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Determinants of Household Access to Improved Sanitation in Burkina Faso

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Abstract

Despite investments made by the Burkinabe authorities in the water and sanitation sub-sector, household access to sanitation services remains a major challenge. The objective of this study is to analyze the main factors explaining household access to improved sanitation in this country. To this end, we used validated data from the National Water, Hygiene, and Sanitation Survey (MEEA, 2025). These data cover 11,348 households across all regions of Burkina Faso. The data on the sanitation section covers 8245 households. We used data from these households to estimate. The survey adopted a three-stage stratified sampling. We used the processed and validated data. We specified and estimated a logit model, leading to the following results: economic factors, sociodemographic factors, and service delivery conditions significantly influence access to improved sanitation in Burkina Faso. In light of these results, the study suggests combining a policy to improve household incomes with a policy to improve sanitation services. It is therefore important to: 1) support household investments in the circular economy, 2) establish a mechanism for targeting interventions to reduce inequalities, 3) increase the construction of sustainable sanitation facilities adapted to local realities, 4) modernize traditional concrete slab facilities, and 5) develop education programs on best sanitation practices.

Keywords

Sanitation, Households, Burkina Faso

1. Introduction

Access to hygiene and sanitation remains a challenge in certain regions of the world. In Burkina Faso, access to improved sanitation is a priority for the authorities. As part of its remit, the Ministry of Environment, Water, and Sanitation

(MEEA) is working to ensure sustainable access to this service for the population. This is reflected in the Ministry's sectoral policy on "Environment, Water, and Sanitation (PS-EEA, 2018-2027)" of the country (MEEA, 2018). In this country, MEEA interventions have led to progress in the sanitation sub-sector. The rate of access to sanitation in rural areas rose from 9.0% in 2014 to 22.7% in 2023 (MEEA, 2023). In urban areas, this rate rose from 15.1% in 2017 to 40.5% in 2023 (MEEA, 2023).

However, this increase is relatively low compared to the target set internationally. Indeed, Goal 6 of the Sustainable Development Goals (SDGs) aims to achieve "universal and equitable access to water, hygiene, and sanitation by 2030, especially for vulnerable populations." In addition, there are regional disparities in terms of access to hygiene and sanitation in Burkina Faso. In urban areas, 40.70% of the population has safely managed access, compared to 10.77% in rural areas (MEEA, 2025). The Central region stands out with the highest proportion of the population with safely managed access (46.13%), compared to 4.64% in the Sahel (MEEA, 2025). Despite investments made by the Burkinabe authorities and their development partners, the number of sanitation facilities remains relatively low. The number of improved family latrines built in rural areas between 2014 and 2023 is estimated at 184,923 (MEEA, 2023) for an estimated rural population of 15,089,674 in 2019 (MEFD, 2019). The number of latrines built in public places in rural areas over the same period is estimated at 2298 (MEEA, 2023). As a result, only 7.7% of the population mainly uses improved sanitation facilities (VIP latrines, flush toilets, and ECOSAN latrines) in Burkina Faso (MEEA, 2025). In addition, 22.63% of the population still practices open defecation (MEEA, 2025). These difficulties, combined with low household living standards, especially in rural areas, may explain the lack of access to sanitation.

Studies have addressed the main determinants of access to sanitation in certain contexts (Kumar, Guthi, Kondagunta, & Subash, 2024; Gurung et al., 2023; Kalaga, Sodore, & Zoungrana, 2022; Adil, Nadeem, & Malik, 2021; Gebremichael, Yismaw, Tsegaw, & Shibeshi, 2021; Schiel, Wilson, & Langford, 2021; Agbadi, Darkwah, & Kenney, 2019; Mulenga, Bwalya, & Chishimba, 2017; Sintondji, Vissin, Dan, Yovo, & Amouzouvi, 2017). These studies highlight the role of economic, sociodemographic, physical, geographic, and cultural factors in explaining access to sanitation. However, despite its importance for improving people's living conditions, very few nationwide studies have focused on the factors that explain the use of sanitation services in Burkina Faso.

