RURAL PLANNING JOURNAL
Website: https://journals.irdp.ac.tz/index.php/rpj

DOI: https://doi.org/10.59557/rpj.25.2.2023.16

Factors Influencing Availability of Handwashing Facilities at Households in Tanzania

Nasra Khamisi Mapoy, Leguma, Bakari, Zainabu Hassan Bonza, Donata Kemirembe, Nyambilila Minga, and Omar Jabu Khamis

Department of Official Statistics, Eastern Africa Statistical Training Centre. Po box 35103 Dar es Salaam, Tanzania.

Corresponding author: nasra.mapoy@eastc.ac.tz

Abstract

The study aimed to determine factors influencing the availability of handwashing facilities at the household level in Tanzania's Mainland. The study used secondary data from the Tanzania Household Budget Survey 2017/2018. Binary logistics regression was carried out to check the influence of characteristics of the household heads which are sex, age group, marital status, education and employment status, and the household condition characteristics, which include sanitation status, household size categories, location type, and use of building on the availability of handwashing facilities at the household level. Results revealed that the sex and employment status of the household heads had no significant influence, while age group, marital status educational level, and employment status of the household head had a significant influence on the availability of handwashing facilities. With regard to household condition, characteristics, sanitation status, household size categories, location type, and use of the building had a significant influence on the availability of handwashing facilities in households at a 5% level of significance. Therefore, the availability of handwashing facilities in households is influenced by the characteristics of the household head and housing characteristics. A study recommends community behavioural change on sanitation by conducting educational campaigns to raise awareness about the importance of handwashing and proper hygiene through several ways such as home visits.

Keywords: Household, handwashing facilities, household budget survey 2017/2018, Binary logistic regression

1. Introduction

Handwashing practice has significantly impacted the prevention and transmission of infectious diseases (Munthir *et al.*, 2021). Globally, hand hygiene is acknowledged as a key practice in saving lives. The initiatives to emphasize the fundamental role of the practice are reflected in the WHO campaign Save Lives, Clean Your Hands which is celebrated globally on the 5th May of each year (WHO, 2024). Furthermore, cognizant of the pivotal importance played by hand hygiene, action to make it a policy and practical agenda has been called upon (UNICEF and WHO, 2021). Notably, in low and middle-income countries, its role in addressing hygiene-related infections is underscored (WHO, 2017). The reported deaths emanating from infectious diseases in developing countries could be combated if hand hygiene is prioritized and emphasized (Endalew *et al.*, 2022). On the contrary, the absence of handwashing is closely related to diarrhoea disease prevalence (Mohammed and Zungu, 2016) and influences other infectious diseases (Noguchi *et al.*, 2021).

According to the World Health Organization (WHO), handwashing facilities refer to a facility providing either a basin, container, or outlet with an adequate supply of potable water, soap, and single-use towels. It may be fixed or mobile and include a sink with tap water, buckets with taps, tippy-taps, and jugs or basins designated for handwashing. Soap includes bar soap, liquid soap, powder detergent, and soapy water. Influencing the availability of handwashing facilities is the response to Sustainable Development Goal 3, which aims to ensure healthy lives and promote well-being for all at all ages. The goal further stipulates that, by 2030, the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases should come to an end, and hepatitis, water-borne diseases, and other communicable diseases should be combated. Another illustration of this initiative is an effort to address Sustainable Development Goal target 6.2, which, among others, emphasizes the need to achieve access to adequate and equitable sanitation and hygiene (UN, 2015).

While the role played by hand hygiene is not deniable, globally, it is estimated that for every 10 people, 3 have no access to basic handwashing facilities with water and soap at home, and 670 million people are without any facilities at all. Moreover, in the least developed countries, the estimates show that more than 6 in 10 people lack basic hand hygiene facilities at home (UNICEF and WHO, 2021). In Sub-Saharan Africa, 63% of urban residents, about 258 million people, lack access to handwashing services, and about 47% of South African urban residents lack basic handwashing facilities. Conversely, the wealthiest urban dwellers are about 12 times more likely to have basic handwashing facilities than rural dwellers (UNICEF, 2020).

