

# Factors That Affect the Demand Housing Finance Choice of Public Sector Workers in Ghana: The Effect of Position Held

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**Abstract**— Regardless of many hard work by the government of Ghana and the key actors to improve the housing industry it remains in its embryonic stage. The purpose of this study is to establish whether the choice of demand housing finance of public sector workers is influenced by their level of position.

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

To test the hypothesis of whether the position of public sector workers has no effect on their choice of housing demand finance, the alternate hypothesis was tested and it was found that the position held by a public sector worker does not affect his or her choice of demand housing finance hence does not contribute to the model. Therefore, we accept the null hypothesis.

Actors of demand housing finance loans or schemes do not have to pay too much attention to the seniority of public sector workers in designing a scheme. The focus should be on the entire public sector workers irrespective of their position.

This is the first time in Ghana Public sector workers have been surveyed comprehensively in relation to their attitude towards the almost fifty-year-old PSHLSB housing loans scheme. The findings stand to improve policy and future research. It also explains why Ghana has large housing deficit.

**Index Terms**— Housing finance, public sector, affordability, business strategy, business management, PSHLSB.

## I. INTRODUCTION

Housing plays a momentous role in societies. This study will focus on the decision of public sector workers to select a demand housing finance loan or a scheme and how it is influenced by their position at work.

The population of Ghana stands at 30.8 million with the economic 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 at 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 one of the lowest earners in Ghana. Available data show that the 886,906 civil and public sector workers make up about 50% of 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 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 majority of public sector workers in a disadvantage 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 position of public sector workers is linked to their income hence it cannot be ignored by any serious policy maker as the public sector is a formal market that can help accelerate economic development with its share scale.

**Hypothesis 1 (Ho1).** Seniority of public sector workers has no positive effect on their choice of housing demand finance choice.

Ha1: senior public sector workers are more likely to acquire a home through a housing finance scheme.

## Background

The challenge facing housing demand finance is compounded further because mortgage facilities offered by financial institutions are not accessible by majority of hard-working citizens whose salaries are under GH¢36,000.00 (\$6000.00) per annum disqualifying their mortgage qualification (BNFT 2018). Average salary in Ghana 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 about 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.

To address the massive housing deficit in Ghana the housing industry stakeholders identified access to unencumbered land, infrastructure, construction and mortgage finance as the key challenges to address in order to accelerate the delivery of affordable housing units for the population (GNA, 2018). This literature focuses on the mortgage finance part that is the demand side of the housing industry.

The identification of Housing Finance/Mortgage as one of the key problems facing the housing sector justifies significant research in the area.

The PWC (2021) noted that financial institutions in Ghana

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are now moving away from loans and Advances to liquid investment in safe government securities. Banks liquid assets increase from 29.3% in 2016 to 48.3% in 2020, nearly twenty percentage point. In 2016 net loans and advances dropped

from 40.4% to 30.7% in 2020. A ten percentage point in just 4 years. This is significant and if the current trend is not checked it could lead to drying of funds in the housing mortgage sector. See Table 1.0

Table: 1.0 Composition of industry Bank operating assets, Ghana

	2016	2017	2018	2019	2020
CashAssets	29.7%	27.5%	24.6%	21.6%	20.8%
LiquidAssets	29.3%	38.3%	44.8%	44.9%	48.3%
NetLoansandAdvances	40.4%	34.1%	30.5%	33.3%	30.7%
OtherOperatingAssets	0.6%	0.2%	0.2%	0.2%	0.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: PWC, 2021

As stated earlier income levels are generally low in developing countries including Ghana. Workers earning below the average salary will struggle to afford mortgage for the cheapest house in Ghana.

Banks in Ghana mortgage tenure is up to 20 years. The limited tenure can obviously limit accessibility to workers with low income that needs more years to be able to afford mortgage. The banks limited tenure could be linked to the composition of their liability structure. About 70% of banks total liability is made up of deposits from customers (BOG, 2021) which are short term in nature. Only 14% of the

liabilities are equity making it difficult to fund the 28% advances (BOG, 2021), this explains why banks concentrate on investments to the detriment of housing demand advances. The Public Servants Housing Loans Scheme Board (PSHLSB) offer the most flexible terms in terms of tenure among the 3 housing loans compared. The National Home and Mortgage Fund is a housing loan fund by the government in partnership with three banks, its tenure of 20 years is not different from what the banks are offering even though government is a major funding partner of that scheme. See tables 2.11 and 2.12.

