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Sanitation access and satisfaction in northern Haiti: Insights from a quasi-census survey

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Abstract

Between 2015 and 2024, global open defecation declined, yet fragile contexts continue to lag behind this trend. In Haiti, urban access to safe sanitation fell from 34% to 32%, with dense housing and frequent flooding limiting the potential of conventional solutions like sewers, septic tanks, and pit latrines. SOIL, a non-profit container-based sanitation provider in northern Haiti, offers an alternative, but high operational costs exceed many households' ability and willingness to pay. In October 2023, SOIL launched a results-based financing pilot with the Inter-American Development Bank Lab's Outcomes for Change Fund, targeting installation of 900 new customers and >10% increase in improved sanitation coverage throughout selected communities. To benchmark progress, we conducted a baseline survey using a cross-sectional quasi-census approach across eight target communities. Enumerators collected household GPS coordinates and data on socioeconomic status, demographics, and sanitation behaviors. Multivariate logistic regressions explored associations between wealth, spatial factors, and sanitation outcomes, including open defecation and private toilet ownership. Between October and November 2023, we surveyed 4,008 households. Most households owned their home and a private toilet, while 19% reported practicing open defecation. Using the Equity Tool, 38% of households were in the poorest quintile, and only 4% in the wealthiest. Open defecation was more common among households whose neighbors practiced it and in lower-density areas. Lack of private toilet ownership was largely due to prohibitive costs, particularly among poorer households, and was associated with lower sanitation satisfaction. Logistic regression of 3,983 households confirmed higher odds of open defecation among poorer households and those with neighbors practicing open defecation. These findings highlight persistent challenges in expanding safely managed sanitation in northern Haiti. Even among households with basic facilities, dissatisfaction suggests strong demand for services that are accessible to the most vulnerable while also providing dignity and aspirational quality for all.

Data availability statement: Underlying data presented in this study can be found at the following link: https://data.humdata.org/dataset/quasi-census-of-sanitation-access-and-behavior-in-northern-haiti Code for data analysis and visualization can be found at the following link: https://zenodo.org/records/19113994.

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1. Introduction

The Sustainable Development Goals call for efforts to improve the lives of people around the world, including SDG6 which aims to improve access to clean water and sanitation [1]. Between 2000 and 2024, the UNICEF-WHO Joint Monitoring Program (JMP) estimated that access to safely managed sanitation services doubled, reaching 2.8 billion people [2]. Between 2015 and 2024 the global population practicing open defecation dropped down to 4%, however fragile contexts, often defined by social, economic, and political indicators, continue to lag behind the global trends [2,3]. Generating momentum is particularly challenging in such areas due to recurrent conflicts and institutional instability that often obstruct sustainable interventions [1].

Haiti is one such fragile low-income country that faces notable sanitation challenges [4]. Between 2015 and 2024 the proportion of rural populations with access to at least basic sanitation services increased from 20% to just 24%, while access of urban populations declined from 34% to 32% [2]. In urban areas, social, economic, and environmental conditions such as dense housing and frequent flooding pose challenges for standard sanitation solutions such as sewer systems, septic tanks, and pit latrines. Centralized water-based systems such as sewage are nonexistent and households with flush toilets often pipe waste directly into a nearby lot or waterway. Unlined, or poorly lined, pit latrines potentially contaminate groundwater and frequently flood after heavy rains, dispersing waste throughout the community [5,6]. This context demands innovative and affordable technologies to expand access to safely managed sanitation.

One emerging alternative to centralized sanitation services is container-based sanitation (CBS). A non-profit organization called Sustainable Organic Integrated Livelihoods (SOIL) runs a household CBS service, called EkoLakay, in Haiti's second largest city of Cap Haitien. The EkoLakay system collects waste in sealable, removable containers. Full containers of waste are collected from households weekly and brought to a waste treatment site outside the city where the waste is treated to generate nutrient rich compost through a thermophilic composting process [7]. EkoLakay currently serves over 4,000 households, resulting in the safe management of over 1,200 tons of waste per year.

Financing household sanitation systems such as CBS services remains a significant challenge for service providers due to high operational expenses that exceed many households' ability and willingness to pay. Households in the EkoLakay service pay a subsidized monthly fee of 350 HTG, equivalent to just under US$2.70, which covers only 10% of operational expenses and represents a level of affordability for households comparable to that of other safely managed sanitation services in low-resource settings. [8]. In order to achieve financially sustainable sanitation services, service providers such as SOIL must explore innovative financing mechanisms, which can complement user fees for the service, maintain affordability for the most vulnerable households, and create pathways to longer-term public sector financing. One such mechanism is results-based financing (RBF), whereby funds are dispersed to a service provider upon achievement and verification of a set of pre-defined targets [9]. While the use of RBF does not eliminate the need to seek out

funding to complement user fees, it is increasingly attractive to donors due to efficient resource allocation and because it more closely resembles a public sector contract than activity-based grants.

