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Influence of Perceived Health Risk Factors on Adoption of Community-Led Total Sanitation: A Case of Turkana Central Sub-County, Turkana County, Kenya

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Abstract:- The primary objective of Sustainable Development Goal 6 target 2 is to achieve widespread accessibility to sufficient sanitation and hygiene facilities, therefore eliminating the practice of open defecation by the year 2030. One strategy for achieving this objective involves the implementation of Community-Led Total Sanitation (CLTS), a participatory method that allows communities to take on accountability for their sanitation behaviors. However, sustaining favorable changes after the implementation of the intervention continues to be a significant obstacle. The objective of this study was to investigate the influence of perceived health risk factors on adoption of Community-Led Total Sanitation. The study was carried out on the household members of Lodwar township and Kalokol ward, targeting a sample size of 382 respondents The research utilized a convergent design methodology, which combined quantitative and qualitative data collection methods, enabling the simultaneous gathering of both types of data. Quantitative data were collected using structured questionnaires and observation checklist, while qualitative data were collected from Focus Group Discussions. A stratified sampling technique was applied to group the village units into strata and simple random sampling used in selection of household heads. Qualitative results were structured into themes and direct quotes. The study determined that an increase in perceived knowledge regarding health risks was associated with a higher likelihood of latrine presence (p-value< 0.05). Findings from multiple regression analysis also showed that education level was a significant predictor for awareness, understanding, and knowledge (p=0.000<0.05), while gender demonstrated a significant negative relationship with awareness and understanding p= -0.2573, suggested males score lower in these areas compared to females. Age correlated positively with awareness and was marginally significant for understanding (p=0.043), indicating that older individuals had higher scores. The study concluded that increased knowledge regarding health risk in terms of vulnerability and susceptibility influenced latrine presence at the households and thus the adoption of community-led total sanitation programs in Turkana Central Sub-County. The study highlighted the critical role of knowledge in achieving open defecation-free status in the area. The study recommended that CLTS interventions by the Ministry of Health and sanitation implementers place a particular focus on knowledge enhancement, to ensure that communities are better informed, which could lead to a higher likelihood of adopting improved sanitation practices, thereby reducing the prevalence of open defecation and related health issues.

Keywords:- *Sustainable Development Goals, Community-Led Total Sanitation, Open Defecation, RANAS.*

I. INTRODUCTION

Community-Led Total Sanitation (CLTS) presents an inventive and participatory approach for addressing the pressing challenges of sanitation and hygiene within communities, particularly those located in rural and low-income areas (Larionova, 2020). The primary objective of CLTS is to attain the significant condition of having communities that do not practice open defecation through the facilitation of behavior change, heightened awareness, and the empowerment of communities to undertake collective actions that enhance sanitation practices. Through fostering a sense of ownership and intervention, Community-Led Total Sanitation guides communities towards autonomous development in sanitation, thereby cultivating enduring shifts in behavior and augmenting overall health and well-being. This approach harnesses the communal strength of societies to engender sustainable advancements in both sanitation and hygiene behaviors. Fundamental to this methodology is the creation of awareness, the instigation of behavioral shifts, as well as ending the practice of defecation without using the toilet through the mobilization and empowerment of communities (Venkataramanan, Crocker, Karon, & Bartram, 2018).

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In 2015, over two billion people in Africa lacked proper sanitation facilities, leading to widespread open defecation (Mara, Evans, & Development, 2018). This dangerous practice is a major cause of diarrheal diseases, which result in 1.6 to 2.5 million deaths annually, and account for 19% of deaths in children under five in developing countries (Mara et al., 2018). Open defecation also affects child development, leading to stunted growth and reduced cognitive abilities (Mara et al., 2018). The practice compromises community health, posing risks even to those who do not engage in it but live nearby (Mulopo et al., 2020). Addressing open defecation requires comprehensive interventions, including improved sanitation infrastructure and promotion of hygiene practices. In Ghana, a community is declared open defecation free only if all individuals have latrine access and at least 80% of families own latrines (Nanyim et al., 2022). These steps are crucial for reducing diarrheal diseases and enhancing health conditions in developing countries. Turkana County is the largest county in Kenya, characterized by a dry, semi-arid environment and a hot climate (Gitari et al., 2022). The region's low population density is mainly due to the prevalence of pastoralist settlements, with 95% of its residents living below the poverty line. Turkana County also has some of the lowest levels of Water, Sanitation, and Hygiene (WASH) coverage in Kenya (Gitari et al., 2022). Beyond water scarcity, inadequate sanitation is a significant challenge, with 82% of the population lacking access to proper sanitary services (Mara et al., 2018)which could affect their health and socio-economic progress. Open defecation is common, driven by limited hygiene knowledge, insufficient potable water, and complex social dynamics (Karanja et al., 2018).

