Context Matters: A Multi-Country Analysis of Individual- and Neighborhood-Level Factors Associated with Women's Sanitation Use in Sub-Saharan Africa

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Abstract

Objectives: To identify cross-national trends in factors associated with women's sanitation use in sub-Saharan Africa.

Methods: Using data from Demographic and Health Surveys conducted in 14 SSA countries between 2008 – 2014, we modeled women's sanitation use in relation to various individual- and neighborhood-level factors.

Results: Substantial variation exists between countries in the strength and direction of factors associated with sanitation use. Particularly significant associations across the region included access to different water sources, years of education, family size, age, living in a female-headed household, being married and wealth. Neighborhood-level poverty, ethnic diversity and urbanization were important factors in a majority of countries.

Conclusions: International development goals for sanitation are frequently framed in terms of availability, implicitly suggesting that if facilities are accessible, they will be used. A more nuanced view that takes into account not only the existence of facilities but also the factors influencing their use is needed to understand the dynamics of women's sanitation use in the region. Policies focused on availability may not yield the desired public health benefits from improved sanitation in sub-Saharan Africa. Context-relevant factors must be addressed concurrently to achieve sanitation development goals.

Keywords: women; Sanitation; sub-Saharan Africa; DHS data; multi-country

Introduction

Approximately 2.4 billion people worldwide lack access to safe toilet facilities today.[1] Lack of access to sanitation remains a persistent problem in the Global South[2,3]. In sub-Saharan Africa (SSA) recent reports suggest only 30% of the population use safe sanitation.[1] Even within the region, access to sanitation varies by

country, with reported ranges of 15-93%. The health consequences of lack of access to sanitation around the world are well established.[4-6] Poor sanitation has been linked to water-borne diseases such as diarrhea, typhoid, and other parasitic infections.[7] In developing countries, in particular, almost half of the population has, at one time, suffered from diseases associated with lack of access to sanitation.[7-9] Evidence also suggests that poor sanitation is one of the biggest killers of children under five through diseases like diarrhea and cholera.[9,10]

Access to sanitation is often understood to be a function of availability, not choice or other constraining factors.[11] Recently, however, discussions of factors that may influence sanitation use such as preference, willingness to pay, and experiences of health improvements have begun to appear in the literature.[12-16] Some research has also identified psycho-social factors, e.g. religious and cultural rules as important drivers of sanitation use.[11-15,17-19]

Scarce research on the factors that influence sanitation use has addressed neighborhood-level characteristics. For example, lack of access roads, broken or non-existent central water supply and/or sewer infrastructure, high population densities, complicated land ownership dynamics, and environmental barriers can make it difficult to build and maintain safe sanitation facilities in certain neighborhoods.[20] Other studies suggest that the social environment can also influence individuals' ability and desire to use existing sanitation options.[11,13] Neighborhood-level factors such as crime rates, security lighting, 24-hour toilet facilities, and community safety may also exert an influence.

Women are disproportionately burdened by the persistent lack of access to safe sanitation.[21-26] Recent studies have suggested a number of factors that may be associated uniquely with women's sanitation use and, consequently, their health and well-being. For example, women's experiences and/or fear of physical and sexual violence associated with having to walk to and use sanitation facilities, particularly in more violent neighborhoods (e.g. informal settlements), have forced many to revert to forms of sanitation that increase their risk of direct contact with untreated waste (e.g. plastic bags or bucket toilets).[27-29] Other research suggests that women's sanitation use may be affected by their fear of contracting infections from unclean sanitation facilities.[21,23]

The objective of this study was to examine the association between a number of socio-economic factors at the individual and neighborhood levels and women's reported sanitation use across 14 countries in sub-Saharan Africa. This study (1) focused specifically on the associations between different factors and sanitation use, (2) explored individual- and neighborhood-level factors associated with sanitation use across countries, and (3) aimed to identify possible trends in the region that may have public health policy implications.

Methods

Data and Sample

We used cross-sectional data from the Demographic and Health Surveys (DHS) from 14 countries in sub-Saharan Africa, including Cameroon (CMR), Côte d'Ivoire (CIV), Democratic Republic of Congo (DRC), Gabon (GAB), Ghana (GHA), Kenya (KEN), Malawi (MWI), Mali (MLI), Mozambique (MOZ), Nigeria (NGA), Sierra Leone (SLE), Togo (TGO), Uganda (UGA), and Zambia (ZMB). In general, DHS datasets provide nationally representative data on general health and population indicators. The DHS surveys, at present, provide the most comprehensive source of information that may identify socio-cultural factors associated with women's sanitation use in sub-Saharan Africa. All women, ages 15-49, from selected households are eligible to be interviewed in the DHS; however, one of the gender-specific factors used in this study (e.g. experiences of recent non-partner violence) required that the analytic sample include only women who completed the domestic violence module of the DHS.[30] Details about the specific sampling strategies used in the DHS datasets have been documented elsewhere.[31]

Measures

For this analysis, a three-level categorical variable was created to correspond to each type of reported sanitation methods: a private facility (any facility not shared with any other household including flush or pour-flush toilet, pit latrine, composting toilet, or hanging toilet/hanging latrine); a toilet facility shared by additional households; or open defecation [OD] ('no facility/bush/field/bucket'). The study focuses on OD and use of shared facilities versus private because OD and shared facilities, in particular, have been associated with adverse health outcomes.[32,33]

Individual-level, socio-economic factors included age, marital status, household wealth quintile, respondent's employment status, level of education, residence in a female-headed household, and family size. As previous studies have suggested that attitudes in certain non-Christian religions may influence sanitation practices,[11,34] a binary Christian/non-Christian variable was also included. A variable for women's primary drinking water source was also used, given earlier research that suggests people's sanitation use may be influenced by the availability of water.[20,35,36] Some scholars have also suggested that women, in particular, may revert to unimproved sanitation alternatives rather than walk to a shared or public facility if they do not feel safe outside their homes.[27,28,37] A binary variable, *recent non-partner violence*, was therefore created from women's survey responses about sexual and physical violence in the past 12 months.

The models have a number of neighborhood-level indicators that are commonly used as proxy variables to identify high-crime, high-violence, or structurally disorganized/disadvantaged communities.[38,39] These included the proportion of female headed-households in the neighborhood, the proportion of households in a neighborhood reporting no employment, the proportion of households in a neighborhood who fall in the lowest wealth quintile, and the proportion of households in a neighborhood that have at least

one woman reporting recent non-partner violence. A neighborhood ethnic diversity index calculated using a diversity entropy method commonly used in multi-level analyses was also included.[38,40]

Analysis

All data analyses were conducted using Stata/MP v.14. Fourteen separate two-level, multinomial logistic regressions were run using the user-written program gllamm.[41] Women's individual responses were nested in communities. Communities were represented by DHS primary sampling units[31] of about 20-200 people because they are the most consistent measure of community between DHS datasets and have been used to represent community in a number of multi-level studies using DHS data.[42-45]

Results

Sample Characteristics

A total of 102,399 women completed the domestic violence module across the 14 countries selected for this study. As item non-response indicated minimal missing data (less than 5%) on all independent, dependent, and control variables in each country, a method of hot-deck imputation was utilized to fill in missing values.[46] The final analytic sample consisted of 102,399 surveys (level 1) collected in 7,268 communities (level 2) in 14 countries. Descriptive statistic ranges are summarized in Table 1. Frequencies for all countries are presented in Appendix 1.

Women's reported use of sanitation facilities was extremely varied within and across all countries included in this study. Reported practices of OD ranged from 2.5% (Gabon) to 54.2% (Togo). Reported use of private facilities ranged from 12.7% (Ghana) to 63.4% (Cameroon) with ranges for reported use of shared facilities from 9.9% (Mozambique) to 64.3% (Sierra Leone).

Figure 1 provides relative-risk ratios and confidence intervals for the associations between individual- and neighborhood-level factors and sanitation use in each country. Detailed results from the two-level regressions are provided in Appendix 2.

Open Defecation (OD) Versus Private Facility Use

Wealth was the most common individual-level factor associated with OD compared to private toilet use. Relative risk ratios ranged from 0.46 [CI(95%) 0.274-0.77] in Mali to 0.08 [CI(95%) 0.034-0.180] in Cameroon. Access to public or open water compared to private sources emerged as another important factor in 10 of the countries. Relative risk for public vs. private water sources in those countries ranged from 1.30 [CI(95%) 1.007-1.689] in Mozambique to 11.44 [CI(95%) 5.533-23.641] in Ghana. Relative risk for open vs. private sources ranged from 1.54 [CI(95%) 1.171-2.034] in Mozambique to 9.56 [CI(95%) 6.333-14.417] in Togo. In half the countries, residing in a female-headed household was associated with higher risk of OD relative to risk of private sanitation use. Relative risk ratios in those countries ranged from 1.45 [CI(95%) 1.268-1.665] in Nigeria to 2.28 [CI(95%) 1.760-2.944] in Malawi. Religion was also an important factor, but

the direction and size of the relative risk varied, e.g. RRR=0.16 [CI(95%) 0.079-0.332] in Mali and RRR=2.36 [CI(95%) 1.404-3.955] in Cameroon.

