

Article

Evaluation of House Rent Prices and Their Affordability in Port Moresby, Papua New Guinea

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Abstract: Access to affordable housing has been a long-standing issue for households in most cities. This paper reports on a study of house rent prices in Port Moresby, factors influencing them, and affordability of the prices. Data was obtained from houses that were advertised for rent in Port Moresby for a period of 13 months and were analysed using the ordinary least squares (OLS) regression model. The results show that monthly house rent prices range from 2357 to 34,286 Papua New Guinea Kina (PGK), or 714 to 10,389 U.S. dollars (USD), and the median price was 7286 PGK (2208 USD). Houses located in the central business district had the highest median house rent price, whereas low-income areas had the lowest rent price. By dividing the median house rent price by gross household income, the housing affordability index was 3.4. House rent price was influenced by factors such as number of bedrooms and location. To make house rent prices more affordable for Port Moresby residents, it is necessary to supply more houses for rent relative to demand, especially in low-income areas. Relevant governmental agencies should put more effort toward unlocking more customarily-owned land for housing development and toward facilitating the private sector to construct more low-cost houses for rent, which are affordable for low to middle income households. This has the potential of improving Port Moresby residents' access to affordable houses for rent. The findings could assist urban development managers and planners in allocating resources for housing by considering housing demand, supply, and house rent prices.

Keywords: housing affordability; housing policy; house rent price; location; urban development

1. Introduction

Housing is one of the basic necessities for humans and it accounts for the largest share of the consumer price index [1]. However, providing houses at affordable rent prices has been a long-standing issue for governments of most countries [2–5]. For this reason, house rent prices and their affordability have continued to be an important policy issue [6–8]. Expenditures associated with house rents has forced some households to reduce their consumption of other necessities and consequently lowered their standard of living [9]. A house is a multidimensional good, which consists of a bundle of attributes that differ in quantity and quality and influence house rent price [10]. This includes physical attributes such as number of rooms, lot size, and housing type; community attributes such as population and characteristics of neighbourhood; and accessibility to the place of work. People's preferences for these attributes differ, and they often influence the amount of money that consumers would be willing to pay for house rent [11]. House rent price is determined by the price at which a house owner is willing to give out a house unit to a potential tenant for rent and the price tenant is willing to pay, i.e., equilibrium house rent price [12]. In other words, the house that was advertised for rent by a house owner meets the preferences and demand of a potential tenant. House owners often face a trade-off between the time it takes to rent a house and the price for which it is rented [13]. If a house owner sets too high a house rent price, he or she might discourage potential tenants and risk having

the house unit on the house rent market for a long period. Furthermore, if the house rent price is too low, the house owner may give out the house for rent quickly at the cost of giving out the house for a lesser house rent price than could have been received with a better market exposure. For the house rent market to function properly, there is a need for house owners to provide house units that meets the preferences of potential tenants.

Several factors have been identified that could influence house rent price. These include a shortage in supply of houses for rent relative to demand, which increases house rent price [4]. In addition, low interest rates increase investment in housing and, consequently, increases supply of houses for rent in a housing market, which pushes down house rent prices [14]. Other factors include house quality, and location. For example, houses made up of high quality materials and located in the city centre attract higher house rent prices than those made up of inferior materials and found in low-income areas [15]. Houses in an area that have trunk infrastructure such as clean portable piped-borne water and electric power will attract a higher house rent price than houses in areas devoid of the infrastructure [15]. An increase in the human population of an area triggers an increased demand for houses for rent relative to supply, which contributes to increased house rent prices [16]. Government housing policy that promotes supply of houses and regulation of house rent prices, stabilizes the prices [9,17].

Shortages in the supply of land push up the costs of building houses and, consequently, push the house rent price up [18,19]. Shortages of skilled personnel, high cost of building materials, and high land allocation costs increase the cost of constructing houses, which push house rent price up [5]. Houses located in areas closer to the city centre attract higher house rent prices than houses further away [20]. Easy access to credit facilities for constructing houses increases the supply of houses relative to demand, which lowers house rent price in an area [21]. In addition, housing rent price is also influenced by industrial production, which increases supply of low-cost houses at a reduced house rent [22]. An increase in the rate of employment of an area might trigger an increase in demand for houses for rent relative to supply, which pushes up house rent prices [23]. House characteristics such as number of toilets, size of the house unit, and availability of balcony influence house rent price [24].

