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Accessibility of Demand Housing Finance Loan by Public Sector Workers in Ghana: The Income Challenge

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Abstract:

Purpose - Despite many efforts by the government of Ghana and the key players to boost the housing industry, it remains in its infancy. The purpose of this study is to identify the knowledge gap within the housing industry by analysing the income levels of public sector workers.

Design/methodology/approach - Mixed methods research is the right choice as three hundred and eighty-four (384) public sector workers were surveyed using a comprehensive questionnaire completed with information gathered from qualitative sources.

Findings—A significant 68.7% of public sector workers surveyed say their income influences their choice of demand housing finance. The test found that a review of public sector workers' salaries is likely to boost their affordability of housing demand finance; hence, the null hypothesis is rejected.

Practical Implications — Lessons are learned from successful examples like the INFONAVIT of Mexico and the Central Provident Fund (CPF) of Singapore, where provision was made for workers to contribute towards acquiring a property with the support of their employers.

Originality/value — This is the first time in Ghana that public sector workers have been surveyed comprehensively in relation to demand for housing finance loans. This research did not follow the existing trends of focusing on the availability of banking products but the expectations of the majority of public sector workers. This knowledge raises many questions as to why the existing demand housing finance schemes have been unsuccessful in Ghana.

Keywords: *Housing finance, public sector, affordability, business strategy, business management*

1. Introduction

Housing is one of the basic necessities of life. It plays a significant role in sheltering individuals, families and communities. This study will focus on housing demand finance for public sector workers in Ghana in relation to their income. The study will examine the general income levels within the public sector and their ability to acquire homes.

The population of Ghana stands at 30.8 million, with an economically active workforce of 11,541,355, out of which 9,990,237 are employed (Ghana Statistical Service, 2021). Out of the total employed population, only 2,364,348 pay taxes as of August 2021, with 1,643,839 SSNIT tier 1 contributors and 2,364,348 Tier 2 pension contributors (Ministry of Finance, 2021).

Public sector workers are among the lowest earners in Ghana. Available data show that 886,906 civil and public sector workers make up about 50% of Ghana's total formal workforce registered with SSNIT. The average annual salary, as quoted in the 2022 Budget, is GHS34,672.00. Per the 2020 single spine salary structure, the universal salary structure used for the majority of public sector workers quotes the lowest public sector salary as GHS3300.54 and the highest public sector salary as GHS79,884.41 per annum. This translates into GHS275-GHS6657 per month, which puts the majority of public sector workers in a disadvantageous position when applying for a mortgage facility. The salary structure clearly denies nearly half of the formal workers from participating in the financial sector housing demand finance. This has policy implications if the industry has to be developed. The base of the pyramid theory recognises such a large market as an opportunity to develop a product. The income of public sector workers cannot be ignored by any serious policy-maker as it is a formal market that can help accelerate economic development through its share scale.

2. Research Approach

Mixed methods research is the right choice, as three hundred and eighty-four (384) public sector workers were surveyed using a comprehensive questionnaire completed with information gathered from qualitative sources. The mixed method allowed the researcher to put findings in context and interpret the quantitative results with qualitative data, which is targeted at adding a richer feel to the findings and conclusions.

Mixed research may be conducted using experimental, simulation, and survey research, as well as correlational study and multivariate analysis (Queiros et al., 2017). This research was conducted using surveys to answer the research questions through a set of hypotheses.

