Household Characteristics and Utilization of Toilet Facilities in Ghana: A Multinomial Logistic Approach

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Abstract:
Utilization of improved toilet facilities is crucial to achieving targets of the Millennium Development Goals (MDGs). The MDG framework that touched on universal education, women and children as well as environment and sanitation are affected directly by a basic facility of life, the toilet. However, toilet utilization is not a well-researched area in Ghana. Studies on the subject matter have focused on barriers to utilization, preferences and financing whilst the influences of household characteristics on utilization have not been adequately covered. This study therefore sought to fill the gap in the empirical literature and as well contribute to on-going policies aimed at promoting utilization of improved toilet facilities in Ghana. The study was based on a sample size of 247,885 obtained from the Ghana Population and Housing Census data (GSS, 2010). Multinomial logistic model was used for the analysis. The results revealed that married couple family households headed by male were about three and half folds as likely to resort to open defecation as compared to use of improved toilet facilities, all other variables remaining the same (exp(B) = 3.315;p<0.0001, Table 2). Also Married couple family households headed by female were 43% more likely to use open defecation than improved toilet facilities all other factors remaining unchanged (exp(B)=1.431, p<0.0001, Table 2).When we controlled for "Household size", "economic activity" and "housing tenancy", the results changed. Married couple family household, headed by male were 71.7% more likely to use open defecation than improved toilet facilities (exp (B) = 1.717, p < 0.0001, Table 4). On the other hand married couple family household headed by female were almost 12% less likely to use open defecation as compared to improved toilet facilities, all other factors remaining the same (exp (B) =0.882, p < 0.0001, Table 4).Gender of family headship had significant influence on utilization of improved latrines and therefore policies and programs targeted at improving utilization should be gender sensitive. Finally, household income, wealth and size mediate positively the likelihood of improved toilet utilization however, these effects were more pronounced with female headed households than that of males.

Keywords: Toilet, utilization, household-type and household characteristics

1. Introduction

Utilization of improved toilet facilities is crucial to achieving targets of the Millennium Development Goals (MDGs). The MDG framework that touched on universal education, women and children as well as environment and sanitation are affected directly by a basic facility of life, the latrine. Poor toilet facilities or more particularly absence of toilet facilities affects health of school children and learning outcomes. It also triggers diarrheal diseases among women and children (Nimo et al., 2014). It is estimated that globally, 1.7 billion diarrheal cases occurs every year, which claimed on the average about 800,000 lives (Galan et al., 2013).

Improved toilet facilities include flush toilets (water closet) that flush into a piped sewer system or septic tank, ventilated improved pit latrines, pit latrines with a slab and composting toilets. Unimproved facilities, however includes flush or pour-flush toilets that do not flush into a piped sewer system, septic tank or pit latrine; pit latrines without a slab or open pits, bucket latrines, hanging toilets or hanging latrines, shared or public facilities and open defecation(WHO/UNICEF JMP, 2013).

In many developing countries including Ghana, infrastructural development lags behind population growth; creating excessive pressure on critical facilities required for healthy living (Aryee and Crook, 2003). This situation is exacerbated by rapid urbanization and dwindling social investments required to bridge the widening gap created by increased demand for improved social amenities. It is natural that in the face of excessive pressure on social infrastructure, households, especially in the resource-poor l bracket may adopt various coping mechanisms to adapt to the status-quo, which may threaten the public health situation of the community.

One of the ramifications of widening infrastructural deficits is worsening conditions of sanitation. It is estimated that the number of people without toilet facilities who resorted to the use of open defecation increased by 33 million from 1990-2010 and the hardest hit were the urban poor and rural populations (Galan et al., 2013). The phenomenon of open defecation includes use of beaches, bushes and other open fields as places of convenience (GSS, 2013).