Table 1.2: Mortgage tenure in Ghana

	BANKS	NHMF	PSHLSB
Tenure (Years)	20	20	30

Source: NHMF, PSHLSB, CHAF

Table 1.3: Mortgage tenure in Ghana, Togo, Mexico and Singapore

	GHANA	TOGO	MEXICO	SINGAPORE
Tenure	20-30	15	30	30

Source: NHMF, PSHLSB, CHAF

The Assets structure of banks in Ghana affirms the challenges associated with credit facilities in the housing sector. Due to the risk associated with credit to individual and businesses in Ghana banks are growing their investment portfolio as against granting more credit to customers. Investment portfolio in banks assets grew from 36.3 in 2018 to 37.5% in 2019 and 43.1 % in 2020 as against banks advances that increase marginally from 30.3% in 2018 to 31% in 2019 and declined to 28% in 2020 (Bog, 2021). The scenario points to the fact that banks are shifting from lending to investment which is less risky. Some of the reasons are the high borrowing rates.

design choice is premise on the research question, research objectives and uniformity with the research philosophy (Saunders et al. 2007). The research design imposes on the researcher to elect and have an overall plan of how the study will answer the research question framed in the study. It also demonstrates to the reader how the study is to be carried out in order to find answers to the research questions. It is imperative to note that the right research design assist the researcher to undertake an efficient and effective study (Malhotra and Birks, 2006) by outlining the data to be collected, how it should be collected and the sampling process to use for the research in order to be able to answer the research questions and achieve the research objectives.

## II. RESEARCH APPROACH

A research study requires that relevant research design is selected. Research design entails quantitative, qualitative and mixed methods approaches that offer a precise direction for procedures (Creswell, 2009, p.41). It is the plan that is used to guide the research during data collection and analysis (Churchill, 1999, p. 98). The rational underpinning a research

### Mixed Method

Usually, there are three types of research methodology quantitative, qualitative, and mixed methods. Quantitative is data driven while qualitative is driven by observation and interviews. Mixed methods uses a mixture of both. Social science relies heavily on qualitative driven data analyses but could use a combination of both quantitative and qualitative

to take advantage of all the tools available in a one collective framework. An ideal Mixed Methods comprises the benefits of both methods (Johnson, Onwuegbuzie, & Turner, 2007): Quantitative analyses uses descriptive and inferential statistics, whereas qualitative analyses produce expressive data that provide descriptive details usually in a narrative form to investigate the research objectives. While quantitative data may be collected by means such as survey in the form of self-administered or electronic questionnaire, qualitative data are collected by interview means with one on one, focus groups with either structured or semi structured, and other forms (Creswell, 2013).

Mixed Method hypotheses are different from only quantitative research questions. The source of information to prepare the hypothesis must come from both quantitative and qualitative data to be used to develop hypothesis in such a way that it has the potential to answer the research questions in an integrated way. Hypotheses should be developed in a priority and be both logical and sequential research questions (Onwuegbuzie & Leech, 2006).

The Integration of quantitative and qualitative data is a complicated exercise and must be done with care to ensure that the objective of the study is achieved. Data integration happens as soon as quantitative and qualitative are joined in a data set. There are various ways to integrate the two approaches, including triangulation, and the mixed methods matrix (Murphy, & Nicholl, 2010). However, appreciating the complete reasoning for using a Mixed Method and the best way to combine the approaches in practice can help reduce the complex nature of mixed method data integration (Bryman, 2006).

### 2.1 Research Approach Adopted in this Research

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

Mixed research may be conducted with experimental, Simulation and Surveys researches, correlational study and Multivariate analysis (Queiros et al., 2017). This research was conducted using surveys to answer the research questions through a set of hypothesis.

The researcher tested the hypothesis through a mixed method approach, in keeping with the understanding of the methodological implications of a post-positivist worldview, with a focus 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, informed by the collection and analysis of primary quantitative data on public sector workers from all the various sectors of the economy. Recognising that these quantitative methods are better at describing correlations than at explaining the behaviours of the underlying social actors involved, we

then 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 fits 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' choice of housing demand finance choice. In this sense, taking a mixed methods approach allowed the researcher to pursue distinctly post-positivist social science explanations for the phenomena on interest.

### Surveys

Survey is a research technique that permits the gathering of data directly through questions in various forms from person's 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 opinion, behaviours and perceptions about a particular phenomenon.