In October 2023, SOIL launched an RBF pilot with the Inter-American Development Bank (IDB) Lab's Outcomes for Change Fund. While RBF has been applied in the water and sanitation sectors globally, evidence on its use for container-based sanitation in low-income, fragile contexts remains limited [10]. The pre-defined targets in the RBF contract included installation of 900 new customers residing in three selected communities (divided into eight subzones) and a bonus objective of achieving >10% increase in the percentage of households with access to improved sanitation within the selected communities [11]. In order to assess progress towards these targets, SOIL first needed to conduct a baseline survey in the target service zones to understand initial sanitation access and behaviors against which service expansion results could be benchmarked. This research explores findings from SOIL's baseline survey, which contributes an updated understanding of the state of sanitation in northern Haiti. The objectives of this study were to (i) characterize sanitation access and satisfaction and (ii) explore factors associated with sanitation access in the selected communities.

2. Methods

2.1. Ethics statement

This study was approved by the Haitian Ministry of Public Health and Population Institutional Review Board on September 8, 2023 (Ref: 2223–47). Between October 1, 2023 and November 30, 2023 enumerators travelled door-to-door with a bag or badge indicating their status as researchers. During each home visit, before administering surveys, the enumerators obtained verbal consent from the eligible household participants, which was captured directly within the electronic mWater survey platform to confirm understanding of the purpose, voluntary nature of the survey, confidentiality measures, and intended use of the information. Respondents had the option of reading the informed consent form themselves or having the enumerator read it to them. Respondents were also invited to have a friend or relative present during the consent process to facilitate understanding, if requested. A second, voluntary informed consent was asked of each respondent who consented to participate in the baseline survey. The second consent asked permission for SOIL staff to enter their personal identifying information and survey responses in the EkoLakay database for future marketing purposes. If a respondent declined the second consent, their personal information was not shared with EkoLakay's operational staff. Declining the second consent form did not prevent respondents from participating in the baseline survey or prevent them from accessing EkoLakay services in the future.

2.2. Study setting

This study was conducted in Haiti's Grand Nord region on the northern coast. The EkoLakay CBS service operates throughout four communal sections, including urban and peri-urban communities. Neighborhoods served by EkoLakay are often densely populated, flood-prone, and characterized by low-income levels and limited sanitation coverage. During the planning phase of the RBF initiative, SOIL and the local ministries of public health and sanitation identified geographic delineations for eight subzones within three target communities (Fosen Michel, Limonad, and Karakol), covering an estimated population of 21,700 people, to concentrate service expansion efforts [12]. The target communities were selected according to neighborhood characteristics including high vulnerability to flooding, limited pre-existing access to safe sanitation, and good road accessibility for service collection vehicles. Subzones were established using satellite imagery to predict the number of household structures in each area. Fig 1 shows a map of the eight selected target subzones where this study, and SOIL's subsequent CBS service expansion, took place.

2.3. Study design

We used a cross-sectional quasi-census approach to conduct household level surveys throughout the eight target communities. SOIL hired a team of external enumerators to conduct door-to-door visits of all households within each