Through influencing social interactions, psychosocial factors—which include psychological hazards and protective resources—have a substantial impact on an individual's mental and physical health (Russell & Knoeri, 2020). Protective resources like social support boost psychological resilience, while risks such as vital exhaustion, depression, hopelessness, and hostility harm health (Russell & Knoeri, 2020). Improved sanitation can reduce diarrheal diseases by up to 36% and intestinal parasitic infections by up to 50% (Alemu et al., 2023). However, in 2015, 2.4 billion people lacked access to improved sanitation, resulting in over 1.8 million annual deaths from diarrheal diseases, mostly among children under five (Alemu et al., 2023). The Risk, Attitude, Norm, Ability, Self-regulation (RANAS) model highlights the role of psychological factors in WASH behaviors, emphasizing the need to address these to improve health outcomes (Contzen & Mosler, 2012). This model involves identifying behavioral determinants, measuring influential factors, selecting behavior change techniques, and evaluating the strategies. Psychosocial elements that include knowledge activation, belief and emotion emergence, and intention development—all of which eventually result in observable behaviors—are closely related to the psychology of human behavior and behavior modification (Bird & Schjoedt, 2017). Targeted interventions like the RANAS technique, which offers a methodological framework for identifying and modifying behavioral determinants, are necessary for effective behavior modification in order to address these issues (Wang, 2017). The RANAS approach, which focuses on cognitive and emotional components, evaluates behavioral characteristics, comprehends their impact, develops customized strategies, and measures their efficacy. By directly influencing behavioral components and varying their influence, it emphasizes the impact of contextual factors—social, physical, and personal—on behavior (Gamma et al., 2017).

II. METHODOLOGY

- *Study Design*

The study employed a convergent research design and mixed methods approach in data collection.. Given that the adoption of community-led total sanitation encompasses complex elements such as individual knowledge, the design considered suitable (Creswell, Fetters, & Ivankova, 2004).

- *Study Area*

The study was conducted within two wards: Kalokol and Lodwar township of Turkana's central sub-county, Turkana County, which is situated in Northwestern part of Kenya at GPS coordinates of 3.531597 and 35.859583 with an area mass of 68,233.1sqKm^2. The area of study falls under arid and semi-arid zones with high temperatures and receives low rainfall of less than 250mm per year. The area of study was chosen because community-led total sanitation program was activated but still open defecation was still higher. Nonetheless, the area is inhabited by nomadic pastoral who contribute large percentages of open defecation thus affects adoption of the program and the area is a fishing ground, where most cases of cholera outbreak is reported.

- *Target Population*

The study focused on household heads aged above 18 years from a population of 8,509 households with a total of 69,548 people from the two selected wards of Turkana Central sub-County (KNBS, 2019). The two wards had a total of 143 villages, and a total of 8455 households who had been activated by community-led total sanitation intervention. A sample size of 382 participants, which was determined using Yamane's (1967) formula at a margin of error of 0.05 was used. .

A stratified sampling technique was employed to categorize the population into two strata based on ward population density, with a ratio of 2:1 for the densely populated ward to the sparsely populated ward. From the total sample of 382 households' heads, 255 (two-thirds) were selected from the densely populated Lodwar township, and 127 (one-third) were selected from the sparsely populated Kalokol ward. The approach ensured proportional representation of households from both wards in the sample.