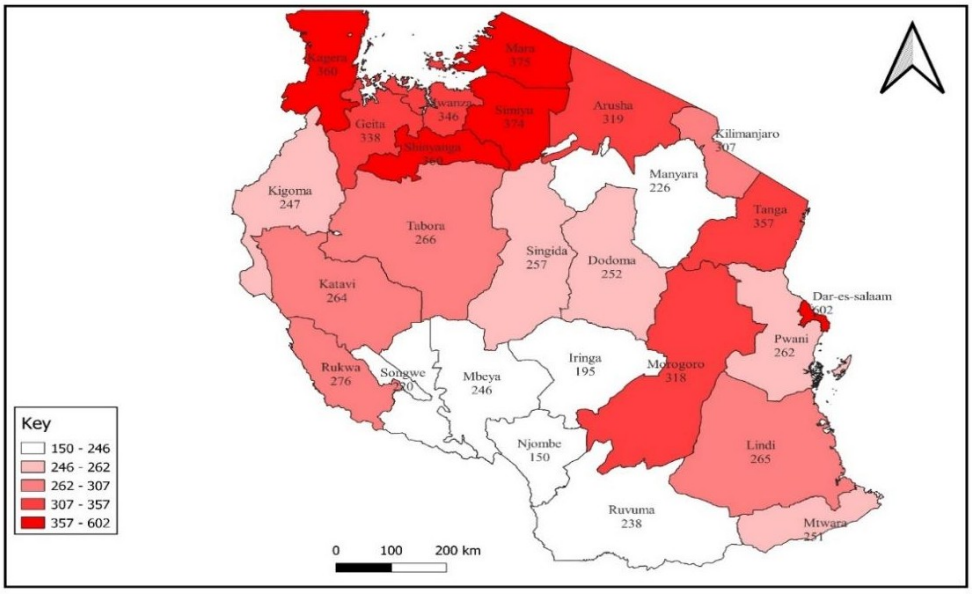
Studies have revealed that the absence of this facility is closely related to the prevalence of diarrhoea, where soap and water are collected in one place for handwashing (Mohammed and Zungu, 2016). Likewise, Noguchi *et al*. (2021) reported that the absence of hand-washing facilities influences diseases like diarrhoea and other infectious diseases. Soboksa *et al*. (2021) revealed that women who had washed their hands were about three times more likely to have their children experience malnutrition than those who did not. Empirical evidence reveals that education level, sex, household size, age, place of residence, and type of sanitation facility were among the factors that were reported to have a significant influence on the availability of handwashing facilities at the household level (Oddo and Mekonnon, 2021; Kisaakye *et al*., 2021; Endalew *et al.,* 2022).

Although several studies have been conducted on handwashing in Tanzania, the focus has been on different areas, methodology, data sources, and setup. Wiedenmayer *et al.* (2020) studied the impact of hygiene interventions in health institutions. Okello *et al*. (2019) conducted a study on factors that hinder handwashing to primary students, and Kisaakye *et al*. (2021) conducted a study on four East African countries focusing on the availability of handwashing facilities in households using a pooled binary logistic regression model. This study, therefore, bridges the gap by employing a binary logistic regression model on 2017/2018 Tanzania household budget survey data to examine the influence of socio-economic and demographic characteristics of household heads and housing characteristics of households on the availability of handwashing facilities for the whole of Tanzania.

2. Materials and Methods

2.1. Study Area

The area of study was the United Republic of Tanzania, a country located in Eastern Africa between Longitude 29° and 42° East and Latitude 1° and 12° South. According to the 2022 census, Tanzania's population was 61,741,120 of which 30,053,130 were males and 31,687,990 were females (URT, 2022). About 81% of households in Tanzania had no handwashing facilities in their buildings (MoFP- PED and NBS, 2020).



