0.208	37.284	1	0.000	3.568		

a. Variable(s) entered on step 1: female Education

Table 9 shows that the logistic regression model predicting latrine ownership using education level of female was statistically significant due to p-value less than the chosen significance level of 5%. It therefore implied that the logistic model provided a better fit for the data. The odds ratio for the regression model was found to be 0.686 (95% C.I 0.575-0.816) and therefore implying that a unit increase in education level of female in Samburu East Sub County would lead to an increase in latrine ownership. The more the education level of female, the more the latrines owned. These results concur with those by Shakya, Christakis, & Fowler (2015) that revealed that latrine ownership was higher amongst the respondents with higher education levels. For each increase in education category, the odds of owning a latrine are 1.07 (CI 1.05-1.08) times that of the lowest education level. The findings in the current study also concur with those by Holm et al., (2016) who noted that education levels was associated with early adoption of corbelled latrines.

Comparing the two odds ratio for male and female in respect their education and latrine ownership, it was established that male were more likely to own a latrine with increase in education (0.712 (95% C.I 0.623-0.814)) as compared to female (0.686 (95% C.I 0.575-0.816)). This may be because men are the head of the households and have to make most of the decisions as well as support the household.

VI. Conclusion

In respect to education levels, the study concluded that there are not significant differences in the education levels of male and female in Samburu East Sub-County.

In the context of latrine usage, the study concluded that there is significant relationship between the level of education and latrine usage for both genders in Samburu East Sub-County.

Focusing on latrine ownership, the study concluded that the likelihood of owning a latrine increased with increase in education level for both genders.

VII. Recommendation

The study recommends adult education for the residents of Samburu East Sub-County in order to improve their literacy levels.

The study further the ministry of health of Samburu County to carry out awareness programs aimed at improving the hygiene standards of the residents in regard to latrine usage.

The study also recommendations creation of public latrines in Samburu East Sub-County in order to enhance access to latrines by the residents,

References

- [1]. Akter, T., & Ali, A. M. (2014). Factors Influencing Knowledge and Practice of Hygiene in Water, Sanitation and Hygiene (WASH) Programme Areas of Bangladesh Rural Advancement Committee. *Rural and Remote Health, 14*(3), 1–10.
- [2]. Alemu, F., Kumie, A., Medhin, G., & Gasana, J. (2018). The Role of Psychological Factors in Predicting Latrine Ownership and Consistent Latrine Use in Rural Ethiopia: A Cross-sectional Study. *BMC Public Health, 18*(1), 1–12.
- [3]. Anteneh, A., & Kumie, A. (2010). Assessment of the Impact of Latrine Utilization on Diarrhoeal Diseases in the Rural Community of Hulet Ejju Enessie. *Ethiopian Journal. Health Development., 24*(2), 1110–1118.
- [4]. Ayalew, A. M., Mekonnen, W. T., Abaya, S. W., & Mekonnen, Z. A. (2018). Assessment of Diarrhea and Its Associated Factors in Under-Five Children among Open Defecation and Open Defecation-Free Rural Settings of Dangla District , Northwest Ethiopia. *Journal of Environmental and Public Health, 1*–8.
- [5]. Banerjee, A., Banik, N., & Dalmia, A. (2016). *Demand for Household Sanitation: The Case of India*. United Nations Economic and Social Commission for Asia and the Pacific.
- [6]. Barnard, S., Routray, P., Majorin, F., Peletz, R., Boisson, S., Sinha, A., & Clasen, T. (2013). Impact of Indian Total Sanitation Campaign on Latrine Coverage and Use: A Cross-Sectional Study in Orissa Three Years following Programme Implementation. *PLoS ONE, 8*(8), 1–8.
- [7]. Brhane, Y., & Worku, A. (2015). *Strengthening Ethiopia's Urban Health Program (SEUHP) Situational Analysis of Urban Sanitation and Waste Management*. Retrieved from <http://www.addiscontinental.edu.et>
- [8]. Cornelio, I., Guterres, L., Yamarat, K., & Xenos, P. (2014). Factors Influencing Household to Use Latrines After the Open Defecation Free Declaration in Ermera District, Timor-Leste. *Journal of Health Research, 28*(3), 191–198.
- [9]. Dereje, O. (2017). Latrine Use and Determinant Factors in Southwest Ethiopia. *Journal of Epidemiology and Public Health*