In the case of Ghana, a number of households have no latrines and they utilize public toilet facilities. The 2010 Population and Housing Census explained that in 2000, the highest reported use of toilet facility was public toilet, which was accounted for by at least a third of households (38.4%) in urban localities and 29.8% of rural localities (GSS, 2013). The use of public toilets showed a slight change in the 2010 Population and Housing Census representing 37.2% for urban households and 26.7% rural households. These results showed that public toilet still remained a critical component of the sanitation matrix of the country. The level of use of public toilet facilities may not ease in the short term.

The report further provided quite detailed information on the situation of toilet facilities in Ghana. Firstly, it stated that the use of the improved pit latrine (KVIP) increased from 6.9 percent of households in 2000 to 10.5 percent in 2010. However the use of the traditional pit latrine reduced from 22 percent in 2000 to 19 percent in 2010. The Volta region scored the highest patronage of KVIP by households (12.8%) followed by 11.8 percent in Central region. KVIP for exclusive use by households was not popular and it was accounted for by only 2.3 percent of all dwelling units (GSS, 2013).

Secondly, though pan latrines have been outlawed in Ghana, it enjoyed some considerable use by households. The use of pan latrines dropped from 4 percent in 2000 to 0.7 percent in 2010 however this represented in excess of 40,000 households. For instance in the Greater Accra region, 2.3 percent of households reported the use of pan latrine when the national average was 0.7 percent. Thus, the national capital continued to use one of the least acceptable forms of human waste disposal (GSS, 2013).

The report further established that nearly one in three dwelling units (32.0%) in rural areas had no toilet facilities and resorted to the use of open fields such as the bush and beaches. According to the 2000 Population and Housing Census the proportion of rural population that used open defecation was 28.3 percent, which pointed to a deterioration of human waste disposal system in rural localities within the inter-censorial period. In the case of urban localities the proportion of the population that resorted to open defecation was 10.7 percent in 2000 and 9.3 percent in 2010, which showed a marginal improvement. In totality, the number of households that have no toilet facilities at home and relied on open defecation eased very marginally from 20 percent in 2000 to 19.3 percent in 2010. The 2010 Census Report covered the various systems of toilet usage by households in Ghana as well as their regional variations (GSS, 2013). It pointed out that there were considerable regional variations in the distribution of toilet facilities with the three northern regions showing the highest use of open defecation.

Apart from the census report some studies have been conducted on toilet usage in Ghana. One of such studies was on the accessibility and utilization of toilet facilities in the Wa Municipality of the Upper West region (Osumanu and Kosoe, 2013). The study was based on a stratified sample of 123 households. It revealed that there existed spatial inadequacies of latrine distribution in the Municipality and concluded that financial constraints, distance and the condition of latrine were determinants of utilization of public toilets. They further opined that given the socio-cultural antecedents of the people, the use of public toilets had no connection with the cultural ethos of the people and thus the presence of public toilets were unable to curb the spate of open defecation.

Another study examined factors that predicted usage of household and communal latrines from a peri-urban district in Ghana (Obeng et al., 2015). It was established that only 15% of households had own-toilet facilities; the rest depended on communal latrines or open defecation. They argued that barriers to utilization of private toilet facilities were intense to odor whilst those of communal latrines were intense odor, user-fee, distance and hygienic conditions.

Studies have also looked at latrine preferences and financing gaps (Nimoh et al., 2014). It was argued that most households preferred the pour latrine to the piped sewer or the improved ventilated pit largely due to cost constraints. In terms of financing domestic latrines, more than half of the respondents sampled for the study preferred financing the construction of their domestic latrines from household savings.

Household wealth played a vital role in the acquisition and utilization of improved toilet facilities because of the correlation between household wealth and access to improved well-being (Boadi and Kuitunen, 2005). Wealthy households (in terms of income and assets) were in a better position to provide improved toilet facilities for their members whilst poor households who were fortunate to have toilet facilities usually shared with other households (Boadi and Kuitunen, 2005).