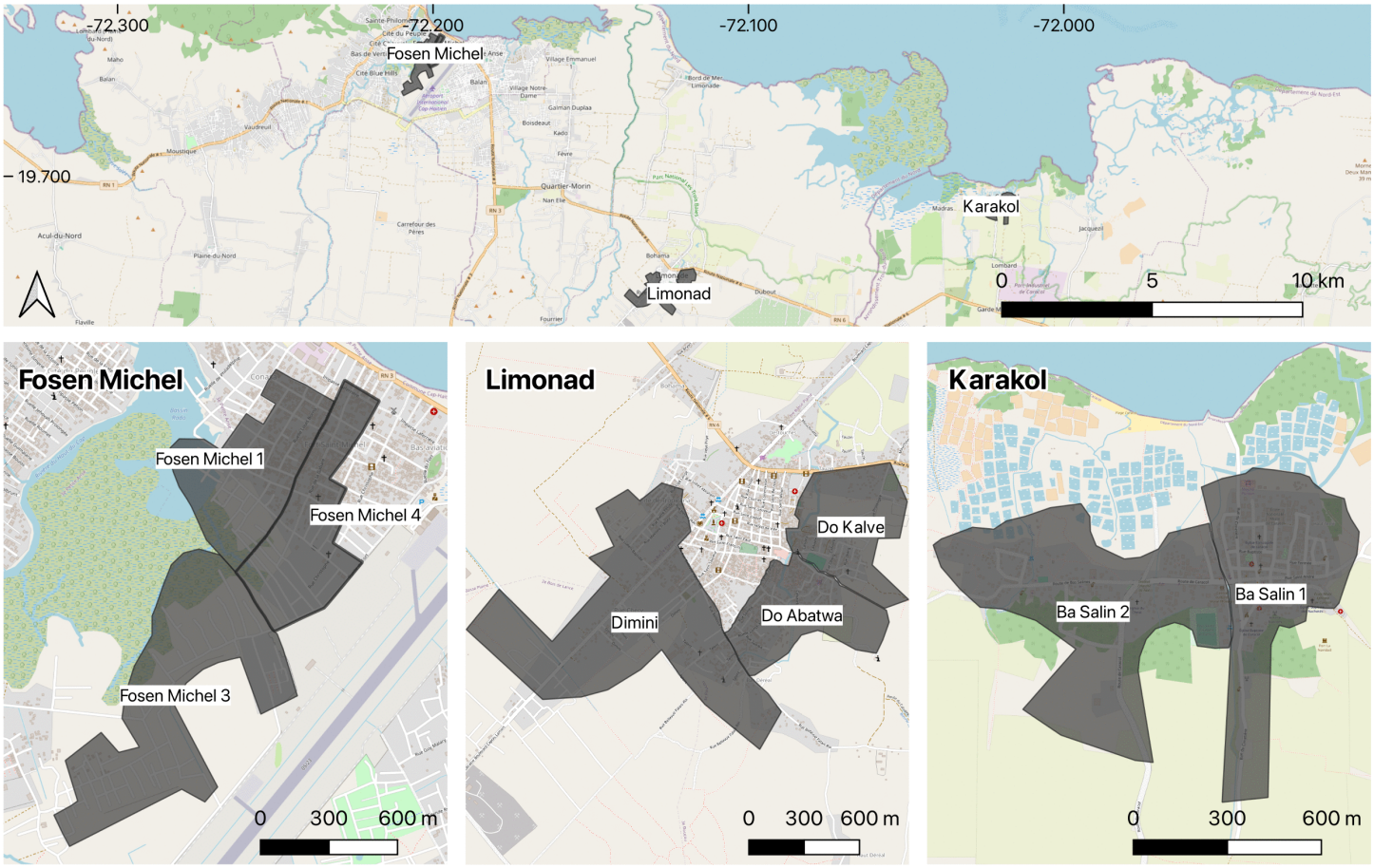

Fig 1. Map of eight target subzones within three communities for SOIL's results-based financing initiative. Base map data can be found at this link: https://download.geofabrik.de/central-america/haiti-and-domrep.html © OpenStreetMap contributors.

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geographic subzone, consisting of an estimated 200–250 households. Enumerators visited households up to three times to identify an eligible respondent for the survey, namely an individual aged 18 years or older who was a native speaker of Haitian Creole. Physical copies of the consent forms were distributed to each participating household, which ensured enumerators would not survey the same household multiple times. All survey data was collected on mobile tablets using mWater, a secure electronic data management system that allows for offline use on handheld mobile devices that can be synced to a server once connected to the internet. After obtaining informed consent, enumerators collected household GPS coordinates and asked a series of survey questions in Haitian Creole pertaining to household demographics and sanitation behaviors. The survey also included the 12-question Equity Tool proxy means test developed for Haiti as a measurement of household wealth [13].

2.4. Data analysis

All quantitative survey data were analyzed using RStudio version 2025.05.1 + 513 [14]. Responses to each Equity Tool question correspond to published weighted values that were summed to produce a wealth score, which was used to parse households into one of five wealth quintiles where quintile one represents the poorest and quintile five represents the wealthiest using the urban cut-offs [13]. Summary statistics and graphs were produced to explore univariate trends

and bivariate associations of interest, including chi-squared and t-tests for categorical and continuous data, respectively. Associations of interest were explored at the aggregate survey population level, as well as stratified by community to understand differences between neighborhoods.

Multivariate logistic regressions with binomial distributions were also conducted using the complete case analysis method to explore independent associations between a parsimonious set of theoretically and programmatically relevant predictors (including household wealth, neighborhood context, and tenure) and sanitation outcomes, namely open defecation and private toilet ownership. Inferential statistics (p-values and 95% confidence intervals) from chi-squared tests, t-tests, and multivariate logistic regression models are presented as model-based measures of precision and strength of association rather than as evidence of sampling-based statistical significance given use of quasi-census data. Model quality was assessed using variance inflation factors (VIFs) to evaluate multicollinearity among predictors and the area under the receiver operating characteristic curve (AUC) to evaluate model discrimination. Because the analysis was conducted on quasi-census data rather than a sampled population, traditional inferential measures of model fit are not strictly applicable; the AUC is therefore presented as a descriptive, model-based measure of how well the predictors distinguish households practicing open defecation or owning a private toilet from those that do not.

We also analyzed household GPS coordinates and accompanying survey data using QGIS version 3.32 to explore spatial trends in sanitation and complement the quantitative findings [15]. For every household surveyed, we computed the percent of households within a 53 meter radius (to yield an average of 20 neighbors) who reported practicing open defecation. To broadly check whether our surveyed population was representative of the communities, we used a WorldPop 2020 raster of population density and applied zonal statistics to estimate the approximate population within each community and subzone. [12].