It is therefore important to analyze the factors likely to affect households' access to improved sanitation in Burkina Faso. This study seeks to answer the following question: What are the main factors determining household access to improved sanitation in Burkina Faso? The study, therefore, aims to analyze the factors influencing household access to improved sanitation in Burkina Faso. It assumes that: 1) a low household standard of living reduces its chances of accessing improved sanitation, 2) a low level of household education reduces its chances of

accessing improved sanitation, and 3) self-financing of the main household sanitation facility limits its access to improved sanitation. The rest of the study is organized into four parts: a review of the literature, the methodological approach, the analysis of the results, and the conclusion.

2. Literature Review

Studies have documented the determinants of access to sanitation in several contexts. Attributes (factors that characterize the demand for improved sanitation) play an important role in households' decisions regarding sanitation (Lancaster, 1966). Factors explaining access to sanitation include economic conditions, sociodemographic factors, and physical, geographical, and sociocultural factors (Kalaga, Sodore, & Zoungrana, 2022).

Some studies have highlighted the influence of economic factors on access to sanitation. In line with this, the literature has documented the role of income and the costs of accessing sanitation (Kumar, Guthi, Kondagunta, & Subash, 2024; Gurung et al., 2023; Mulenga, Bwalya, & Chishimba, 2017). According to this literature, an improvement in income or, more broadly, in living conditions increases the chances of households having access to improved sanitation. However, when the costs of accessing sanitation are high, the probability that households will opt for improved sanitation becomes relatively low. Wealthier households have better access to sanitation facilities in India (Kumar, Guthi, Kondagunta, & Subash, 2024). In India, households belonging to affluent groups have greater access to improved sanitation systems (Gurung et al., 2023). According to the results of a study in Zambia, access to improved sanitation is concentrated among the wealthiest households in both rural and urban areas (Mulenga, Bwalya, & Chishimba, 2017).

Beyond economic factors, research has emphasized the influence of sociodemographic factors on household access to sanitation (CROIX-ROUGE, 2024; Kumar, Guthi, Kondagunta, & Subash, 2024; Gurung et al., 2023; UNICEF, 2022; Adil, Nadeem, & Malik, 2021; Gebremichael, Yismaw, Tsegaw, & Shibeshi, 2021; Schiel, Wilson, & Langford, 2021; Agbadi, Darkwah, & Kenney, 2019; Mulenga, Bwalya, & Chishimba, 2017; Sintondji, Vissin, Dan, Yovo, & Amouzouvi, 2017). These factors include household size, household status (internally displaced persons (IDPs) or not), environment/area of residence, household culture, level of education, gender, age, and marital status of the head of household. According to this literature, urban households, those in subdivided areas, those headed by women or educated individuals, and those headed by adults are more likely to have access to improved sanitation. However, large households are less likely to use improved sanitation facilities. In the Indian context, households residing in urban areas, nuclear families, and households headed by women are strongly associated with better access to improved sanitation (Kumar, Guthi, Kondagunta, & Subash, 2024). In the same context, small urban households headed by older married women belonging to affluent groups with primary education have greater ac-

cess to improved sanitation (Gurung et al., 2023). In Punjab, social norms, place of residence, level of education, and ethnicity of the head of household influence households' access to improved sanitation, with social norms playing a particularly important role (Adil, Nadeem, & Malik, 2021). In Ghana, female-headed households are more likely to have access to improved toilets (Agbadi, Darkwah, & Kenney, 2019). The same is true for households whose head has at least an average level of schooling, is at least 35 years old, or is married (Agbadi, Darkwah, & Kenney, 2019). Rural households, households with at least seven members, and households that have reached at least an average level of wealth are also more likely to have access to improved toilets (Agbadi, Darkwah, & Kenney, 2019). Household socioeconomic status and access to education explain access to drinking water, hygiene, and sanitation in Benin (Sintondji, Vissin, Dan, Yovo, & Amouzouvi, 2017). IDP households have less access to sanitation. Indeed, insecurity and associated population displacement limit certain households' access to social services. This has caused unprecedented humanitarian problems for access to water, sanitation, and hygiene in Burkina Faso (UNICEF, 2022). In urban areas, massive population displacement has led to high concentrations around sanitation facilities in host cities (CROIX-ROUGE, 2024).