Within the context of household wealth as a driver to ownership of improved toilet facilities, cost levels may deter purchasing intention of improved toilet facilities because an equally high proportion of households preferred self-financing their own toilet facilities (Nimo, et al., 2014). In cases where households overestimate cost associated with owning improved toilet facilities, they were likely to defer or abandon plans of ownership subject to the constraints of household budget (O'Connell, 2014). It was argued further that toilet ownership is one of items with low priority to households especially in India and sub-Saharan Africa.

Household type has been identified as a critical variable that mediates household wealth status (GSS, 2013; Anyanwu, 2013). Various studies have established that married couple households commanded more wealth than their non-married counterparts and they were more exposed to improved well-being and longevity (Schmidt and Sevak, 2006; Anyanwu, 2013). The married were also in a better position to generate higher incomes and savings to provide services that would improve general well-being including sanitation and nutrition.

A review of the empirical literature on influences of open defecation and latrine ownership established a gender factor that affected type of latrine utilization (O'Connell, 2014). From the analysis of the literature, women including married women were more concerned of their privacy, which motivated their use of enclosed latrine instead of open fields. This factor also resonated with men who wanted to protect the privacy of their spouses and thus provided enhanced latrine facilities for them. The implication was that the gender constitution of the household played critical role in determining acquisition and utilization of improved toilet facility.

1.1. Problem Statement
Latrine usage is not a well-researched area in Ghana. The few studies on the issue have focused on barriers to utilization, preferences and financing. The influences of household factors have not been adequately covered in the empirical literature. The 2010 Population and Housing Census threw some light on the issue however the report was limited to regional variations in the utilization of toilet facilities. It did not delve into other critical correlates of toilet utilization that have serious implications on policy such as the effects of household type on latrine utilization. This study seeks to fill this gap in the empirical literature and as well to contribute to on-going policies aimed at promoting utilization of improved toilet facilities.

1.2. Research Questions
The following questions served as the basis for the paper:
- Do married couple family households have access to improved toilet facilities in Ghana?
- Does gender of family headship influence access to improved toilet facilities?

2. Materials and Methods
The study was cross-sectional in nature based on a secondary data obtained from the Ghana Statistical Service. **A** sample size of 247,885, which constituted one percent of 2010 Ghana Population and Housing Census, was used for the study. The sample covered all the ten regions of Ghana, with 51.8 percent drawn from the Districts whilst 26.5 percent and 21.9 percent were from Municipal and Metropolitan areas respectively.

Region	Frequency	Percent
Western	23949	9.7
Central	22331	9.0
Greater Accra	40063	16.2
Volta	21608	8.7
Eastern	26779	10.8
Ashanti	48140	19.4
Brong Ahafo	23087	9.3
Northern	24471	9.9
Upper East	10471	4.2
Upper West	6986	2.8
Total	247885	100.0

Table 1: Regional Distribution of Study Sample

The data set obtained for the study contained 99 variables on relevant socio-economic and demographic variables defined by the census questionnaire. In designing the questionnaire, the Ghana Statistical Service (GSS) made wide consultations with users of census data and also adopted international best practices used by the United Nations (GSS, 2013). Variables such as sex, marital status, internal migration, occupation among others were considered as core to the census project. However the census also included other variables that organizers considered very important to the socio-cultural setting of the country. These included religion, ICT use and child survival among many others. The census also touched on variables such as toilet facilities, sharing arrangement on toilet facilities and number of people who access particular toilet and bathroom facilities available to a household.

On housing, the focus was on complete enumeration of living quarters (occupied and vacant) including their state as well as living conditions, which served as a basis to measure well-being of the population (GSS, 2013). Variables covered included type of dwelling, type of roof, walls, floor, tenure arrangement, number of sleeping rooms and cooking space.

2.1. Dependent Variable
The dependent variable for the study was "toilet facility used by household". This was captured as a nominal variable with four levels. The first response option was "use of improved toilet facilities", which included water closet (flushed toilet facility), and ventilated improved pit (KVIP). The second response option was "open defecation". This referred to using open spaces, beach and the bush as places of convenience. The third option was "use of unimproved toilet facilities", which included the "pit latrine" and "pan/bucket" latrine. The last response option was "other", that is any other toilet facility.