Map 1: Map of Tanzania Showing Number of Households with no Handwashing Facilities by Region
Source: Authors Creation Using QGIS package

2.2. Research Design

This study employed a cross-sectional research approach to determine factors influencing the availability of handwashing facilities at the household level in Tanzania. The target population was all heads of households in Tanzania in 2017/2018. The accessible population was the heads of households participating in the 2017/2018 Household Budget Survey.

2.3. Sampling Procedure and Sample Size

The study employed data from the 2017/2018 Household Budget Survey. It is a nationally representative sample survey. The survey covered 9,552 private households residing on the Tanzania Mainland.

The survey employed a two–stage cluster design. A sample of 796 enumeration areas (PSUs – Primary Sampling Units) was selected in the first stage. The frame of enumeration areas was obtained from the 2012 Population and Housing Census. Then, the listing of households from the selected enumeration areas was done. In the second stage, a sample of 12 households from each selected enumeration area was selected using a systematic sampling technique (MoFP- PED and NBS, 2019).

2.4. Data Analysis

2.4.1. Chi-square Test

A chi-square test at the 5% level of significance was used to examine the association between the availability of handwashing facilities, the demographic and employment status of the household head, and the housing characteristics of the household.

2.4.2. Cramer's V

Cramer's V measures association between two categorical variables, giving a value between 0

and 1 (inclusive). Cramer's V is the most popular of the Chi-square-based measures of the nominal association because it gives good norming from 0 to 1. The study employed Cramer's V to examine the strength of the association between the availability of handwashing facilities in households and each predictor variable.

2.4.3. Binary Logistic Model

A Binary Logistic Model is a statistical model that, in its basic form, uses a logistic function to model a binary dependent variable. Since the response variable Y (availability of handwashing facilities) is a binary variable with the categories "Yes" and "No," this study employed binary logistic regression to analyse factors influencing the availability of handwashing facilities at the household level.

$\log(\pi) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9$

Whereby:

$$\log it\,\pi = \log\left(\frac{\pi}{1-\pi}\right)$$

π is the probability of availability of handwashing facilities in households where π is the availability of handwashing facilities; furthermore, regression coefficient of age, sex, marital status, educational level, employment status of household head, sanitation status, location type and use of the building are $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ respectively. $x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9$ are age, sex, marital status, educational level, employment status of household head, sanitation status, location type, and use of building variable, respectively.

3. Results and Discussion of Findings

3.1. Descriptive Statistics

3.1.1. Distribution of Household Heads to Different Demographic and Social Characteristics

Table 1 results show that the majority of households (81.1%) had household heads with primary education, while a small percentage (about 5%) had household heads with a higher education level. This suggests that many households had little knowledge about the importance of having handwashing facilities in their homes. The findings are in line with Kisaakye *et al.* (2021), who, in a study on four East African countries focusing on the availability of handwashing facilities in households using a pooled binary logistic regression model, revealed that most household heads had primary education. This could indicate a need for awareness about the importance of handwashing facilities in households to save lives and address infectious diseases.

Moreover, results revealed that most households were headed by males (72.7%), with the majority being married (72.9%). Since handwashing is a habitual practice, and it is believed that men in society tend to neglect hygiene, including washing their hands, this could be one of the factors contributing to the lack of handwashing facilities in many households. The dominance of matrimonial status suggests that households have families to care for. The findings align with Endalew *et al.* (2022), who, in a study on limited handwashing facilities and associated factors in sub-Saharan Africa, found that men headed most households. Moreover, the study revealed that, amongst these men-headed households, the majority had inadequate handwashing facilities. This further implies that the availability of handwashing facilities remains a challenge.