3. Results

Between October and November 2023, all available households in the eight target zones were surveyed (N = 4,008). The surveyed population was broadly proportional to the estimated population within each subzone, confirming that survey coverage was generally consistent across subzones (Table A in S1 Appendix). The largest surveyed community was Fosen Michel, with 1,761 households (43.9%) across three subzones, followed by Limonad with 1,518 households (37.9%) across three subzones, then Karakol with 729 households (18.2%) across two subzones. About one-third of household respondents were 30–39 years old (31.7%) and the mean duration of residence was 106 months (8.8 years). The majority of households owned their home (71.6%) and 61.2% reported owning a private toilet. While 19.1% reported practicing open defecation overall, this prevalence varied notably at the community level with 5.1%, 17.7%, and 51.2% of households practicing open defecation in Limonad, Fosen Michel, and Karakol, respectively. According to the Equity Tool with urban cut-off scores, 37.7% of households were in the poorest quintile while only 3.8% were in the wealthiest quintile, relative to urban areas throughout the country (Table 1).

Households practicing open defecation had lower levels of satisfaction with their sanitation than those who did not (chi-square p-value <0.001) (Fig 2). Similarly, households not owning a private toilet had lower levels of satisfaction with their sanitation than those who did (chi-square p-value <0.001) (Fig 2). Almost one-quarter (24%) of households who owned a private toilet were also not satisfied with their current sanitation (Fig 2). Respondent's wealth quintile was associated with open defecation, where 37% and 10% of households in quintiles one and two reported practicing open defecation, respectively, compared to none in quintile five (chi-square p-value<0.001) (Fig 3). Toilet ownership was similarly associated with the wealth quintiles, where only 47% and 68% of household in quintiles one and two reported owning a toilet, respectively, compared to 99% of those in quintile five (chi-square p-value<0.001) (Fig 3). These associations held true even after stratifying by zone.

Open defecation was exclusively practiced by households who did not own a private toilet (Fig A in S1 Appendix). Private toilet ownership and open defecation were similarly frequent among homeowners and non-homeowners (Fig B in

Table 1. Demographics and sanitation behavior of the survey population by community.

	Fosen Michel N (%)	Karakol N (%)	Limonad N (%)	Total N (%)
Total Households	1761 (43.9)	729 (18.2)	1518 (37.9)	4008 (100)
Respondent Age				
18 or 19	109 (6.2)	18 (2.5)	38 (2.5)	165 (4.1)
20-29	489 (27.8)	171 (23.5)	383 (25.2)	1043 (26.2)
30-39	516 (29.3)	243 (33.3)	502 (33.1)	1261 (31.7)
40-49	339 (19.3)	118 (16.2)	297 (19.6)	754 (18.9)
50-59	161 (9.1)	83 (11.4)	150 (9.9)	394 (9.9)
60-69	94 (5.3)	54 (7.4)	99 (6.5)	247 (6.2)
70-79	25 (1.4)	24 (3.3)	27 (1.8)	76 (1.9)
80-89	3 (0.2)	10 (1.4)	11 (0.7)	24 (0.6)
90+	5 (0.3)	3 (0.4)	1 (0.1)	9 (0.2)
Missing	20 (1.1)	5 (0.7)	10 (0.7)	35 (0.9)
Residence Duration in Months (mean(SD))	91.6 (92.7)	133.1 (137.6)	110.3 (122.2)	106.3 (114.5)
Owns Home				
No	479 (27.2)	200 (27.4)	455 (30.0)	1134 (28.4)
Yes	1276 (72.5)	527 (72.3)	1062 (70.0)	2865 (71.6)
Missing	18 (1.0)	2 (0.3)	3 (0.2)	23 (0.6)
Practices Open Defecation				
No	1432 (81.3)	354 (48.6)	1437 (94.7)	3223 (80.9)
Yes	311 (17.7)	373 (51.2)	78 (5.1)	762 (19.1)
Missing	7 (0.4)	1 (0.1)	0 (0.0)	8 (0.2)
Owns a Private Toilet				
No	544 (30.9)	475 (65.2)	532 (35.0)	1551 (38.8)
Yes	1210 (68.7)	253 (34.7)	986 (65.0)	2449 (61.2)
Missing	6 (0.3)	2 (0.3)	1 (0.1)	9 (0.2)
Urban Equity Tool Quintile				
Q1: Poorest	714 (40.5)	280 (38.4)	519 (34.2)	1513 (37.7)
Q2: Poorer	645 (36.6)	236 (32.4)	479 (31.6)	1360 (33.9)
Q3: Middle	205 (11.6)	114 (15.6)	274 (18.1)	593 (14.8)
Q4: Richer	151 (8.6)	67 (9.2)	170 (11.2)	388 (9.7)
Q5: Richest	46 (2.6)	32 (4.4)	76 (5.0)	154 (3.8)

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S1 Appendix). Open defecation was higher among households whose neighbors practiced open defecation and those living in lower density areas ($p < 0.001$ for both associations) (Fig C in S1 Appendix).