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➢ *Data Collection and Analysis*

Quantitative data was collected using 382 structured questionnaires and observation checklists while qualitative data was gathered using focus group discussion guides who were purposively selected. The focus group discussion participants included one public health officer, four community health promoters and three village representative members. The data collected from the households was edited, coded, and analyzed in descriptive and inferential statistics using the Statistic & Data (STATA) software version 14 and Python software. For inferential statistics, categorical responses pertaining to the dependent variable on health risk factors were subjected to logistic regression analysis utilizing odd ratio, which was chosen due to its appropriateness for binary outcome variables(adoption or non-adoption). Qualitative data were presented as direct quotes from themes which emerged from the study.

➢ *Ethical Considerations*

The researcher sought a research permit from the National Commission for Science, Technology and Innovation (NACOSTI), reference number NACOSTI/P/23/30885, and introduction letter from the university. Informed consent was obtained from all respondents to ensure that they participated willingly and the researcher assured the respondent of the privacy and confidentially of the information provided. The respondents were informed of the aim of the study, which was for academic purposes. Respondents' identities were protected by using unique codes that kept their names unidentified.

III. RESULTS

Table 1 present demographic characteristic from the participants, it captures gender, age, marital status, level of education, household size and monthly income.

Table 1 Demographic Characteristic of the Study Population

Variable	Frequency (N=382)	Percentages (%)
Gender		
Female	234	61.26
Male	148	38.74
Age bracket in years		
18-35	137	35.86
36-50	190	49.74
51 and above	55	14.40
Marital Status		
Single	37	9.69
Married	296	77.49
Divorced	22	5.76
Widowed	27	7.07
Level of education		
No formal	147	38.48
Primary	98	25.65
Secondary	75	19.63
College/University	62	16.23
Household size		
1-5	213	55.76
6-10	160	41.88
11 & above	9	2.36
Income (Monthly)		
< 10,000	216	56.54
10,001-20,000	84	21.99
20,001-30,000	34	8.90
30,000 & above	48	12.57

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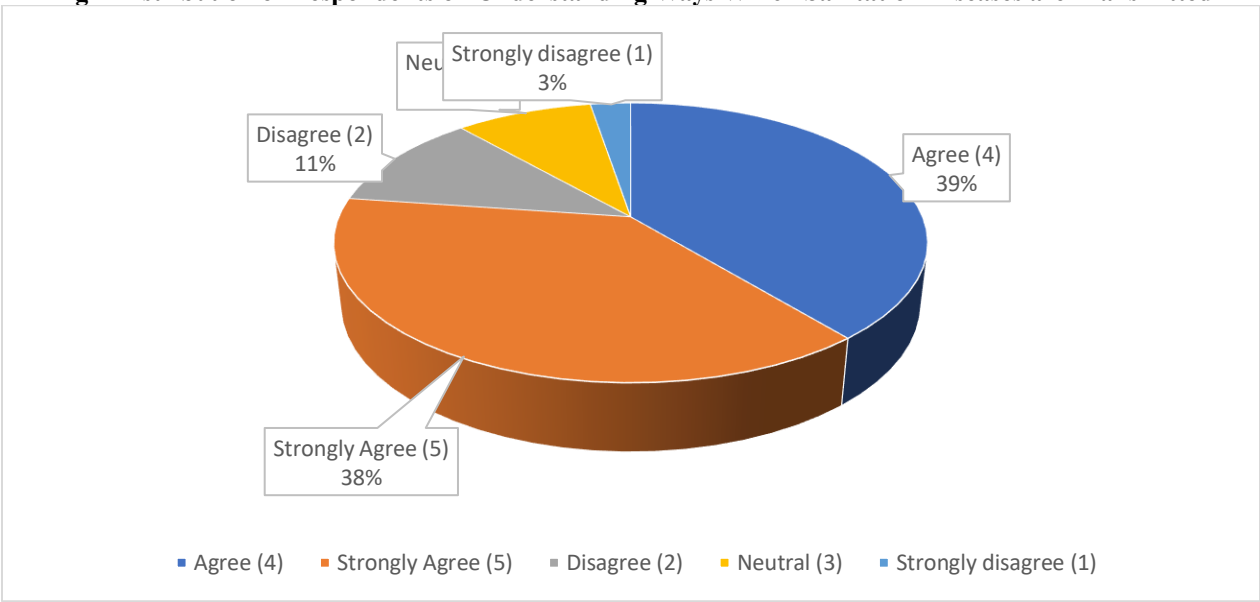
The results from table 1 indicated that from the study population, 148 (38.74%) were males whereas 234 (61.26%) were females. The findings implied that most women in the households bore the burden of sanitation issues which concurs with a study by Organization (2023) which established that in nearly half of Kenyan households, it is women and children, especially girls, who are responsible for household chores such as water collection. On age aspect, most respondents under the study were aged 36-50 years represented by 190 (49.74%), which implied that middle-aged individuals often served as household heads or decision-makers and could exert considerable influence over sanitation-related decisions within their families and communities. The results on level of education showed that the many (147=38.48%)) people in the study area had no formal education followed by 98 (25.65%) who had only attained primary education 75 (19.63%) who had schooled up to secondary level and finally college/university education (62=16.23%).The study revealed a diverse education distribution among respondents, with a significant gap in access to formal education, highlighting the importance of education in influencing knowledge and adoption of improved sanitation(Kasiva (2023) and Nanyim et al.,2022) who reported that literacy level of a population has implication on adoption of sanitation practices. The results regarding household size showed that 213 (55.76%) of the respondents' homes were occupied by one to five persons, implying that most of the respondents who took up the program were those with one to five people living in their homes. According to results for a similar study by Wasonga et al. (2016), smaller households generally experience less sanitation problems than bigger families due to the latter struggle with sharing the few available toilets. Married respondents represented the larger population standing at 296 (77.49%) which implied that most of the respondents under study were married. The findings were affirmed by Bouchard et al. (2022) who opined that families had collective responsibility to handle sanitation issues since a single sanitation problem to a family member affects the whole family. The study also found out that 56.54% of participants earned less than 10,000 KES per month, 21.99% earned between 10,001 and 20,000 KES, 12.57% earned above 30,000 KES, and 8.90% earned between 20,000 and 30,000 KES. A study by Busienei et al.(2019) associated low-income status with reduced likelihood of owning toilets.