Furthermore, results show that most household heads (80.90%) were employed. This suggests that most household heads who are employed can afford handwashing facilities. Similarly, most households (63.3%) were headed by adults. The adults often face difficulties in working extra jobs to earn more money. As a result, they are possibly unable to afford the necessary funds to install

handwashing facilities in their homes. Similar findings were revealed by Odo and Mekonnen (2021) when studying the availability of and factors influencing community-level handwashing facilities in Ethiopia. Wealthier families possessed basic handwashing facilities. Lack of funds points to limited availability. This might be a contributing factor as to why most households did not have handwashing facilities.

Table 1: Distribution of Households According to Social and Demographic Characteristics of Household Heads

Variable	Number of Households	Percentage of Households
Head of Household education level		
Primary	6,033	81.1
Secondary	1,033	13.9
Higher education	369	5.0
Head of Household marital status		
Un-married	2,567	27.1
Married	6,889	72.9
Head of Household sex		
Female	2,581	27.3
Male	6,882	72.7
Head of Household age categories		
Young	3,469	36.7
Adult	5,994	63.3
Employment Status		
Unemployed	1,806	19.1
Employed	7,648	80.9

3.1.2. Availability of Handwashing Facilities

Figure 1 presents the availability of handwashing facilities in households in Tanzania in 2017-2018. Most households in Tanzania (81.1%) did not have handwashing facilities. Only a small percentage (18.9%) had access to these facilities. The findings agree with Odo and Mekonnen (2021), who studied the availability and factors influencing community-level handwashing facilities in Ethiopia and found that a minority of the respondents (8%) had handwashing facilities. This suggests that the majority of households are at risk of getting infectious diseases such as cholera, diarrhoea, and skin diseases.

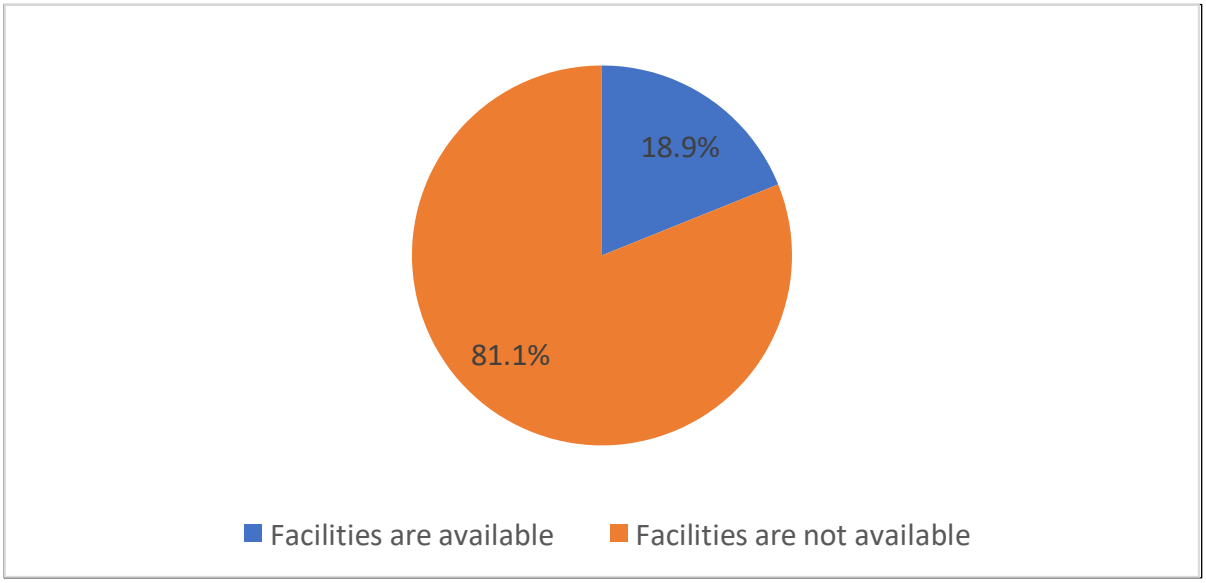


Figure 1: Pie chart representing the availability of handwashing facilities in households

