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Research article

Correlates of access to hand hygiene resources in Ghanaian households: An exploratory analysis of the 2014 demographic and health survey

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ABSTRACT

Objectives: Handwashing with soap and water remains the most effective public health measure to reduce the risk of infectious diseases, which kill over 2.5 million people annually, mostly children in developing countries. The absence of hand hygiene resources in homes put many at risk of these infectious diseases. In the wake of the outbreak of the COVID-19 pandemic, the World Health Organization (WHO) and governments around the world have stressed the importance of regular handwashing to prevent the spread of the virus. This suggests that research on water, sanitation, and hygiene issues deserve continuous scholarly attention. In Ghana, studies on household's access to hand hygiene resources are few and relatively old. Therefore, this study estimated the proportion of Ghanaian households with access to hand hygiene resources and their associated determinants using data from a recent national survey.

Methods: The study used the cross-sectional 2014 Ghana Demographic and Health Surveys dataset. We used STATA-14 to perform data analyses on a weighted sample of 11,710.06 households. We used complex samples analysis technique to adjust for sample units, stratification and sample weights for both the descriptive statistics and multivariate robust Poisson regression.

Results: The result showed that about one fifth of Ghanaian households had access to hand hygiene resources. Households with heads who attained a Middle/JHS/JSS or Secondary/SSS/SHS/Higher level education, those headed by persons having at least 30–44 years, and non-poorest households, and from the Volta region were more likely to have access to hand hygiene resources. Further, households in urban areas, households that spent between 0-30 min to get to a source of water, and households in Eastern and Brong-Ahafo regions were less likely to have access to hand hygiene resources.

Conclusion: This study identified key socioeconomic and demographic correlates of a household's access to hand hygiene resources in Ghana. In the interim, the government and development partners can provide hand hygiene resources to households with limited or no access. For the long term, we recommend that the government should implement measures and policies that facilitate citizens' economic independence and their attainment of higher formal education.

1. Introduction

Hand hygiene is among the most effective and inexpensive ways of reducing the spread of infectious diseases such as pneumonia and diarrhoea, the two leading causes of child morbidity and mortality globally [1]. Yet, inappropriate hand hygiene continues to be the third-largest contributor to the global burden of diseases [2]. Unsafe water, sanitation, and hygiene (WASH) result in about 300,000 deaths annually in developing countries, especially in sub-Saharan Africa [2]. Similar conditions also resulted in about 7,300 deaths and 435,500 disability-adjusted life years (DALYs) in Ghana in 2015 [3]. In Ghana, even though over 50 per cent of households have assigned a place for hand washing and other related practices, only about 20 per cent have water and other cleansing materials available [4].

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The need for improved hand hygiene is more pressing among households in developing countries. One cultivates lifestyles and behavioural choices in the home, so it is important to promote the practice of hand hygiene at the home to influence behaviours and choices especially among children [5]. Evidence suggests that effective hand hygiene can reduce the risk of diarrhoea episodes by 30–70% [1]. A study shows that hygiene education can lead to about a 27% reduction in the risk of diarrhoea among under-five children [2]. Also, consistent handwashing with soap under running water can significantly reduce the incidence of gastrointestinal, respiratory infections, eye infections like trachoma, and intestinal worms, especially ascariasis and trichiasis [6].

The absence of hand hygiene resources in homes put many at risk of these infectious diseases. In the wake of the outbreak of the COVID-19 pandemic, the World Health Organization (WHO) and governments around the world have stressed the importance of regular handwashing to prevent the spread of the virus. This suggests that research on water, sanitation, and hygiene issues deserve continuous scholarly attention because lack of access to WASH resources is still a challenge in many low-and-middle-income countries. Without a nationally representative study delineating the correlates of access to hand hygiene resources, the government and other development partners cannot reliably know the sub-populations that are in the most need. In Ghana, studies on household's access to hand hygiene resources are few and relatively old. Therefore, this study estimated the proportion of Ghanaian households with access to hand hygiene resources and their associated determinants using data from a recent national survey.

2. Methods

This study used the 2014 dataset of the cross-sectional Ghana Demographic and Health Survey (GDHS). The Ghana Statistical Service conducted the GDHS data in coordination with the Ghana Health Service and the National Public Health Reference Laboratory. They undertook the GDHS survey using a multi-stage sampling involving the random selection of enumeration areas (EA), stratified by place of residence (rural/urban), as primary sampling units in the first stage. There were 211 and 216 EA selected in rural and urban areas, respectively. Each EA contains about 30 households, culminating in 12,831 selected households.

2.1. Data collection

Trained enumerators collected data from September–December 2014. Only 12,010 out of the 12831 initially selected households were occupied. They successfully reached 11835 of the occupied household for an interview, representing a response rate of 99%. Heads of households gave information about household members, household properties, and access to essential utilities: the source of drinking water, sanitation facilities, and electricity amongst others.

