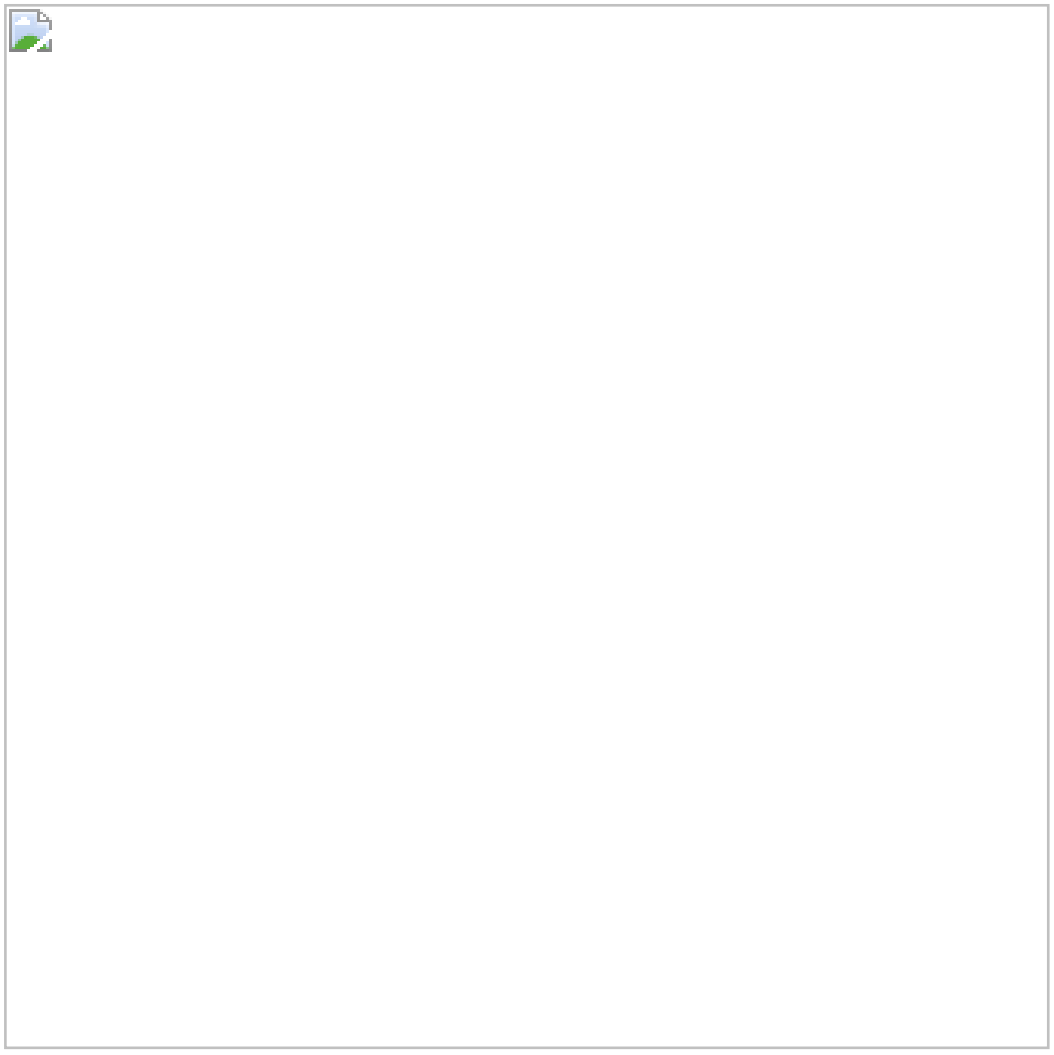

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Prevalence and Determinants of Household Access to Improved Latrine Utilization in Somalia: Health Demographic Survey (SHDS) 2020