Education and family size were important individual-level factors. Increasing family size and increasing years of education were associated with lower relative risk of OD compared to private facility use in 13 of the 14 countries. For example, each additional year of education was associated with lower risk of OD relative to risk of private facility use. Relative risk ratios for years of education in the 13 countries ranged from 0.95 [CI(95%) 0.912-0.985] in Sierra Leone to 0.82 [CI(95%) 0.784-0.855/0.755-0.898] in Kenya/Gabon).

Important neighborhood-level factors associated with risk of using OD relative to private facility use included urban area (8 countries), diversity (4 countries), and poverty (12 countries). The direction and magnitude of the neighborhood-level associations varied by country. For example, urban area ranged from RRR=0.21 [CI(95%) 0.088-0.500] in Gabon to 6.40 [CI(95%) 2.24-18.279] in Uganda; diversity ranged from RRR=0.18 [CI(95%) 0.073-0.427] in Mali to 2.29 [CI(95%) 0.999-5.232] in Togo; and poverty ranged from RRR=0.97 [CI(95%) 0.955-0.979] in Gabon to RRR=1.08 [CI(95%) 1.068-1.098] in Kenya.

Shared Toilets versus Private Toilets

Several demographic and household structure variables emerged as important factors associated with use of shared relative to private facilities. In most of the countries, living in a female-headed household, being married, and using public or open water sources were positively associated with women using shared rather than private toilets. Family size, age, and education, on the other hand were associated with lower risk of using shared facilities relative to private ones in most countries. For example, for each additional year of education, the risk of a woman using shared facilities relative to using private facilities was lower (3% lower risk [CI(95%) 0.947-0.992/0.942-0.992] in Sierra Leone/Mali to 10% lower risk [CI(95%) 0.882-0.92] in Kenya).

At the neighborhood-level, the urban factor was associated with higher risk of using shared relative to private sanitation in 11 countries—ranging from 1.69 [CI(95%) 1.243-2.301] in the DRC to 4.42 [CI(95%) 3.144-6.225] in Gabon. Neighborhood diversity was also associated with higher risk of shared relative to private facility use in a number of countries with the risk ranging from 1.29 [CI(95%) 1.058-1.566] in Malawi to 2.42 [CI(95%) 1.774-3.309] in Mozambique. The direction and size on the relative risk for neighborhood-level poverty and family disorganization varied between countries.

Discussion

Results suggest that predictors such as wealth, family size, education, water source, religion, and living in a female-headed household are the most prominent individual-level factors associated with OD relative to private facility use across the 14 countries. Neighborhood location (urban versus rural), diversity and poverty were the most prominent community-level factors associated with OD relative to private facility use. Demographic variables, such as family size, age, being married, living in a female-headed household, and

years of education were the most prominent individual-level factors associated with shared relative to private facility use. Whether or not a respondent resided in an urban or rural area was the most common neighborhood-level factor associated with use of shared relative to private toilets across the study countries. Neighborhood-level poverty, family disorganization, and diversity were also important factors associated with shared relative to private facility use in a majority of countries.

The results of this study showed that wealth at the individual level was associated with lower risk of OD relative to private toilet use in almost all countries, and neighborhood-level poverty was also associated with higher relative risk of OD in most countries. These findings are consistent with literature reporting that wealth is empirically linked to demand for and adoption of improved sanitation technologies.[17,20,47] Neighborhood location also emerged as an important factor associated with OD and shared relative to private facility use. The results are consistent with literature that suggests shared facilities are more common in cities[33] and with studies that suggest OD is common in both rural areas[48] and informal settlements in urban areas[37]. Results from this study also suggest that women with increasing years of education have lower risk of using OD relative to private toilets. Again, this is consistent with findings from literature that suggest education and knowledge are linked to individuals' ability to adopt new methods of urine/feces disposal.[17] Health-related education and awareness are often considered leading factors influencing user sanitation preferences and decisions.[12] In fact, many community-focused sanitation adoption and implementation programs rely largely on health education and training.[36]

Other common demographic variables associated with use of OD and shared facilities relative to private facilities in this study included family size, being married, living in a female-headed household, and having access to different water sources. These individual-level factors were not only common across the countries in this sample, but the direction of the association was also consistent. For example, family size was consistently associated with lower risk of using OD or shared relative to private toilets and female headed households, marriage, and access to shared water sources – both improved and unimproved - were generally associated with higher risk of using OD or shared relative to private facilities. According to the Joint Monitoring Programme (JMP),[49] unimproved sanitation, which includes OD and use of shared toilet facilities, is particularly persistent in disadvantaged households and communities, especially in sub-Saharan Africa.[1] Several of these demographic variables have been associated with household or neighborhood-level social or economic disadvantage in recent literature. Female headship and family size (number of children), for example, are sometimes used as variables in structural disadvantage measures at the household and neighborhood levels.[50] In these results, however, family size is associated with lower risk of using OD and/or shared facilities relative to private ones, which does not seem to indicate structural disadvantage. One explanation, as suggested by recent evidence from a study using DHS data from Kenya,[51] is that more children (family size) can increase a woman's decision-making power in the home and, relatedly, her ability to demand improved sanitation. Access to water is also a common factor in measuring household or community disadvantage.[1] For example, 93% of the people still using open water sources (e.g. rivers, lakes, or

unprotected surface water) as their primary water source are located in disadvantaged rural communities, particularly in sub-Saharan Africa.[1]

Results from this study also yielded less common and/or less consistent associations between several factors and sanitation use. For example, married women in the study had higher risk of using OD or shared relative to private facilities in almost all countries in the study. Literature does not highlight marriage as a common factor associated with sanitation use. Neither is marriage is frequently associated with household or community-level disadvantage. Some literature suggests that it is a cultural taboo for a child-in-law to use the same toilet facility as the parents-in-law in some African communities,[52] which might provide an explanation for why some married women might use OD or a shared instead of a private facility in a family setting. Yet, this cultural belief is unlikely to fully explain the association. Being a non-Christian also emerged as an important factor associated with women's use of OD or shared relative to private facilities in this study; however, the direction and magnitude of the risk varied between countries. These results suggest, as several previous studies have[20,34], that religion may be an important factor in women's sanitation use; however, the binary Christian/non-Christian measure available for this analysis does not provide enough detail about different religions.

Another unexpected finding was that, in several of the countries, being employed was associated with higher risk of OD or shared facility use relative to private facility use. Employment is usually associated with structural advantage and, consequently, one might expect the relative risk of women using OD or a shared facility to be lower for women who are employed. Perhaps women are unable to access sanitation facilities while at work. These findings highlight the need for more precise information on the nature and location of employment and access to and use of facilities while at work.

Many of the neighborhood-level variables in this study varied in direction and magnitude across different countries. This may be largely due to the variability of different methods of urine/feces disposal at the neighborhood level. There may be a uniformity of available sanitation methods in one neighborhood—e.g. an urban neighborhood in which every member of the neighborhood has access to a private, household sanitation facility that feeds into a government sewerage system or a rural neighborhood in which all households have access to pit latrines. In a number of other settings, however, the availability of different sanitation methods may vary considerably.[3] For example, residents in a single sampling unit in an informal settlement in a city in Kenya may utilize a variety of different sanitation methods, such as public toilets; private, household facilities; sites for OD; bags or buckets in the home; and/or plot toilets (toilets shared by a cluster of houses or a building). The results from this study suggest that neighborhood-level characteristics may influence sanitation use, but they may also highlight the need to look at the unique context of each neighborhood.

In addition to the more commonly recognized factors associated with sanitation use in the literature (e.g. wealth, access to water, and demographics), this study also yielded associations between neighborhood-level violence and sanitation use in several countries. While the relative risk was small compared to

some of the other factors, these results should not be neglected. Violence was associated with lower risk of OD or shared relative to private facility use in some countries (Nigeria, Uganda). This is contradictory to some studies that suggest that women who defecate in the open or use shared/public facilities are at higher risk of experiencing physical or sexual violence as a result of having to go outside the house at night.[16,23,25,27] On the other hand, these findings may be consistent with literature that suggests women may adopt alternative sanitation strategies to avoid OD or shared/public toilets if they fear they are at risk of experiencing violence.[14,15,25,27,28,37] Also, neighborhood-level violence is often associated with social disorganization.[38,39] Results suggesting a positive relative risk association between neighborhood-level violence and OD or use of shared facilities may be similar to findings that OD or shared sanitation are associated with poorer and/or more socially disorganized neighborhoods. On the other hand, results that suggest a negative relative risk association may reflect literature that suggests women who fear physical or sexual violence in their neighborhoods are likely to develop sanitation strategies that keep them from having to go outside their houses.