- Reviews, 1(6), 1–7.
- [10]. Gius, M., & Subramanian, R. (2015). The Relationship between Inadequate Sanitation Facilities and the Economic Well-Being of Women in India. *Journal of Economics and Development Studies*, 3(1), 11–21. <https://doi.org/10.15640/jeds.v3n1a2>
- [11]. Holm, R., Tembo, M., Njera, D., Kasulo, V., Malota, M., Chipeta, W., ... Mchenga, J. (2016). Adopters and Non-adopters of Low-cost Household Latrines: A Study of Corbelled Pit Latrines in 15 Districts of Malawi. *Sustainability (Switzerland)*, 8(10), 1–8.
- [12]. Kenya National Bureau of Statistics. (2018). Education and employment. Society for International Development, 1–180.
- [13]. Kenya National Bureau of Statistics. (2018). Samburu County. Exploring Kenya's Inequality: Pulling Apart or Pooling Together, 2(1), 1–53.
- [14]. Ministry of Health. (2016a). National Odf Kenya 2020 Campaign Framework.
- [15]. Ministry of Health. (2016b). Samburu County SMART Survey Report, (June). Retrieved from [http://www.nutritionhealth.or.ke/wp-content/uploads/SMART Survey Reports/Samburu County SMART Survey Report - June 2017.pdf](http://www.nutritionhealth.or.ke/wp-content/uploads/SMART_Survey_Reports/Samburu_County_SMART_Survey_Report_-_June_2017.pdf)
- [16]. Neal, D., Catalyst, P. D., Vujcic, J., Catalyst, M. P. H., Mubarak, M., Mukherjee, N., ... Vohs, K. (2016). *Nudging and Habit Change for Open Defecation: New Tactics from Behavioral Science*. Retrieved from <http://documents.worldbank.org/curated/en/905011467990970572/Nudging-and-habit-change-for-open-defecation-new-tactics-from-behavioral-science>
- [17]. O'Connell, K. (2014). *What Influences Open Defecation and Latrine Ownership in Rural Households?* Retrieved from <http://documents.worldbank.org/curated/en/159311468154787194/What-influences-open-defecation-and-latrine-ownership-in-rural-households-findings-from-a-global-review>
- [18]. O'Loughlin, R., Fentie, G., Flannery, B., & Emerson, P. M. (2006). Follow-up of a Low Cost Latrine Promotion Programme in One District of Amhara, Ethiopia: Characteristics of Early Adopters and Non-adopters. *Tropical Medicine and International Health*, 11(9), 1406–1415.
- [19]. Obeng, P. A., Keraita, B., Oduro-Kwarteng, S., Bregnhøj, H., Abaid, R. C., & Konradsen, F. (2015). The Latrine Ownership Ladder: A Conceptual Framework For Enhancing Sanitation Uptake In Low-Income Peri-Urban Settings. *Management of Environmental Quality: An International Journal*, 26(5), 752–763.
- [20]. Okafo, C. N., & Nwude, M. O. (2016). Sanitation and Hygiene Practices of Nigeria 's Coastal Communities and Associated Socio-economic Characteristics : Study of Two Akwa Ibom Communities. *British Journal of Applied Science and Technology*, 14(2), 1–12.
- [21]. Shakya, H. B., Christakis, N. A., & Fowler, J. H. (2014). Association Between Social Network Communities and Health Behavior : An Observational Sociocentric Network Study of Latrine Ownership in Rural India. *American Journal of Public Health*, 104(5), 930–935.
- [22]. Shakya, H. B., Christakis, N. A., & Fowler, J. H. (2015b). Social Network Predictors of Latrine Ownership. *Social Science and Medicine*, 125, 129–138.
- [23]. Shakya, H. B., Christakis, N. A., & Fowler, J. H. (2015a). Social Network Predictors of Latrine Ownership. *Social Science & Medicine*, 125, 129–138.
- [24]. Sinha, A., Nagel, C. L., Schmidt, W. P., Torondel, B., Boisson, S., Routray, P., & Clasen, T. F. (2017). Assessing Patterns and Determinants of Latrine Use in Rural Settings: A Longitudinal Study in Odisha, India. *International Journal of Hygiene and Environmental Health*, 220(5), 906–915.
- [25]. Sulansi, I. (2016). Employment , Knowledge and Latrine Ownership as Risk Factors and Prediction Model of Diarrhea Incidence. *International Journal of Public Health Science (IJPHS)*, 5(2), 158–163.
- [26]. United Nations. (2018). *The Sanitation Crisis*. Retrieved from <http://www.un.org/en/events/toiletday/>
- [27]. Waithaka, R. W. (2015). *Latrine Use and Associated Factors Among Rural Community Members in Samburu East Sub-County, Samburu County, Kenya*. Unpublished Master of Public Health (Monitoring and Evaluation) Thesis: Kenyatta University.

Wamukuru David Kuria. "Relationship Between Level Of Formal Education And Use And Ownership Of Hygiene And Sanitation Facilities In Samburu Central, Samburu County, Kenya". *IOSR Journal of Research & Method in Education (IOSR-JRME)* , vol. 9, no. 2, 2019, pp. 68-75.