Furthermore, beyond the factors mentioned above in the literature, certain factors related to service delivery conditions can influence households' access to improved sanitation. These factors include the financing of the construction of the toilet, the availability of public latrines, ownership, location, and functionality of the household's main sanitation facility.

3. Study Methodology

As the dependent variable in our model is a categorical variable, the methodology of this study is based on the estimation of a logistic model. We used data from the national water, hygiene, and sanitation survey (MEEA, 2025). In this section, we present the model specification, the model variables (see **Table 1**), and the data source.

3.1. Model Specification

Household decisions regarding sanitation depend on economic and sociodemographic factors and service delivery conditions. According to Lancaster (1966), a good can have a vector of distinct attributes. These attributes may be present and combined with others. Consequently, the nature of the main sanitation facility, its state of functionality, and the possibility of contracting a disease are, among others, possible attributes. In view of the above, we specified a logit model describing the probability of using an improved sanitation facility.

3.2. Model Variables and Data Source

The variables used to implement the specified model are presented in **Table 1** below.

Table 1. Description of model variables.

Variables	Labels (name)	Definitions	Expected signs
Laa	Improved sanitation	Binary variable (it takes the value 1 if the household uses improved sanitation facilities: a VIP latrine, an ECOSAN latrine, or a flush toilet, and 0 otherwise).	
Niv_vie	Household standard of living	Qualitative variable (it takes the value 1) if the standard of living is low or very low, 2) if it is average, and 3) if it is high or very high)	+
Cou_ouv	Cost of constructing the facility	This variable measures in CFA francs the cost of constructing the main household sanitation facility (it takes the value 1) if the cost is low or very low, 2) if it is average, 3) if it is high or very high, and 4) if the household does not know the cost)	+
Household_size	household size	This variable gives the number of individuals in the household (it takes the value 1) if the household size is small, 2) if it is average, and 3) if it is large).	−
Sex_cm	Gender of head of household	Binary variable (it takes the value 1 if the head of household is female and 0 if male).	+
Niv_inst	Head of household education level	This variable assesses the head of household's level of education (it takes the value 1) if the head of household has no education, 2) if he has primary education, and 3) if he has secondary or higher education).	+
Mil_res	residential environment	Binary variable, which indicates the environment in which the household resides (it takes the value 1 for an urban environment and 0 for a rural environment).	+
Zon_res	area of residence	Binary variable, which indicates the area where the household resides (it takes the value 1 if the household resides in a subdivided area and 0 in an unsubdivided area)	+
Age_cm	age of the head of household	This variable measures the age of the head of household (it takes the value 1) if the head of household is young, 2) if he is an adult, and 3) if he is elderly).	+
Cat_soc	socio-professional category	Categorical variable (it takes the value 1) if the head of household is unemployed, 2) if he is a manual worker, 3) if he is a manager, and 4) if he is self-employed).	+
Sta_men	household status	Binary variable (it takes the value 1 if the household is a household of internally displaced persons (IDPs), and 0 otherwise)	−
Sit_mat	Marital status of the head of household	Qualitative variable (it takes the value 1 if the head of household is married, 2 if he is single, and 3 if he is widowed or divorced)	+
Emp_pla	Location of the household's main sanitation facility	Binary variable indicating the location of the household's main sanitation facility (takes the value 1 if the main facility is located in housing/Concession and 0 otherwise).	+
App_ouv	ownership of the household's main sanitation facility	Binary variable indicating the owner of the household's main sanitation facility (takes the value 1 if the main sanitation facility belongs to the household, and 0 otherwise)	+
Fin_ouv	Method of financing the construction of the main facility	Binary qualitative variable (takes the value 1 if the household finances the construction of its main sanitation facility itself or collaborates with other households, and 0 otherwise).	−
Fon_pla	Functionality of the household's main sanitation facility	Binary variable assessing the functional status of the household's main sanitation facility (takes the value 1 if the household's main sanitation facility is functional, and 0 otherwise)	+
Pro_pla	Ownership of the household's main sanitation facility	This variable is approximated by the frequency of cleaning of the main sanitation facility (takes the value 1) if the main sanitation facility is cleaned every day, 2) every 2 days, and 3) for other values (every 3 days, once a week, occasionally, never))	+

Continued

Sat_dlp	Households' assessment of the availability of public latrines	This variable assesses households' perceptions of the availability of public latrines in their localities (takes the value 1) if the household is satisfied, 2) if the household is moderately satisfied, 3) if the household is not at all satisfied, and 4 if the household does not know).	+

Source: Ouédraogo and Bassinga, March 2026.