The survey also asked households without a private toilet to explain the reasons for not having one. Lack of toilet ownership was primarily attributed to prohibitively high costs, particularly for households in lower wealth quintiles (Fig 4). Some responses in the "other" category included households who were already in the process constructing a private toilet, or who had easy access to nearby shared toilets.

The results of a multivariate logistic regression with complete data from 3,983 households suggest that poorer households had higher odds of practicing open defecation. For example, households in quintile four had 0.02, or 98% decreased odds of practicing open defecation compared to households in quintile one, controlling for home ownership, geographic zone, and neighbor's open defecation behaviors (95% CI: 0.01 – 0.05, $p < 0.001$) (Table 2). Households also had higher odds of practicing open defecation if more of their neighbors did. For each additional 1% of neighbors practicing open

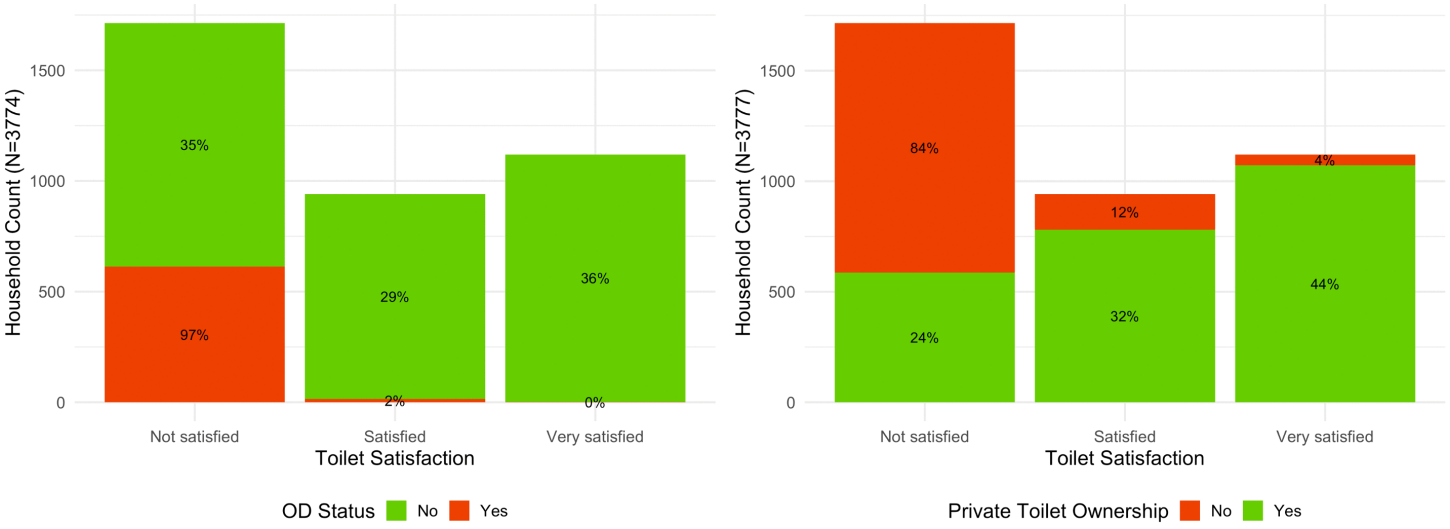

Fig 2. Sanitation satisfaction by open defecation (left) and toilet ownership status (right). The labelled percentages indicate the proportion of each open defecation and private toilet ownership group who reported each level of satisfaction, respectively.

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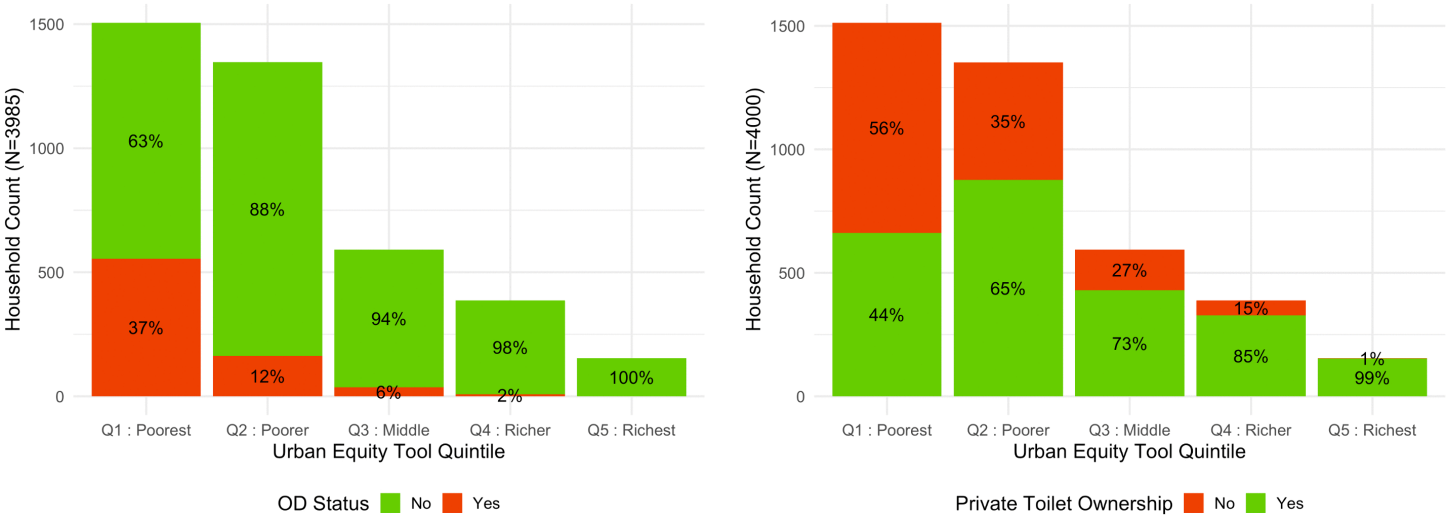