2.2. Study sample

The unit of analysis for this study is households. We removed these cases from the dataset: households that disallow enumerators to inspect their place of handwashing (71 cases), households that could not tell the distance to their water source from their dwelling (54 cases), and households with missing information on multiple study variables (7 cases). Thus, the analytic sample comprised 11703 households (11,710.06 when weighted).

2.3. Measures

2.3.1. Outcome variable

We used these three variables in the dataset to compute household access to hand hygiene resources: "a place where household members wash their hands", "the presence of water at handwashing place", and "items present: Soap or detergent." For the descriptive results, we created three categories for the outcome variable: "water & soap at a handwashing station," "either water only or soap only at a handwashing station", and "no place for handwashing observed." For the multivariate model, we dichotomised the outcome: hand hygiene equipped households (defined as a household with both water and soap at a handwashing station) and others.

2.3.2. Explanatory variables

We selected eight explanatory variables from the GDHS dataset for our study and recoded only the age of household head and distance to water source variables and used the remaining as reported in the dataset. The DHS measured distance to the water source in minutes, and we recoded it as water on the premise; less than 30 min; and 30 plus minutes. The household head age variable was continuous, and we recoded it as reported in Table 1.

2.4. Data analysis

We used STATA-14 for data analysis. We adopted a complex sample data analysis to adjust for sampling units, stratification and sample weights using the 'svyset' command. Accounting for complex sampling design helps to prevent the reporting of bias estimates for standard errors of the confidence interval of regression coefficients. We performed a multivariate robust Poisson regression. This allows us to report prevalence ratios instead of the odds ratio in line with a recommendation for cross-sectional data and when the prevalence of an outcome is above 10% to avoid faulty estimation of the standard errors of predicted coefficients [7, 8, 9]. We achieve this by using the generalised linear model (glm) command, specifying family and link as "Poisson" and "log", respectively.

2.5. Ethical considerations

The Ethical Review Committee of the Ghana Health Service and the Institutional Review Board (IRB) of ICF International approved the 2014 GDHS. Besides, participants gave their consent after the trained enumerators explained the purpose of the survey to them. The DHS de-identified datasets are publicly available upon online request to the DHS program here: https://dhsprogram.com/data/dataset_admin/login_main.cfm. We did not seek additional consents or IRB approval for this study.

3. Result

3.1. Sample characteristics

About 21.1% of households had access to hand hygiene resources. Males headed most of the households (66.2%) and most households were in urban areas (54.7%). Persons who have attained a junior secondary school level education (39.1%) headed many of the households. We report detail summary statistics results on the study variables in Table 1.

3.2. Correlates of household access to hand hygiene resources

We assessed the relationship between each of the following household head and demographic factors and household's access to hand hygiene resources: sex, age, education, and marital status of household heads and the distance to the water source, household wealth, place of residence, and region of residence. All the study variables, except sex and marital status of household head, were significant correlates of household's access to hand hygiene resources. We adjusted for all the correlates in a multivariable robust Poison model. The adjusted model (taking into account the reference categories of each correlate) showed that households with heads who attained a Middle/JHS/JSS or Secondary/SSS/SHS/Higher level education, those headed by persons having at least

30–44 years, and non-poorest households, and from the Volta region were more likely to have access to hand hygiene resources. Further, households in urban areas, households that spent between 0-30 min to get to a source of water, and households in Eastern and Brong-Ahafo regions were less likely to have access to hand hygiene resources. We reported the crude prevalence ratio (PR) and adjusted prevalence ratio (APR) results in Table 2.

4. Discussion

The study estimated the proportion of Ghanaian households with access to hand hygiene resources and their significant correlates. A fifth of Ghanaian households had access to hand hygiene resources. A positive association exists between a household's accesses to hand hygiene resources and certain key household head demographic factors and household characteristics.

To begin with, we observed that the age of the household head was a statistically significant correlate of a household's access to hand hygiene resources. Household heads with at least 30 years of age were more likely to have access to hand hygiene resources. Narratives suggest that persons within this age group are more likely to have the economic and financial capability to provide the necessary and enough hand hygiene hardware and infrastructure than their counterparts within the reference age group.

The household head's education level correlated with a household's access to hand hygiene resources in Ghana. Households with heads who had attained at least a Middle/JHS/JSS were more likely to have access to hand hygiene resources. Several health outcomes depend on education. We, however, argue that the level of education largely determines the extent to which a person adequately instil the habit of hygienic practices. Similar studies also emphasise education as a key determinant for the practice of hand hygiene [5, 6, 10]. The literature associates higher education in Africa with greater access to economic resources, making it easy for households with heads who have attained a higher education to purchase the products needed for hand hygiene.