The researcher tested the hypothesis through a mixed method approach, in keeping with understanding the methodological implications of a post-positivist worldview, focusing on quantitative methods for description and regression analysis and qualitative methods for interpretation. To this end, the researcher adopted an approach akin to what Creswell (2009) calls a sequential explanatory mixed methods research design. This involved providing an overview of housing demand finance in Ghana, which was informed by collecting and analysing primary quantitative data on public sector workers from various sectors of the economy. Recognising that these quantitative methods are better at describing correlations than explaining the behaviours of the underplaying social actors involved, we examined these general quantitative patterns through in-depth qualitative fieldwork and industry document analysis. Our aim is to explain rather than merely describe the existence of the various housing demand finance products in the market. The quantitative data allowed us to reveal large-scale patterns in housing demand finance among public sector workers across all sectors in Ghana, a task not attempted by previous studies. However, to confidently answer the central question of the best housing demand finance model that fits public sector workers, the researcher could not limit himself to the existing products on the market but needed to look at successful products in other countries in industry publications that fit into the characteristics of the public sector workers in Ghana. For this reason, the data collection also covered high-level policy-makers (Dexter, 2006; Goldstein, 2002) in most of the government ministries, departments and agencies. This approach allowed the researcher to recognise the correlative patterns or factors among public sector workers' choices of housing demand finance. In this sense, taking a mixed methods approach allowed the researcher to pursue distinctly post-positivist social science explanations for the phenomena of interest.

2.1. Surveys

The survey is a research technique that permits the gathering of data directly through questions in various forms from persons participating in the research (Queiros et al., 2017). It is very popular with quantitative techniques research, as the information gathered from the questions relates to the opinions, behaviours and perceptions about a particular phenomenon.

2.2. Sampling

It is mostly unrealistic and not cost-effective to research the entire 800,000 plus public sector workers when they relatively have similar characteristics. Therefore, a sample of it is used to represent the population. The sample must have the characteristics of the target population. The sample is the amount of correctly extracted material from the lot. Sampling is broadly divided into probability and non-probability (Etikan et al., 2016). With probability sampling types, each population has an equal chance of being selected, while with non-probability types, subjective methods are used to decide which elements are elected. According to Marshall (1996), Quantitative researchers often fail to understand the usefulness of studying small samples; he found that the appropriate sample size for qualitative research is the sample size that answers the research question. Some of the commonly cited probability sampling techniques include simple random sampling, systematic sampling, stratified sampling and cluster sampling, and non-probability include purposive sampling, convenience sampling, snowball sampling and quota sampling.

The data collection phase of the research involved administering three hundred and ninety survey questionnaires to answer the research questions. Parts of the questions relate to the housing demand finance, the attitude of public sector workers and the PSHLSB loans scheme. Stratified/random sampling methods were used to select respondents from among public sector workers who have benefited or not benefited from the various housing demand finance schemes. Lynn (2019, pp254) identified Explicit Stratified Sampling (ESS) and Implicit Stratified Sampling (ISS). ESS involves sorting the population elements into explicit groups (strata) and then selecting a sample independently from each stratum. ISS involves ranking the elements following some ordering principle and then applying systematic sampling, i.e. selecting every *n*th element. This research adopts the ESS method by sorting the public sector workers into explicit groups or sectors referencing the Ministries, Departments and Agencies (MDA) categorisation stated in the Ghana 2022 budget and economic plan. The broad sectors are administration, economics, infrastructure, social and public safety. In addition, each sector is assigned an apportioned number, which is selected randomly.

2.3. Sampling Size

After choosing the appropriate sampling method for the study, the size of the sample must also be considered. Factors that affect the sample size are population, confidence level and cost-benefit ratio (Oribhabor & Anyanwu, 2019). In considering the sample, care must be taken to ensure that it will adequately draw valid and generalised conclusions (Singh & Masuku, 2014).

The population for this study is the entire public sector workers of Ghana, which is made up of 886,906 workers (MOF, 2021). The desired confidence level for this research is ninety-five percent (95%), requiring a higher sample size for the required confidence (Noordzig, et al. 2010). It also means that if a 95% confidence level is selected, 95 out of 100 samples will have the true population value within the range of precision specific (Singh & Masuku, 2014). The cost to benefit of this research is mainly the time and cost of the survey (Sukhatme, 2008) as a random method is used to select the sample. This research population is very large and, therefore, requires a very large sample.

Many researchers have developed statistical formulas to determine sample size.