➢ *Influence of Health Risk Factors on Perceived Vulnerability and Susceptibility on Sanitation Related Disease*

The study investigated the respondent's perception on knowledge, awareness and understanding on the health risks associated with sanitation related diseases to underscore their vulnerability and susceptibility and how health risks related with adoption of community-led total sanitation. The responses were as presented in (Fig. 1, 2 & 3)

Fig 1 Distribution of Respondents on Understanding Ways Which Sanitation Diseases are Transmitted



The findings from figure 1 on the survey on risk factors influencing the adoption of CLTS revealed insightful patterns among respondents. Understanding the ways in which sanitation diseases such as cholera was transmitted garnered a significant agreement from participants, with 38.22% strongly agreeing and 39.01% agreeing. However, a notable proportion, 11.26%, expressed disagreement with understanding while a smaller percentage, 2.62%, strongly disagreed. A relatively small percentage, 8.9%, remained neutral on the aspect.

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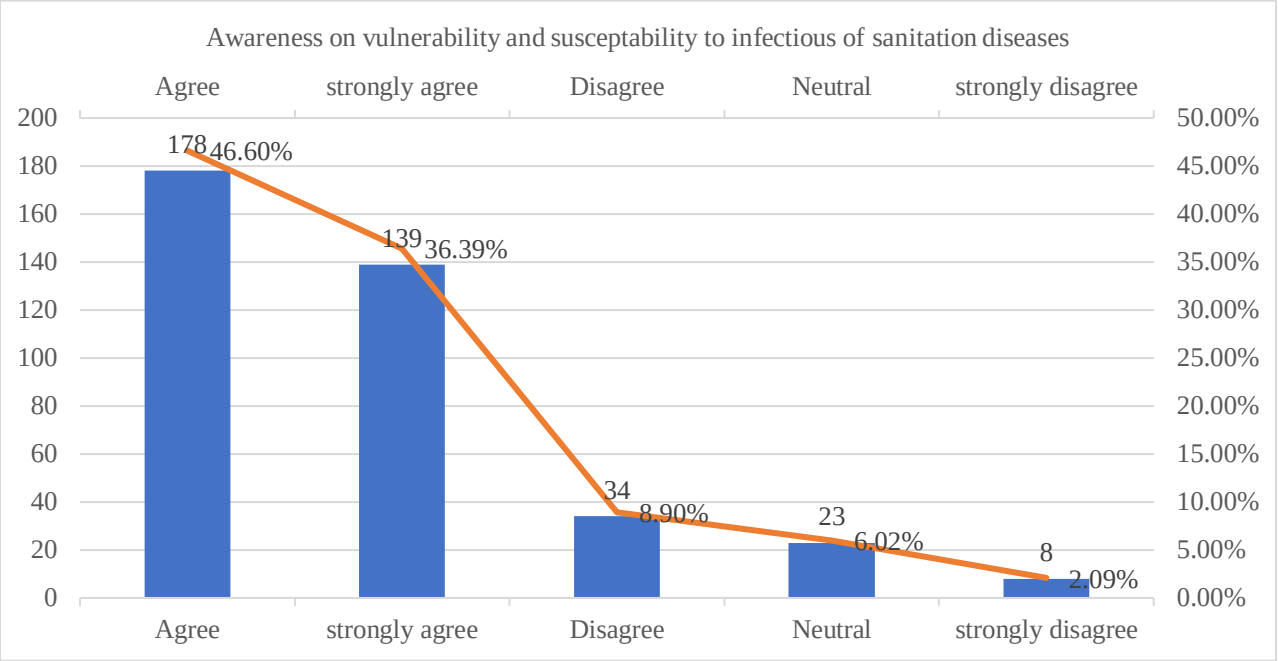
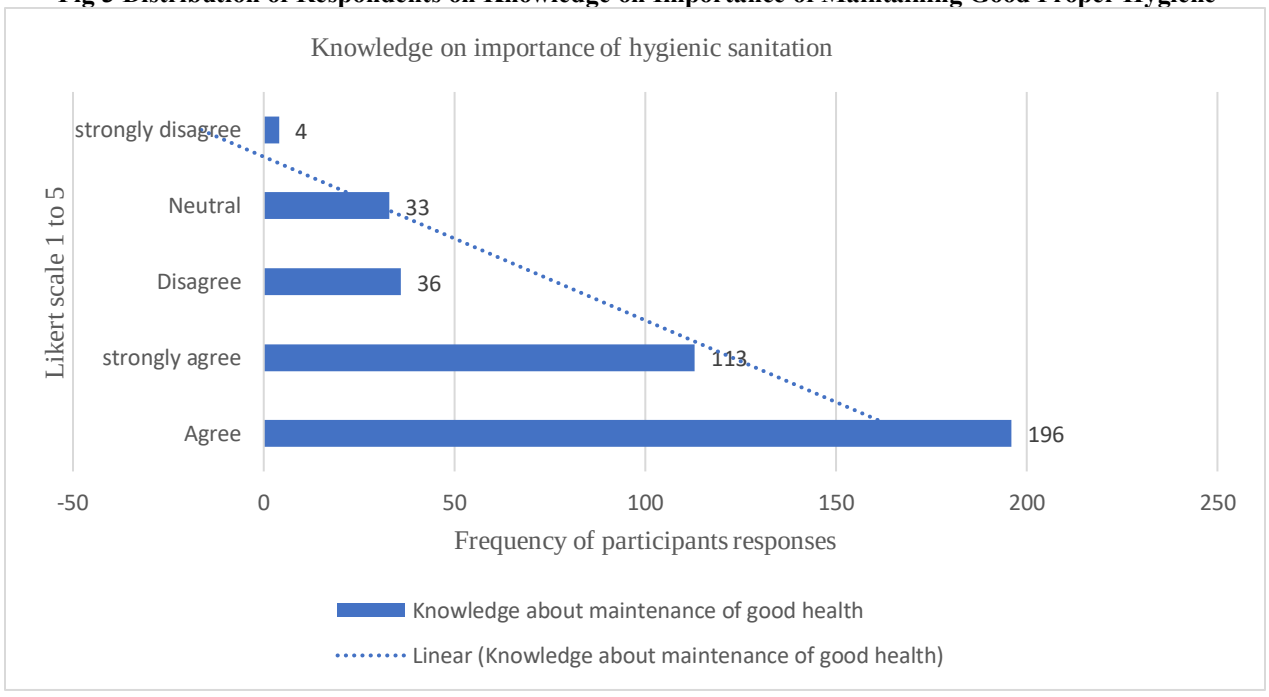
Fig 2 Distribution of Respondents on Influence of Awareness on Vulnerability and Susceptibility to Sanitation Related Infections