3.1.3. Description of Household Condition Characteristics

Table 2: Distribution of Households According to Household Condition Characteristics

Variable	Number of Households	Percentage of Household
Household sanitation status		
Poor sanitation	7,093	75.0
Good sanitation	2,268	24.0
Other	101	1.0
Household location type		
Rural	6,675	70.5
Urban	2,788	29.5
Household housing uses		
Dwelling Only	8,687	91.8
Dwelling and Business Activity	335	3.5
Dwelling and Renting	442	4.7
Household size categories		
Small household size	6,242	66.0
Medium household size	2,865	30.3
Large household size	356	3.7

Table 2 shows the distribution of households according to different household conditions. The majority of households (75.0%) had poor sanitation conditions. This is an indication that

the majority of households had inadequate hygiene conditions. This contradicts the findings of Endalew *et al.* (2022), who conducted a study on limited handwashing facilities and associated factors in sub-Saharan Africa and found that 56.78% of the households had improved sanitation. The place of residence revealed that most households (70.5%) were in rural areas. The findings agree with Endalew *et al.* (2022), who noted that 59.85 of the respondents lived in rural areas. This factor can contribute to poor household hygiene conditions because rural areas in most developing countries lag in most social and economic facilities. This suggests a need to devise relatively affordable handwashing facilities that suit rural settings. Additionally, most households (91.8%) used their buildings only for residential purposes. This suggests not seeing a need to have handwashing facilities since the interactions are primarily family based. However, with the changing environment and interactions between urban and rural areas, a need for awareness and sensitization is called upon considering the occurring infectious disease outbreaks.

In addition, most households (66%) had a small number of members. This suggests that households might be able to allocate resources towards installing handwashing facilities since they are associated with lower expenses. However, it is surprising that despite this, many households still had limited handwashing facilities. This does not support the previous study by Endalew *et al*. (2022), who found that the number of limited handwashing facilities increased with an increasing number of family members. This suggests sensitization to handwashing facilities and related health benefits.

3.2. The Association Between Availability of Handwashing Facilities and Other Variables

A cross tabulation with a Chi-square test of independence was carried out to examine the association between the availability of handwashing facilities and each independent variable (employment status, educational level, marital status, sex, age group of house head, household size group, household sanitation status, location type of household and uses of household buildings). The observed association between the availability of handwashing washing facilities and each independent variable (employment status, educational level, marital status, gender, age group of house head, also household size group, household sanitation status, location type of household, and uses of house buildings) is statistically significant when the p-value of the Pearson chi-square test statistics is less than 5% level. Table 3 shows that all independent variables have a statistically significant association with the availability of handwashing facilities at the 5% significance level.

Table 3: Cross Tabulation Showing Association between Availability of Handwashing Facilities and Independent Variables

	Availability of Handwashing Facilities		χ^2	p-value	Cramer's V
	Facilities are not Available.	Facilities are Available			
Household employment status					
Unemployed	1,510	296	9.13	0.003	0.03
Employed	6,157	1,490			
Household education level					
Primary	4,960	1,073	302.91	0.000	0.20
Secondary	724	309			
Higher education	176	193			
Marital status of head of household					
Unmarried	2,165	401	24.46	0.000	0.05
Married	5,504	1,385			
Sex of head of household					
Female	2,130	451	4.69	0.030	0.02
Male	5,544	1,337			
Uses of building of household					
Dwelling Only	7,067	1,620	8.72	0.013	0.03
Dwelling and Business	251	84			
Dwelling and Renting	357	85			
Location type of household					
Rural	5,565	1,109	76.82	0.000	0.09
Urban	2,109	679			
Household sanitation status					
Poor sanitation	6,132	961	586.48	0.000	0.25
Good sanitation	1,447	821			
Other	95	6			
Age group of head of household					
Young	2,870	599	9.49	0.002	0.03
Adult	4,804	1,189			
Household size group					
Small household size	5,003	1,239	12.09	0.002	0.04
Medium household size	2,368	496			
Large household size	303	53			

3.3. Effect of Household Characteristics and Housing Conditions on Availability of Handwashing Facilities

Binary logistic regression was carried out to see the influence of independent variables (employment status, educational level, marital status, sex, age group of house head, household size group, household sanitation status, location type of household, and uses of household buildings) on the dependent

variable (availability of handwashing facilities). All independent variables showed some association with dependent variables and hence were entered into the binary multiple logistic models.