The data for this study are from ENEHA (MEEA, 2025). Despite the difficult security situation in some localities, data collection covered the entire national territory.

4. Results and Discussion

The estimates from our model of household access to improved sanitation are summarized in the **Appendix** (see Table A1). Robustness tests performed in Stata confirm these results. We measured the ability of our logit classification model to correctly distinguish between two classes. The ROC curve (see Figure A1) illustrates this result. The Area Under the ROC Curve (AUC) value of our model is .79, indicating good discriminatory power. In other words, our model correctly classifies observations in 78.7% of cases. The model has a good ability to discriminate between positive and negative observations. This value, which is greater than .7, shows that the model has satisfactory predictive performance. This situation is very common in logit and probit models with microeconomic data. We also evaluated the model's classification performance using the confusion matrix (see Figure A2). This test yielded an overall success rate of 91.34%, indicating that the model correctly classifies 91.34% of observations. However, the model's sensitivity is low (1.84%), indicating a low ability of the model to detect positive cases. In addition, we analyzed the goodness of fit of our model using the link test (see Figure A3). The pseudo-coefficient of determination (Pseudo R^2 = .1433) indicates that the model has acceptable (correct) explanatory power. Although this value is relatively moderate, it is consistent with the values generally observed in logit and probit models applied to microeconomic data. By combining the different indicators, the pseudo-R^2 indicates an acceptable explanatory power, the AUC reveals a good discriminatory ability of the model, but the very low sensitivity underlines a poor performance in predicting positive events. As a result, although the model is generally relevant for analyzing the determinants of access to improved sanitation in Burkina Faso, its use for prediction purposes remains limited.

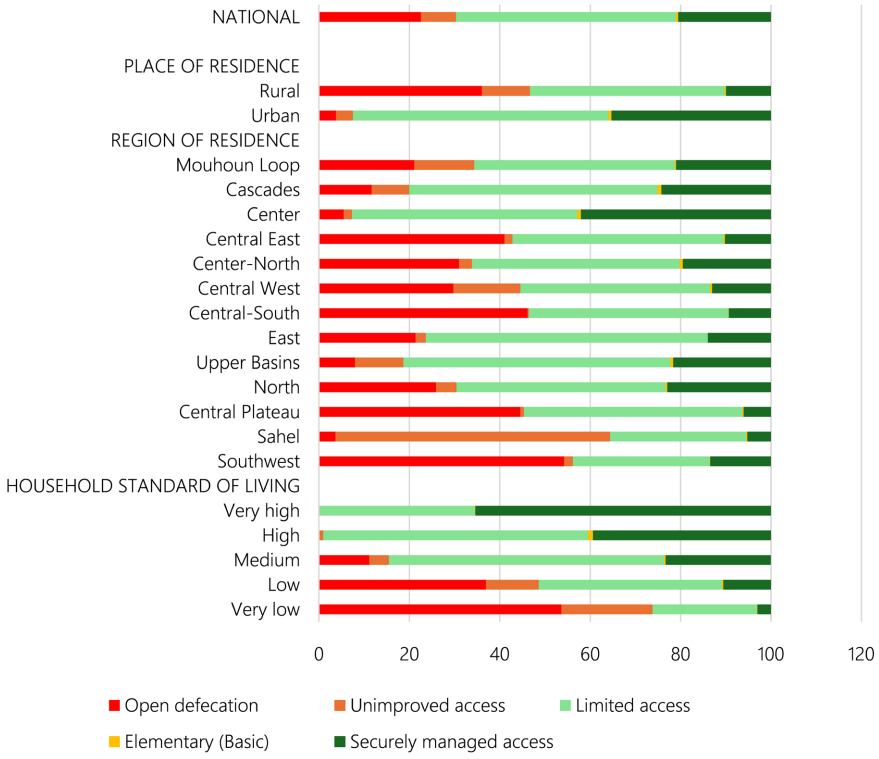
4.1. Access to Sanitation at the National Level According to Service Levels

In Burkina Faso, access to adequate sanitation services remains limited, particularly in rural areas. Despite the efforts of the government and its partners, a significant proportion of the population continues to practice open defecation, which can have consequences for the health and well-being of communities. Figure 1 illustrates the various details.