2.2. Independent Variables
The main explanatory variable for the model was "household type". This was captured as a nominal variable with five response options. Household type described the relationship among the members of the household in terms of their family structure. This showed whether the household was constituted of married couples or singles with dependents or not. The responses for the household type included "married couple family, male head" and "married couple family, female head". These were followed by "non-married couple, male head" and non-married couple, female head" and "others".

2.3. Control Variable

Other variables were also selected to serve as control variables in the model. These were "Household size", "economic activity" and "housing tenancy". These were selected as proxies or more practically, correlates of household consumption pattern, income and wealth respectively. "Household size" was captured as count data whilst "economic activity" and "housing tenancy" were captured as nominal variables with two levels of responses. "Economic activity" was captured as "worked" or "did not work" for pay or profit for the seven days prior to census night whilst "housing tenancy" was measured as "ownership by household member" and "others".

2.4. Modeling

Multinomial logistic model was used to explain the relationship between the variable of interest and the explanatory variables. The variable of interest, which was "toilet facility used" by household was captured as a nominal variable and thus logistic regression was suitable to analyze its relationship with other key independent variables.

The treatment of the multinomial logit theory was based on the work of Agresti (2002). Let Y be a categorical response with J categories, the multinomial logit for nominal response variable simultaneously describe log-odds for all $\binom{J}{2}$ pairs of categories for a certain given pairs of J-1 categories where the remaining category is made redundant.

Let $\pi_j(x) = P(Y = j|x)$ at a fixed certain of x explanatory variables where $\sum_j \pi_j(x) = 1$ for all j. For all observations at x, the counts at the J categories of Y are treated as multinomial with probabilities $\{\pi_1(x), \ \pi_2(x) \ ... \ \pi_j(x)\}$

The logit model pair each response category with a baseline category. The model

$$\log \frac{\pi_j(x)}{\pi_J(x)} = \alpha_j + \beta'x; \text{ for } j=1, 2,..., J-1$$

(1)

Simultaneously describe the effect of x on these $J-1$ logits.

Given a multinomial logistic regression model

$$\log \frac{\pi_j(x)}{\pi_J(x)} = \beta_0 x_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$$

Where x_i are explanatory variables and β_i are parameters to be estimated and ε is a random variable.

The Maximum Likelihood fitting of the multinomial logit maximizes the likelihood $\pi_j(x)$ simultaneously satisfying the J-1 categories specifying the model.

Let y_{ij} be the observed responses, then since $\pi_j(x) = 1 - (\pi_1(x) + \pi_2(x) + \cdots + \pi_{J-1}(x))$ and $y_{ij} = 1 - (y_{i1} + y_{i2} + \cdots + y_{i(J-1)})$, the contribution to the log likelihood by the i is

$$\log \left[\prod_{j=1}^{J} \pi_j(x_i)^{y_{ij}} \right] = \sum_{j=1}^{J-1} y_{ij} \log \pi_j(x_i) + \left(1 - \sum_{j=1}^{J-1} y_{ij} \right) \log \left[1 - \sum_{j=1}^{J-1} \pi_j(x_i) \right]$$

$$= \sum_{j=1}^{J-1} y_{ij} \log \frac{\pi_j(x_i)}{1 - \sum_{j=1}^{J-1} \pi_j(x_i)} + \log \left[1 - \sum_{j=1}^{J-1} \pi_j(x_i) \right]$$