Others factors affecting house rent price are mortgage market features, which could encourage or discourage investment in the housing sector. If the market encourages investment in the housing sector, this will result in an increase in the supply of houses for rent and, consequently, reduces house rent price [25]. Larger rooms and more rooms lead to higher house rent prices [26]. An increase in household income level in an area increases willingness to pay for house rent, which pushes up house rent price [27]. An increase in demand for houses for rent from other countries, such as demand for houses for tourism, could increase house rent price [28]. Housing rent prices often mimic the trend of the economic cycle of a country. During boom periods (economic growth), house rent prices are expected to rise, whereas they fall during the bust period, i.e., economic decline [29]. These factors are important for designing an effective housing policy and making informed decisions on providing houses that have affordable rent prices in urban areas.

Port Moresby is the capital of Papua New Guinea (PNG), the largest city, and one of the fastest growing cities in the country. In addition, it has the largest housing market in PNG. Many people have continued to migrate from rural areas to Port Moresby in search of jobs and other opportunities to better their lives. As more people make the city their home, the social, economic, and environmental challenges associated with housing need to be addressed. For this reason, there is a need for developing an efficient and operational framework for the house rent market in Port Moresby to achieve sustainable housing and urban development. This study contributes to this filling this need. The findings could assist policy-makers and urban development managers in designing a more acceptable sustainable housing strategy that meets societal preferences and demand. The Independent Consumer and Competition Commission (ICCC) has been advocating for the development of a competitive real estate and property market in PNG [30]. However, the development of an informal house rent market has continued to change the landscape of Port Moresby [31]. In an attempt to address the housing problems in major cities of PNG, several initiatives that have the potential to promote affordable house rent

prices by supplying more houses were introduced by the PNG government. The initiatives include the Land and Affordable Housing Program, Land Development Program, First Home Ownership Scheme, Duran Farm Housing Project, and Gerehu Stage 3B. Several large scale private property developers such as EDAI Town Housing Development and Glory Group have emerged in and around Port Moresby.

In Port Moresby, the state-owned land, which is often preferred by property developers due to the fact that it is linked to secure tenure and low transaction costs, is almost exhausted. For this reason, property developers are shifting their attention from state-owned land to customarily-owned land. However, it is often difficult to access the customarily-owned land for development, due to insecurity of tenure and high transaction costs associated with it. Furthermore, development projects such as the PNG liquefied natural gas project attracted people from different parts of the country and from abroad to Port Moresby, which increased human population in the city and, consequently, increased housing demand. This resulted in an increase in house rent prices, which most low to middle-income households in the city might not be able to afford. The inability of these groups of households to afford house rent prices will affect their welfare, because they might find it difficult to afford other necessities such as nutritious food and clothing. To cope with this situation, some households have taken steps that have the potential to generate conflict situations and public health problems. For example, there are cases where several households live in the same three-bedroom apartment where they use the same toilet and bathroom. As more people move to Port Moresby, it is necessary to develop an affordable housing strategy that promotes house rent prices that most residents of the city will be able to pay for and at the same time afford other necessities.

The aim of this study was to examine house rent prices in Port Moresby, factors influencing them, and whether residents can afford the prices. Potential urban development strategies for making house rent prices more affordable for residents of the city were explored. It is hoped that findings from this study will contribute to urban development planning and to policy discussions related to developing strategies for making house rent prices more affordable to Port Moresby residents. This has the potential of contributing to housing policy that incorporates the strategy for reducing house rent prices aimed at improving the current housing affordability level in Port Moresby and potentially other major cities in PNG.