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ABSTRACT: The aim of this research paper is to determine the prevalence of improved household latrine utilization and its determinants in Somalia, using the Somali Health Demographic Survey (SHDS) 2020 dataset. Limited sanitation is a major global problem mainly for the poor and disadvantaged. According to the SHDS 2020 report, around 22.3% of households in Somalia utilize unimproved toilet facilities. In this study, a secondary data analysis was carried out on the SHDS 2020 dataset. The study included 15 826 households weighted for representativeness. Four models were constructed after identifying relevant factors for the outcome variable. The first model, null (empty), had no independent variables. The second model assessed the effect of individual-level determinants on the outcome. The third model determined how community-level variables influenced on the response variable. Finally, a multilevel multivariable logistic regression model examined the combined impact of individual- and community-level factors on the outcome variable. The prevalence of improved latrine utilization in Somalia was (41.1%). The factors: educational status (AOR: 1.899 (1.598, 2.258)), wealth index (AOR: 7.815 (6.990, 8.736)), urban residence (AOR: 2.467 (2.262, 2.690)), households living in various regions/states, including Hirshabelle, Galmudug, Southwest, Puntland, Jubaland, and Somaliland, indicate statistically significant findings and were more likely to utilize improved latrines (AOR: 0.259 (0.229, 0.294)), (AOR: 0.223 (0.196, 0.254)), AOR: 0.196 (0.168, 0.230)), (AOR: 0.220 (0.194, 0.251)), (AOR: 0.204 (0.180, 0.232)), (AOR: 0.086 (0.077, 0.095)). Hirshabelle had a 0.259 times more likelihood of improved latrine utilization than the rest of the regions/states, (AOR: 0.259 (0.229, 0.294)). The prevalence of improved latrine utilization was quite low in Somalia. Higher wealth index, living in more urbanized areas, and the household head's educational status were all significant predictors of improved latrine utilization. The finding implies a need to increase household's access to latrine facilities and improve latrine utilization, particularly for rural households in the country.

KEYWORDS: Prevalence, determinants, latrine utilization, Somalia

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Introduction

Globally, over 2.5 billion people worldwide lack access to adequate sanitation and hygiene. Poor water, sanitation, and hygiene contribute to around 4% of the disease burden and fatalities. Open defecation was prevalent in rural areas, particularly in southern Asia and Sub-Saharan Africa. This was attributed to inadequate sanitation and hygiene practices. In Sub-Saharan Africa, around one-third of the population lacks access to adequate hygiene and sanitation services.[1] Sanitation is the provision of facilities for the safe disposal of human waste and urine, as well as hygiene behaviors such as a safe toilet and soap-based handwashing. Many infectious disease pathogens originate in human excreta. The availability of proper defecation facilities is critical to maintaining people's dignity, safety, health, and well-being. Despite general understanding that adequate sanitation is necessary for better health, welfare, and economic productivity, progress in lowering the burden of sanitation-related illnesses in underdeveloped nations has been slow.[2] In locations with low resources, insufficient sanitation facilities greatly increase the risk of different disorders including health risks, safety concerns, and a loss of dignity and well-being. The provision of appropriate toilet facilities is critical for upholding human dignity, guaranteeing safety, encouraging good health, and improving general well-being. Insufficient water supply and sanitation cause major worldwide economic losses. Approximately 2 billion people worldwide do not have access to basic sanitary facilities. Latrine use is the continuous and regular use of existing latrines for the safe disposal of human excrement.[3] In Somalia, 22.3% of households have unimproved sanitation facilities that fulfill the necessary standards for effective human waste disposal. These facilities are critical for meeting basic necessities, protecting human rights, maintaining personal cleanliness, preserving dignity, and preventing infections (SDHS survey 2020). Inadequate disposal of human excreta and poor personal cleanliness have been linked to a variety of ailments, including diarrhea. Improved sanitation can reduce diarrheal illness by more than a third as well as dramatically reduce the negative health effects of various ailments that kill and sicken millions of children in impoverished nations.[4] Latrine ownership is one of the most important variables controlled by a number of behavioral, cultural, social, geographical, and economic elements within the society.[5] An enhanced sanitation facility is one that safely separates human excreta from human touch. Improved sanitation facilities for

excreta disposal include flushing or pouring into a piped sewage system, septic tank, or pit latrine, ventilated improved pit latrines, pit latrines with slabs, and the use of a composting toilet. The SHDS defines improved toilets as ones that flush or dump into a piped sewer system or septic tank.[6] A household is considered to have a basic toilet facility if the toilet is used by only one member of the household (it is not shared) and the facility used by the household separates waste from human contact, as proposed by the United Nations Children's Fund (UNICEF, WHO report 2012). Because of the fast population expansion in urban areas of most developing nations, the disadvantaged and marginalized wind up residing in informal settlements where basic sanitation coverage is substantially lower than the norm for urban regions.[7]