Fig 3. Open defecation (left) and toilet ownership (right) by Urban Equity Tool wealth quintile.

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defecation, a household had 1.07 increased odds of practicing open defecation (95% CI: 1.06 – 1.07, $p < 0.001$) (Table 2). This model demonstrated excellent discrimination between households practicing open defecation and those that do not, with an area under the ROC curve (AUC) of 0.94. This indicates that the included predictors capture meaningful variation in sanitation outcomes. Variance inflation factors (VIFs) were all below 1.25, indicating no evidence of problematic multi-collinearity among predictors in the multivariate logistic regression model.

Similarly, among 3,997 households with complete data, multivariate regression results indicated households in quintile four had 5.85 increased odds of owning a private toilet compared to those in quintile one, with the same controls (95% CI: 4.28 – 8.11, $p < 0.001$) (Table 3). For each 1% increase in neighbors practicing open defecation households had 0.96, or

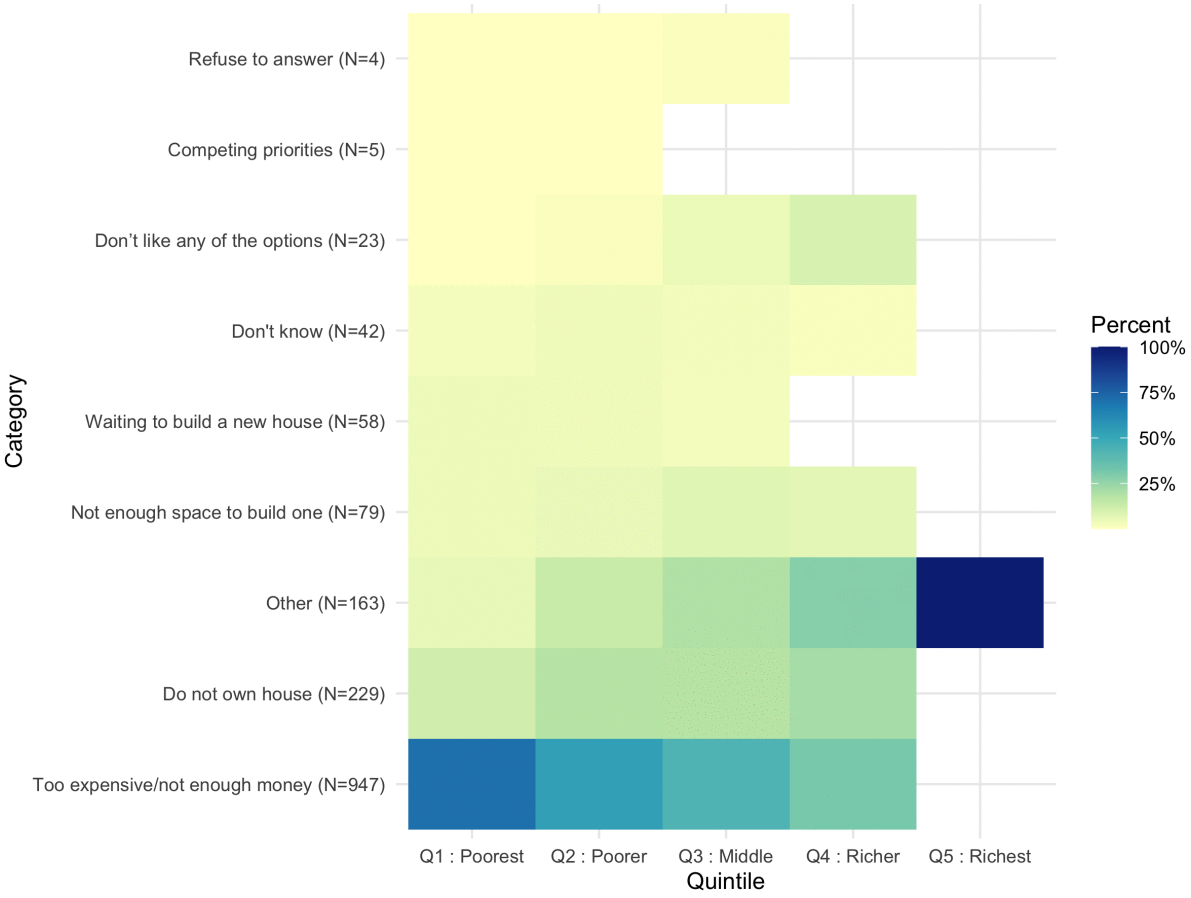

Fig 4. Heat map of reasons for lack of private toilet ownership by Urban Equity Tool wealth quintile.

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4% decreased odds of owning a private toilet (95% CI: 0.95 – 0.96, $p < 0.001$) (Table 3). Home ownership was not significantly associated with open defecation, however home owners did have 1.34 higher odds of owning a private toilet (95% CI: 1.14 – 1.58, $p < 0.001$) (Tables 2 and 3). This model demonstrated acceptable discrimination between households owning a private toilet and those that do not, with an AUC of 0.79. VIFs were all below 1.32, again indicating no evidence of problematic multicollinearity among predictors.

4. Discussion

This study aimed to establish baseline sanitation behaviors to benchmark improvement throughout a results-based financing pilot. We identified moderate baseline access to private toilets within the three target communities, with 19% of the surveyed households reporting practice of open defecation, which is consistent with national estimates [2]. Sanitation characteristics varied across surveyed zones, with lower prevalence of open defecation in areas such as Limonad and higher prevalence in areas with limited private toilet access such as Karakol, reflecting local differences in wealth, household infrastructure, access to shared facilities, and community sanitation norms. Overall low reported satisfaction with existing sanitation, even among households who already own a private toilet, suggests that there is ample demand within the target communities for innovative and dignified sanitation, such as the EkoLakay CBS service. These findings suggest