While this was the first attempt to quantitatively explore individual and neighborhood-level factors associated with sanitation, it had limitations. First, this study used cross-sectional data; thus, causal claims about the factors influencing sanitation use cannot be made. Second, this study used data from nationally-representative surveys that were not focused on sanitation use. Consequently, there were limited factors available across all datasets that were theoretically appropriate for inclusion, and these variables are sometimes problematic in sanitation analyses.[3,53] Other factors that are often associated with sanitation use in literature, such as cleanliness of toilets, distance to toilets, level of privacy, characteristics of toilet construction (e.g. doors and locks) were not included in DHS surveys. Neighborhood-level variables were constructed based on primary sampling units (PSU) in the surveys. While this is a common practice with multi-level analyses, it is limited in its ability to truly represent neighborhood-level characteristics.[54] Lastly, due to confidentiality issues, sampling weights at the neighborhood (PSU) level are not provided with DHS data, limiting the ability to do weighted, nationally representative, multi-level analyses.[55,56]

Conclusion

This was the first multi-country study to look at the factors associated with sanitation use. Findings from this study suggest that there are numerous individual-level (wealth, access to different water sources, age and education) and household structure (family size and female headship) variables that should be considered important factors associated with sanitation use. Sanitation use is not only a technical issue, but also a social one. While there are a number of small studies that have looked at factors that influence sanitation preferences, behaviors, use, and adoption, there is little information about common factors across a variety of contexts. Findings from this study suggest that household and neighborhood disadvantage, in particular, may be key factors in sanitation use. This is important as it highlights the connection between the social environment and a critical public health issue. Sanitation coverage continues to be a persistent problem,

particularly in SSA. While this may be the result of a number of regional, national, political, or economic issues, social organization may be a key factor in sanitation use. Although our study is an important first step in pushing the development and research agenda to focus on a broader perspective of sanitation use, it also highlights a need for better and more research into this dilemma.

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Appendix 1. Frequencies for descriptive statistics (*n* = 102,399)

Country	CMR	CIV	DRC	GAB	GHA	KEN	MWI	MLI	MOZ	NGA	SLE	TGO	UGA	ZMB
n	5043	6351	6811	5557	2442	6318	6229	3459	6835	27634	5185	6701	2056	11778
Sanitation Variables														
No facility (OD)	299	2143	1131	144	638	1135	714	297	2210	8392	1076	3630	254	1662
Private facility	3196	1564	2873	3064	311	2659	3201	1812	3951	11688	773	993	967	6417
Shared facility	1548	2644	2807	2349	1493	2524	2314	1350	674	7554	3336	2078	835	3699
Individual-level factors														
Non-Christian	321	3747	299	815	608	1256	769	3325	2001	13283	4065	2884	292	153
Married	3579	4640	5120	3563	1600	4268	4577	3050	4880	21004	4029	4891	1447	7973
Employed	3323	4453	4921	2511	1924	3488	3591	1594	2728	17696	3762	4923	1445	6404
Age (years)	28.6	29.3	28.7	30.1	29.7	29.1	28.6	28.7	29.1	29.2	30.2	29.9	28.5	29
	(0.13)	(0.11)	(0.11)	(0.13)	(0.19)	(0.11)	(0.11)	(0.15)	(0.11)	(0.06)	(0.13)	(0.11)	(0.2)	(0.08)
Years of education	6.1	2.7	5.3	6.4	6.1	7.3	5.1	1.8	3.9	6.3	2.9	4.2	5.6	6.6
	(0.06)	(0.05)	(0.05)	(0.04)	(0.09)	(0.06)	(0.05)	(0.06)	(0.05)	(0.03)	(0.06)	(0.05)	(0.09)	(0.03)
Family size	6.2	6.3	6.0	5.8	4.7	5.0	5.3	6.2	5.1	5.5	6.4	5.7	5.6	5.8
	(0.05)	(0.05)	(0.03)	(0.05)	(0.05)	(0.03)	(0.03)	(0.05)	(0.03)	(0.02)	(0.04)	(0.04)	(0.06)	(0.02)
Female-headed house-hold	1247	1242	1410	1965	895	2266	1661	368	2451	5159	1493	1712	632	2973
Public water source	2687	3031	1964	1852	1576	2346	4529	1943	1565	14765	2883	3803	316	5353
Open water source	1415	1251	3908	815	312	2070	1242	1060	2690	9272	1985	2193	499	4138
Private water source	941	2069	939	2890	554	1902	458	456	2580	3597	317	705	1241	2287
Wealth above the median	2285	2631	2696	1525	1102	3135	2794	1794	3709	13915	2523	2790	989	4945
Recent non-partner vio-lence	512	264	445	291	176	367	244	267	257	1227	427	182	171	491
Neighborhood-level factors														
Urban	2451	2660	2154	3620	1052	1905	782	1050	2546	11015	1871	2523	560	5257
Percent female-headed households	24.6	17.7	22.3	30.8	34.5	37.3	25.7	9.3	36.3	17.8	28.9	23.7	30.4	25.6
	(0.21)	(0.17)	(0.13)	(0.17)	(0.41)	(0.19)	(0.15)	(0.16)	(0.2)	(0.09)	(0.23)	(0.16)	(0.29)	(0.12)

Percent households with unemployment	17.2 (0.18)	14.5 (0.13)	15.3 (0.18)	27.7 (0.18)	13.2 (0.23)	35.6 (0.28)	28.6 (0.18)	31.9 (0.27)	42.8 (0.27)	19.3 (0.07)	14.7 (0.17)	14.8 (0.13)	17.8 (0.3)	13.5 (0.11)
Percent households in lowest wealth quintile	16.2 (0.4)	21.6 (0.33)	25.8 (0.29)	38.4 (0.48)	22.1 (0.67)	21.7 (0.36)	21.1 (0.21)	18.7 (0.36)	15.3 (0.26)	17.1 (0.17)	20.8 (0.33)	21.3 (0.35)	22 (0.63)	21.7 (0.22)
Diversity	0.5 (0.01)	1.2 (0.01)	0.2 (0.00)	0.8 (0.01)	0.5 (0.01)	0.5 (0.01)	0.6 (0.01)	0.7 (0.01)	0.6 (0.01)	0.6 (0.00)	0.6 (0.01)	0.4 (0.00)	0.7 (0.01)	1.0 (0.01)
Percent households with recent non-partner violence	4.6 (0.07)	3.4 (0.06)	3 (0.05)	4.2 (0.06)	4.3 (0.14)	5.8 (0.09)	1.2 (0.03)	3.6 (0.1)	2.3 (0.05)	3.9 (0.03)	3.8 (0.07)	2.4 (0.04)	2.5 (0.08)	3.8 (0.05)

Appendix 2. Results from all two-level multinomial logistic regressions of factors associated with OD versus private facility use and shared versus private facility use

	Cameroon			Cote d'Ivoire		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	1.06	0.731	0.762-1.473	1.61	0.000	1.354-1.920
Married	1.34	0.001	1.119-1.608	1.55	0.000	1.268-1.905
Employed	1.19	0.052	0.998-1.418	1.09	0.325	0.918-1.293
Age	0.97	0.000	0.966-0.984	0.98	0.000	0.973-0.992
Years of education	0.94	0.000	0.921-0.966	0.94	0.000	0.919-0.957
Family size	0.81	0.000	0.793-0.836	0.89	0.000	0.868-0.908
Female-headed household	1.28	0.008	1.066-1.542	1.25	0.046	1.004-1.554
Public water source	1.87	0.000	1.546-2.261	3.02	0.000	2.445-3.725
Open water source	2.01	0.000	1.562-2.591	3.55	0.000	2.621-4.813
Wealth above the median	1.05	0.646	0.853-1.292	0.51	0.000	0.416-0.621
Recent non-partner violence	1.03	0.834	0.804-1.311	1.07	0.714	0.745-1.537
Neighborhood-level factors						
Urban	1.05	0.757	0.775-1.421	1.86	0.009	1.165-2.975
Female-headed households	1.01	0.001	1.006-1.021	1.01	0.013	1.003-1.024
Household unemployment	0.98	0.000	0.970-0.988	1.01	0.074	0.999-1.029
Households in lowest wealth quintile	0.97	0.000	0.962-0.974	1.01	0.155	0.998-1.015
Diversity	1.59	0.001	1.209-2.081	1.40	0.003	1.122-1.742
Recent non-partner violence	1.00	0.967	0.980-1.021	1.02	0.348	0.983-1.048
OPEN DEFECATION						
Individual-level factors						
Non-Christian	2.36	0.001	1.404-3.955	1.24	0.066	0.986-1.558
Married	1.12	0.624	0.712-1.760	1.64	0.001	1.240-2.171
Employed	0.99	0.977	0.670-1.475	1.19	0.144	0.942-1.503
Age	1.00	0.820	0.980-1.016	0.98	0.010	0.972-0.996
Years of education	0.92	0.030	0.861-0.993	0.89	0.000	0.856-0.917
Family size	0.94	0.006	0.893-0.982	0.95	0.000	0.921-0.974
Female-headed household	1.58	0.085	0.939-2.672	1.23	0.172	0.913-1.669
Public water source	0.66	0.248	0.329-1.333	5.86	0.000	4.196-8.195
Open water source	1.13	0.735	0.561-2.266	9.33	0.000	6.20-14.028
Wealth above the median	0.08	0.000	0.034-0.180	0.12	0.000	0.093-0.165