In Ethiopia, just 51.5% of health care institutions employ improved sanitation facilities, and inadequate WASH accounts for 60% of the communicable disease burden, with more than 250 000 children dying from WASH-related infections each year.[5] Ethiopia Demographic and health survey report 2016 indicates 56% of rural households use unimproved toilets.[8] Similarly, a comprehensive evaluation done in Ethiopia discovered a significant frequency of trachoma related with inadequate toilet usage.[3] Diarrheal infections kill over 88% of people in poorer nations due to inadequate sanitation, contaminated drinking water, and poor hygiene practices. Improved sanitation has the potential to lower the global incidence of diarrheal illness, a primary cause of infant mortality, by one-third. It can also help minimize parasite diseases that impair child development.[9] Safe drinking water, sanitation, and hygiene are crucial for human health and well-being. Ensuring clean WASH (Water, Sanitation, and Hygiene) not only promotes excellent health, but also improves livelihoods, school attendance, and dignity. Inadequate access to clean water, inadequate sanitation facilities, and poor hygiene habits create perfect conditions for the onset and spread of a variety of dangerous disorders.[8] In many underdeveloped countries, inadequate waste disposal poses a substantial health risk. The majority of people rely on insufficient sanitation services and indulge in open defecation, with rural regions severely impacted.[10] A lack of sanitary amenities, including as latrines, water, and a secure waste disposal system, encourages individuals to perform open defecation and toss dirt around, resulting in pollution.[11]

Poor sanitation is a global issue that disproportionately affects disadvantaged and impoverished people, leading to lower school attendance, anxiety, stunting, and cognitive function.[7] Our study used the SHDS 2020 data set to identify the prevalence and factors influencing improved latrine utilization among households in Somalia. According to our findings, 41.1% of households had improved latrines. This result is lower than that of low-income informal settlers in East African cities.[7] This may be attributed to variations in study settings, sample populations, and socioeconomic development of nations. The results also indicate that inequalities in access to improved water supply and sanitation exist between the rich and the poor households both in the rural and urban areas. Moreover, in the rural areas inequalities in access to improved water supply are higher than in the urban areas. Access to improved water sources and sanitation is more concentrated in the rich households than the poor ones.[12] However, inequalities in access to improved sanitation are higher among the urban households compared to the rural households.[12] These findings observe that despite some progress in access to improved water sources and sanitation, stark disparities between the rich and the poor still exist. However, the concentration indices indicate that there is no statistical difference between female and male headed households (WHO, UNICEF, 2014 report-https://www.unicef.org/reports/2014-annual-results-reports). Poor water supply, sanitation, and hygiene (WASH) measures provide ideal circumstances for the spread of several infectious illnesses connected to hunger.[13]

The WHO-UNICEF Joint Monitoring Programme for Water Supply and Sanitation's (JMP) strategy to monitoring sanitation development has had a significant impact. JMP sanitation monitoring collects data on coverage and household use to a limited extent (WHO-UNICEF, 2015). Governments, international development organizations, urban planners, and sanitation practitioners have a hard task of improving public access to sanitation services as the globe becomes more urban.[14] Basic sanitation systems include latrines, on-site disposal, and alternative sanitation systems, as well as incentives for households and communities to invest in the building of these facilities. Because of its cheap cost and accessibility by individuals and communities in unserved and non-networked locations, assistance to basic water and sanitation systems can serve as a proxy indicator for help that reaches previously unserved populations and the poor. In 2015, development aid to basic systems accounted for $1.9 billion of the $7.4 billion (25%) in water and sanitation ODA expenditures. Aid for basic systems increased from $1.4 billion in 2010 to $1.9 billion in 2015, albeit at a slower rate than overall disbursements for water and sanitation.[15] Sanitation is thought to be essential to human health. However, many individuals, particularly those with limited resources, do not have access to sanitation. Approximately 946 million people utilize open defecation, with 9 out of 10 living in rural areas. Almost 60% of the world's open defecators live in India, with the majority in rural areas.[16]

Conceptual Framework

The dependent variable (outcome) was improved latrine utilization and independent variables classed as individual and community-level determinants. Individual-level characteristics included age of household head, gender, education, wealth index of household head, and location of water source while the variables of residency and region were analyzed as community-level determinants.[3] Latrine associated variables were assessed using 2 methods: direct observation and self-report. Factors observed were the kind of latrine, its condition, the presence of feces near the pit or floor, location, squat hole cover, slab sealing

material, and the existence of walls, roof, and door. Latrine variables studied in self-reported of study research participants include the method of disposing of feces of under-five children, the number of years since the latrine was built, and the number of times a latrine was built. Additionally, the distance between the latrine and the home was measured in meters.[17]