Table 2. Results of multivariate logistic regression to assess independent predictors of open defecation (N = 3983).

Variable	OR	Lower 95% CI	Upper 95% CI	P-Value
(Intercept)	0.10	0.07	0.13	<0.001
Home Ownership				
Yes (vs. No)	1.05	0.81	1.37	0.726
Geographic Zone				
Karakol (vs. Fosen Michel)	2.03	1.50	2.77	<0.001
Limonad (vs. Fosen Michel)	0.80	0.58	1.10	0.171
% Neighbors Practicing OD				
Per each 1% increase	1.07	1.06	1.07	<0.001
Urban Equity Tool Quintile				
Q2: Poorer (vs. Q1: Poorest)	0.16	0.12	0.21	<0.001
Q3: Middle (vs. Q1: Poorest)	0.06	0.04	0.10	<0.001
Q4: Richer (vs. Q1: Poorest)	0.02	0.01	0.05	<0.001
Q5: Richest (vs. Q1: Poorest)	0.00	0.00	0.00	0.951[1]

[1]The high p-value noted in this quintile is due to lack of variance because all households within quintile five did not practice open defecation, as opposed to indicating a lack of association of wealth with OD).

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Table 3. Results of multivariate logistic regression to assess independent predictors of private toilet ownership (N = 3997).

Variable	OR	Lower 95% CI	Upper 95% CI	P-Value
(Intercept)	2.55	2.08	3.13	<0.001
Home Ownership				
Yes (vs. No)	1.34	1.14	1.58	<0.001
Geographic Zone				
Karakol (vs. Fosen Michel)	0.59	0.46	0.75	<0.001
Limonad (vs. Fosen Michel)	0.37	0.31	0.44	<0.001
% Neighbors Practicing OD				
Per each 1% increase	0.96	0.95	0.96	<0.001
Urban Equity Tool Quintile				
Q2: Poorer (vs. Q1: Poorest)	2.04	1.73	2.42	<0.001
Q3: Middle (vs. Q1: Poorest)	3.09	2.45	3.9	<0.001
Q4: Richer (vs. Q1: Poorest)	5.85	4.28	8.11	<0.001
Q5: Richest (vs. Q1: Poorest)	199.13	43.61	3529.54[1]	<0.001

[1]The large confidence interval noted in this quintile is due to lack of variance because only one household within quintile five did not own a private toilet, as opposed to indicating a lack of association of wealth with private toilet ownership.

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the chosen target communities were suitable for service expansion efforts with the goal of increasing access to private sanitation for the RBF pilot.