Irrespective of the several formulas developed for calculating sample size, most have capped the maximum sample size to 384 (Meyer, 1979); (Fox et al., 2007); (Taherdoost, 2017): Gill et al., 2010) and 400 (Singh & Masuku, 2014) for populations of 886,906 with 95% confidence level. A sample size of 390 was administered, of which 384 questionnaires were fully completed and used in this research. As public sector workers may share some identical characteristics, the sample size is the ideal number. See table 1 below for the sample size based on the desired accuracy with a confidence level of 95%.

	95% Confidence Level
Population	Sample Size
25000	378
50000	381
100000	383
250000	384
500000	384
1000000	384

*Table 1: Sample Size and Confidence Level
Source: (Gill et al., 2010)*

The Budget statement grouped the MDAs into five (5) groups: Administration, Economic, Infrastructure, Social and Public Safety. The number of staff sampled to be surveyed per sector was determined using the total staff strength per sector over the total number of public sector workers. The sample per sector is further apportioned by the staff strength of each organisation within the sector. The total sample of three hundred and eighty-four respondents for the sectors are Administration- 23, Economic-9, Infrastructure-2, Social-288 and Public Safety-62. The respondents are randomly selected from each organisation per the quota limit (See table 2 below).

Sectors	Sample					
Administration		EC	Audit Serv.	MOF	MOLGDRD	MOI
	23	2	1	2	16	2
Economic		MOFA	MOLNR	MOTI	MOTAC	MOESTI
	9	2	3	1	1	2
Infrastructure		MOSWR	MWRWH			
	2	1	1			
Social		MOE	MOELR	MOH	NCCE	MOELR
	288	195	1	90	1	1
Public Safety		MOD	JS	MOI	MONS	OAGMOJ
	62	13	4	42	2	1
TOTAL	384					

Table 2: Distribution of 384 Surveys to MDAs in Ghana

2.4. Data Collection

Data collection is the methodological route of accumulating information about a specific subject. The researcher has to ensure that the data collected is complete and done ethically in compliance with all legal instruments. A diversion will affect the accuracy of the analysis, which may render the research irrelevant.

Data collection methods are purposefully selected to provide the data needed to answer the research questions and goals.

Data collection is the systematic collection of data by either observing or measuring for a research study. It allows the researcher to gain first-hand or original knowledge about the research problem. The researcher gathered data from both secondary and primary sources. The secondary sources were the Central Bank, PSHLSB and other practitioner publications.

Data can be collected first-hand by the researcher as primary data; data can also be acquired from third parties, and data can be collected from other publications or organisations.

The data collected can be either qualitative or quantitative. Qualitative data are non-numeric, while quantitative data, as in this research, are numeric.

Quantitative data was compiled by integrating a range of quantitative and qualitative sources. In addition to studying publications of the industry and policy-makers, data were collected from primary archives, government websites, and industry publications to determine the existence and types of housing demand finance available to public sector workers. The various housing demand finance types were catalogued and studied as a case for their relevance and suitability for public sector workers in Ghana (Yin, 2003).

Data were also collected according to the hypothesis about the determinants of housing demand finance choice among public sector workers covering the various sectors of the economy per the budget statement. These data were compiled mainly from secondary sources.

Data collection is the next step in the data collection process, after which it is processed, managed and analysed.

2.4.1. Secondary Data

It is possible in social research to use data collected earlier by other researchers or for other purposes than research, such as official statistics, administrative records, or other accounts kept routinely by organisations. Data collection from secondary data sources, such as legislation, policies, published reports, institution data and similar sources, aid research. The researcher used data from the PSHLSB, Ministry of Works and Housing and the Statistical Service Ghana for an in-depth analysis of variables. The secondary data sources from the PSHLSB include Act 319 (PSHLSB Law 1975) and LI (PSHLSB Legislative Instrument) 1020 and Loan Scheme data.