Operational Definition

Latrine utilization refers to households with functional latrines that show signs of use, such as a functional footpath, fresh feces around the squat hole, no spider weave in the gate, wet slab, visible anal cleansing materials, and the presence of flies.[2] Latrine utilization also refers to the frequent use of latrines for safe excreta disposal.[11] Improved sanitation facilities (latrines) are those that hygienically segregate excreta from human touch. There are 2 types of sanitation technologies: wet (flush and pour flush toilets connected to sewers, septic tanks or pit latrines) and dry (ventilated improved pit latrines, pit latrines with slabs, or composting toilets).[18] In households with shared or private latrines, under-five children's feces should be disposed of in a latrine. There should be no visible feces in the compound, no fresh feces on the inner side of the squatting hole, and a clear footpath to the latrine without obstacles.[18] Latrine use include utilizing a latrine to excrete feces and pee, as well as to dispose of children's excreta. Functional latrine - a latrine that supplied services during data collecting, even if it needed to be maintained. Latrine maintenance entails repairing the current working latrine in the event of a broken sub or superstructure without excavating a new pit. Self-initiation: the construction of a latrine without external influence by previously conscious families.[19] Access to hand washing facilities: the presence of hand washing facilities at the entrance or near the lavatory. A Child-friendly feature of a latrine facility includes at least one of the following features: a tiny squatting hole, a lower seat, and the existence of a toilet.[20] Unsatisfactory toilet utilization refers to households that do not meet the standards for satisfactory latrine utilization.[21] The Source of drinking water were classified as improved (Piped into dwelling, Piped into yard/plot, Piped to neighbor, Public tap/Stand pipe, Tube Well or Borehole, Protected Well, Protected Spring, Rainwater and Bottled Water and Unimproved (Unprotected Well, Unprotected Spring, Tanker/Truck, Cart with small tank, Water Kiosk, Surface water (River/Dam/Lake/Pond/Stream/Canal/Mugsiid) and Others (SHDS 2020 report).A clean latrine is one that is not full, has no visible feces, and has no anal cleansing substance on the floor.[22]

Methodology and Data Source

This study analyzed dataset from the Somalia Health Demographic Survey (SHDS 2020), which collected information from urban, rural, and nomadic locations throughout the nation. It is a nationally representative survey conducted by the Somalia National Bureau of Statistics between January 2018 and February 2019.[23] The survey was performed across 16 out of 18 Somalia's regions. Lower Shabelle and Middle Juba regions, were completely excluded from the survey due to security reasons. Each of the 18 pre-war geographical regions in Somalia was stratified into urban, rural, and nomadic areas, with the exception of the Banadir region which was considered completely urban.[24] A final total of 47 sampling strata was accessible to conduct the survey. Somalia is located in the Horn of Africa and has a population of more than 12.3 million people (Population Estimation Survey [PESS] 2014). The unit analysis of this survey is households. Three types of questionnaires were used in the SHDS 2020. The Household Questionnaire, the Ever-married Woman's Questionnaire and the Never married Woman's Questionnaire. Each EA created had a minimum of 50 and a maximum of 149 dwelling structures. A total of 10 525 EAs of this kind, also referred to as primary sampling units (PSUs), were digitized 7488 in urban areas and 3037 in rural areas. However, because of security and accessibility constraints, not all digitized areas were included in the final sampling frame 9136 PSU (7308 in urban and 1828 in rural) formed the final frame. All households in each of the allocated 10 PSUs were serialized based on their location in the PSU and 30 of these households were selected systematically for a survey like a Health Demographic Survey (HDS). The serialization was done to ensure that households selected for interview would distribute throughout the PSU. the SHDS followed a three-stage stratified cluster sample design in urban and rural strata with a probability proportional to size, for the sampling of Primary Sampling Units (PSU) and Secondary Sampling Units (SSU) (respectively at the first and second stage), and systematic sampling of households at the third stage. The nomadic frame comprised an updated list of temporary nomadic settlements (TNS) obtained from the nomadic link workers who are tied to these settlements. A weighted sample of 15 826 individuals from households was conducted in the analysis. More details regarding the methodology and sampling techniques can be found in the SHDS 2020 report and guide. A total of 2521 TNS formed the SHDS nomadic sampling frame. For the nomadic stratum, a two-stage stratified cluster sample design was applied with a probability proportional to size for sampling of PSUs at the first stage and systematic sampling of households at the second stage. A total of 16 360 households were selected for the sample, of which 15 870 were occupied. Of the occupied households, 15 826 were successfully interviewed, yielding a response rate of 99.7%. The SHDS 2020 interviewed 16 486 women 11 876 ever-married women and 4610 never-married women.[6] The survey was designed with the express goal of gathering viewpoints from both nomadic populations and individuals living in urban and rural regions, with a focus on understanding their distinct needs and concerns.[25]