Surveys are triggered when individuals or organisations have the need for information on a group including customers and there is no existing data or the data available is insufficient for the purpose. Based on the required information a survey will have to be planned to achieve a certain aim before it is deployed to make it meaningful. Survey is the best technique for this research as it is aimed at collecting information from public sector workers and their housing demand finance choice and also describe, compare, explain or predict their housing finance choice, and also the attitudes or behaviours towards the public servants housing loans scheme.

Survey study is basically a systematic investigation conducted through a survey technique such as using questionnaire, online or telephone survey. In summary, it is a style of research undertaken by administering surveys to respondents.

Surveys is a useful method of gathering views by sampling and discovering what people think about diverse situations and circumstances. Using a survey method implies gathering first-hand information from individuals affected by specific contexts. The paramount way to collect data about customers is to ask them directly. Companies collect relevant information of their company to create strategies to sustain their operations to keep their staff and customers happy. Good utilisation of information gathered from recipients can be used to generate competitive advantage and knowledge about a particular product or sector. The valuable nature of data surveyed from customers directly has the potential to determine the sustainability or extinction of any business.

The completion of valuable questions is instrumental to the success of the survey and the research study. To achieve this a researcher can undertake a pilot study to test the quality and relevance of survey questions.

Survey research is very suitable in [primary research](#) data collection. Survey for instance can be used by the PSHLSB to gather information about how their clients view their services vis a vis other housing demand loan schemes which will be an ideal way to get first-hand information on suitability of its operations.

Such an exercise will provide the PSHLSB primary data from their clients (respondents) which will put them in a position to take the best decision for their clients and the organisation.

### Sampling

Sampling has been defined differently by many authors. The preferred definition for this study is “the process of selecting a smaller group of participants to tell us essentially what a larger population might tell us if we ask every member of the larger population the same questions” (Adwok, 2015, pp95).

Sampling plays a critical role during research studies. It is a fact that irrespective of how other areas like research questions, research design, data collection and analysis are done, an ill-conceived research sample could cause the research to lack authenticity, credibility and dependability. Sampling strategies should, whenever possible, identify inclusion and exclusion criteria to set boundaries on what item is selected and what is not selected from a given population of study (Mweshi and Sakyi, 2020, pp181).

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. Sample is the amount of correctly extracted material from the lot. Sampling are broadly divided into probability and non-probability (Etikan et al 2016). With probability sampling types, each population has 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 a 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 that of non-probability include purposive sampling, convenience sampling, snowball sampling and quota sampling.

### Sampling Process

The sampling process entails picking a small number of larger population to find information that ensures that the conclusion arrived at reflects the entire population (Hair et al., 2003). It guides the researcher to understand and develop the process and to identifying a hypothesis that needs to be investigated (Hair et al. 2003). As stated earlier, the two main types of sampling are probability and non-probability

sampling. The probability sampling technique is widely associated with representative samples. Which is based on a carefully reasoning of the population in question, to upholding natural sciences and quantitative social sciences.

The probability sampling technique attempts to advance a perfect representative sample with apparent errors, drawing a sample from a large collection of cases i.e. a unit of analysis or case in a population (Neuman, 2014). Some frontiers including, geographic and temporal boundaries are utilised in this sampling technique. On the contrary, non-probability sampling is supposed to be a modest alternative in forming a representative sample. Non-probability sampling is the preferred choice when the study is faced with challenges such as cost, time and inconvenience. Most cases in non-probability sampling are usually seen as not a representative of the target population. Hair et al. (2003) described non-probability sampling as a process whereby the probability of each unit is unknown.

From the preceding, it is important that certain critical factors are considered before selecting an appropriate sampling design for this study. Hair et al. (2003) identified a number of critical factors to be considered by the researcher before selecting an appropriate sampling design, including a choice guided by the research objective, degree of accuracy of the research, availability of resources for the research, time frame for the study, knowledge of the target population and finally the scope of the study.

To be fair, unbiased and to give each item in a given population an equal chance of being selected, most researchers go for the scientific method of random sampling which sometimes for practical purposes is idealistic and far-fetched (Mweshi and Sakyi, 2020, pp181).

This research adopts probability sampling to enable the study adequately answer the research questions devoid of bias and also offering every public sector worker an equal opportunity to partake in the study.