The primary data for this research was based on quantitative data collection in the form of a survey. The fundamental principles guiding data collection in quantitative research are that it is derived in a way that is independent of the expectations of the researcher and that the data are true representations of a phenomenon (Botti and Endacott, 2005, p187). The four major objectives that guide quantitative data collection are empiricism, replicability, objectivity and measurement (Botti and Endacott, 2005, p188). The objectives inform the choice of the data collection method by ensuring that the selected method will ensure that data is gathered from a valued source and is meaningful. The choice must be the most effective method, which will provide valid and reliable results, and finally, it seeks to eliminate any biases in the way data are collected so that conclusions reflect the true facts about the opinion of public sector workers on demand housing finance.

The objectives are to ensure that the observations and measurement can be replicated by others when the scales within the questionnaires used in measuring the phenomena are carefully selected and explicit.

The data collection process involved administering a comprehensive questionnaire to the three hundred and eighty-four public sector workers in the Greater Accra ministries area, where all the five major sectors and their related departments and agencies are located.

2.5. Questionnaires

Questionnaires are any group of written questions to which participants are asked to respond in writing, often by checking or circling (Morgan & Harmon, 2001). Questionnaires can adopt either structured or unstructured questions or both.

Questions are usually open or closed. Open questions are expected to generate narrative responses, which are qualitative in nature, while closed questions offer a choice of alternative responses to be selected (Morgan & Harmon, 2001, pp. 975). The more structured the questions are, the easier they are for the researcher to interpret, as the data produced will be quantitative (Marshall, 2005). Less open and non-numerical observations are associated with qualitative data.

The questionnaires used for this research are closed-ended and require participants to either check or circle the responses. The responses to the general questions are the usual characteristics of participants, for example, "What gender do you identify yourself with?" 1. Male, 2. Female and 3. Other. The rest of the questions seek to investigate the attitude of public sector workers on housing demand finance with Likert scale items when the participant is asked to rate from strongly disagree to strongly agree (Morgan and Harmon, 2001 pp975). Even though researchers developed their own attitude-measuring scales, the Likert scale developed this method as a way of measuring attitudes about particular groups, institutions or concepts (Morgan & Harmon, pp.975). Researchers should be able to adopt any of the scales provided to meet the requirements of the research design.

2.5.1. Validation of Questionnaires

Several pieces of literature were searched to establish whether there are already validated questionnaires related to the research topic to be adopted for this research. The finding was not encouraging; therefore, the researcher adopted the questionnaire style of research studies partially related to this research. The use of a validated questionnaire would have saved time during the design phase. The questionnaire used for this study was validated via a pilot study. The outcome of the pilot study highlighted the potential challenges that could have hampered the main research. Critical among the challenges found in the pilot study were the response options to the general questions, to which some participants were not willing to respond, and the length of the questionnaire.

2.6. Data Analysis

In conducting a survey, one must have the skills to analyse the data. Statistical analysis is one of the most widely used means to analyse data and was deployed for the data collected for this research. Statistical analysis can be undertaken manually or by software. There are several methods of survey data analysis, including diagnosis analysis – used in identifying patterns in data; predictive analysis – used to predict future events; prescriptive analysis – used in predicting future events from older data; statistical analysis – which covers data collection, analysing, modelling, interpretation, and presentation. Statistical analysis is further subcategorised as descriptive and inferential. This research used statistical analysis software to make meaning of the data collected and to ensure that modern data analysis technique is deployed for the ultimate outcome.

This section outlines the quantitative data analysis techniques used in the study in accordance with the research design. The researcher utilised the SPSS program to perform statistical analyses on the raw data. The data collected was presented in statistical tables, charts, and diagrams. The analysis of the questionnaire data adopted three phases in sequence: descriptive analysis, cross-tabulation technique, and hypothesis testing.