Statistical Analysis

The data was gathered, processed, and subsequently analyzed with statistical software of Statistical Package for the Social

Sciences (SPSS) version 27. During the analysis, a sampling weight was employed to compensate for the survey's unequal distribution of samples across strata and regions, ensuring that the data accurately reflected the population. To effectively summarize the findings of this study, we employed descriptive statistics such as weighted frequencies and other summary measures to describe the characteristics of the study population. A multilevel multivariable logistic regression analysis was employed in the study to identify statistically significant factors associated with improved latrine utilization. The purpose of this investigation was to find the parameters that had a statistically significant association with increased latrine utilization. We fitted 4 models based on the relevant factors for the outcome. The first model, the null model, was created without any individual or community level factors. The Model II, included the effects of individual-level variables on the response variable. The third model (Model III) investigated the impact of community-level variables on the response variable. The final model analyzed the impacts of both individual and community-level variables. Out of the 4 fitted models, the better model was chosen based on Akaike information criterion (AIC) statistics, which measure model fitness. A model with a lower Akaike information criterion value was considered to be a better fit for this study. The adjusted odds ratio with 95% confidence interval was utilized to assess the strength of connection between independent factors and improved latrine usage.[3]

Findings of the Study

Socio-economic and demographic characteristics of respondents

In this study, a total of 15 826 households (weighted) were examined in the analysis. Approximately 10 575 (66.8%) of the participants were males while 5251 (33.2%) were females. The average age of the respondents was 44 with SD (±16 years). Regarding education status, about 12 410 (78.4%) of survey participants were uneducated, 1492 (9.4%) and 1017 (6.4%) were in primary and secondary levels respectively and about 907 (5.7%) were higher education. In terms of economic status (wealth index) category, about 8833 (55.8%) of the respondents were poor, 2745 (17.3%) were in the middle wealth index group, and 4248 (26.8%) were rich (Table 1). According to region of residence, about 6077 (38.4%) of the respondents were from Cluster 1 followed by Cluster 6 1769 (11.2%) while the lowest regions were including in Cluster 5 1078 (6.8%). By residence, about 6427 (40.6%) of the respondents were living in urban areas while 9399 (59.4%) living in rural areas.

Table 1. Socio-demographic and economic characteristics of respondents, SHDS 2020.

VARIABLE	CATEGORY	WEIGHTED FREQUENCY	WEIGHTED PERCENT
Sex	Male	10575	66.8
	Female	5251	33.2
Age (y)	<40	8187	51.7
	⩾40	7639	48.3
Education	No education	12410	78.4
	Primary	1492	9.4
	Secondary	1017	6.4
	Higher	907	5.7
Wealth index	Poor	8833	55.8
	Middle	2745	17.3
	Rich	4248	26.8
Location of water source	In own dwelling	924	5.8
	In own plot/yard	1326	8.4
	Elsewhere	13576	85.8
Residence	Urban	6427	40.6
	Rural	9399	59.4
Region	Cluster 1	6077	38.4
	Cluster 2	1745	11.0
	Cluster 3	1742	11.0
	Cluster 4	1695	10.7
	Cluster 5	1078	6.8
	Cluster 6	1769	11.2
	Cluster 7	1720	10.9

We have consolidated the regions into 6 clusters due to sensitivity and the extensive range of options within the variable region: Cluster 1 (Awdal, Woqooyi Galbeed, Togdheer, Sool, and Sanaag), Cluster 2 (Bari and Nugaal), Cluster 3 (Galgaduud and Mudug), Cluster 4 (Hiraan and Middle Shabelle), Cluster 5 (Bay and Bakool), Cluster 6 (Gedo and Lower Juba), and lastly Cluster 7 (Benadir).

Latrine coverage and type of latrine facilities in Somalia

According to Table 2, 6499 (41.1%) of households experienced an improvement in their latrine facility. Around 58.9% of households, equivalent to 9327, had latrines that were not improved. Additionally, almost 6169(39%) of households shared a toilet with other households. In terms of toilet facility location inside homes, it was found that 30.3% (4797 households) had a toilet facility in their own household. For 19.9% of households (3146), the toilet was on their own yard or plot. Furthermore, around 10.8% (roughly 1707 households) had the toilet facility located elsewhere. The majority, 81.4%, or 12 882 households, reported that five or more households shared a toilet. A small number of respondents, 0.1%, or 13 households, had no idea how many households shared a toilet.