The data collection phase of the research involved administering of three hundred and ninety survey questionnaire to answer the research questions. Parts of the questions relate to the housing demand finance, attitude of public sector workers and the PSHLSB loans scheme. Stratified/random sampling methods was 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 nth element. This research adopts 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, economic, infrastructure, social and public safety. In addition, each sector is assigned an apportioned number which is selected randomly.

**Sampling Size**

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

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

Many researchers have developed statistical formulas to determining 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 and Masuku, 2014)for populations of 886,906 with 95% confidence level. The sample size of 390 was administered out of which 384 questionnaires were fully completed and used in this research. As public sector workers may share some identical characteristics made the sample size the ideal number. See table 4.1 below for sample size based on desired accuracy with confidence level of 95%.

Table 2.2: Distribution of 384 Surveys to MDAs in Ghana

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					

**2.2 Data Collection**

Data collection is the methodological route of accumulating information about a specific subject. Researcher has to ensure that data collected is complete in the process 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 a systematic collection of data by either

Table 2.1: Sample size and Confidence Level

	95% confidence level
POPULATION	Sample Size
25000	378
50000	381
100000	383
250000	384
500000	384
1000000	384

Source: (Gill et al., 2010)

The Budget statement grouped the MDAs into five (5) groups namely Administration, Economic, Infrastructure, Social and Public Safety. The number of staff sampled to be surveyed per each sector was determined using the total staff strength per the 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 4.2 below:

observing or measuring for a research study. It allows the researcher to gain first-hand or original knowledge in a research problem. The researcher gathered data from both secondary and primary data. The data from the secondary data were data from the Central Bank, PSHLSB and other practitioner publications.

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

Data collected can be either qualitative in nature or quantitative in nature. Qualitative data are nonnumeric while quantitative data as in this research is numeric.

Quantitative data was compiled by integrating a range of quantitative and qualitative sources. As well as studying publications of the industry and policy makers, data was 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 its 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.

The fundamental principal 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 guides quantitative data collection are empiricism, replicability, objectivity and measurement (Botti and Endacott, 2005, p188). The objectives inform the choice of data collection method by ensuring that the selected method will ensure that data is gathered from a valued source and it is meaningful. The choice must be the most effective method which will provide valid and reliable results and finally it seeking to eliminate any biases in the way data are collected so that conclusions reflects the true facts about 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 the administering of comprehensive questionnaire to the three hundred and eighty-four public sector workers in the Greater Accra ministries area where all the five major sector and its related departments and agencies are located.

### **Data Collection Method**

The data collection methods considered for this research include survey in the form of questionnaire and observation. As mentioned earlier questionnaire was used to collect the data.

### **Questionnaires**

Questionnaires are any group of written questions to which participants are asked to respond in writing, often by checking or circling (Morgan and 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 are where a choice of alternative responses are offered to be selected (Morgan and Harmon, 2001 pp975). 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 questionnaire used for this research are closed-ended and require participants to either check or circle the responses. The responses for the general questions are the usual characteristics of participants for example “what gender do you identify yourself?” 1. Male, 2. Female and 3. Other. The rest of the questions that seeks 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 develop their own attitude measuring scales, Likert scale developed this method as a way of measuring attitudes about particular groups, institutions or concepts (Morgan and Harmon, 2001 pp.975). Researchers should be able to adopt any of the scales provided it meets the requirement of the research design.

### **Validation of Questionnaire**

Several literatures were search to establish if there are already validated questionnaires that relates 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 validated questionnaire would have saved time during the design phase. The questionnaire used for this study were 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 where some participants were not willing to respond and the length of the questionnaire.

### **2.3 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 a 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 – it 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 line with the research design. The researcher utilised SPSS program to perform statistical analyses on the raw data. Data collected was presented in statistical tables, charts and diagrams. The analysis of the questionnaire data adopts three phases in sequence; descriptive analysis, cross tabulation technique and hypothesis testing.

Quantitative data were analysed statistically, aiming at identifying which kinds of factors influences a public sector workers' choice of housing demand finance. Wide range of

statistical techniques were deployed reflecting both mixed methodologies and post-positivist epistemologist using the SPSS software. Various regression analysis was deployed to analyse the extent to which housing demand finance is influence by the various dependent variables including age, marital status, position, salary and gender. The researcher also used logic model to illustrate the planned research and the intended results to justify the policy recommendations. In these 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 illustration above. Through this analysis, we hoped to address the task of explanation in ways that could not be addressed adequately through identifying statistical correlations alone. This mixed methods analytical strategy was directly supported by our goal of post-positivism social science explanation.