Quantitative data were analysed statistically to identify which factors influence a public sector worker's choice of housing demand finance. A wide range of statistical techniques was deployed, reflecting both mixed methodologies and

post-positivist epistemologists using the SPSS software. Various regression analyses were deployed to analyse the extent to which housing demand finance is influenced by the various dependent variables, including age, marital status, position, salary and gender. The researcher also used the logic model to illustrate the planned research and the intended results to justify the policy recommendations. In this sense, the research employed mixed methods not just in terms of integrating quantitative and qualitative approaches but also by a range of quantitative techniques, as illustrated above. Through this analysis, we hoped to address the task of explanation in ways that could not be addressed adequately by identifying statistical correlations alone. This mixed methods analytical strategy was directly supported by our goal of explaining post-positivism social science.

The analysis helps find meaning in the raw data collected. The analysis starts by coding the data.

2.6.1. Coding

After the completion of the questionnaires in April 2022, the raw data were assigned codes and inputted on the computer. There are nine types of variables in SPSS, including numeric and string; in this research, numeric variables were used to enable the researcher to perform numeric operations such as calculating mean, median and other statistical tests. The variable view in SPSS was used in the coding by assigning names to each variable. Each question was synonymous with a variable, and the accompanying label characteristics described it. See table 3 for variable names:

Question No./Variable	Variable Label
Q1	Gender
Q2	Age
Q3	Ethnicity
Q4	Residence
Q5	Education

Table 3: Sample Variable Names and Labels

The default decimals in SPSS are two, but in this research, they were adjusted to zero, as the researcher saw whole numbers as ideal for interpreting the data collected.

Variable name coding in SPSS can be done before or after data entry; in this analysis, the researcher coded the data before it was entered. The characteristics for each variable were completed in a way that gives meaning to the variable. Value labels were used to assign numbers to the categorical variables, e.g., Male=1, female=2, and data in ranges were also assigned numbers to represent the various categorical variables, e.g., in age 1=18-25, 2=26-35, 3=36-45, 4=46-55, and 5=56 or over.

2.6.2. Analysis

Once data is collected, it has to be processed before analysis can be performed. The collected data were assigned codes to the variances, and the relevant characteristics were also completed. Then, statistical analysis was used to answer the questions. Statistical analysis requires a clear understanding of "the goal to come out of the measurement that resulted in the data set" (Albers, 2017, pp. 228).

Statistical analysis was performed to test the hypothesis of the research. Descriptive statistics and regression analysis were used to analyse the data to answer the research questions.

2.6.3. Descriptive Statistics

Descriptive statistics are the numerical and graphical techniques used to organise, present and analyse data (Fisher & Marshall, 2009).

The characteristics of public sector workers that were used as the independent variables were analysed with descriptive statistics prior to undertaking the main regression analysis test. The independent variables that were analysed with descriptive statistics include Age, Marital status, position in the organisation, income level and gender. The descriptive statistics highlighted the characteristics and understanding of the public sector workers and the various groups within the set.

2.6.4. Logistic Regression Analysis

Logistic regression analysis is a powerful statistical method that allows you to examine the relationship between two or more variables of interest. Although there are many types of regression analysis, at their core, they all examine the influence of one or more independent variables on a dependent variable.

2.6.5. The Logistic Equation

In logistic regression, we need to use a complex formula and convert back and forth from the logistic equation to the OLS-type equation. The logistic formulas are stated in terms of the probability that $Y = 1$, which is referred to as P . The probability that Y is 0 is $1 - P$.

$$\ln\left(\frac{P}{1-P}\right) = a + bX$$

The \ln symbol refers to a natural logarithm, and $a + bX$ is a familiar equation for the regression line.

P can be computed from the regression equation also. So, if we know the regression equation, we could, theoretically, calculate the expected probability that $Y = 1$ for a given value of X .

$$P = \frac{\exp(a + bX)}{1 + \exp(a + bX)} = \frac{e^{a+bX}}{1 + e^{a+bX}}$$

\exp is the exponent function, sometimes written as e . So, the equation on the right is just the same thing, but replacing \exp with e . It should be noted that e here is not the residual. You can always tell when e stands for \exp if you see that there is a superscripted value with the e , suggesting that e is raised to some power.