	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
Recent non-partner violence	1.61	0.106	0.904-2.854	1.58	0.104	0.911-2.735
Neighborhood-level factors						
Urban	2.59	0.041	1.040-6.471	0.79	0.456	0.434-1.455
Female-headed households	0.95	0.000	0.926-0.974	1.03	0.000	1.014-1.040
Household unemployment	0.99	0.267	0.970-1.008	1.02	0.107	0.996-1.039
Households in lowest wealth quintile	1.03	0.000	1.018-1.038	1.05	0.000	1.040-1.059
Diversity	0.95	0.904	0.434-2.091	0.57	0.000	0.424-0.753
Recent non-partner violence	1.03	0.337	0.970-1.093	1.06	0.060	0.998-1.118
Neighborhood variance (null model)	7.54	1.462[1]		12.04	1.064[1]	
ICC (null model)	69.63			78.54		
Neighborhood variance (full model)	2.69	0.494[1]		2.86	0.282[1]	
ICC (full model)	45.02			46.49		

[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

	DRC			Gabon		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	1.24	0.193	0.896-1.720	0.93	0.439	0.764-1.124
Married	1.44	0.000	1.226-1.702	1.50	0.000	1.283-1.750
Employed	1.12	0.158	0.957-1.306	1.08	0.295	0.934-1.252
Age	0.98	0.000	0.976-0.991	0.98	0.000	0.975-0.990
Years of education	0.99	0.218	0.969-1.007	0.99	0.339	0.964-1.013
Family size	0.91	0.000	0.889-0.932	0.88	0.000	0.862-0.899
Female-headed household	1.48	0.000	1.242-1.757	1.10	0.227	0.943-1.280
Public water source	0.87	0.325	0.664-1.145	1.62	0.000	1.382-1.903
Open water source	0.85	0.254	0.637-1.126	1.49	0.002	1.157-1.929
Wealth above the median	1.12	0.164	0.954-1.321	0.16	0.000	0.135-0.196
Recent non-partner violence	1.07	0.622	0.828-1.372	1.10	0.535	0.817-1.476
Neighborhood-level factors						
Urban	1.69	0.001	1.243-2.301	4.42	0.000	3.144-6.225
Female-headed households	0.99	0.119	0.983-1.002	1.01	0.025	1.001-1.020
Household unemployment	1.00	0.997	0.992-1.008	1.01	0.041	1.000-1.017
Households in lowest wealth quintile	1.01	0.016	1.001-1.012	1.00	0.674	0.995-1.003
Diversity	1.32	0.132	0.920-1.893	2.41	0.000	1.876-3.099
Recent non-partner violence	1.02	0.243	0.988-1.047	1.02	0.149	0.993-1.046
OPEN DEFECATION						
Individual-level factors						
Non-Christian	1.17	0.503	0.738-1.859	0.68	0.257	0.351-1.323
Married	1.11	0.423	0.863-1.420	1.48	0.129	0.893-2.439
Employed	1.02	0.892	0.793-1.305	1.26	0.332	0.790-2.008
Age	0.99	0.181	0.982-1.003	0.98	0.145	0.959-1.006
Years of education	0.94	0.000	0.913-0.968	0.82	0.000	0.755-0.898
Family size	0.88	0.000	0.842-0.909	0.91	0.009	0.854-0.978
Female-headed household	1.81	0.000	1.418-2.299	1.73	0.032	1.049-2.845
Public water source	1.19	0.481	0.729-1.954	1.97	0.006	1.210-3.200
Open water source	1.25	0.382	0.761-2.044	1.87	0.089	0.909-3.855
Wealth above the median	0.38	0.000	0.295-0.494	0.09	0.000	0.039-0.197
Recent non-partner violence	1.09	0.661	0.743-1.598	0.77	0.586	0.307-1.946
Neighborhood-level factors						
Urban	0.50	0.016	0.288-0.877	0.21	0.000	0.088-0.500
Female-headed households	1.02	0.008	1.005-1.037	1.01	0.528	0.982-1.037
Household unemployment	0.99	0.029	0.972-0.998	1.02	0.034	1.002-1.044
Households in lowest wealth quintile	1.01	0.017	1.002-1.019	0.97	0.000	0.955-0.979

	0.91	0.767	0.483-1.709	0.69	0.247	0.364-1.297
Diversity	0.91	0.767	0.483-1.709	0.69	0.247	0.364-1.297
Recent non-partner violence	0.97	0.286	0.925-1.023	1.11	0.006	1.030-1.196
Neighborhood variance (null)	3.72	0.336[1]		5.71	1.205[1]	
ICC (null)	53.05			63.44		
Neighborhood variance (full model)	3.82	0.399[1]		4.91	0.905[1]	
ICC (full model)	53.73			59.86		

[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

	Ghana			Kenya		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	1.29	0.289	0.804-2.076	0.54	0.000	0.404-0.730
Married	2.18	0.000	1.465-3.237	1.74	0.000	1.461-2.064
Employed	1.46	0.067	0.973-2.189	1.19	0.028	1.02-1.398
Age	0.98	0.062	0.962-1.001	0.96	0.000	0.955-0.972
Years of education	0.94	0.002	0.897-0.976	0.90	0.000	0.882-0.920
Family size	0.86	0.000	0.799-0.922	0.81	0.000	0.786-0.842
Female-headed household	1.70	0.009	1.146-2.536	1.23	0.016	1.040-1.458
Public water source	7.22	0.000	4.660-11.179	1.78	0.000	1.439-2.208
Open water source	5.91	0.000	2.926-11.938	1.46	0.002	1.152-1.852
Wealth above the median	0.74	0.173	0.486-1.138	1.23	0.023	1.029-1.473
Recent non-partner violence	1.09	0.786	0.582-2.045	1.05	0.737	0.775-1.435
Neighborhood-level factors						
Urban	2.38	0.005	1.292-4.376	4.25	0.000	2.758-6.538
Female-headed households	1.02	0.000	1.012-1.038	1.00	0.398	0.995-1.013
Household unemployment	1.01	0.329	0.990-1.032	1.01	0.040	1.000-1.017
Households in lowest wealth quintile	0.98	0.000	0.967-0.988	1.01	0.017	1.002-1.017
Diversity	1.63	0.121	0.878-3.036	0.87	0.432	0.608-1.237
Recent non-partner violence	0.99	0.459	0.953-1.022	1.02	0.024	1.003-1.047
OPEN DEFECATION						
Individual-level factors						
Non-Christian	1.97	0.025	1.087-3.564	1.03	0.899	0.623-1.714
Married	1.49	0.165	0.850-2.596	1.28	0.103	0.951-1.734
Employed	0.85	0.574	0.478-1.506	1.12	0.441	0.845-1.472
Age	0.98	0.109	0.953-1.005	0.98	0.004	0.963-0.993
Years of education	0.86	0.000	0.810-0.913	0.82	0.000	0.784-0.855
Family size	0.97	0.552	0.891-1.064	0.84	0.000	0.799-0.888
Female-headed household	1.68	0.067	0.965-2.910	1.23	0.157	0.925-1.625
Public water source	11.44	0.000	5.533-23.641	1.89	0.006	1.197-2.98
Open water source	7.59	0.000	2.809-20.488	2.07	0.002	1.315-3.267
Wealth above the median	0.19	0.000	0.102-0.348	0.10	0.000	0.066-0.157
Recent non-partner violence	0.60	0.261	0.244-1.465	1.42	0.146	0.885-2.287
Neighborhood-level factors						
Urban	1.49	0.427	0.559-3.949	3.42	0.004	1.498-7.827
Female-headed households	1.00	0.775	0.982-1.024	1.00	0.820	0.981-1.016
Household unemployment	0.99	0.733	0.962-1.028	1.00	0.518	0.984-1.008
Households in lowest wealth quintile	1.04	0.000	1.029-1.058	1.08	0.000	1.068-1.098
Diversity	0.70	0.488	0.253-1.928	0.72	0.343	0.358-1.430
Recent non-partner violence	1.01	0.619	0.960-1.071	1.04	0.039	1.002-1.077
Neighborhood variance (null)	30.09	5.580[1]		19.16	1.796[1]	
ICC (null)	90.14			85.35		
Neighborhood variance (full model)	5.68	1.070[1]		5.77	0.817[1]	
ICC (full model)	63.34			63.70		