2. Material and Methods

2.1. The Study Area

As Port Moresby is the capital of PNG and is undergoing an economic boom, the city continues to attract people from different parts of the country and from abroad, who come to the city in search of jobs. This contributes towards increasing the population of Port Moresby. For example, in 2011, the city population was 364,125 people, whereas it was approximately 400,000 people in 2015 [32,33]. Of the land in Port Moresby, 60% belongs to the state and 40% is customarily-owned. Private property developers often prefer investing in state-owned land, because it is associated with secure title and low transaction costs. However, the state land is almost exhausted, and attention has shifted to customary land, which developers are often reluctant to invest in because of in-secure tenure, which is often associated with high transaction costs. Various initiatives such as the National Land Development Program (NLDP) have been introduced by the PNG government for promoting access to customary land. The NLDP established processes and systems for accessing customary land and recommended the establishment of an entity whose activities would focus primarily on the administration of customary land. For this reason, the Customary Land Development Office was established by the National Executive Council (NEC) on 16 February 2016 [34]. However, activities of some interest groups who were against the positive development led to the rescinding of the NEC decision and the office was abolished the same year. This led to an upsurge of an informal house rent market in Port Moresby. The houses are often found in areas where trunk infrastructure such as clean

portable-piped borne-water, electric power, and sewerage are lacking [35]. Coupled with the problems associated with inaccessibility of secure land for development, most house building materials are imported from abroad, and there are shortages of skilled labour and equipment. This contributes to the cost of constructing houses and, consequently, the house rent prices [36]. The state also contributes toward the provision of houses for rent through the National Housing Corporation (NHC) and National Housing Estate Limited (NHEL). These state-owned entities are theoretically involved in the development and supply of houses for rent [37]. There are 15 suburbs in Port Moresby:

Badili, Boroko, and Erima,
8 Mile, 5 Mile, and Gerehu,
Gordons, Hohola, and Korobosea,
9 Mile, Sabama, and 6 Mile,
Tokarara, Town (also known as Downtown) and Waigani.

For a more detailed description of Port Moresby, see Endekra et al. [38].

2.2. Data Collection and Statistical Analysis

The data were obtained from houses that were advertised for rent on the Homes and Property pages of *The National* newspaper. The advertisements were reviewed and the attributes of the houses and prices were registered on an Excel spreadsheet for a period of 13 months (March 2015 to March 2016). The house attributes that were collected include location of the house, number of bedrooms, and house type. Other attributes included house rent price, date that the advertisement was placed, and the name of the real estate agent that paid for the advertisement. The data were first analysed using simple average, median, and simple percentages, which focused primarily on differences between rent prices in relation to location, house type, and number of bedrooms. Secondly, the ordinary least squares (OLS) regression model was used to examine factors influencing rent price for houses in Port Moresby.

The Econometric Model

One of the Gauss-Markov assumptions is that the error terms in OLS have the same variance, i.e., homoscedasticity [39]. To explore whether the OLS regression model that was used in this study meets this assumption, the Breusch-Pagan test was conducted [40]. The test statistic was 186.71, and the critical value of chi-squared at 6 degrees of freedom at 1% statistical significance level was 16.81. The null hypothesis of homoscedasticity was rejected. This indicates that the error terms of the OLS model do not have equal variance, i.e., it is heteroscedastic. To correct for the heteroscedasticity, the log-linear form of OLS was applied. This involves the transformation of continuous variables in the model to log form. For this reason, the house rent price and number of bedrooms variables were converted to logarithm using the LIMDEP statistical package [41]. For the case of the Breusch-Pagan test for the log-linear form, the test statistic was 69.77, and the critical value of chi-squared at 6 degrees of freedom at 1% level was 16.81. This indicates that the log-linear form decreased the heteroscedasticity by 63%. The result from logarithmic transformation was corrected for heteroscedasticity using the White's heteroscedastically consistent variance estimator [40]. To explore multicollinearity in the independent variables, the variance inflation factor (VIF) of the variables was estimated. The VIF of each of the included independent variables did not exceed 2.8. This indicates that multicollinearity is not a serious problem in the estimated model, see Chatterjee and Price [42]. The valuation function for OLS was estimated as in Equation (1):

$$\text{Log}(\text{Rent}P) = \alpha + \beta_1 \text{TYPE}_h + \beta_2 \text{Log}(\text{Bed}R) + \beta_3 \text{CBD} + \beta_4 \text{INCO}_m + \beta_5 \text{EN}_{Sub} + \beta_6 \text{INCO}_l + \varepsilon \quad (1)$$

where α is constant, β is a vector of parameters to be estimated, $\text{Rent}P$ is house rent price, TYPE_h is house type, $\text{Bed}R$ is number of bedrooms, CBD is central business district, INCO_m is a historically

middle-income area, EN_{sub} is 8 Mile and 9 Mile suburbs, $INCO_l$ is a historically low-income area, and ε is the error term, which is independent and identically distributed [40].