At the national level, 22.57% of households still practice open defecation, while 20.54% have access to safely managed sanitation. A significant proportion of households (48.7%) have limited access to sanitation. These statistics reveal significant challenges in achieving SDG 6 targets, particularly in certain areas of the country and among vulnerable populations.

At the regional level, disparities in access to sanitation are observed. The Center stands out with a high rate of access to safely managed sanitation (42.05%). Conversely, open defecation is more prevalent in the Southwest (54.25%), the Center-South (46.13%), the Center-East (47.92%), and the Central Plateau (43.82%). The Sahel region is characterized by a very high rate of unimproved access (60.78%) and a low rate of safely managed access (5.23%).

In urban areas, only 3.77% of households practice open defecation, compared to 30.05% in rural areas. Access to safely managed sanitation reaches 35.28% in urban areas, compared to 9.97% in rural areas.



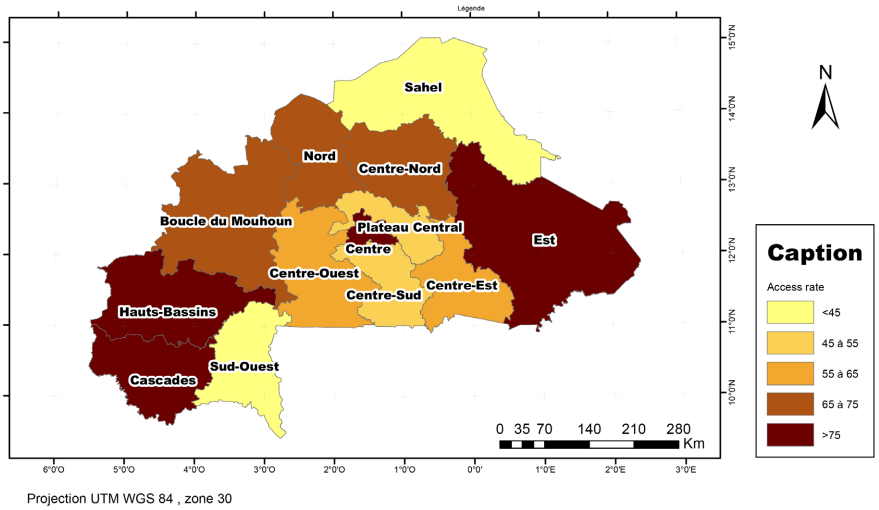
Source: Ouédraogo and Bassinga, March 2026, based on ENEHA data (MEEA, 2025).

Figure 1. Access to sanitation at the national level according to service levels.

Standard of living strongly determines access to sanitation. Half of households with a very low standard of living (53.61%) practice open defecation, while those with a very high standard of living overwhelmingly benefit from safely managed sanitation (65.42%). Households with an average (23.30%) and high (39.39%) standard of living also have access to safely managed sanitation. These results confirm the close link between poverty and lack of access to sanitation.

4.2. Overall Access to Improved Sanitation in Burkina Faso

At the national level, the rate of access to improved sanitation is estimated at 69.7% (MEEA, 2025). Although this is high compared to previous years, it remains low compared to the SDG target for 2030. **Figure 2** below illustrates the various details. There are regional disparities in access to sanitation. The central region has the highest rate (92.69%), followed by the Hauts-Bassins region (81.33%). Access to sanitation is lower in the Sahel (35.58%) and Southwest (43.82%) regions.



Source: Ouédraogo and Bassinga, March 2026, based on ENEHA data (MEEA, 2025).