Table 4 shows that the value of the likelihood ratio (LR) Chi-square test is 627.01, the overall model p-value is 0.0000, suggesting that independent variables significantly influence handwashing facilities' availability at the 5% significance level. The categories male, dwelling and business, and variable employment have no significant influence on the availability of handwashing facilities at the house at a significance level of 0.05. Similar findings were revealed in categories other than variable household sanitation status and large household size groups.

Table 4: Estimation for Binary Logistic Regression Model

		Odds ratio	Std. errs.	z	p-value	[95% conf. interval]	
						Lower	Upper
Household location type	Rural (reference)						
	Urban	0.73	0.05	-4.19	0.000	.63	0.85
Head of household sex	Female (reference)						
	Male	0.87	0.07	-1.65	0.099	0.74	1.03
Household building uses	Dwelling only (reference)						
	Dwelling and Business Activity	1.09	0.16	0.63	0.530	0.83	1.44
	Dwelling and Renting	0.68	0.09	-2.77	0.006	0.52	0.89
Head of household marital status	Un-married (reference)						
	Married	1.50	0.13	4.83	0.000	1.28	1.78
Head of the household educational level	Primary (reference)						
	Secondary	1.69	0.14	6.26	0.000	1.43	1.99
	Higher education	3.81	0.45	11.29	0.000	3.02	4.81
Head of household employment status	Unemployed (reference)						
	Employed	1.07	0.09	0.84	0.403	0.91	1.26
Household sanitation status	Poor sanitation (reference)						
	Good sanitation	3.22	0.24	15.90	0.000	2.79	3.72
	Other	0.39	0.18	-2.02	0.044	.15	0.97
Head of the household age group	Young (reference)						
	Adult	1.57	0.10	6.95	0.000	1.38	1.79
Household size group	small household size (reference)						
	medium household size	0.83	0.06	-2.79	0.005	0.72	0.94
	large household size	.74	0.14	-1.61	0.107	0.52	1.07
	_cons	0.11	0.01	-19.51	0.000	0.09	0.13

Number of observations = 7,432 LR chi2(13) = 627.01 Prob > chi2 = 0.0000
Pseudo R2 = 0.0817 Log likelihood = -3523.7455

Based on the results presented in Table 4, households in urban areas are 0.73 times less likely to have handwashing facilities in their buildings than households in urban areas. This implies that living in rural areas places a greater emphasis on handwashing facilities in households than in urban areas. This could be attributed to the nature of activities conducted in rural areas. However, the findings are contrary to Endalew *et al.* (2022), who found that the likelihood of having limited handwashing facilities is two times higher for rural households than urban households. In addition, household heads who use buildings for dwelling and renting are 0.68 times less likely to have handwashing facilities on their premises than household heads who use their buildings for dwelling only. This suggests that landlords are not prioritizing the installation of handwashing facilities in buildings used for rental purposes and further points to the tenants' lack of associated effects that lack handwashing facilities would have on their health and their business. This calls for education for tenants and other beneficiaries.

Households with a secondary education level are 1.69 times more likely to have handwashing facilities on their premises compared to households with household heads with a primary education level. Household heads with higher education are 3.81 times more likely to have handwashing facilities in their buildings than household heads with primary levels. This indicates that education level is fundamental in making households appreciate the need for handwashing facilities. This aligns with Odo and Mekonnen (2021), who found that the odds of having basic handwashing facilities increased with an increasing level of education—further suggesting that awareness and sensitization should be highly emphasized in households with no or low levels of education.