3. Results

Of the 615 houses that were advertised for rent, approximately 96% (591) was useable for analysis. Four percent of the advertised houses were excluded because the houses were either advertised jointly or prices were not included in the advertisement. For this reason, the analyses were based on 591 observations. Of the useable observations, 77% were apartments and 23% were standalone houses. The results show that Boroko had the highest number of apartments (24%) for rent, whereas 9 Mile, Sabama, and 6 Mile had the lowest (0.2% each). For the case of standalone houses, Waigani had the highest (15%) and Erima had the lowest (1.4%) availability, see Figure 1.

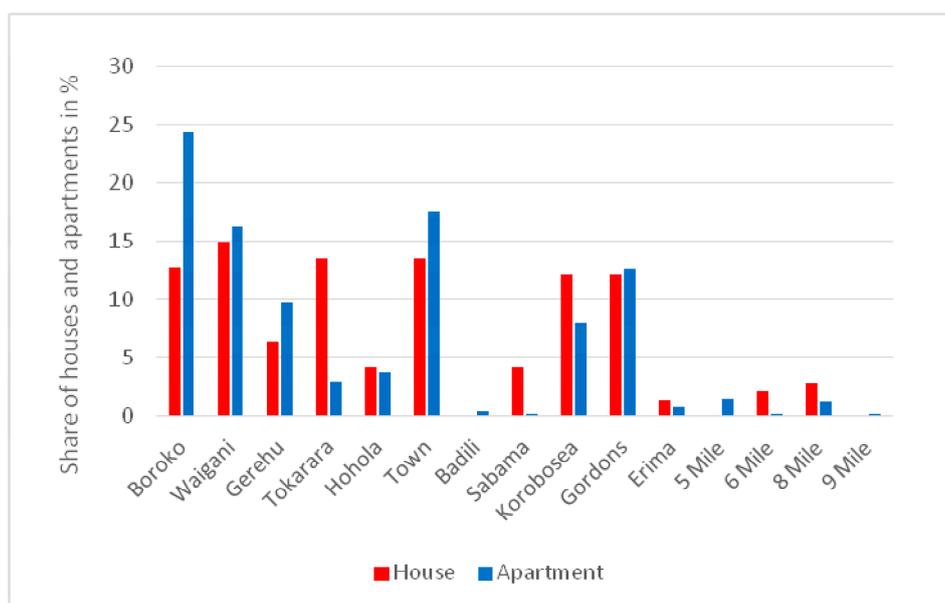


Figure 1. Houses that were advertised for rent in the *National* newspaper in Port Moresby.

The results show that weekly house rent price range from 550 to 8000 Papua New Guinea Kina (PGK) (Table 1). The median weekly rent price for all advertised houses was 1700 PGK.

Table 1. Median weekly house rent prices.

Suburb	All Houses	S. House	Apartment	3-Bedroom
	(PGK)	(PGK)	(PGK)	(PGK)
Boroko	2100	2250	2100	2500
8 Mile	1150	1100	1150	1100
5 Mile	1100	-	1100	1500
Gerehu	1300	1200	1300	1200
Gordons	1500	1500	1500	2150
Hohola	1000	1000	1000	1000
Korobosea	2000	2500	2000	2000
Sabama	2000	2000	-	2000
6 Mile	925	950	800	950
Tokarara	1200	1200	1200	1000
Town	3500	5000	3500	3500
Waigani	1300	1800	1200	1500

Notes: S. House is standalone house, 1 U.S. dollar (USD) is 3.3 Papua New Guinea Kina (PGK).

Town had the highest median house rent price for apartments and standalone houses (3500 PGK; 5000 PGK), whereas 6 Mile had the lowest (800 PGK; 950 PGK). House rent price for 3-bedroom houses ranged from 650 to 7000 PGK. Town had the highest median weekly price for 3-bedroom (3500 PGK), whereas 6 Mile had the lowest (950 PGK). Badili, Erima, and 9 Mile were excluded from this analysis because they had only a few observations, which might not be a true representative of house rent prices of the suburbs.