Now for n independent observation and substituting $(\alpha_j + \beta_j'x_i)$ for the logit in the first term and $\pi_j(x_i) = 1 / \left[1 + \sum_{j=1}^{J-1} exp(\alpha_j + \beta_j'x_i) \right]$ for the second, the log likelihood becomes

$$\log \prod_{i=1}^{n} \left[\prod_{j=1}^{J-1} \pi_j(x_i)^{y_{ij}} \right] = \sum_{i=1}^{n} \left\{ \sum_{j=1}^{J-1} y_{ij} (\alpha_j + \beta_j'x_i) - \log \left[1 + \sum_{j=1}^{J-1} exp(\alpha_j + \beta_j'x_i) \right] \right\}$$

$$= \sum_{j=1}^{J-1} \left[\alpha_j \left(\sum_{i=1}^{n} y_{ij} \right) + \sum_{k=1}^{p} \beta_{jk} \left(\sum_{i=1}^{n} x_{ik} y_{ij} \right) \right] - \sum_{i=1}^{n} \log \left[1 + \sum_{j=1}^{J-1} exp(\alpha_j + \beta_j'x_i) \right]$$

The sufficient statistics for β_{jk} is $\sum_{i=1}^{n} x_{ik} y_{ij}$ and the sufficient statistics for a_j is $\sum_{i=1}^{n} y_{ij} = \sum_i x_0 y_{ij}$, for $x_0 = 1$; which is the total number of outcomes in category j.

2.5. Model Equations

Two statistical equations were established. Equation one was based on the relationship between "toilet type" and "household type". Equation two however involved the relationship between "toilet type" and "household type", controlling for household characteristics such as "household size", "economic activity" and "housing tenancy".

$$g(x_i) = \log \frac{(y_i = m)}{(y_i = 1)} = \beta_0 + \beta_{m1} x_{m1} + \epsilon \qquad (1)$$

Where

βo was the intercept term

β_{m1} was the parameter of household type, x_{m1}

$(y_{i=1})$ is the reference category, representing use of water closet

ϵ was random variable

$$g(x_j) = \log \frac{(y_i = mj)}{(y_i = 1)} = \beta_0 + \beta_{m1} x_{m1} + \beta_{m2} x_{m2} + \beta_{m3} x_{m3} + \beta_{m4} x_{m4} + \epsilon \qquad (2)$$

Where

x_j, $j=1,2,3,4$ were variables," household type", "household size", "housing tenancy" and "economic activity" respectively.

β_i were parameters to be estimated respectively

€was random variable

3. Results

Figure 1 presented a graph of toilet usage per types of household. Over 60% of married-couple family households headed by male had no toilet facilities and resorted to the use of open defecation. Also among this same category of household, the use of unimproved toilet facilities was comparably higher than improved facilities. However use of open defecation and unimproved toilet facilities were least practiced by married couple family households headed by female as well as non-married family households. These latter categories preferred the use of improved toilet facilities to unimproved facilities.
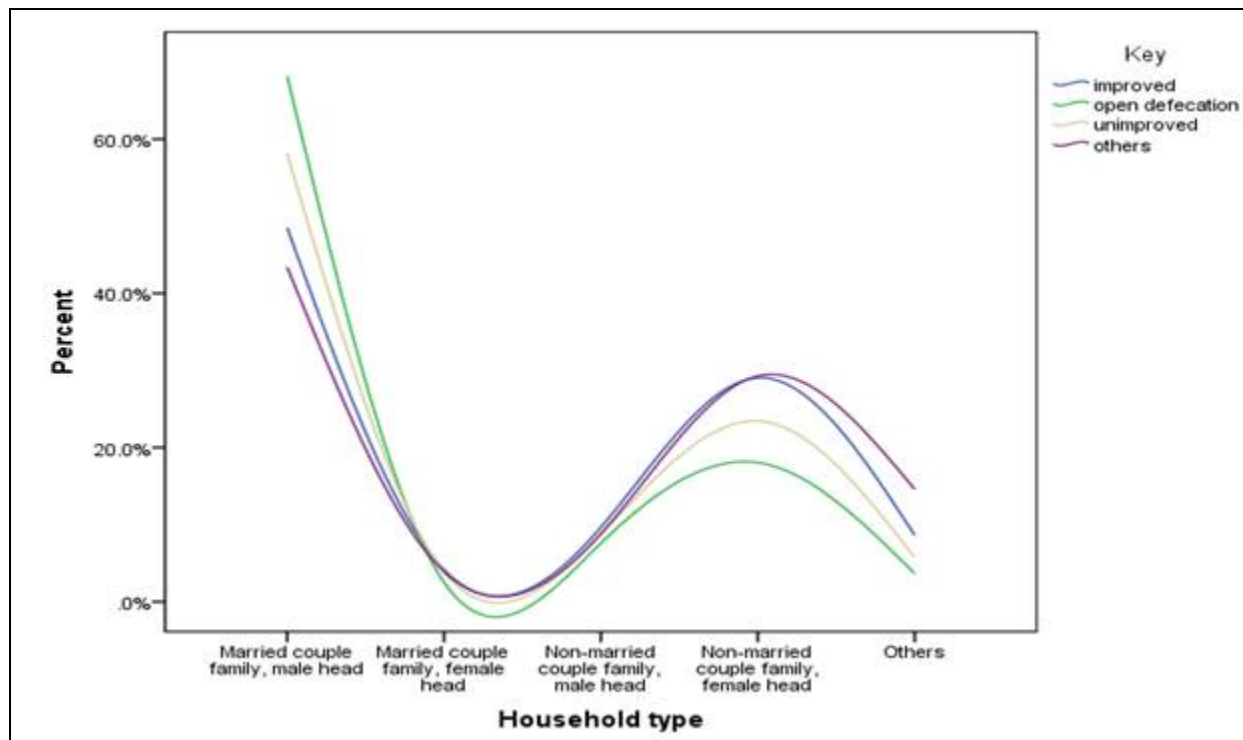