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

**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 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 to a variable with the accompanying label characteristics describing it. See Table 4.3 for variable names:

Table 2.3: Sample Variable Names and Labels

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

The default decimals in SPSS is two but in this research it was adjusted to zero as the researcher see whole numbers as ideal for interpreting the data collected.

The variable name coding in SPSS can be done before or after data entry, in this analysis the researcher coded before data was entered. The characteristics for each variable was completed in a way that give meaning to the variable. Values 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.

**2.4 Analysis**

Once data is collected, it has to be processed before analysis can be performed. The data collected 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 having a clear understanding of “what is the goal to come out of the measurement that resulted in the data set” (Albers, 2017,

pp228).

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

**Descriptive Statistics**

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

The characteristics of public sector worker 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 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.

**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.

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 our 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.

**Binary Logistic Regression**

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

The first research question is:

- a. What influences public sector workers’ choice of housing demand finance?

Binary logistic regression fits to 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 to 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:

**Assumptions**

To perform a binary logistic regression, some assumptions must be met. These include: 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 Linear relationship between continuous variables and the logit transformation of the outcome variable.

The questions used a dependable variable that has a dichotomous predicted outcome. From the question ‘‘how did you finance your house: Finance/No Finance’’. The independent variables were categorical for marital status, position and gender and continuous for Age and Income levels.

**III. FINDINGS**

**Hypothesis 1 (Ho1).**Seniority of public sector workers has no positive effect on their choice of housing demand finance choice.

Ha1: Senior public sector workers are more likely to acquire a home through a housing finance scheme.

**Descriptive Statistics**

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

The characteristics of public sector worker 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 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.

Descriptive Characteristics of Respondents (Public Sector Workers)

This part describes the demographics of participants. The respondents of this survey largely identified 204 (53.1%) as female while 180 (46.9%) were identified as male (see Table 4.1).

Table 4.1. Gender of Participants – Frequencies and Percentages

<b>Gender</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	180	46.9	46.9	46.9
	Female	204	53.1	53.1	100.0
	Total	384	100.0	100.0	

The ages of participants were distributed in the following ranges: 18–25 years, 26–35 years, 36–45 years, 46–55 years, and 56+ years. The respective distribution and percentages

were 75 (19.5%), 153(39.8%), 105(27.3%), 42(10.9%), and 9(2.3%). The overall response was 100% (see Table 4.2).

Table 4.2. Age of Participants – Frequencies and Percentages

<b>Age</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	75	19.5	19.5	19.5
	26-35	153	39.8	39.8	59.4
	36-45	105	27.3	27.3	86.7
	46-55	42	10.9	10.9	97.7
	56+	9	2.3	2.3	100.0



	Total	384	100.0	100.0	
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Public sector workers with a bachelor’s degree amounted to 50% of the participants, while 36.7% are documented as having master’s degrees. Senior High Secondary accounts for 5.5% of respondents, then 2.3% makes up vocational qualification, followed by Doctorate 0.8%. Participants of 3.9% prefer not to say and only 0.8% have other qualification (see Table 4.3).

Table 4.3 Degree Level of Participants – Frequencies and Percentages

Education		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Senior High	21	5.5	5.5	5.5
	Undergraduate	192	50.0	50.0	55.5
	PG/Masters	141	36.7	36.7	92.2
	PhD or Higher	3	.8	.8	93.0
	Vocational	9	2.3	2.3	95.3
	Other	3	.8	.8	96.1
	Prefer not to say	15	3.9	3.9	100.0
	Total	384	100.0	100.0	

A slight majority of the sample were reported married (51.6%). Unmarried participants are 44.5% while 3.9% prefer not to say (see Table 4.4).

Table 4.4 Employment of Participants – Frequencies and Percentages

Married		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	198	51.6	51.6	51.6
	No	171	44.5	44.5	96.1
	Prefer not to say	15	3.9	3.9	100.0
	Total	384	100.0	100.0	

Participants responded to a question that identified the class of area they live. The largest percentage of participants were living in second class area (39.1%). Followed by third class area 35.9%, then 21.8% in first class area. Participants of 0.8% live in other area while 1.6% prefer not to say. Last 3 (0.8%) participants did not respond to this question (see Table 4.5).