The most common type of latrine used in Somali households is the pit latrine with slab, followed by the pit latrine without slab/open latrine. Approximately 6064 (38.3%) of households did not have latrine facility or a toilet, instead relied on bush or open fields for defecation (Figure 1).

Table 2. Latrine coverage and related conditions in Somalia, SHDS 2020.

VARIABLES	CATEGORY	WEIGHTED FREQUENCY	WEIGHTED PERCENT
Type of latrine facility	Improved	6499	41.1
	Unimproved	9327	58.9
Share toilet with other households	Yes	6169	39.0
	No	9657	61.0
Number of households shared toilet	Don't know	13	0.1
	<5 households	2931	18.5
	⩾5 households	12882	81.4
Location of toilet facility	In own dwelling	4797	30.3
	In own yard/plot	3146	19.9
	Elsewhere	7883	49.8

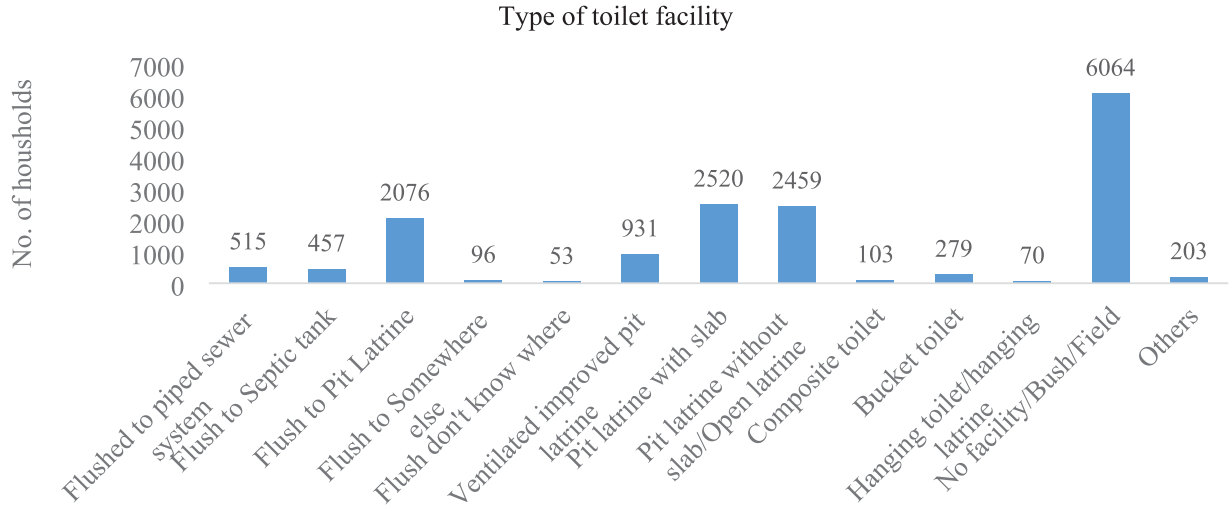

Figure 1. Type of toilet facility in Somali households, SHDS, 2020.

Source of water supply and means of communication for the households

As seen in Table 3, piped water entering the dwelling was the major source of drinking water for 3330 (21%) of households. About 2335 (14.8%) of households drew water from unprotected wells, while a minimum of 1.0% (155) used water kiosks. Concerning the location of the drinking water source, the majority of households, 53.7% (8491), acquired water from sources located outside their dwellings. Furthermore, 8.4% (1326) possessed water sources on their own plot or yard (Table 3).

Determinants of improved latrine utilization in Somalia

The multilevel multivariable analysis revealed that the educational status of the household head, wealth index, location residence and living in regions of Somalia were significantly associated predictors for improved latrine utilization in Somalia. Educated household heads were more likely to use improved latrines than those without an education. Furthermore, household heads with secondary education were approximately twice more likely to utilize improved latrines as those with no education (AOR = 1.899; 95% CI (1.598, 2.258)). Households with a rich wealth index were significantly more likely to utilize improved latrines than those with a poor wealth index category (AOR: 7.815 (6.990, 8.736)). As the household wealth index increased, the utilization of improved latrines was also increased. Additionally, households in urban areas were shown to be three times more likely to use improved latrines than those in rural areas, with an (AOR: 2.467 (2.262, 2.690)). All households living in various regions including (Cluster 1-7), indicates statistically significant findings and were less likely to utilize improved latrines (AOR: 0.259 (0.229, 0.294), (AOR: 0.223 (0.196, 0.254), (AOR: 0.196 (0.168, 0.230), (AOR: 0.220 (0.194, 0.251), (AOR: 0.204 (0.180, 0.232), (AOR: 0.086 (0.077, 0.095), as seen in Table 4).