Our study revealed that, compared to households that have water in their dwelling, households that had to spend between 0–30 min to collect water were less likely to have access to hand hygiene resources. This implies that households without readily accessible water will have to travel interminable distances to fetch water and such households are perhaps likely to prioritise the use of water for cooking, drinking, bathing, and other essential household need over handwashing [11, 12]. The time and energy invested in search of water especially in rural and some urban areas in Ghana may largely serve as a disincentive to a household's access to hand hygiene resources. These findings are inconsistent with a study that suggested that time spent in collecting water do not influence a household's access to hand hygiene resources [13].

Besides, non-poorest households were more likely to have access to hand hygiene resources. Similar to this finding, studies have revealed household wealth as a key variable in explaining the extent to which a household may have access to hand hygiene resources [14, 15, 16]. The provision of handwashing hardware and infrastructures such as designated hand-washing stations, soap, water, and other cleaning agents comes with some cost implications that often serves as a disincentive for poorer households. Unlike non-poor households who have the financial capability to extend potable water to their respective households reducing the distance to water sources, poorer households lack these and are likely to treat spending on hand hygiene resources as secondary to other prevailing household welfare necessities.

We also observed that households in urban areas are more likely to have access to hand hygiene resources than their rural counterparts when we do not account for other household-level characteristics. In the multivariable model, however, we observed that urban residency negatively affected household's access to hand hygiene resources. This observation was inconsistent with studies that suggest that urban households are more likely to have access to hand hygiene resources [17, 18]. This is an interesting contrast to the conventional narrative on hygienic behavioural characteristics between rural and urban dwellers. Our result reflects an observation by Adams et al. [14, 19]. They noted that many households in urban slums and peri-urban areas in Ghana lack access to basic social amenities such as pipe-borne water at their dwelling [14, 19]. This could largely serve as a hindrance to household access to hand hygiene resources. The concentration of several hygiene interventions by non-governmental organisations (NGOs) in rural areas of Ghana may have contributed to the result in this study [20]. These interventions could have covertly or overtly induced the behaviour of hand hygiene among households in rural areas.

We further investigated the association of a region of residence on household access to hand hygiene resources in Ghana. Taking Greater

Table 1. Summary statistics of study variables.

Study variables	N	%
Household preparedness for hand hygiene		
Water & Soap at a handwashing station	2470	21.1
Either water only or soap only at a handwashing station	3829	32.7
No place for handwashing observed	5411	46.2
Sex of HH		
Male	7746	66.2
Female	3964	33.8
Age of HH		
15–29 years	2309	19.7
30–44 years	4222	36.1
45–59 years	2968	25.3
60 + years	2210	18.9
Education of HH		
No education	2573	22.0
Primary	1603	13.7
Middle/JHS/JSS	4576	39.1
Secondary/SSS/SHS/Higher	2958	25.3
Marital status of HH		
Never married/never lived together	1908	16.3
Currently married	7149	61.1
Formerly/ever married	2653	22.7
Distance to a water source		
Water in dwelling	1723	14.7
Less than 30 min	8207	70.1
30 + mins	1780	15.2
Household wealth		
Poorest	1580	13.5
Poorer	2202	18.8
Middle	2631	22.5
Richer	2656	22.7
Richest	2640	22.5
Place of residence		
Urban	6407	54.7
Rural	5303	45.3
Region of Residence		
Western	1292	11.0
Central	1176	10.0
Greater Accra	2416	20.6
Volta	1003	8.6
Eastern	1234	10.5
Ashanti	2209	18.9
Brong Ahafo	1013	8.7
Northern	730	6.2
Upper East	375	3.2
Upper West	264	2.3
HH: Household head		

Table 2. Prevalence and adjusted prevalence ratios of correlates of a household's access to hand hygiene resources.