Table 4.5 Residence of Participants – Frequencies and Percentages

Residence		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First Class High	42	10.9	11.0	11.0
	First Class Low	42	10.9	11.0	22.0

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	Second Class High	102	26.6	26.8	48.8
	Second Class Low	48	12.5	12.6	61.4
	Third Class	138	35.9	36.2	97.6
	Other	3	.8	.8	98.4
	Prefer not to say	6	1.6	1.6	100.0
	Total	381	99.2	100.0	
Missing	System	3	.8		
Total		384	100.0		

Table 4.6).

Data was collected on the income level of Participants. It was recorded that majority of participants accounting for 43% earns less than GHS2000, followed by 37.5% that earns between GHS2001-4000. Then 7% earns GHS4001-6000 and 3.1% earns GHS8001-10000. The data also recorded that 1.6% earns 6001-8000 and 0.8% earns more than 10000. It was recorded that 7% of respondents prefer not to say (see

Table 4.6: Income Level of Participants – Frequencies and Percentages

Income level		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	>2000	165	43.0	43.0	43.0
	2001-4000	144	37.5	37.5	80.5
	4001-6000	27	7.0	7.0	87.5
	6001-8000	6	1.6	1.6	89.1
	8001-10000	12	3.1	3.1	92.2
	<10000	3	.8	.8	93.0
	Prefer not to say	27	7.0	7.0	100.0
	Total	384	100.0	100.0	

The age, income level and No. of years use to complete house were analysed. The minimum age range of participating public sector workers was 18-25 and the maximum range at 56 +. The mean age range in 36-45. The standard deviation of the participants' age range is 0.992 which is within 2 standard deviations of the mean.

The minimum income level is >GHS2000.00, while the maximum income is <GHS10,000.00 per month. The average income range is 1.59 which is within GHS2000.00-GHS4000.00. The Standard deviation of the income ranges is 1.647 which is within 2 standard deviations

of the mean.

The minimum number of years used by participants surveyed to complete their house is one year which the maximum is 6 years. The mean is 1.59 while the standard deviation is 1.274 which is within 2 standard deviations of the mean. See table 4.7 below.

Table 4.7: Descriptive Stats of Age, Income and No. of years to complete home

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	384	1	5	2.37	.992
Income level	384	1	7	2.15	1.647
No. of years to complete house/houses	384	1	6	1.59	1.274
Valid N (listwise)	384				

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 out of the 384 respondents which represents 100% were used in our data analysis. See table 3.1 below for details.

Table: 3.1

<b>Case Processing Summary</b>
--------------------------------

		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%
position in your organisation	Director	3	0.8%
	Deputy Director	21	5.5%
	Principal Officer	42	10.9%
	Senior Officer	93	24.2%
	Officer	123	32.0%
	Junior Officer	51	13.3%
	Prefer not to say	51	13.3%
Valid		384	100.0%
Missing		0	
Total		384	

The N column provides the number of observations fitting the description. The first three values give the number of observations for public sector workers that responded to how they financed their house acquisition. It was through Housing Finance, Self-built or not applicable, respectively.

The marginal percentage column lists the proportion of valid observations found in each of the outcome variable's groups. This can be calculated by dividing the N for each group by the N for "Valid". Of the 384 subjects with valid

data, 279 were categorized as used housing finance. Thus, the marginal percentage for this group is  $(279/384) * 100 = 72.7\%$ .

In this regression, the outcome variable is "how did you finance your house" which contains a numeric code for the subject's. The data includes three levels.

Table: 3.2

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	148.175			
Final	93.241	54.934	6	.000
Link function: Logit.				

This specifies the parameters of the model for which the model fit is calculated. "Intercept Only" describes a model that does not control for any predictor variables and simply fits an intercept to predict the outcome variable. "Final" describes a model that includes the specified predictor variables whose coefficient have been estimated using an iterative process that maximizes the log likelihood of the outcome. By including the predictor variables and maximizing the log likelihood of the outcome, the "Final" model should improve upon the "Intercept Only" model. This can be seen in the differences in the -2(Log Likelihood) values associated with the models.

The -2(Log Likelihood) – This is the product of -2 and the log likelihoods of the null model and fitted "final" model. The likelihood of the model is used to test whether all of the estimated regression coefficients in the model are simultaneously zero.