Figure 1: Type of Toilet Facility and Household Type

3.1. Inferential Analyses

The inferential analysis was done in two parts: the first part was without control variables whilst the second part introduced control variables. The control variables were introduced to assess the effects of other mediating characteristics of the household. The reference category for both analyses was "use of improved toilet facilities".

3.1.1. Analysis of the First Model

The results revealed a positive relationship between "household type", "open defecation" and "use of unimproved toilet facilities". Married couple family households headed by male were about three and half times as likely to resort to open defecation as compared to use of improved toilet facilities all other variables remaining the same (exp(B) = 3.315;p<0.0001, Table 2). Also Married couple family households headed by female were 43% more likely to use open defecation than improved toilet facilities all other factors remaining unchanged (exp(B)=1.431, p<0.0001, Table 2). Further to this, non-married family households headed by male were 85.8% more likely to use open defecation as compared to improved toilet facilities. Lastly, non-married family households headed by female were 46.6% more likely to use open defecation than improved toilet facilities all other things remaining the same (Table 2).

The results of open defecation were consistent with the use of unimproved toilet facilities. Married couple family households headed by male was almost twice as likely to use unimproved toilet facilities as compared to improved facilities all other factors remaining unchanged (exp(B)=1.797, p < 0.0001, Table 2). Similarly married couple households headed by female were 40.6% more likely to use unimproved toilet facilities than use improved facilities, all other factors remaining unchanged (exp(B) =1.406, p < 0.0001, Table 2).

Use of facility	Household type	B	Std. Error	Wald	df	Sig.	Exp(B)
open defecation	Intercept	-.835	.026	1035.317	1	.000	
	Married family couple, male head	1.198	.027	1955.791	1	.000	3.315
	Married couple family, female head	.359	.042	72.437	1	.000	1.431
	Non-married family, male head	.619	.033	354.852	1	.000	1.858
	Non married family, female head	.383	.029	176.724	1	.000	1.466
	others	0^b	.	.	0	.	.
unimproved	Intercept	-.550	.024	543.308	1	.000	
	Married family couple, male head	.586	.025	547.261	1	.000	1.797
	Married couple family, female head	.341	.039	77.427	1	.000	1.406
	Non-married family, male head	.304	.031	95.323	1	.000	1.356
	Non married family, female head	.190	.027	51.514	1	.000	1.210
	Other	0^b	.	.	0	.	.
others	Intercept	.911	.017	2903.749	1	.000	
	Intercept	-.636	.019	1157.833	1	.000	.529
	Married family couple, male head	-.590	.032	342.909	1	.000	.554
	Married couple family, female head	-.614	.025	625.013	1	.000	.541
	Non-married family, male head	-.516	.020	688.937	1	.000	.597
	Non married family, female head	0^b	.	.	0	.	.