2.6.6. Binary Logistic Regression

The first question was answered with the Binary logistic regression analysis method, and the variables fit with the assumptions.

The first research question is: What influences public sector workers' choice of housing demand finance?

Binary logistic regression fits into the category of logistic regression analysis where the dependent or outcome variable is binary or categorical in nature and one or more nominal, ordinal, interval or ratio-level independent variables. Like all linear regressions, logistic regression is mainly a predictive analysis.

It is used to describe data and explain the relationship between one dependent binary variable and one or more continuous-level (interval or ratio scale) independent variables. In binary logistic regression, the log of odds of the dependent variable is modelled as a linear amalgamation of the independent variables. Log odds are an alternate way of expressing probabilities, which simplifies the process of updating them with new findings.

A binomial logistic regression (or logistic regression for short) is used when the following assumptions exist:

2.7. Assumptions

To perform a binary logistic regression, some assumptions must be met:

- The outcome variable being predicted is dichotomous (i.e., yes/no, pass/fail);
- Any number of independent variables that are categorical or continuous;
- Independence of observations;
- Categories of the outcome variable must be mutually exclusive, exhaustive and
- A linear relationship between continuous variables and the logit transformation of the outcome variable.

The first two questions used a dependable variable with a dichotomous predicted outcome. From the question: How did you finance your house/ no finance, the independent variable was the income level.

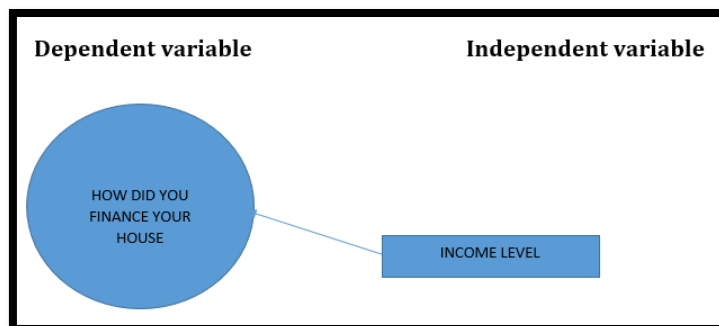


Figure 1: Dependent and Independent Variables

3. Findings

- Hypothesis 1 (Ho1): The income level of public sector workers has no positive effect on their choice of housing demand finance.
- Ha1: The high-income level of public sector workers has a positive effect on the choice of housing finance demand.

Figure 1 shows the case-processing summary. SPSS clearly labels the variables and their values for the variables included in the analysis. This is important to check that you are analysing the variables you want to. Here, it shows the modelling of how houses were financed in relation to the income levels of public sector workers.

In this case processing summary, we see the number and percentage of cases in each level of our response variable. We observed that all 384 respondents, which represents 100%, were used in our data analysis as there were no missing values. See table 4 below for details.

Case Processing Summary			
		N	Marginal Percentage
How did you finance your house?	Housing Finance	279	72.7%
	Self - Built	85	22.1%
	Prefer not to say and n/a	20	5.2%
Income level	>2000	165	43.0%
	2001-4000	144	37.5%
	4001-6000	27	7.0%
	6001-8000	6	1.6%
	8001-10000	12	3.1%
	<10000	3	0.8%
	Prefer not to say	27	7.0%
Valid		384	100.0%
Missing		0	
Total		384	

Table 4: Case-Processing Summary

Table 5 shows the Model-fitting information. Before we start looking at the effects of each explanatory variable in the model, we need to determine whether the model improves our ability to predict the outcome. We do this by comparing a model without any explanatory variables (the baseline or "Intercept Only" model) against the model with all the explanatory variables (the "Final" model - this would normally have several explanatory variables, but at the moment, it just contains gender). We compare the final model against the baseline to see whether it has significantly improved the fit to the data. The Model Fitting Information table gives the -2 log-likelihood (-2LL) values for the baseline and the final model, and SPSS performs a chi-square to test the difference between the -2LL for the two models.