Figure 2. Household access to sanitation (%) by region in Burkina Faso.

4.3. Effects of Economic Factors on Access to Improved Sanitation

The standard of living, calculated as part of the ENEHA (MEEA, 2025), provides an understanding of the economic situation of households. It takes into account household income, living conditions, and purchasing power. The estimated coefficient for this variable is positive and significant at the 1% threshold. Household standard of living is a key factor in household access to sanitation in Burkina Faso. Wealthier households are more likely to have access to improved sanitation than poorer households. This result is in line with the findings of a study conducted in India, where wealthier households had better access to improved sanitation than poor households (Kumar, Guthi, Kondagunta, & Subash, 2024). In the same context, the results of another study corroborate this conclusion. In India, households belonging to wealthy groups have greater access to improved sanitation systems (Gurung et al., 2023). A similar result is also observed in Zambia, where access to improved sanitation is concentrated among the wealthiest households (Mulenga, Bwalya, & Chishimba, 2017).

The estimated coefficient of the cost of the main sanitation facility is significant at the 1% threshold and positive. Improved sanitation infrastructure is associated with high implementation costs. This limits access to improved sanitation. This result is in line with our expectations. The cost of building the facility limits house-

holds' access to improved sanitation. When households bear the cost of constructing the facility, they tend to opt for an unimproved facility or practice open defecation. However, when households receive a subsidy or financing for the construction of the sanitation facility, they tend to opt for an improved sanitation facility.

4.4. Effects of Socio-Demographic Conditions on Access to Improved Sanitation

In addition to economic factors, certain sociodemographic factors influence households' access to improved sanitation. These include the household's place and area of residence, household size, level of education, socio-professional status, gender, marital status, and age of the head of household. However, household size, gender, and marital status of the head of household are not significant factors.

The coefficient for educational attainment is significant and positive for households whose head has a secondary or higher level of education. These households are more likely to have access to improved sanitation than those whose head has no education. The coefficient for place of residence is significant and negative. Households in urban areas are less likely to have access to improved sanitation than those in rural areas. The coefficient for the area of residence of households is also significant and negative, reflecting a higher probability of access to improved sanitation among households in non-subdivided areas compared to households in subdivided areas. These results on the place and area of residence are contrary to our expectations. However, unplanned urbanization could explain this result. Indeed, in many urban and subdivided areas, the construction of improved sanitation facilities lags behind urbanization. The coefficients for the age of the head of household are significant and positive for older heads of household. These categories of households are more likely to use improved sanitation facilities than households headed by younger (less aged) individuals. The coefficient for the socio-professional category of the head of household is significant and positive for heads of households who are self-employed. Households in this category have better access to improved sanitation than those who are unemployed. The various results are broadly in line with our expectations. Studies have found similar results in other contexts. In Ghana, for example, households whose head has at least an average level of schooling are more likely to have access to improved toilets (Agbadi, Darkwah, & Kenney, 2019). The same is true for households whose head is at least 35 years old (Agbadi, Darkwah, & Kenney, 2019). In addition, rural households are also more likely to have access to improved toilets (Agbadi, Darkwah, & Kenney, 2019). In contrast, in India, large urban households are more likely to have improved sanitation (Gurung et al., 2023). Similarly, in the Indian context, for households residing in urban areas, small households are associated with better access to improved sanitation (Kumar, Guthi, Kondagunta, & Subash, 2024). Furthermore, in Punjab, the place of residence and the level of education of the head of household influence households' access to improved sanitation,

with social norms playing a particularly important role (Adil, Nadeem, & Malik, 2021). In Benin, the socioeconomic status of households and access to education explain access to sanitation in this country (Sintondji, Vissin, Dan, Yovo, & Amouzouvi, 2017).

4.5. Effects of Service Delivery Conditions on Access to Improved Sanitation

In this section, we analyze the influence of certain factors related to service delivery conditions, namely: the method of financing the construction of the main household sanitation facility, households' assessment of the availability of public latrines, and the location, ownership, functionality, and maintenance of the main household sanitation facility.