Table 2: Parameter Estimate of Logistic Model without Controls
Reference category was use of improved toilet facility

Table 3 presents the model fitting information for the analysis. The presence of a relationship between the dependent variable and the independent variable was based on the statistical significance of the final model chi-square. In this analysis, the probability of the model chi-square (12456.240; p<0.0001) was highly significant. Based on this, the null hypothesis that there was no difference between the model without independent variables and the model with independent variable was rejected. Therefore it could be concluded that the existence of a relationship between the independent variables and the dependent variable was supported.

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	154.153			
Final	12610.394	12456.240	12	.000

Table 3: Model Fitting Criteria Tests

3.1.2. Analysis of Second Model

When control variables, "Household size", "economic activity" and "housing tenancy", where introduced into the model, the results changed. Married couple family household, headed by male were 71.7% more likely to use open defecation than improved toilet facilities (exp (B) = 1.717, p < 0.0001, Table 4). However married couple family household headed by female were almost 12% less likely to use open defecation as compared to improved toilet facilities, all other factors remaining the same (exp (B) =0.882, p < 0.0001, Table 4).

Toilet facility		B	Std. Error	Wald	df	Sig.	Exp(B)
open defecation	Intercept	-1.964	.030	4339.401	1	.000	
	Married couple family, male head	.541	.029	340.408	1	.000	1.717
	Married couple family, female head	-.125	.047	7.269	1	.007	.882
	Non-married family, male head	.153	.035	18.988	1	.000	1.166
	Non married family, female head	-.034	.031	1.243	1	.265	.966
	others	0[b]	.	.	0	.	.
	Household size	.061	.002	1456.527	1	.000	1.063
	Engaged in economic activity	.454	.013	1146.375	1	.000	1.575
	Household own house	1.432	.016	8450.040	1	.000	4.186
unimproved	Intercept	-.910	.026	1187.530	1	.000	
	Married family couple, male head	.354	.027	168.992	1	.000	1.424
	Married couple family, female head	.168	.042	15.890	1	.000	1.183
	Non-married family, male head	.120	.033	13.534	1	.000	1.128
	Non married family, female head	.027	.028	.900	1	.343	1.027
	others	0[b]	.	.	0	.	.
	Household size	.012	.002	39.483	1	.000	1.012
	Engaged in economic activity	.192	.014	200.989	1	.000	1.212
	Household own house	.604	.014	1828.708	1	.000	1.829
others	Intercept	.481	.020	579.464	1	.000	
	Married family couple, male head	-.729	.021	1216.246	1	.000	.483
	Married couple family, female head	-.633	.035	328.653	1	.000	.531
	Non-married family, male head	-.562	.026	465.881	1	.000	.570
	Non married family, female head	-.502	.021	555.455	1	.000	.605
	others	0[b]	.	.	0	.	.
	Household size	.061	.002	1474.549	1	.000	1.063
	Engaged in economic activity	.129	.012	117.144	1	.000	1.138
	Household own house	-.029	.012	5.808	1	.016	.971

Table 4: Parameter Estimate of Multinomial Logistic Model with Controls

Also, married couple family households, headed by male were 42.4% more likely to use unimproved toilet facilities than improved toilet facilities, all other variables remaining the same (exp (B) =1.424, p <0.0001, Table 4). Married couple family households headed by female were 18.3% more likely to use unimproved toilet facilities than improved facilities (exp (B) = 1.183, p < 0.0001, Table 4).
Table 5 presents the model fitting information for the analysis. The presence of a relationship between the dependent variable and the independent variables was based on the statistical significance of the final model chi-square. Similarly in this analysis, the probability of the model chi-square (26435.415; p<0.0001) was highly significant and based on this, the null hypothesis that there was no difference between the model without independent variables and the model with independent variable was rejected. Therefore it could be concluded that the existence of a relationship between the independent variables and the dependent variable was supported.