The results show that all the houses that were advertised for rent had an average of three rooms, and 16% of the houses were found in Town suburb (Table 2), which is also the central business district (CBD). The historically low-income areas had more houses for rent than did the historically middle-income areas.

Table 2. Description of variables used in statistical analysis.

Variable	Description	Mean	%
<i>RentP</i>	Weekly house rent prices in PGK (USD 1 = 3.3 PGK)	2159	
<i>TYPE_h</i>	Type of house: Apartment = 1; standalone = 0	-	77
<i>BedR</i>	Number of bedrooms present in the advertised house	2.81	-
<i>CBD</i>	Advertised house is located in central business district Yes = 1, No = 0	-	16
<i>INCO_m</i>	House is located in historically medium-income (Boroko and Korobosea) Yes = 1, No = 0	-	29
<i>EN_{sub}</i>	House is located in 8 Mile or 9 Mile: Yes = 1, No = 0	-	2
<i>INCO_l</i>	House is located in historically low-income area (Gerehu, Tokarara, and Hohola) Yes = 1, No = 0	-	30

The OLS regression model was estimated to account for factors that might have influenced house rent price (Table 3). The results show that the coefficients associated with number of bedrooms, CBD, and historically middle-income areas had positive and statistically significant effects. The coefficients associated with 8 Mile and 9 Mile suburbs and historically low-income areas had negative and statistically significant effects. Coefficient associated with house type had no statistical significant effect.

Table 3. Ordinary least squares (OLS) results for factors influencing house rent price.

Variable	Coefficient	Std. Error	t-Value
Constant	6.66	0.08	85.95 ***
<i>TYPE_h</i>	0.01	0.05	0.16
<i>Log(BedR)</i>	0.72	0.006	11.93 ***
<i>CBD</i>	1.12	0.05	18.71 ***
<i>INCO_m</i>	0.22	0.04	5.15 ***
<i>EN_{sub}</i>	-0.21	0.10	-2.02 *
<i>NCO_l</i>	-0.36	0.05	-7.26 ***
R ²	0.44		
Adjusted R ²	0.43		
F-value	75.36 ***		
No. of observations	591		

Notes: * and *** represent 5% and 1% levels of statistical significance, respectively. House rent price is the dependent variable.

In terms of elasticity, an increase in number of bedrooms by one per cent was associated with an increase in house rent price by 0.72%. The presence of CBD was associated with an increase in house rent price by 112%. The presence of historically middle-income area was associated with an increase in rent price by 22%. The presence of 8 Mile and 9 Mile and the presence of the historically low-income area were associated with a decrease in house rent price by 21% and 36%, respectively.

The gross monthly salary for public service workers ranged from 691 to 12,328 PGK (209 to 3736 USD) with a median of 2115 PGK (641 USD), see Table 4. The lowest weekly house rent price was 550 PGK, which corresponds to 2357 PGK monthly. This shows that public service workers who belong to the median salary scale (pay scale (PS) 10 and PS 11) cannot afford house rent

price in Port Moresby. Using the median multiple indicator, which rates house rent price affordability by dividing the median house rent price by gross household income, the house rent price affordability index for public service workers in Port Moresby is 3.4. Using 30% of a household income as a measure of house rent price affordability shows that only workers that belong to PS categories 18 to 20 can afford the lowest house rent price in Port Moresby.

Table 4. Salary scale in relation to annual salary for public service workers.

Salary Scale	Annual Salary	Monthly
	(PGK)	Salary (PGK)
PS01	8290	691
PS02	8808	734
PS03	9724	810
PS04	11,370	945
PS05	12,617	1051
PS06	14,505	1209
PS07	16,229	1352
PS08	18,192	1516
PS09	21,051	1754
PS10	23,782	1982
PS11	26,989	2249
PS12	30,907	2576
PS13	33,544	2795
PS14	36,285	3024
PS15	42,640	3553
PS16	46,763	3897
PS17	61,132	5094
PS18	94,327	7861
PS19	107,577	8965
PS20	147,937	12,328

Notes: PS is pay scale. The annual salary is the median salary point within each scale, and it includes base salary and allowances. Income tax is excluded. Salary is adopted from [43]. 1 USD = 3.3 PGK.