The Chi-Square is the Likelihood Ratio (LR) Chi-Square test. It tests whether at least one of the predictors' regression coefficient is not equal to zero in the model. The LR Chi-Square statistic can be calculated by  $-2 * L(\text{null model}) - (-2 * L(\text{fitted model})) = 148.175 - 93.241 = 54.934$ , where  $L(\text{null model})$  is from the log likelihood with just the response variable in the model (Iteration 0) and  $L(\text{fitted model})$  is the log likelihood from the final iteration (assuming the model converged) with all the parameters.

The df indicates the degrees of freedom of the Chi-Square

distribution used to test the LR Chi-Square statistic and is defined by the number of predictors in the model.

The Sig. is the probability of getting a LR test statistic as extreme as, or more so, than the observed under the null hypothesis; the null hypothesis is that all of the regression coefficients in the model are equal to zero. In other words, this is the probability of obtaining this chi-square statistic (54.934) if there is in fact no effect of the predictor variables. This p-value is compared to a specified alpha level, our willingness to accept a type I error, which is typically set at 0.05 or 0.01. The small p-value from the LR test,  $<0.00001$ , would lead us to conclude that at least one of the regression coefficients in the model is not equal to zero. The parameter of the Chi-Square distribution used to test the null hypothesis is defined by the degrees of freedom in the prior column. See table 3.2 above.

Table: 3.3

Pseudo R-Square	
Cox and Snell	.133
Nagelkerke	.175
McFadden	.099
Link function: Logit.	

Pseudo R-Square are three pseudo R-squared values.

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Logistic regression does not have an equivalent to the R-squared that is found in OLS regression; however, many people have tried to come up with one. There are a wide variety of pseudo R-squared statistics which can give contradictory conclusions. Since these “pseudo” R-squared

values do not have the same interpretation as standard R-squared values from OLS regression (the proportion of variance for the response variable explained by the predictors), we recommend interpreting them with great caution. See Table: 3.3

Table: 3.4

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Q14 = 1]	1.916	.418	20.980	1	.000	1.096	2.736
	[Q14 = 2]	4.108	.484	72.127	1	.000	3.160	5.055
Location	[Q8=1]	3.012	1.172	6.604	1	.010	.715	5.309
	[Q8=2]	3.012	.599	25.313	1	.000	1.838	4.185
	[Q8=3]	1.464	.522	7.880	1	.005	.442	2.487
	[Q8=4]	1.148	.473	5.887	1	.015	.221	2.075
	[Q8=5]	.496	.476	1.088	1	.297	-.436	1.429
	[Q8=6]	-.048	.597	.006	1	.936	-1.218	1.122
	[Q8=7]	0 <sup>a</sup>	.	.	0	.	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

The Threshold represents the response variable in the ordinal logistic regression. The threshold estimate for [How did you finance your house = 1.00] is the cutoff value between housing finance and self-built and the threshold estimate for [how did you finance your house = 2.00] represents the cutoff value between self-built and the who did not have house therefore not applicable.

For [how did you finance your house = 1.00] this is the estimated cut point on the latent variable used to differentiate housing finance from self-built and not applicable when values of the predictor variables are evaluated at zero. Public sector workers that had a value of 1.916 or less on the underlying latent variable that gave rise to our housing finance variable would be classified as housing finance given they were senior public sector workers (the variable junior public sector workers evaluated at zero, its reference value).

[how did you finance your house = 2.00] – This is the estimated cut point on the latent variable used to differentiate housing finance and self-built from not applicable when values of the predictor variables are evaluated at zero. Subjects that had a value of 4.108 or greater on the underlying latent variable that gave rise to our how did you finance your house variable would be classified as not having a house given they were senior public sector worker. Public sector workers that had a value between 2.755 and 5.105 on the underlying latent variable would be classified as used housing finance.

The Estimate column are the ordinal log-odds (logit) regression coefficients. Standard interpretation of the ordinal logit coefficient is that for a one-unit increase in the predictor, the response variable level is expected to change by its respective regression coefficient in the ordinal log-odds scale while the other variables in the model are held constant.

Std. Error column are the standard errors of the individual regression coefficients. They are used in both the calculation of the Wald test statistic, superscript p, and the confidence

interval of the regression coefficient, superscript r.

Wald is the Wald chi-square test that tests the null hypothesis that the estimate equals 0.

DF are the degrees of freedom for each of the tests of the coefficients. For each Estimate (parameter) estimated in the model, one DF is required, and the DF defines the Chi-Square distribution to test whether the individual regression coefficient is zero given the other variables are in the model.