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	142.170			
Final	83.676	58.493	6	.000

Link function: Logit.

Table 5: Model-Fitting Information

The significant chi-square statistic ($p < .0005$) indicates that the Final model gives a significant improvement over the baseline intercept-only model. This tells you that the model gives better predictions than if you just guessed based on the marginal probabilities for the outcome categories.

The next table in the output is the Goodness-of-Fit table (Table 6). This table contains Pearson's chi-square statistic for the model (as well as another chi-square statistic based on the deviance). These statistics are intended to test whether the observed data are consistent with the fitted model. We start from the null hypothesis that the fit is good. If we do not reject this hypothesis (i.e. if the p-value is large), then you conclude that the data and the model predictions are similar and that you have a good model. However, if you reject the assumption of a good fit, conventionally, if $p < .05$, then the model does not fit the data well. The results of our analysis suggest that the model does not fit very well ($p < .000$).

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	50.698	6	.000
Deviance	56.282	6	.000

Link function: Logit.

Table 6: Goodness-of-Fit

In linear regression, R^2 (the coefficient of determination) summarises the proportion of variance in the outcome that can be accounted for by the explanatory variables, with larger R^2 values indicating that more of the variation in the outcome can be explained up to a maximum of 1. For logistic and ordinal regression models, it is not possible to compute the same R^2 statistic as in linear regression, so three approximations are computed instead.

Pseudo R-Square	
Cox and Snell	.141
Nagelkerke	.185
McFadden	.106

Link function: Logit.

Table 7: Pseudo R-Square

What constitutes a "good" R2 value depends upon the nature of the outcome and the explanatory variables. Here, the pseudo-R2 values (e.g. Nagelkerke = 18.5%) indicate that income explains a relatively small proportion of the variation between public sector workers and their mode of house acquisition. This is just as we would expect because there are characteristics such as gender, marital status and position that impact public sector workers, many of which will be much more important predictors of housing finance choice than just income. The low R2 indicates that a model containing only income is likely to be a poor predictor of the outcome for any particular individual public sector worker. Note, though, that this does not negate the fact that there is a statistically significant and relatively large difference between those who used finance to acquire their home and those who did not (See table 7 above).

The Parameter estimates table (Table 8) is the core of the output, telling us specifically about the relationship between our explanatory variables and the outcome.

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Q14 = 1]	2.009	.596	11.383	1	.001	.842	3.176
	[Q14 = 2]	4.209	.642	43.013	1	.000	2.951	5.467
Location	[Q7=1]	.260	.634	.167	1	.683	-.984	1.503
	[Q7=2]	1.183	.622	3.614	1	.057	-.037	2.402
	[Q7=3]	2.326	.701	11.026	1	.001	.953	3.699
	[Q7=4]	3.109	.980	10.056	1	.002	1.188	5.031
	[Q7=5]	3.109	.815	14.540	1	.000	1.511	4.707
	[Q7=6]	3.109	1.247	6.220	1	.013	.666	5.552
	[Q7=7]	0 ^a	.	.	.	0	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

Table 8: Parameter Estimates

The threshold coefficients are not usually interpreted individually. They just represent the intercepts, specifically the point (in terms of a logit) where public sector workers' choice of housing finance might be predicted. The labelling may seem strange, but remember the odds of being level 2 or below (Q14=2) is just the complement of the odds of being level 3; the odds of being level 1 or below (Q14=1) are just the complement of the odds of being level 2 or above, and so on. While you do not usually have to interpret these threshold parameters directly, we will explain below what is happening so you understand how the model works.

3.1. Test of Parallel Lines

Remember that the model is equal at each threshold because the ordinal model has constrained it to be so through the proportional odds assumption. We can evaluate the appropriateness of this assumption through the "test of parallel lines." This test compares the ordinal model with one set of coefficients for all thresholds (labelled Null Hypothesis) to a model with a separate set of coefficients for each threshold (labelled General).