Multivariate logistic regressions indicate that, on average, poorer households were more likely to practice open defecation and less likely to own a private toilet after controlling for geographic zone, home ownership status, and neighbor's open defecation behaviors. This trend aligns with findings of a nationally representative survey which found open defecation in Haiti to be significantly associated with several socio-economic and demographic factors, including household wealth [16]. Sanitation service providers such as EkoLakay must ensure that their offerings are not only attractive to households but also financially accessible to the most vulnerable populations. Expanding access to safe sanitation

can yield broad public health and environmental benefits, however, these benefits may only be realized when coverage reaches a substantial proportion of the community [17]. Equitable service delivery requires the intentional inclusion of the poorest and most marginalized households in community-wide sanitation initiatives that aim to reduce open defecation.

The observed associations between household wealth and sanitation access are consistent with expectations and support the validity of the Equity Tool as a measure of household wealth in this context. Because wealth is a multifaceted construct, proxy means tests such as the Equity Tool require careful consideration and validation within each setting [18]. SOIL's previous internal analyses comparing Equity Tool data with customer payment behavior revealed promising correlations, however, this larger-scale study provides stronger evidence for the tool's applicability beyond self-selected users of the EkoLakay service. In the future, SOIL may employ an adapted version of the Equity Tool, informed by this study, to determine eligibility for service subsidies, thereby strengthening efforts to ensure that CBS services remain accessible to the most vulnerable households in the region.

We also found that the sanitation behaviors of a household's neighbors were associated with the household's own likelihood of practicing open defecation or owning a private toilet. Households with a greater proportion of neighbors practicing open defecation were more likely to do so themselves and less likely to own a private toilet, even after controlling for geography, home ownership status, and wealth. Literature exploring this phenomenon primarily focuses on communities in rural India and does not provide a consensus on the effects of spatial neighbors on sanitation behavior. While one study conducted in 2024 found that the sanitation choices of direct spatial neighbors have a strong positive association with a household's own behaviors [19], another conducted in 2017 found that toilet use was less strongly correlated with spatial neighbors and more so associated with the behaviors of close relatives and friends [20]. This study represents the first exploration of how neighborhood behaviors are associated with individual-level behavior in this setting, and indicates that social networks and community norms may play an important role in addressing open defecation.

Home ownership was not significantly associated with open defecation, despite its positive association with private toilet ownership. While home ownership may theoretically confer greater financial means and perceived stability to invest in sanitation infrastructure, this relationship appears to influence infrastructure ownership rather than sanitation behaviors. In this setting, stakeholders noted that home ownership does not necessarily imply formal land tenure or housing security, which may help explain why owning a home does not translate into consistent use or behavioral change related to sanitation practices.

One limitation of this study lies in the quasi-census design. Enumerators sought to survey all households within the target communities, making up to three return visits at different times of day when necessary. Field staff reported that an eligible adult was available at almost all households during at least one of these visits, minimizing the likelihood of missed households. However, some households may not have been reached if all adults were consistently away for work, which could introduce systematic bias. For this reason, we describe the data as a quasi-census, reflecting coverage of nearly all households in the study area. Additionally, this survey summarizes self-reported data on potentially stigmatized undesirable behaviors, such as open defecation, which may result in under-reporting. Regarding the Equity Tool, one of the twelve questions pertained to household sanitation access which may partially drive some of the observed associations with sanitation outcomes. To explore this further, we used this dataset to re-calculate household wealth scores and associated urban quintile cut-offs after removing the sanitation question and an additional question about household bank accounts, which made respondents uncomfortable and resulted in a higher proportion of non-responses. Analyses using the adapted 10-question Equity Tool still found similar results to those presented in this paper. Furthermore, although the multivariate models included conceptually and programmatically relevant predictors, additional socioeconomic and household characteristics not included in the analysis may further explain variation in sanitation outcomes. Finally, the communities selected for inclusion in this study were purposively selected based on certain characteristics, namely dense population, flood-prone, low income levels, and limited sanitation coverage, therefore these results may not be generalized more broadly throughout the country.

In northern Haiti, improving access to safely managed sanitation remains a notable challenge, with 19% of households in the surveyed communities reporting practice of open defecation. Even households who did have access to at least basic sanitation expressed dissatisfaction with their facilities, suggesting high demand for sanitation services that are not only available to the most vulnerable, but also dignified and aspirational for all. Household wealth and neighborhood sanitation behaviors may be important characteristics to consider when marketing and scaling safely managed and dignified sanitation, such as EkoLakay's container-based sanitation service. Understanding the social and economic factors that influence sanitation uptake can inform policies and financing programs that prioritize equitable, sustainable, and user-centered sanitation services to reduce open defecation and improve community health outcomes.

Supporting information

S1 Appendix. The following tables and figures can be found in the supporting document titled "S1 Appendix to Sanitation access and satisfaction in northern Haiti: Insights from a quasi-census survey": Table A. Comparison of surveyed population to WorldPop 2020 population estimates. Fig A. Open defecation by private toilet ownership status. Fig B. Private toilet ownership and open defecation by home ownership status. Fig C. Open defecation by neighborhood sanitation practices and population density.
(DOCX)

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