Furthermore, households with married household heads are 1.50 times more likely to have handwashing facilities in their building compared to households whose heads of households are not yet married. Most household heads who are married have children. This suggests that having children contributes to making households more health-conscious. The sanitation status showed that households with good sanitation status are 3.22 times more likely to have handwashing facilities in their buildings than those with poor sanitation status. This conforms to the findings of Endalew *et al.* (2022), who asserted that households with poor sanitation are 1.58 times more likely to have limited handwashing facilities than households with improved sanitation.

Households with an adult head of household are 1.57 times more likely to have handwashing facilities in their buildings than households with young household heads. This infers that adult household heads prioritize the presence of handwashing facilities in their homes more than young household heads. This might be because adults may have a greater awareness of hygiene practices and the importance of handwashing and are aware of the health-related risks associated with old age.

4. Conclusion and Recommendations

4.1. Conclusion

The study examined the factors influencing the availability of handwashing facilities in households in Tanzania. The study revealed that the availability of handwashing facilities in households depends on the household head's age, marital status and educational level. Therefore, this suggests that the household head's age, marital status and

educational level significantly influence the availability of handwashing facilities in households. However, the sex and employment status of the household head were not found to influence the availability of handwashing facilities in the households significantly.

About housing conditions, the study revealed that the sanitation status and location type of the household had a significant influence on the availability of handwashing facilities in the households. In addition, variables such as household building use and household size were not found to significantly influence the availability of handwashing facilities in households. However, households residing in buildings with dwelling and renting uses and households with medium household size were found to influence the availability of handwashing facilities significantly.

The results of this study indicate that any measures and actions taken to influence the availability of handwashing facilities in households should pay special attention to the variables of age group, marital status education and specific categories of medium household size and buildings for dwelling and renting. This study has provided insights into the socio-economic factors influencing the availability of handwashing facilities in households at the national level. The reported findings shed light on the current status of the availability of handwashing facilities in households.

4.2. Recommendations

The study asserts that the excellent sanitation status of households has a more significant influence on the availability of handwashing facilities in households. Therefore, several strategies should be established to improve sanitation in households, especially in urban areas where households are less likely to have handwashing facilities than rural areas. This may be achieved by supplying clean water and establishing several policies and plans for ensuring good sanitation in households. This should be done along with monitoring and evaluation strategies for easy tracking of progress, measuring attainment of the target as well as a means to establish workable measures and those that need improvement. Since sanitation is more of a habitual act or practice, community behavioural change on sanitation should be sensitized by conducting educational campaigns to raise awareness about the importance of handwashing and proper hygiene through several means, like home visits.

On the other hand, the attainment of a higher level of education among household heads influenced the increased likelihood of having handwashing facilities. The study recommends that awareness, sensitization, and knowledge sharing be done frequently in households as this will benefit all households regardless of their educational level. This should be done with public social workers and community leaders who directly interact with households.

Lastly, since results showed that households used for renting are less likely to have handwashing facilities, owners of rental houses (landlords) should install handwashing facilities in the buildings to take care of the environment and tenants' health. This could be done by having bylaws in place. In addition, tenants and other beneficiaries should be sensitized to recognize this facility as their right and hence demand for it. In so doing, every party will become an actor, and eventually, improved attainment of handwashing facilities will be achieved.

References

Endalew, M., Belay, D.G., Tsega. N.T., Aragaw, F.M., Gashaw, M., and Asratie, M.H. (2022). Limited handwashing facility and associated factors in sub-Saharan Africa:

pooled prevalence and multilevel analysis of 29 sub-Saharan Africa countries from demographic health survey data. BMC Public Health.27;22(1):1969.

Hand Hygiene: A global call to action to make hand hygiene a priority in policy and practice, UNICEF,New York, 2021.Retreived from https://www.who.int/campaigns/world-hand-hygiene-day.