If the general model gives a significantly better fit to the data than the ordinal (proportional odds) model (i.e. if $p < .05$), then we are led to reject the assumption of proportional odds. This is the conclusion we would draw for our test, given the significant value as shown below ($p < .000$) (See Table 9 below).

Test of Parallel Lines ^a				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	83.676			
General	46.554 ^b	37.122 ^c	6	.000
The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.				
a. Link function: Logit.				
b. The log-likelihood value cannot be further increased after a maximum number of step-halving.				
c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. The validity of the test is uncertain.				

Table 9: Test of Parallel Lines^a

4. Conclusion

Hypothesis 1 (Ho1): The income level of public sector workers has no effect on their choice of housing demand finance. This was tested with the alternate hypothesis below:

- Ha1: High-income earning public sector workers prefer housing demand finance to acquire a home.

The outcome of the test using regression analysis concluded that the odds of a public sector worker given the significant p-value led to the conclusion that income has an effect on public sector workers' choice of house finance. This is an indication that the income of public sector workers influences their decision to acquire demand housing finance. Therefore, the null hypothesis is rejected as income has an effect on public sector workers' choice of demand housing finance.

Public servants are among the lowest-earner workers in Ghana. Available data show that 886,906 civil and public sector workers make up about 50% of the total formal workforce registered with SSNIT in Ghana. The average annual salary, as quoted in the 2022 Budget, is GHS34,672.00. Per the 2020 single spine salary structure, the universal salary structure used for the majority of public sector workers in Ghana quotes the lowest public sector salary as GHS3300.54 and the highest public sector salary as GHS79,884.41 per annum. This translates into GHS275-GHS6657 per month, which puts the majority of public sector workers in a disadvantageous position when applying for a mortgage facility. The salary structure clearly denies nearly half of the formal workers from participating in the housing demand finance sector. This has policy implications if the industry is to be developed. The base of the pyramid theory recognises such a large market as an opportunity to develop a product. The income of public sector workers cannot be ignored by any serious policymaker as it is a formal market that can help accelerate economic development through its share scale.

The challenge facing housing finance is compounded further because mortgage facilities offered by financial institutions are not accessible to the majority of hard-working citizens whose salaries are under GH¢36,000.00 (\$6000.00) per annum to qualify for a mortgage to buy a home (BNFT 2018). The average salary was stated as GH¢34,672 (\$5,778) per annum (Ministry of Finance, 2021), and CAHF (2021) also put the figure at GH¢33,947 (\$5,657). The three annual income sources are not significantly different from each other, which clearly gives a fair idea of household earnings. The worker in Ghana earning below the average salary will struggle to acquire the cheapest newly built house costing GH¢134 684 (US\$22 938), a standard two-bedroom property.

A significant 68.7% of public sector workers surveyed say their income influences their choice of demand housing finance. The test found that a review of public sector workers' salaries is likely to boost their affordability of housing demand finance; hence, the null hypothesis is rejected.

Acheampong and Anokye (2015) recommended that housing subsidies do not appear to be the appropriate financing instrument for low-income housing development in Ghana in the short to long term. The literature gave reasons such as the informal nature of the housing market and low-income workers.

In a developing country like Ghana with low income, it also becomes virtually impossible for low-income households to access available mortgages (Acheampong & Anokye, 2015). Afrane et al. (2016) identified inadequate mortgage financing, among others, as the cause of the 2 million housing units deficit in Ghana by referring to the short-term funding available to banks, hence being unable to lend medium to long-term. Hence, there is a need to consider the housing finance alternatives proposed below.

A review of public sector workers' salaries does not necessarily mean an increase in disposable salary but any attempt to enhance the structure that will ensure that workers can afford accommodation at the appropriate time in their careers. A clear successful examples are the INFONAVIT of Mexico and the Central Provident Fund (CPF) of Singapore where provision was made for workers to contribute towards acquiring a property with the support of their employers.

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