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	29509.626			
Final	3074.211	26435.415	18	.000

Table 5: Model Fitting Information

4. Discussion
The results revealed that married couple family households exhibited strong propensity for use of open-defecation and unimproved toilet facilities as compared to non-married family households when we failed to control for housing tenancy, economic activity and household size. When these factors were controlled, level of utilization of open defecation fell though rigidly for married couple family than non-married family households.   This challenged the view held in the empirical literature that married couple family households were more likely to own assets that could provide improved sanitation and healthy living (Schmidt and Sevak, 2006; Anyanwu, 2013; Boadi and Kuitunen, 2005). That is, following from the evidence of the results, the question utilization of improved toilet facilities by household type were influenced by wealth, income and the number of people forming the household. However the effect was more seen in non-married family households than their married family counterparts.
The results further showed that without controlling for housing tenancy, household size and economic activities, all categories of household types irrespective of gender of headship had higher odds of resorting to open defecation and unimproved toilet facilities. However, when the control variables were introduced, household types headed by female resorted to improved toilet facilities. For instance, married couple family households headed by female were almost 12% less likely to resort to open defecation as compared to improved facilities. But married couple family households headed by male were 71.7% more likely to use open defecation as

compared to improved facilities. When living conditions improved in terms of income and wealth, female headed households prioritize improved toilet facilities. This was consistent with (O'Connell, 2013) who argued that women were more concerned with their privacy when it came to the utilization of latrine facilities.

The study presented vital information that impinged on policy directions with regards to expanding utilization of improved latrines. The policy implications would be looked at in two-folds, gender responsiveness and community targeting. Firstly, the toilet gap as indicated in the 2010 Population and Housing Census report required urgent intervention as almost a fifth of households did not have toilet facilities at home and resorted to defecating in the open. Interventions in this direction would contribute immensely to improve sanitation and reduced maternal as well as pediatric disease burden. However, policies and programs targeted at improving utilization of improved latrines should be gender sensitive. On the evidence of the study, women involvement in domestic toilet provision would enhance sustainability because improved toilet facility was central to women's well-being and priority than men. Also, maintenance and compliance to the terms of acquisition and utilization would be adequately met if program addressed specific issues of women and their expectations on households' well-being.

Policies aimed at increasing household ownership of improved toilet facilities should have a subsidy package on specific materials used in toilet construction as well as other incentive packages. This is because on the evidence of the study by (Nimo et al., 2014) households preferred constructing their own private toilet facilities from domestic savings. Secondly, on the evidence of this study, priority for improved toilet facilities for household-use is likely to be low in Ghana given the dominance of male-headed married family households. Direct provision of cash to household to facilitate construction of domestic toilets may be counter-productive since it would suffer the risk of misapplication. Also subsidy alone may not be able to attract household savings for the construction of improved toilet facilities for household use. The program should be complimented by incentive packages on education and rents, which are key issues that receive priority by male headed married family households (O'Connell, 2013). For instance, a household that takes advantage of the subsidy package to construct improved toilet facilities should also obtain educational materials for school children or comprehensive subsidy on utilities for a considerable period of time.

5. Conclusions

The study concluded that utilization of open defecation and use of unimproved toilet facilities among married couple family households was high in Ghana. However when we introduced variables such as housing tenancy, household size and economic activity as control factors, usage of toilet facilities improved significantly especially with households headed by female. Gender of family headship had significant influence on utilization of improved latrines and therefore policies and programs targeted at improving utilization of improved latrines should be gender sensitive. Women's involvement in the provision of household toilets would enhance sustainability because an improved toilet facility was central to women's well-being and priority.

6. Acknowledgement

7. References

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