[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

	Malawi			Mali		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	0.58	0.000	0.471-0.725	0.66	0.068	0.420-1.032
Married	1.50	0.000	1.271-1.762	1.78	0.000	1.342-2.369
Employed	1.12	0.090	0.983-1.265	1.35	0.001	1.130-1.622
Age	0.97	0.000	0.965-0.980	0.98	0.000	0.968-0.989
Years of education	0.95	0.000	0.932-0.969	0.97	0.009	0.942-0.992
Family size	0.90	0.000	0.873-0.925	0.92	0.000	0.894-0.949
Female-headed household	1.65	0.000	1.394-1.950	1.25	0.128	0.939-1.654
Public water source	3.06	0.000	2.426-3.866	1.26	0.110	0.949-1.672
Open water source	2.68	0.000	2.040-3.511	1.30	0.149	0.911-1.851
Wealth above the median	0.76	0.000	0.669-0.868	1.24	0.066	0.986-1.549
Recent non-partner violence	0.96	0.791	0.695-1.319	0.91	0.594	0.652-1.278
Neighborhood-level factors						
Urban	1.85	0.000	1.421-2.402	2.21	0.000	1.486-3.301
Female-headed households	0.99	0.089	0.988-1.001	1.00	0.752	0.983-1.013
Household unemployment	0.99	0.001	0.986-0.996	0.99	0.002	0.978-0.995
Households in lowest wealth quintile	0.99	0.001	0.986-0.997	1.00	0.610	0.990-1.006
Diversity	1.29	0.012	1.058-1.566	0.73	0.067	0.523-1.022
Recent non-partner violence	1.03	0.095	0.995-1.065	1.03	0.016	1.005-1.053
OPEN DEFECATION						
Individual-level factors						
Non-Christian	0.82	0.229	0.584-1.137	0.16	0.000	0.079-0.332
Married	1.41	0.011	1.082-1.826	1.23	0.582	0.592-2.543
Employed	1.23	0.041	1.008-1.511	1.14	0.530	0.757-1.719
Age	0.97	0.000	0.963-0.986	1.00	0.889	0.977-1.021
Years of education	0.87	0.000	0.837-0.896	0.91	0.054	0.819-1.002
Family size	0.92	0.000	0.876-0.962	0.93	0.032	0.867-0.994
Female-headed household	2.28	0.000	1.760-2.944	0.99	0.988	0.512-1.933
Public water source	2.55	0.000	1.576-4.139	1.24	0.698	0.412-3.757
Open water source	3.04	0.000	1.815-5.083	1.70	0.359	0.546-5.306
Wealth above the median	0.24	0.000	0.192-0.313	0.46	0.003	0.274-0.770
Recent non-partner violence	0.92	0.772	0.541-1.578	0.88	0.733	0.431-1.808
Neighborhood-level factors						
Urban	0.90	0.724	0.509-1.598	0.92	0.920	0.187-4.541
Female-headed households	0.99	0.094	0.979-1.002	1.00	0.935	0.961-1.044
Household unemployment	0.99	0.176	0.985-1.003	0.97	0.004	0.952-0.990
Households in lowest wealth quintile	1.01	0.170	0.997-1.015	1.04	0.000	1.023-1.054
Diversity	1.24	0.222	0.878-1.749	0.18	0.000	0.073-0.427
Recent non-partner violence	0.99	0.675	0.928-1.050	1.03	0.341	0.970-1.092
Neighborhood variance (null)	1.48	0.197[1]		10.38	1.488[1]	
ICC (null)	31.08			75.93		
Neighborhood variance (full model)	1.58	0.212[1]		5.65	0.972[1]	
ICC (full model)	32.44			63.20		

[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

	Mozambique			Nigeria		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	0.84	0.150	0.668-1.064	0.83	0.006	0.734-0.948
Married	1.10	0.394	0.878-1.390	1.37	0.000	1.239-1.523
Employed	1.10	0.401	0.883-1.365	1.17	0.001	1.069-1.271
Age	0.97	0.000	0.962-0.984	0.98	0.000	0.980-0.989
Years of education	0.91	0.000	0.886-0.942	0.94	0.000	0.934-0.954
Family size	0.77	0.000	0.733-0.803	0.87	0.000	0.857-0.882
Female-headed household	1.35	0.011	1.069-1.693	1.33	0.000	1.199-1.485
Public water source	0.75	0.023	0.579-0.960	1.15	0.009	1.037-1.285
Open water source	0.60	0.002	0.430-0.830	1.41	0.000	1.223-1.627
Wealth above the median	0.87	0.298	0.669-1.131	0.98	0.663	0.871-1.092
Recent non-partner violence	1.33	0.230	0.837-2.105	1.00	0.988	0.834-1.195
Neighborhood-level factors						
Urban	1.10	0.609	0.767-1.573	1.93	0.000	1.655-2.256
Female-headed households	0.98	0.000	0.968-0.985	1.03	0.000	1.027-1.039
Household unemployment	1.01	0.071	0.999-1.013	0.99	0.000	0.984-0.995
Households in lowest wealth quintile	1.00	0.559	0.986-1.008	0.98	0.000	0.980-0.987
Diversity	2.42	0.000	1.774-3.309	1.06	0.318	0.944-1.193
Recent non-partner violence	0.97	0.149	0.933-1.011	0.97	0.000	0.956-0.982
OPEN DEFECATION						
Individual-level factors						
Non-Christian	0.93	0.488	0.754-1.144	0.57	0.000	0.480-0.670
Married	0.92	0.418	0.739-1.134	1.12	0.109	0.976-1.276
Employed	1.39	0.001	1.147-1.683	1.20	0.001	1.076-1.340
Age	0.99	0.013	0.978-0.997	0.99	0.000	0.982-0.993
Years of education	0.91	0.000	0.879-0.940	0.90	0.000	0.892-0.917
Family size	0.90	0.000	0.868-0.933	0.93	0.000	0.911-0.943
Female-headed household	1.56	0.000	1.274-1.922	1.45	0.000	1.268-1.665
Public water source	1.30	0.044	1.007-1.689	1.84	0.000	1.561-2.180
Open water source	1.54	0.002	1.171-2.034	3.05	0.000	2.489-3.737
Wealth above the median	0.24	0.000	0.189-0.294	0.31	0.000	0.268-0.353
Recent non-partner violence	0.91	0.686	0.563-1.460	0.94	0.579	0.748-1.176
Neighborhood-level factors						
Urban	0.30	0.000	0.194-0.472	1.97	0.000	1.540-2.515
Female-headed households	1.00	0.804	0.989-1.009	1.06	0.000	1.055-1.072
Household unemployment	1.01	0.003	1.004-1.018	0.99	0.007	0.984-0.997
Households in lowest wealth quintile	1.06	0.000	1.055-1.075	1.03	0.000	1.023-1.031
Diversity	1.56	0.031	1.042-2.325	0.27	0.000	0.218-0.336
Recent non-partner violence	1.05	0.053	0.999-1.098	1.00	0.858	0.982-1.022
Neighborhood variance (null)	8.02	0.770[1]		10.60	0.514[1]	
ICC (null)	70.91			76.32		
Neighborhood variance (full model)	3.28	0.333[1]		10.14	0.467[1]	
ICC (full model)	49.90			75.50		