The results in figure 2 regarding the awareness of risk factors associated with sanitation diseases such as cholera indicates that 36.39% of respondents strongly agreed, while 46.6% agreed, respondents with disagreement were 8.09%. A minority, 6.02%, were neutral, and even fewer, 2.09%, expressed strong disagreement. The findings implied that a significant majority of respondents are aware of the risk factors associated with sanitation diseases like cholera, suggesting a high level of awareness, although a small portion remains indifferent or unaware.

Fig 3 Distribution of Respondents on Knowledge on Importance of Maintaining Good Proper Hygiene



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From the findings shown in figure 3, majority of respondents (196=51.31% and 113=29.58%) demonstrated familiarity with the principles of maintaining good health as shown by the high percentage of responses in the agree category. Only 9.42% disagreed, and 8.64% remained neutral. A mere 1.05% strongly disagreed with this aspect. The results suggested a strong knowledge among respondents regarding the importance of maintaining good health.

"The most prevalent illness is typhoid and sometimes cholera, but the issue in this area is that instead of getting tested to determine what illness a person has, they just go to the clinic and beg for medication when they feel sick" are experiencing"

Table 2 Regression Analysis of Risk Factors to Adoption of Community Led Total Sanitation

Ordinary Least of Squares (OLS) analysis. Dependent variable Latrine presence		**R-square 0.031 AOR 0.023 F=4.044 (P=0.00753)**
	β	p>|t|
Const.	0.372	0.001
Understanding	0.0149	0.744
Awareness	-0.0759	0.127
Knowledge	0.1313	0.005

The study used logistic regression to ascertain the association between the dependent (adoption of CLTS) and independent (health risk factors) variables. The Ordinary Least Squares (OLS) analysis on latrine presence yielded an R-square of 0.031 and an Adjusted R-square (AOR) of 0.023, with an F-statistic of 4.044 (p = 0.00753). The constant coefficient was significant (β = 0.3702, p = 0.001). Knowledge positively influenced latrine presence (β = 0.1313, p = 0.005), while understanding and awareness were not significant predictors.

The analyses focused on knowledge, understanding, and awareness related to infection of sanitation-related diseases on the level of vulnerability and susceptibility of community members to adoption of community-led total sanitation using latrine presence as a measure. The regression model as shown by table 2 produced an R-squared value of 0.031, indicating that approximately 3.1% of the variability in latrine presence could be explained by the independent variables - understanding, awareness, and knowledge. The findings suggested that although these factors play a role, they collectively had a limited explanatory power regarding the presence of latrines in the community. After adjusting for the number of predictors in the model, the adjusted R-squared value stands at 0.023, suggesting a slight decrease in explanatory power, accounting for model complexity.

Although the regression model as a whole was statistically significant as shown on table 2, it only explained a small proportion of the variance in latrine presence as an indicator of CLTS adoption, evident by R-square value of 0.031 which explains 3.1% of latrine presence. Among the factors examined, only knowledge emerges as a significant predictor, indicating its importance in influencing latrine presence within the community thus adoption of community led total sanitation program to achieve open defecation free status. Though the model indicates knowledge significantly impacts the presence of latrines which is a measured of CLTS adoption, its overall explanatory power is quite limited. This suggest that there may be other factors not captured in the model that also influences the presence of latrines in relation to health risk posed sanitation diseases. The result further highlights the need for targeted interventions aimed at enhancing knowledge regarding health risk factors that subjects the community to be vulnerable and susceptible to sanitation related disease thus promoting better sanitation practices, ultimately contributing to improved public health outcomes.