The coefficient for the method of financing is significant and negative. Self-financing the construction of the main sanitation facility limits households' access to improved sanitation. Households that have to finance the construction of the main sanitation facility themselves tend to choose the least expensive options, particularly unimproved facilities. The coefficient for the assessment of the availability of public latrines is significant and negative. Households that are dissatisfied or moderately satisfied with the availability of public latrines have less access to improved sanitation than satisfied households. The coefficient for the location of the household's main sanitation facility is significant and negative. Households whose main sanitation facility is located on their property have less access to improved sanitation than households whose main sanitation facility is located off their property. The coefficient for the functionality of the main sanitation facility is also significant and positive. Households whose main sanitation facility is functional have better access to improved sanitation than households whose facility is not functional. The coefficient for ownership of the main sanitation facility is significant and positive. Households whose main sanitation facility is clean (cleaned every day or after each use) have better access to improved sanitation than households whose main sanitation facility is dirty. The coefficient for household ownership of the facility is also significant and positive. Households that own their main sanitation facility have better access to improved sanitation than households that do not own their main sanitation facility. Studies on access to sanitation have paid less attention to these service delivery conditions. However, these factors have a significant impact on access to improved sanitation, especially in the context of Burkina Faso.

4.6. Limitations of the Study

Despite the results obtained, our study has some limitations. The data used covers only one year (2025), thus limiting the scope of the conclusions. In addition, the data on satisfaction variables come from household statements and may therefore be subjective. Finally, our study took into account insecurity and population displacement in certain areas of the country (through the variable "Sta_men"), but

the results have limitations.

5. Conclusion

Despite the initiatives undertaken in Burkina Faso in the sanitation sector, some households still have difficulty accessing this service. This research aimed to highlight the key factors influencing household access to improved sanitation in this country. By estimating a logit model using ENEHA (MEEA, 2025) data, the study yielded the following main results: socioeconomic conditions, sociodemographic factors, and service delivery conditions determine access to improved sanitation in this country.

In light of these findings, the study suggests combining a policy to improve household incomes with a policy to improve sanitation services. It is therefore important to: 1) support household investments in the circular economy, 2) establish a mechanism for targeting interventions to reduce inequalities, 3) increase the construction of sustainable sanitation facilities adapted to local realities, 4) modernize traditional concrete slab facilities, and 5) develop education programs on best sanitation practices.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Table A1. Summary of estimation results.

Variables	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
Standard of living (Niv_vie)						
Average	**.3962419**	.1143986	3.46	**.001**	.1720246	.6204591
High	**1.725.436**	.1630014	10.59	**.00**	1,405,959	2,044,912
Cost of constructing the main structure (Cou_ouv)						
Average cost	**−.3014893**	.1779917	−1.69	**.090**	−.6503466	.0473679
High cost	**.4275369**	.161069	2.65	**.008**	.1118475	.7432264
Don't know	.0968034	.1326518	.73	.466	−.1631893	.356796
Household size (Tail_men)						
Medium size	−.1391065	.1036543	−1.34	.180	−.3422652	.0640523
Large size	.1116873	.1263435	.88	.377	−.1359414	.359316
Gender of head of household (Sex_cm)						
Male	.0847371	.1543205	.55	.583	−.2177255	.3871996
Level of education of the head of household (Niv_inst)						
Primary	.0335479	.1279776	.26	.793	−.2172837	.2843795
Secondary/Higher	**.3810388**	.1313267	2.90	**.004**	.1236433	.6384344
Place of residence (Mil_res)						
Urban	**−.2488823**	.119837	−2.08	**.038**	−.4837585	−.0140061
Area of residence (Zon_res)						
Subdivided area	**−.2448113**	.1321511	−1.85	**.064**	−.5038228	.0142001
Age of head of household (Age_cm)						
Adult head of household	.0334693	.1184242	.28	.777	−.1986379	.2655766
Elderly head of household	**.2663353**	.1470431	1.81	**.070**	−.021864	.5545345
Socio-professional category (Cat_soc)						
manual worker	.2585517	.1782773	1.45	.147	−.0908653	.6079688
a manager	.0979737	.1838906	.53	.594	−.2624453	.4583928
Self-employed worker	**.5036301**	.1219624	4.13	**.00**	.2645881	.7426721
Household status (Sta_men)						
Internally Displaced Persons (IDP)	−.0313035	.2170433	−.14	.885	−.4567005	.3940934
Marital status of head of household (Sit_mat)						
Single	−.2682651	.2119611	−1.27	.206	−.6837013	.1471711
Divorced/Widowed	.0650001	.2030312	.32	.749	−.3329337	.462934
Location of the main household sanitation facility (Emp_Pla)						
In housing/Concession	**−.2272359**	.1146827	−1.98	**.048**	−.4520099	−.002462
Ownership of the main sanitation facility (App_ouv)						
Housekeeping	**.4889865**	.1167531	4.19	**.000**	.2601546	.7178183
Method of financing the sanitation works (Fin_ouv)						
itself or collaborates with other households	**−1,732,223**	.0977341	−17.72	**.000**	−1,923,778	−1,540,668