[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

	Sierra Leone			Togo		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	2.30	0.000	1.853-2.862	1.30	0.018	1.046-1.626
Married	1.41	0.005	1.108-1.793	1.98	0.000	1.572-2.491
Employed	1.25	0.033	1.019-1.542	0.98	0.859	0.790-1.217
Age	1.00	0.518	0.986-1.007	0.97	0.000	0.955-0.978
Years of education	0.97	0.007	0.947-0.992	0.92	0.000	0.898-0.941
Family size	0.91	0.000	0.881-0.935	0.79	0.000	0.762-0.815
Female-headed household	0.87	0.201	0.701-1.078	1.32	0.016	1.052-1.649
Public water source	3.80	0.000	2.794-5.165	4.07	0.000	3.250-5.084
Open water source	3.81	0.000	2.639-5.487	3.05	0.000	2.227-4.183
Wealth above the median	0.62	0.000	0.493-0.791	1.62	0.001	1.206-2.177
Recent non-partner violence	1.26	0.200	0.884-1.799	1.30	0.364	0.737-2.299
Neighborhood-level factors						
Urban	2.13	0.000	1.415-3.198	0.99	0.954	0.674-1.452
Female-headed households	1.02	0.001	1.007-1.026	1.01	0.018	1.002-1.024
Household unemployment	0.99	0.368	0.982-1.007	0.99	0.199	0.98-1.004
Households in lowest wealth quintile	1.02	0.000	1.008-1.025	0.99	0.043	0.985-1.00
Diversity	0.77	0.113	0.564-1.062	1.04	0.847	0.69-1.570
Recent non-partner violence	1.03	0.059	0.999-1.063	1.08	0.000	1.043-1.125
OPEN DEFECATION						
Individual-level factors						
Non-Christian	2.13	0.000	1.544-2.927	1.68	0.000	1.317-2.146
Married	1.07	0.705	0.759-1.504	2.13	0.000	1.631-2.787
Employed	1.18	0.296	0.868-1.593	1.37	0.013	1.071-1.761
Age	0.99	0.246	0.977-1.006	0.96	0.000	0.948-0.973
Years of education	0.95	0.007	0.912-0.985	0.89	0.000	0.866-0.920
Family size	0.88	0.000	0.840-0.917	0.89	0.000	0.864-0.921
Female-headed household	0.79	0.133	0.581-1.074	1.69	0.000	1.294-2.197
Public water source	1.35	0.255	0.805-2.265	6.82	0.000	4.737-9.806
Open water source	2.36	0.004	1.308-4.246	9.56	0.000	6.333-14.417
Wealth above the median	0.21	0.000	0.152-0.301	0.16	0.000	0.113-0.238
Recent non-partner violence	1.19	0.483	0.731-1.938	1.07	0.828	0.568-2.029
Neighborhood-level factors						
Urban	1.18	0.724	0.462-3.036	0.57	0.066	0.308-1.038
Female-headed households	1.01	0.221	0.994-1.027	1.03	0.002	1.009-1.044
Household unemployment	1.00	0.894	0.978-1.020	1.04	0.000	1.020-1.060
Households in lowest wealth quintile	1.06	0.000	1.047-1.072	1.05	0.000	1.036-1.057
Diversity	0.77	0.396	0.421-1.408	2.29	0.050	0.999-5.232
Recent non-partner violence	1.09	0.002	1.031-1.150	1.16	0.000	1.080-1.239
Neighborhood variance (null)	5.13	0.506[1]		7.48	0.715[1]	
ICC (null)	60.95			69.44		
Neighborhood variance (full model)	4.38	0.533[1]		3.81	0.457[1]	
ICC (full model)	57.12			53.65		

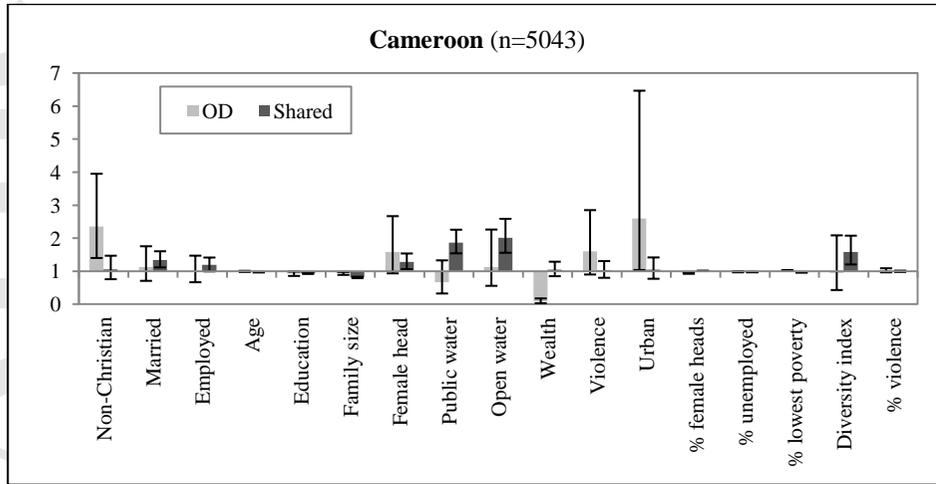[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

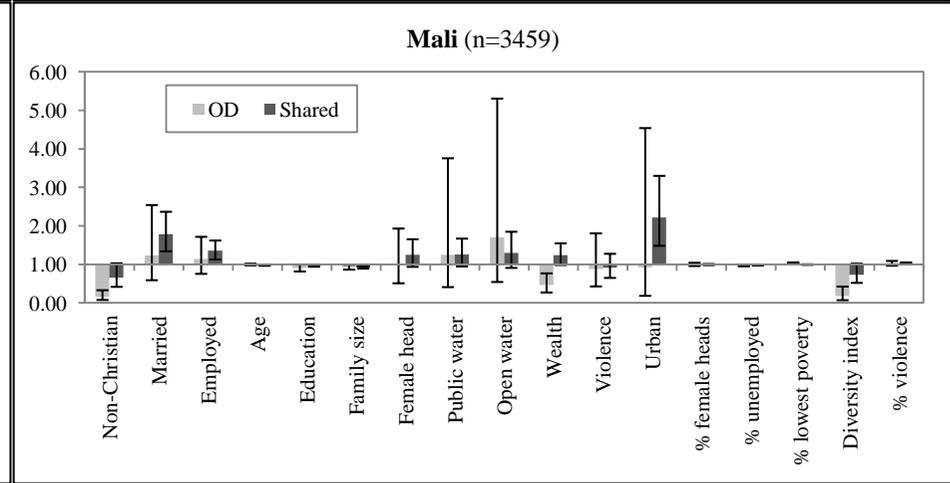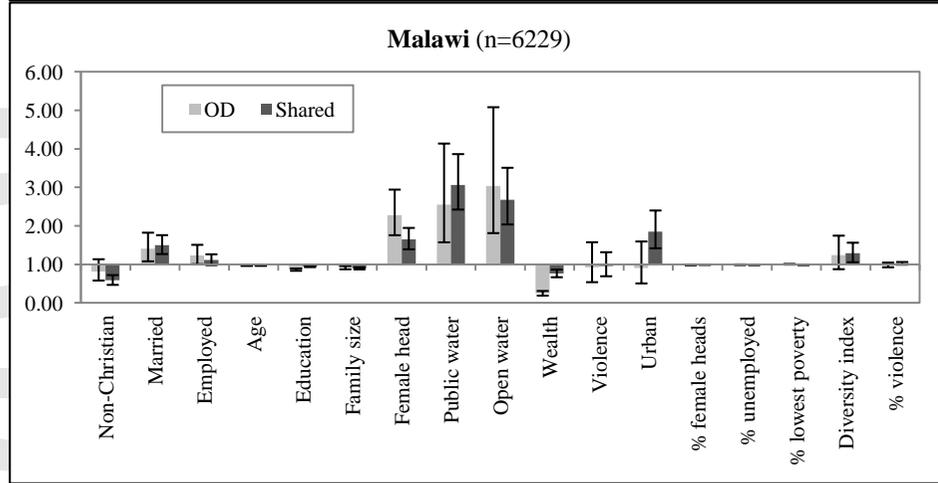|	Uganda			Zambia		
	RRR	p-value	CI [95%]	RRR	p-value	CI [95%]
SHARED						
Individual-level factors						
Non-Christian	1.78	0.001	1.265-2.502	0.81	0.405	0.499-1.325
Married	1.58	0.002	1.183-2.099	1.80	0.000	1.575-2.066
Employed	0.97	0.838	0.741-1.275	0.99	0.928	0.891-1.111
Age	0.97	0.000	0.961-0.989	0.98	0.000	0.976-0.988
Years of education	0.99	0.520	0.957-1.023	0.94	0.000	0.923-0.954
Family size	0.79	0.000	0.756-0.830	0.84	0.000	0.822-0.859
Female-headed household	1.36	0.045	1.006-1.827	1.94	0.000	1.676-2.240
Public water source	1.83	0.001	1.267-2.634	1.59	0.000	1.364-1.862
Open water source	0.83	0.209	0.614-1.113	1.43	0.000	1.187-1.723
Wealth above the median	0.87	0.321	0.665-1.143	0.71	0.000	0.614-0.815
Recent non-partner violence	1.18	0.488	0.744-1.856	1.10	0.447	0.861-1.405
Neighborhood-level factors						
Urban	4.18	0.000	2.825-6.191	2.23	0.000	1.695-2.926
Female-headed households	1.01	0.114	0.998-1.020	0.99	0.114	0.985-1.002
Household unemployment	1.01	0.185	0.997-1.018	1.01	0.063	1.000-1.017
Households in lowest wealth quintile	1.02	0.000	1.014-1.028	0.99	0.000	0.984-0.994
Diversity	0.91	0.618	0.638-1.306	1.38	0.000	1.154-1.646
Recent non-partner violence	0.95	0.024	0.915-0.994	1.00	0.800	0.979-1.017
OPEN DEFECATION						
Individual-level factors						
Non-Christian	1.67	0.179	0.792-3.503	2.08	0.031	1.067-4.049
Married	1.39	0.241	0.801-2.416	1.39	0.002	1.129-1.708
Employed	1.18	0.535	0.700-1.987	1.06	0.469	0.901-1.255
Age	0.98	0.074	0.950-1.002	0.98	0.000	0.972-0.990
Years of education	0.85	0.000	0.789-0.921	0.88	0.000	0.857-0.904
Family size	0.81	0.000	0.745-0.887	0.90	0.000	0.876-0.934
Female-headed household	1.43	0.196	0.832-2.450	1.61	0.000	1.300-1.992
Public water source	1.09	0.868	0.385-3.103	2.75	0.000	1.872-4.043
Open water source	1.17	0.567	0.687-1.988	3.35	0.000	2.266-4.965
Wealth above the median	0.11	0.000	0.050-0.232	0.18	0.000	0.140-0.239
Recent non-partner violence	0.62	0.304	0.252-1.538	0.97	0.871	0.651-1.439
Neighborhood-level factors						
Urban	6.40	0.001	2.240-18.279	0.39	0.000	0.233-0.659
Female-headed households	1.00	0.922	0.979-1.024	1.00	0.601	0.989-1.020
Household unemployment	1.02	0.132	0.995-1.035	1.01	0.314	0.993-1.022
Households in lowest wealth quintile	1.07	0.000	1.053-1.078	1.01	0.072	0.999-1.015
Diversity	0.68	0.326	0.313-1.471	0.95	0.771	0.698-1.306
Recent non-partner violence	0.99	0.785	0.916-1.069	0.98	0.226	0.941-1.014
Neighborhood variance (null)	8.58	1.405[1]		4.06	0.305[1]	
ICC (null)	72.28			55.23		
Neighborhood variance (full model)	1.79	0.543[1]		3.97	0.413[1]	
ICC (full model)	35.19			54.70		