Kisaakye, P., Ndagurwa, P., and Mushomi, J. (2021). An assessment of availability of handwashing facilities in households from four East African countries. *Journal of Water, Sanitation and Hygiene for Development*, *11*(1), 75-90.

Ministry of Finance and Planning - Poverty Eradication Division (MoFP- PED) [Tanzania Mainland] and National Bureau of Statistics (NBS). (2019). Tanzania Mainland Household Budget Survey 2017-18, Key Indicators Report. Dodoma Tanzania, June 2019.

Ministry of Finance and Planning - Poverty Eradication Division (MoFP- PED) [Tanzania Mainland], National Bureau of Statistics (NBS) and the World Bank. (2020). Tanzania Mainland Household Budget Survey 2017/18. Final Report Dodoma, Tanzania MoFP-PED, NBS and Washington DC USA, and WB, December 2020.

Mohammed, A.I., and Zungu, L.I. (2016). Environmental health factors associated with diarrhoeal diseases among under-five children in the Sebeta town of Ethiopia, Southern African Journal of Infectious Diseases, 31(4), 122-129.

Munthir, M. A., Talal, A. A, Arwa, A. A., Mohammed. T. A., Mohamed E. H., and Mahmoud M. B. (2021). Handwashing Knowledge, Attitudes, and Practices among Students in Eastern Province Schools, Saudi Arabia. *Journal of Environmental and Public Health*, vol. 2021, 6638443.

Noguchi, Y., Nonaka, D., Kounnavong, S., and Kobayashi, J. (2021). Effects of Handwashing Facilities with Water and Soap on Diarrhea Incidence among Children under Five Years in Lao People's Democratic Republic: A Cross-Sectional Study. Int J Environ Res Public Health., 18(2):687.

Odo, D.B., and Mekonnen, A.G. (2021) Availability and factors influencing community level handwashing facility in Ethiopia: Implication for prevention of infectious diseases. *PLoS One*. 2021 Jan 19;16(1):e0243228.

Okello,E., Kapiga,S., Grosskurth,H., Makata, K., Mcharo, O., Kinungh'i, S., and Dreibelbis, R. (2019).Factors perceived to facilitate or hinder handwashing among primary students: a qualitative assessment of the Mikono Safi intervention schools in NW Tanzania. BMJ Open. 2019 Nov 28;9(11):e030947..

Soboksa, N.E., Gari, S.R., Hailu, A.B., and Alemu, M.B. (2021). Childhood Malnutrition and the Association with Diarrhea, Water supply, Sanitation, and Hygiene Practices in Kersa and Omo Nada Districts of Jimma Zone, Ethiopia. Environ Health Insights. 15:1178630221999635.

UN. (2015). Resolution adopted by the General Assembly on 25 September *2015*. *16301*(October), 1–35.

United Nations Children's Fund and World Health Organization (UNICEF and WHO), Lack of Handwashing with soap puts millions at increased risk to COVID-19 and other infectious diseases, UNICEF, New York, 2020.

United Nations Children's Fund and World Health Organization (UNICEF andWHO), State of the World's HandHygiene: A global call to action to make hand hygiene a priority in policy and practice, UNICEF, New York, 2021.

The United Republic of Tanzania (URT), Ministry of Finance and Planning, Tanzania National Bureau of Statistics and President's Office - Finance and Planning, Office of the Chief Government Statistician, Zanzibar. The 2022 Population and Housing Census: Administrative Units Population Distribution Report; Tanzania, December 2022.

Wiedenmayer, K., Msamba, V. S., Chilunda, F., Kiologwe, J. C., & Seni, J. (2020). Impact of hand hygiene intervention: a comparative study in health care facilities in Dodoma region, Tanzania using WHO methodology. *Antimicrobial Resistance & Infection Control*, *9*(1), 1-9.

WHO. (2017). Evidence of hand hygiene as the building block for infection prevention and control. Retrieved from https://www.who.int/publications/i/item/WHO-HIS-SDS-2017.7