Table 3 Multiple Regression for Demographic Factors and Health Risk Factors on Adoption of CLTS

	IV						
DV	**Gender**	**Age**	**Marital**	**Edu.**	**HH**	**Income**	**Intercept**
Awareness	p=0.025)	p=0.043	p= 0.019	p = 0.000	p = 0.773	p= 0.488	p = 0.000
Understanding	p = 0.013	p=0.050	p= 0.089	p = 0.000	p = 0.813	p= 0.323	p = 0.000)
Knowledge	p = 0.267	p=0.133	p= 0.130	p = 0.000	p = 0.998	p= 0.914	p = 0.000

The study sought to understand how demographic characteristic which include age, gender, marital status, education level, household size and income of the study population influences dependent variable which are knowledge, understanding and awareness on the health risk factors that subjects the community to be vulnerable and susceptible to infectious of sanitation related diseases. The study aimed to identify the significant predictors for each of

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the dependent variables and provide insights into their relative importance, thus the choice of multiple regression model. For each dependent variable, the model performance was assessed using key metrics: Root Mean Squared Error (RMSE) which indicates the average magnitude of the residuals. R-squared (R-sq) which shows proportion of the variance in the dependent variable explained by the independent variables. F-statistic (F) which measures overall significance of the regression model and P-value (P) which shows significance of the F-statistic.

The results on table 3 revealed that education level was consistently a significant positive predictor across all three dependent variables (awareness, understanding, and knowledge), indicating that higher education levels are associated with higher scores in these areas. Gender shown a significant negative relationship with awareness and understanding but not with knowledge, suggesting that males tend to have lower awareness and understanding scores compared to females. Age was found to be a significant positive predictor for awareness and marginally significant for understanding, indicating that older individuals tend to have higher awareness and understanding. Marital status was found out to significant negative predictor for awareness but not for the other two dependent variables, implying that married individuals tend to have lower awareness scores. While household size and income, the variables were found out not significant predictors for any of the dependent variables, suggesting that they do not have a substantial impact on awareness, understanding, or knowledge. All models are statistically significant with p-values less than 0.05, indicating that the independent variables collectively explain a significant portion of the variance in the dependent variables. However, the relatively low R-squared values suggest that other factors not included in the models may also play a substantial role. The study revealed that higher education levels significantly predicted better awareness, understanding, and knowledge about sanitation, consistent with Linggar et al. (2019) who found a significant association between defecation knowledge and latrine usage in Manokwari District ($p = 0.014$). Individuals with better knowledge were 2.496 times less likely to engage in non-latrine defecation. These findings align with BOKEA (2020) and Mukadi (2016), who also identified a significant relationship between knowledge and the adoption of sanitation practices. The focus group discussion highlighted that despite awareness of malaria risks, few community members use mosquito nets, and cholera remains prevalent among children, with some attributing diarrhea to dietary factors rather than sanitation issues. This underscores the importance of knowledge in driving positive sanitation behaviors and addressing health risks within communities.

"*Cholera is a common illness among children, it is uncommon for elderly people to experience diarrhea, and when we do, they tend blame the diet. Most speculate that it could be a result of eating food with more additives, which caused an adverse stomach reaction."*

IV. CONCLUSION

The study concluded that increased knowledge regarding health risks in terms of vulnerability and susceptibility influenced latrine presence at the households and thus the adoption of community-led total sanitation programs in Turkana Central Sub-County. The study highlighted the critical role of knowledge in achieving open defecation-free status in the area.

RECOMMENDATION

The results highlighted the need for targeted interventions aimed at enhancing knowledge regarding sanitation related diseases which subject the community to be vulnerable and susceptible to infectious diseases, ultimately contributing to improved public health outcomes. The study recommended that CLTS interventions by the Ministry of Health and sanitation implementers place a particular focus on knowledge enhancement, to ensure that communities are better informed, which could lead to a higher likelihood of adopting improved sanitation practices, thereby reducing the prevalence of open defecation and related health issues.

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