Discussion

Safe drinking water, sanitation, and hygiene are crucial for human health and well-being.[26] Ensuring clean WASH (Water, Sanitation, and Hygiene) not only promotes excellent health, but also improves livelihoods, school attendance, and dignity.

Table 3. Source of water supply and means of communication for the household, SDHS, 2020.

VARIABLES	CATEGORY	WEIGHTED FREQUENCY	WEIGHTED PERCENT
Source of drinking water			
Improved			
	Piped into dwelling	3330	21.0
	Piped into yard/plot	1091	6.9
	Piped to neighbor	438	2.8
	Public tap/stand pipe	538	3.4
	Tube well or borehole	370	2.3
	Protected well	1535	9.7
	Protected spring	524	3.3
	Rainwater	977	6.2
	Bottled water	53	0.3
Unimproved			
	Unprotected well	2335	14.8
	Unprotected spring	590	3.7
	Tanker/truck	1978	12.5
	Cart with small tank	349	2.2
	Water Kiosk	155	1.0
	Surface water (River/Dam/Lake/ Pond/Stream/Canal/Mugsiid)	1338	8.5
	Others	223	1.4
Location of water source used for drinking	In own dwelling	924	5.8
	In own plot/yard	1326	8.4
	Elsewhere	13576	85.8

Additionally, it promotes resilient communities that thrive in healthy environments. Ensuring universal access to adequate sanitary facilities for all households is crucial.[26] Poor sanitation is a global issue that disproportionately affects disadvantaged and impoverished people, leading to lower school attendance, anxiety, stunting, and cognitive function.[7] Our study used the SHDS 2020 data set to identify the prevalence and factors influencing improved home latrine utilization in Somalia. According to our findings, 41.1% of household had improved latrines. This result is lower than that of low-income informal settlers in East African cities.[7] This diversity may be attributed to variations in study settings, sample populations, and socioeconomic development of nations. Household heads with secondary education were approximately twice more likely to utilize improved latrines as those with no education. This finding is consistent with previous research, which found that households with educated heads are more likely to use improved latrines than those without educated heads. This might be explained by stating that knowledge is has a crucial role in making more educated health decisions as well as making good use of resources to build and use improved latrines.[27] Households with a rich wealth index were significantly more likely to utilize improved latrines than those with a poor wealth index category. As the household wealth index increased, the utilization of improved latrines was also increased. This is because as household income rises, so will the amount of alternatives and possibilities available to them. So,households with a stable economy may afford the materials needed to build improved toilet facilities of higher quality than those in the low wealth index group.[3] Additionally, households in cities were approximately 3 times more likely to utilize improved latrines than those in rural regions. This result is consistent with prior study results.[28] This might be related to the fact that most people in rural areas utilized more water for agriculture than sanitation. In addition, financial constraints and a lack of awareness may be contributing factors to the underutilization of upgraded latrines in rural families.[28] All households in Somaliland, Puntland, Hirshabelle, Galmudug, Southwest, Jubland, and Benadir regions were more likely to utilize improved latrines. The finding is consistent with other investigations.[3,28] Our research also found that the likelihood of improved latrine utilization was

Table 4. Multilevel multivariable logistic regression analysis of determinants of improved latrine utilization using individual and community level factors, SHDS 2020.