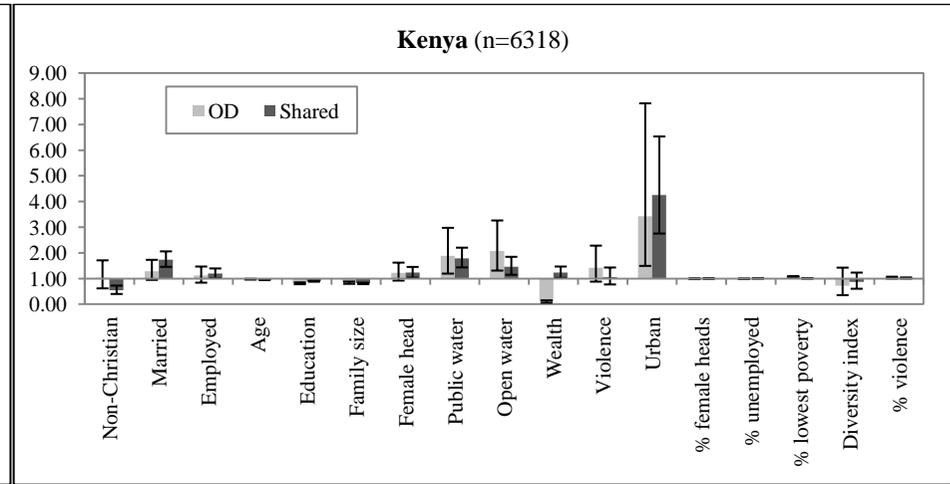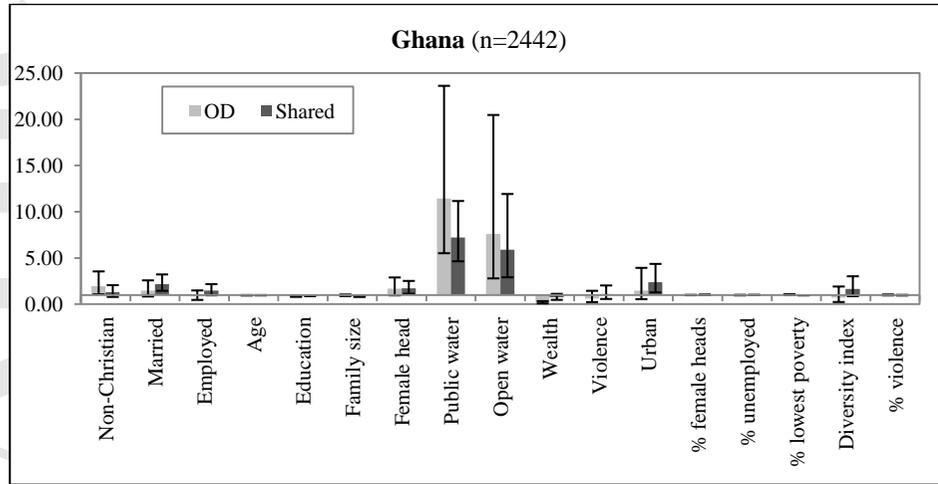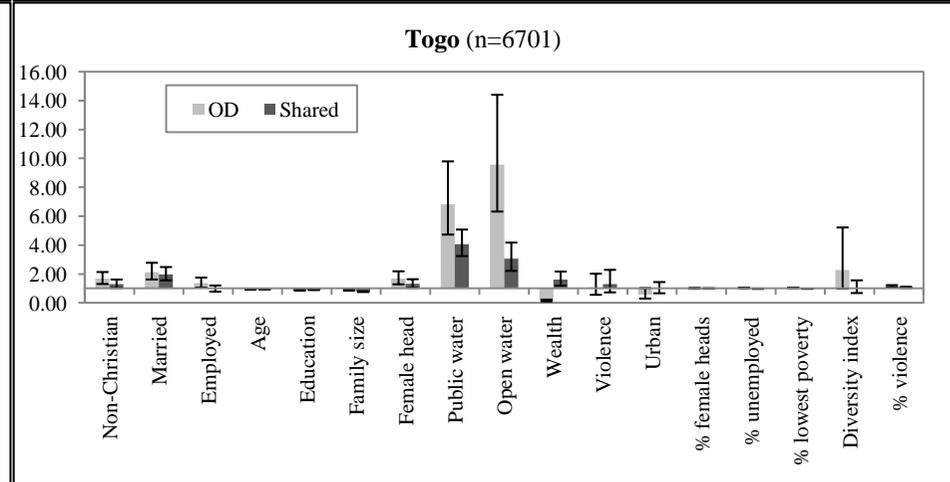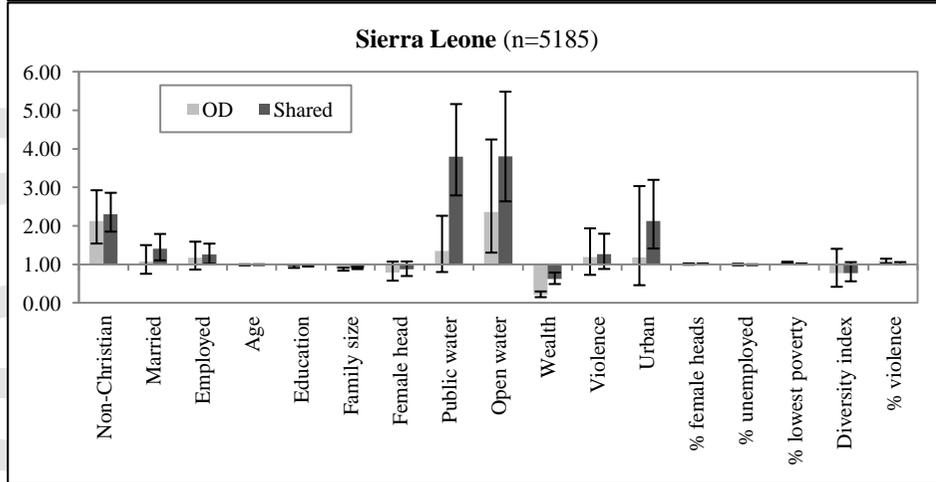[1]Standard errors corresponding to neighborhood-variance (level 2 variance)