Study variables	PR [95% CI]	p-value	APR [95% CI]	p-value
Sex of HH				
Female (ref.)	1		1	
Male	1.11 [1.01,1.23]	0.04	0.95 [0.87, 1.05]	0.32
Age of HH				
15–29 years (ref.)	1		1	
30–44 years	1.20 [1.06, 1.36]	0.01	1.17 [1.01, 1.34]	0.03
45–59 years	1.10 [0.96, 1.25]	0.18	1.27 [1.07, 1.50]	0.01
60 + years	0.98 [0.84, 1.14]	0.75	1.38 [1.15, 1.65]	<0.001
Education of HH				
No education (ref.)	1		1	
Primary	1.27 [1.00, 1.61]	0.05	1.16 [0.91, 1.49]	0.24
Middle/JHS/JSS	1.92 [1.58, 2.33]	<0.001	1.29 [1.05, 1.58]	0.01
Secondary/SSS/SHS/Higher	3.45 [2.77, 4.30]	<0.001	1.68 [1.35, 2.09]	<0.001
Marital status of HH				
Never married/never lived together (ref.)	1		1	
Currently married	0.93 [0.84, 1.03]	0.16	1.08 [0.95, 1.24]	0.23
Formerly/ever married	0.77 [0.66, 0.90]	<0.001	1.04 [0.87, 1.25]	0.67
Distance to the water source				
Water in a dwelling (ref.)	1		1	
Less than 30 min	0.62 [0.52, 0.75]	<0.001	0.83 [0.73, 0.96]	0.01
30 + minutes	0.38 [0.29, 0.51]	<0.001	0.87 [0.68, 1.10]	0.24
Household wealth				
Poorest (ref.)	1		1	
Poorer	1.35 [1.01, 1.80]	0.04	1.37 [1.06, 1.78]	0.02
Middle	1.77 [1.30, 2.42]	<0.001	1.84 [1.31, 2.49]	<0.001
Richer	2.70 [2.02, 3.64]	<0.001	2.96 [2.18, 4.03]	<0.001
Richest	5.91 [4.41, 7.93]	<0.001	6.22 [4.43, 8.71]	<0.001
Place of residence				
Rural (ref.)	1		1	
Urban	1.95 [1.59, 2.38]	<0.001	0.74 [0.58, 0.94]	0.01
Region of Residence				
Greater Accra (ref.)	1		1	
Western	0.80 [0.62, 1.05]	0.10	1.23 [0.95, 1.27]	0.11
Central	0.51 [0.35, 0.75]	<0.001	0.82 [0.59, 1.13]	0.23
Volta	0.78 [0.58, 1.05]	0.11	1.60 [1.17, 2.20]	<0.001
Eastern	0.32 [0.21, 0.48]	<0.001	0.55 [0.38, 0.80]	<0.001
Ashanti	0.66 [0.49, 0.88]	0.01	0.84 [0.66, 1.07]	0.16
Brong Ahafo	0.29 [0.21, 0.42]	<0.001	0.62 [0.44, 0.86]	<0.001
Northern	0.36 [0.22, 0.59]	<0.001	1.10 [0.68, 1.77]	0.70
Upper East	0.33 [0.22, 0.52]	<0.001	1.08 [0.70, 1.67]	0.73
Upper West	0.32 [0.19, 0.53]	<0.001	0.88 [0.56, 1.40]	0.60
Strata	20			
Primary Sample Units (PSUs)	427			
Population size	11710.06			
Design Degree of freedom	407			

HH: Household head; PR: Prevalence Ratio; APR: Adjusted Prevalence Ratio; CI: Confidence intervals.

Accra as the reference, households at Eastern and Brong Ahafo regions were less likely to have access to hand hygiene resources. According to Marmot and Bell [21], the decentralisation of political power and socioeconomic resources largely influence health outcomes in political jurisdictions. Ghana, for example, has over the years suffered the consistent uneven regional distribution of political, socioeconomic resources and implementation of health care delivery. The Greater Accra region, according to Songsore [22], is the seat of government with access to viable economic and political resources for an improved standard of living. This implies that households within this region would have the advantage of enjoying national health-related interventions which could induce hygienic practices among households in the region.

Our paper has merits because we used nationally representative data and adopted appropriate statistical analyses, but there is a limitation worth mentioning. Like any cross-sectional design, we only established a temporal association between the outcome and its correlates, hence the observed associations do not imply causal relationships.

In the wake of the COVID-19 pandemic during which public health professionals have recommended hand hygiene as a key preventive measure for reducing transmission, there is the need for further research especially at the sub-regional level to help identify subgroups of populations in dire need of hand hygiene assistance from governmental and non-governmental organizations. Thus, future analysis with spatial interpolation would provide further insights into “where” and “which”

populations to target for cost-effective intervention. For instance, in the Greater Accra Region, some neighbourhood, especially the inner slums and peri-urban areas, may not enjoy the same level of access to hand hygiene resources as compared to other wealthy neighbourhoods; these details are often masked in regional level analysis.

5. Conclusion

Our study revealed that household head demographic factors, household characteristics, place, and region of residence are significant correlates of a household's access to hand hygiene resources. Household head's level of education, households in urban areas, households' distance to a water source (0–30 min), and households headed by persons between 15-29 years were less likely to have access to hand hygiene resources. We also found household wealth and a region and place of residence as significant correlates of a household's access to hand hygiene resources.

We have made these recommendations to increase a household's access to hand hygiene resources. In the interim, the government and development partners can provide hand hygiene resources to households with limited or no access. For the long term, we recommend that the government should implement measures and policies that facilitate citizens' economic independence and their attainment of higher formal education.

Declarations

Author contribution statement

P. Kenney, H. Agboh, and A. Agyemang: Conceived and designed the experiments; Wrote the paper.

H. Duah and S. Dadzie: Analyzed and interpreted the data; Wrote the paper.

P. Agbadi: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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