VARIABLE	CATEGORY	LATRINE UTILIZATION		MODEL 2 (AOR, 95% CI)	MODEL 3 (AOR, 95% CI)	FINAL MODEL (AOR, 95% CI)
		IMPROVED (%)	UNIMPROVED (%)			
Sex	Male	4291 (40.6)	6284 (59.4)	1		1
	Female	2208 (42.0)	3043 (58.0)	1.088 (1.004, 1.179)		1.035 (0.949, 1.129)
Education	No education	4341 (35.0)	8069 (65.0)	1		1
	Primary	810 (54.3)	682 (45.7)	0.809 (0.713, 0.919)		**1.493 (1.305, 1.708)**
	Secondary	711 (69.9)	306 (30.1)	0.575 (0.488, 0.677)		**1.899 (1.598, 2.258)**
	Higher	637 (70.2)	270 (29.8)	0.672 (0.568, 0.796)		**1.584 (1.322, 1.897)**
Age	<40 y	3367 (41.1)	4820 (58.9)	1		1
	⩾40 y	3132 41.0)	4507 (59.0)	1.150 (1.068, 1.238)		0.990 (0.914, 1.073)
Wealth index	Poor	1501 (17.0)	7332 (83.0)	1		**1**
	Middle	1772 (64.6)	973 (35.4)	0.139 (0.126, 0.153)		**5.173 (4.647, 5.758)**
	Rich	3226 (75.9)	1022 (24.1)	0.085 (0.078, 0.094)		**7.815 (6.990, 8.736)**
Location of water source	In own dwelling	413 (44.7 %)	511 (55.3)	1		1
	In own plot/ yard/elsewhere	6086 (40.8)	8816 (59.2)	4.201 (3.924, 4.498)		1.184 (0.990, 1.416)
Residence	Urban	4511 (70.2)	1916 (29.8)		1	**1**
	Rural	1988 (21.2)	7411 (78.8)		7.687 (7.085, 8.340)	**2.467 (2.262, 2.690)**
Region	Cluster 1	1700 (28.0)	4377 (72.0)		0.721 (0.668, 0.779)	**0.086 (0.077, 0.095)**
	Cluster 2	853 (48.9)	892 (51.1)		0.257 (0.228, 0.290)	**0.220 (0.194, 0.251)**
	Cluster 3	796 (45.7)	946 (54.3)		0.301 (0.267, 0.340)	**0.223 (0.196, 0.254)**
	Cluster 4	710 (41.9)	985 (58.1)		0.368 (0.326, 0.415)	**0.259 (0.229, 0.294)**
	Cluster 5	371 (34.4)	707 (65.6)		0.911 (0.792, 1.047)	**0.196 (0.168, 0.230)**
	Cluster 6	625 (35.3)	1144 (64.7)		0.517 (0.459, 0.583)	**0.204 (0.180, 0.232)**
	Cluster 7	1444 (84.0)	276 (16.0)		1	**1**
AIC				**16646**	**17709**	**14550**

Bold indicates statistically significant findings.
We have consolidated the regions into 6 clusters due to sensitivity and the extensive range of options within the variable region: Cluster 1 (Awdal, Woqooyi Galbeed, Togdheer, Sool, and Sanaag), Cluster 2 (Bari and Nugaal), Cluster 3 (Mudug and Galgaduud), Cluster 4 (Hiraan and Middle Shabelle), Cluster 5 (Bay and Bakool), Cluster 6 (Gedo and Lower Juba), and lastly Cluster 7 (Benadir).

higher in the Benadir area than in other regions/states of the country. This might be because it is a large administrative city or capital of the nation, and the households that live there are more likely to have access to improved toilet facilities than other locations in the country. Because of its size and status as a capital city, sanitation services receive a lot of attention.

Study Limitations

This multilevel study utilized weighted evidence from the SHDS 2020 dataset to investigate the prevalence and determinants influencing improved latrine facilities. However, it is crucial to emphasize that our findings are restricted since the Somali Health Demographic Survey did not include some predictor factors associated to improved toilet utilization.

Conclusion and Recommendations

Improved latrine utilization is quite low in Somalia. Key characteristics related with increasing utilization include the educational level of the household head, higher wealth index, and living in an urban area. Our findings show that the availability and usage of improved sanitation facilities falls short. The study underlines the need of increasing latrine availability and usage in households. Based on our findings, we recommend that there is a need to increase household's access to latrine facilities and improve latrine

utilization, particularly for rural households in the country. Furthermore, we recommend raising community knowledge of proper sanitation and hygiene through health education programs in order to promote healthy behaviors. Also, we recommend conducting future study with survey data from several countries, such as merging Demographic Health Survey data from different nations for comparative analysis. Finally, this study recommends designing strategies to increase the income of low-income households in accessing better latrine utilization practices.

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Author Contribution

Hassan Abdi Ahmed was responsible for writing the introduction of the manuscript, the methodology, data extraction, statistical analysis, first draft preparation of the manuscript. Dahir Abdi Ali handled the conceptualization and design of the manuscript, analyzed the dataset using multilevel multivariable logistic regression, interpreted the findings, and reviewed the first draft. All authors read and approved the final manuscript.

Ethical Approval and Consent to Participate

The dataset for this study was gathered from the SHDS 2020. The dataset was downloaded from SNBS microdata portal after explaining the purpose of the study. The data sets acquired from the SHDS program were kept secret and did not include the participants' personal identifiers. The SHDS dataset was publicly available upon reasonable request at https://microdata.nbs.gov.so/index.php/catalog/50/get-microdata. The research follows the Declaration of Helsinki.

Data Availability

The dataset used or analyzed in the current research study is accessible from the corresponding author upon reasonable request/purpose.

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