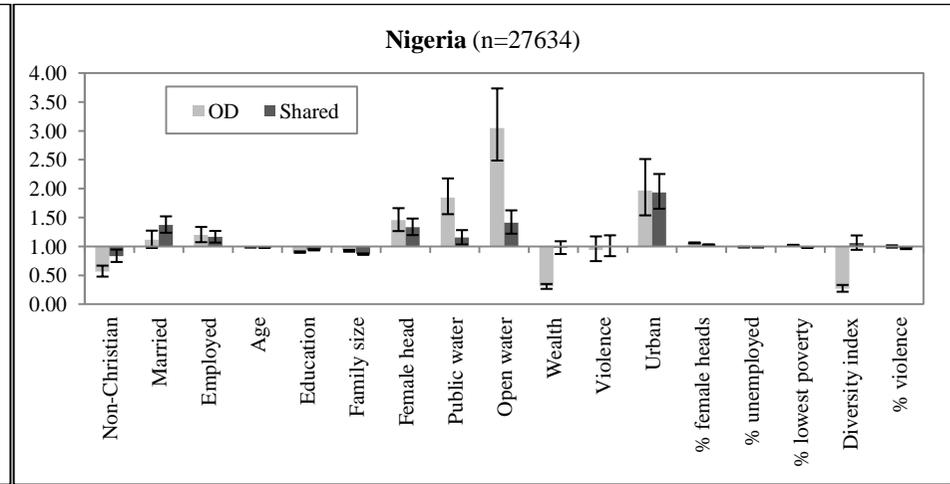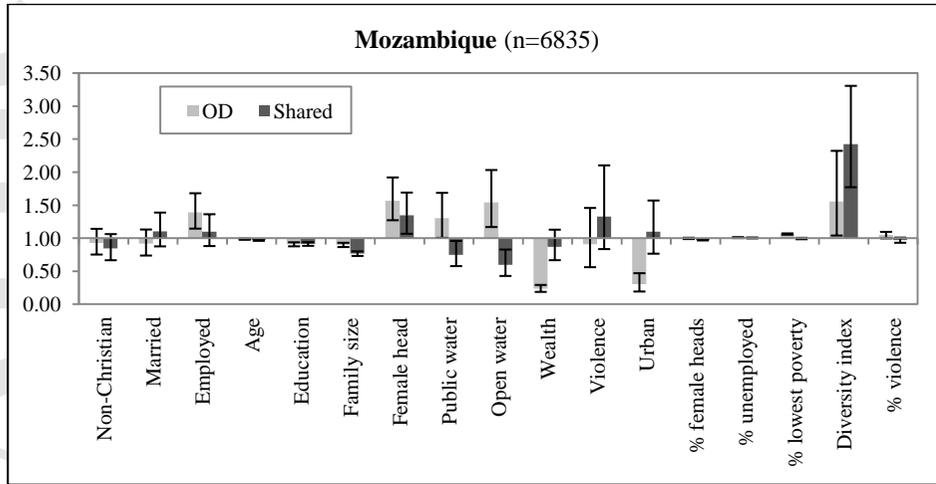Table 1. Variation in sample characteristics of 14 countries in SSA (n = 102,399)
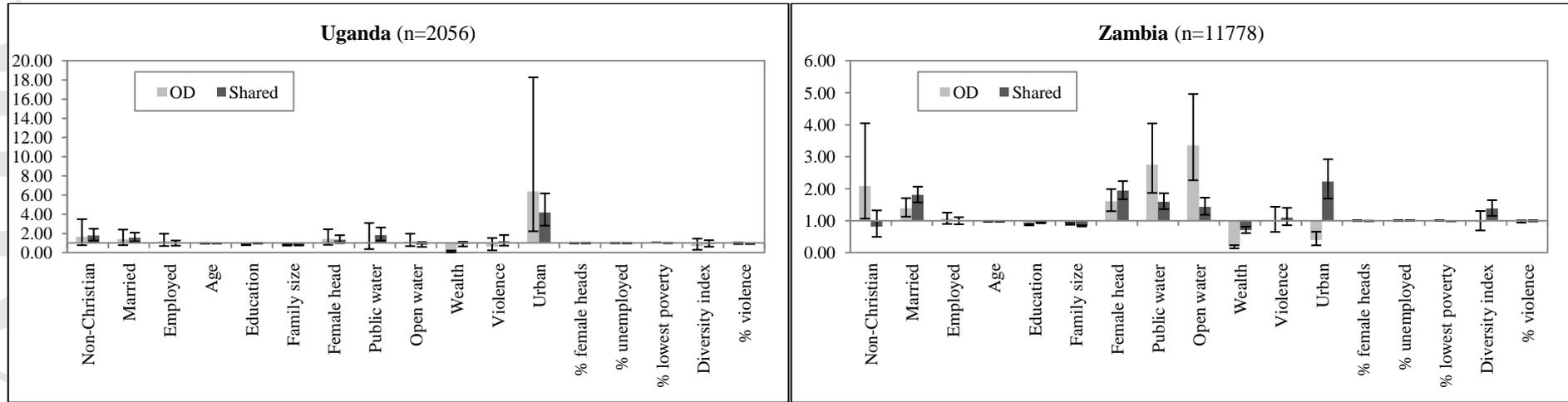
Variable	Range (Percentages except where noted)*
Type of sanitation use	
Open Defecation	2.5 (Gabon) – 54.2 (Togo)
Private Facility	12.7 (Ghana) – 63.4 (Cameroon)
Shared facility	9.9 (Mozambique) – 64.3 (Sierra Leone)
Individual factors	
Non-Christian	1.3 (Zambia) to 96.1 (Mali)
Married	64.1 (Gabon) to 88.2 (Mali)
Employed	39.9 (Mozambique) – 78.8 (Ghana)
Age	28.9 years (Uganda) – 30.2 years (Sierra Leone)
Yrs. of Education	1.8 years (Mali) - 7.3 years (Kenya)
Family Size	4.7 children (Ghana) – 6.4 children (Sierra Leone)
Female-headed Household	10.6 (Mali) – 36.7 (Ghana)
Source of Drinking Water	
Public Water Source	15.4 (Uganda) – 72.7 (Malawi)
Open Water Source	12.8 (Gabon) – 57.4 (DRC)
Private Water Source	6.1 (Sierra Leone) – 60.4 (Uganda)
Wealth above the median	27.4 (Gabon) – 54.3 (Mozambique)
Recent non-partner violence	2.7 (Togo) – 10.2 (Cameroon)
Neighborhood-level factors	
Urban	12.6 (Malawi) – 65.1 (Gabon)
Female-headed Households	9.3 (Malawi) – 37.3 (Kenya)
Household Unemployment	13.2 (Ghana) – 42.8 (Mozambique)
Households in Lowest Wealth Quintile	15.3 (Mozambique) – 38.4 (Gabon)
Diversity	0.2 (DRC) – 1.2 (Côte d'Ivoire)
Women Reporting Recent Non-Partner Violence	1.2 (Malawi) – 5.8 (Kenya)

*Frequencies for all countries are presented in Appendix 1

Cameroon (n=5043)

Cote d'Ivoire (n=6351)

Democratic Republic of Congo (n=6811)

Gabon (n=5557)

Ghana (n=2442)

OD Shared

Non-Christian | Married | Employed | Age | Education | Family size | Female head | Public water | Open water | Wealth | Violence | Urban | % female heads | % unemployed | % lowest poverty | Diversity index | % violence

25.00
20.00
15.00
10.00
5.00
0.00

Kenya (n=6318)

OD Shared

9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00

Non-Christian | Married | Employed | Age | Education | Family size | Female head | Public water | Open water | Wealth | Violence | Urban | % female heads | % unemployed | % lowest poverty | Diversity index | % violence

Malawi (n=6229)

OD Shared

6.00
5.00
4.00
3.00
2.00
1.00
0.00

Non-Christian | Married | Employed | Age | Education | Family size | Female head | Public water | Open water | Wealth | Violence | Urban | % female heads | % unemployed | % lowest poverty | Diversity index | % violence

Mali (n=3459)

OD Shared

6.00
5.00
4.00
3.00
2.00
1.00
0.00

Non-Christian | Married | Employed | Age | Education | Family size | Female head | Public water | Open water | Wealth | Violence | Urban | % female heads | % unemployed | % lowest poverty | Diversity index | % violence

Mozambique (n=6835)

Nigeria (n=27634)

Sierra Leone (n=5185)

Togo (n=6701)

Figures 1. Relative risk ratios and confidence intervals (95%) for factors associated with OD and shared compared to private facilities for all countries