Sig are the p-values of the coefficients or the probability that, within a given model, the null hypothesis that a particular predictor’s regression coefficient is zero given that the rest of the predictors are in the model. They are based on the Wald test statistics of the predictors, which can be calculated by dividing the square of the predictor’s estimate by the square of its standard error. The probability that a particular Wald test statistic is as extreme as, or more so, than what has been observed under the null hypothesis is defined by the p-value and presented here. The Wald test statistic for the predictor senior public sector worker is 6.604 with an associated p-value of 0.010. If we set our alpha level to 0.05, we would fail to reject the null hypothesis and conclude that the regression coefficient for senior public sector workers has not been found to be statistically different from zero in estimating how did you finance your house given housing finance and self-built are in the model. The Wald test statistic for the predictor self-built is 25.313 with an associated p-value of 0.000. If we set our alpha level to 0.05, we would reject the null hypothesis and conclude that the regression coefficient for self-built has not been found to be statistically different from zero in estimating how did you finance your house given. 95% Confidence Interval – This is the Confidence Interval (CI) for an individual regression coefficient given the other predictors are in the model. It is calculated as the Coef. ( $z_{\alpha/2}$ ) \*(Std.Err.), where  $z_{\alpha/2}$  is a critical value on the standard normal distribution. The CI is equivalent to the z test statistic: if the CI includes zero, we’d

fail to reject the null hypothesis that a particular regression coefficient is zero given the other predictors are in the model. See Table: 3.4

Table: 3.5

Test of Parallel Lines <sup>a</sup>				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	93.241			
General	33.895	59.347	6	.000
The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.				
a. Link function: Logit.				

In the General column, SPSS tests the proportional odds assumption. This is commonly referred to as the test of parallel lines because the null hypothesis states that the slope coefficients in the model are the same across response categories (and lines of the same slope are parallel). Since the ordinal logit model estimates one equation over all levels of the response variable (as compared to the multinomial logit model, which models, assuming how did you finance your house is our referent level, an equation for self-built versus housing finance, and an equation for those not applicable versus housing finance), the test for proportional odds tests whether our one-equation model is valid. If we were to reject the null hypothesis based on the significance of the Chi-Square statistic, we would conclude that ordinal logit coefficients are not equal across the levels of the outcome, and we would fit a less restrictive model (i.e., multinomial logit model). If we fail to reject the null hypothesis, we conclude that the assumption holds. For our model, the proportional odds assumption appears not to have held because the significance of our Chi-Square statistic is .000 > .05. See table: 3.5

#### IV. DISCUSSIONS

Personality of a consumer is one of the driving factors the influences consumer behaviour (Gunasekara, 2019). The personality of individuals can mirror a person’s distinctive features that define and influence a person’s behaviour towards a particular goods and services. A person’s personality reflects his views on items which can determine his purchasing behaviour pattern and this varies from person to person (Kotler & Armstrong, 2007, pp 171, 172.).

Economic circumstances is one the driving factors of consumer decision making which affects consumer behaviour (Gunasekara, 2019). Many consumers may dream of buying a lot of things but their economic situation decide what product or service they can acquire. The economic situation refers to the income, savings of individuals and interest rates. Senior public sector workers economic circumstance varies from their juniors.

To test the second hypothesis whether the position of public sector workers has no effect on their choice of housing demand finance, the alternate hypothesis was tested and it was found that the position held by a public sector worker does not affect his choice of demand housing finance hence does not contribute to the model. Therefore, we accept the null hypothesis as the position of public sector workers have no effect on their choice of demand hosing finance.

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## PUBLICATIONS

The Effect of Marital Status and Gender on the Demand Housing Finance Choice of Public Sector Workers in Ghana - Dr. Isaac Okpoti Nai - *IJFMR* Volume 6, Issue 3, 2024.

The Impact of a Change in Government Policy on the Infant Demand Housing Finance Loan Schemes in Ghana - Dr. Isaac Okpoti Nai - *TIJER* Volume 11, Issue 6, 2024.

Accessibility of Demand Housing Finance loan by Public Sector Workers in Ghana; the Income challenge. Dr. Isaac Okpoti Nai - *IJIRD* Vol 13 Issue 6, 2024

A Study of Housing Demand Finance in Ghana: Public Sector Workers Perspective. – Thesis, Isaac O. Nai, British Library, 2024

## PEER REVIEW

Reviewer - *Journal of Emerging Technologies and Innovative Research*  
Editor - *Journal of Strategic Management*