Continued

Functionality of the main household sanitation facility (Fon_pla)						
functional	.2683939	.2583123	1.04	.299	−.237889	.7746768
Ownership of the main sanitation facility in the household (Pro_pla)						
2 to 3 days	**−.4019183**	.1303723	−3.08	**.002**	−.6574433	−.1463933
more than three days	**−.4476206**	.1186192	−3.77	**.000**	−.68011	−.2151312
Household assessment of the availability of public latrines (Sat_dlp)						
moderately satisfied	**−.4785507**	.1185605	−4.04	**.000**	−.7109249	−.2461764
Not at all satisfied	**−.2720601**	.1401137	−1.94	**.052**	−.546678	.0025577
Don't know	**.2680547**	.1105238	2.43	**.015**	.0514321	.4846774
_cons	**−2,560,415**	.373025	−6.86	**.000**	−3,291,531	−1,829,299

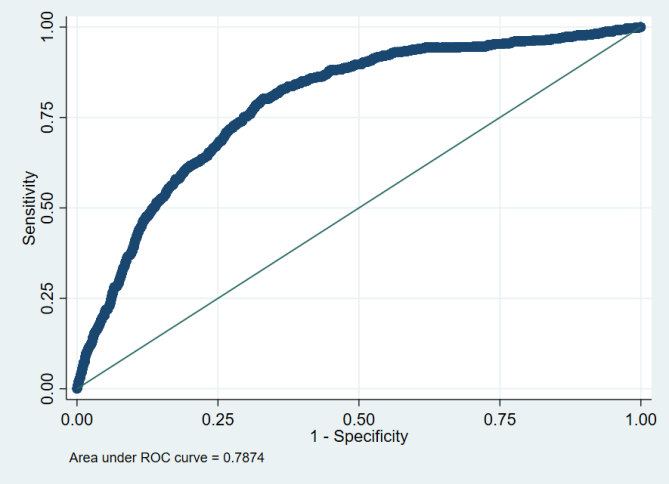

Figure A1. The ROC curve.

Logistic model for LAA

Classified	True D	True ~D	Total
+	13	20	33
-	694	7518	8212
Total	707	7538	8245

Classified + if predicted Pr(D) >= .5
True D defined as LAA != 0

Sensitivity	Pr(+| D)	1.84%
Specificity	Pr(-|~D)	99.73%
Positive predictive value	Pr(D| +)	39.39%
Negative predictive value	Pr(~D| -)	91.55%
False + rate for true ~D	Pr(+|~D)	0.27%
False - rate for true D	Pr(-| D)	98.16%
False + rate for classified +	Pr(~D| +)	60.61%
False - rate for classified -	Pr(D| -)	8.45%
Correctly classified		91.34%

Figure A2. The confusion matrix.

Logistic regression — Number of obs = 8,245
LR chi2(2) = 703.68
Prob > chi2 = 0.0000
Log likelihood = -2060.5679 — Pseudo R2 = 0.1458

LAA	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_hat	.5264486	.149516	3.52	0.000	.2334026	.8194946
_hatsq	-.1151063	.0353247	-3.26	0.001	-.1843415	-.0458711
_cons	-.376762	.1468506	-2.57	0.010	-.664584	-.0889401

Figure A3. The link test.