4. Discussion and Policy Lessons

The findings from this study show that house rent prices in Port Moresby are strongly linked to location. A segment of the city that is historically a high-income area was linked to the highest house rent price, whereas a historically low-income area had the lowest rent price. This suggests that the history of a neighbourhood influences the house rent price for houses found there. The findings are supported by findings from previously published papers such as Leung et al. [44], who found in a general equilibrium model that house price and consequently house rent price and affordability are determined by location and accessibility to trunk infrastructure. In a Malaysian study of developers' perspectives on housing price, Kamal et al. [16] reported that location is necessary in determining house rent price. This suggests the importance of considering location in urban development planning, especially in allocating land for residential areas and in providing trunk infrastructure and services. If the aim is to make house rent prices in Port Moresby affordable for most residents, it is important for urban development managers and planners to consider the demand and supply of houses in various segments of the city and their rent prices. It is also necessary to consider preferences of Port Moresby residents in the design of affordable house rent strategy. For example, more houses for rent could be built in areas further from the CBD. However, it is important to note that some residents of the areas might be engaged in travelling to and from the CBD for work and other businesses, which increases costs associated with house rent price. For this reason, it is necessary for urban development managers to consider providing necessary infrastructure and services in all built areas to reduce travel costs. In addition, supplying low-cost houses for rent only in areas located long distances from the CBD could discriminate against low-income households, because most of the households could only afford

house rents in that areas. This suggests the importance of providing pockets of low-cost houses for rent in historically middle-income areas and the CBD, as well as pockets of executive houses for rent in historically low-income areas. The mix would contribute toward highlighting the heterogeneity of Port Moresby residents.

More houses were advertised for rent in historically middle to high-income areas than in low-income areas. Property developers are often motivated to build houses and consequently to rent houses in areas that have necessary trunk infrastructure and services, because it often costs less compared to building houses for rent in areas devoid of infrastructure. In Port Moresby, historically middle-income areas and the CBD are supplied with necessary infrastructure and services, as well as have less security concerns. This is due to the fact that the areas are where top government officials and expatriates live. For this reason, developers will prefer to build houses for rent there. In addition, Waigani, which used to be a low-income area, is becoming more important in the supply of houses for rent. This could be due to the fact that some governmental and non-governmental offices, as well as shopping malls and hotels, are springing up there, which contributes towards increased house rent price. As people often prefer living in locations closer to their workplace and markets, this could be a possible reason that more houses are being built in Waigani in response to demand. The findings are in line with that of Hanushek et al. [45], who found in a general equilibrium model of workplace choice and residential choice that welfare of households could fall when they are restricted from choice of locations where they live in relation to workplaces. The findings are also supported by Nao and Ezebilo [46], who found that, it is necessary to introduce trunk infrastructure before building houses to avoid loss of money in terms of house rent or mortgage. The findings indicate the availability of trunk infrastructure in an area has the potential of increasing house rent prices for houses found there.

The results reveal that most Port Moresby residents might find it difficult to afford rent price for houses found in the city. Only top level public service workers have the financial capacity for house rent prices. As low and middle level workers' salaries are not enough to pay house rent prices, it indicates that most public service workers cannot afford house rent price in Port Moresby. Furthermore, a median multiple indicator revealed that, house rent prices in Port Moresby is seriously unaffordable for public service workers. For this reason, it is common to see different households sharing a housing unit and the facilities in the house, which is often made for one household. This often has adverse effects on the welfare the households. For example, school aged children might find it difficult to study at home and household's privacy is compromised. To make house rent price affordable for public service workers and other Port Moresby residents in general, it is necessary for governmental agencies such as the NHC to facilitate the private sector in constructing more low-costs houses for rent, especially in low-income areas. Housing voucher schemes could also be introduced to assist low-income households to access affordable housing, see Leung et al. [44]. This entails the issuance of a household voucher by a governmental agency; the household finds a suitable house for rent, and the landlord is paid a subsidy directly by the agency. The household pays the difference between the actual house rent price and the subsidy. As low-income households are involved in choosing houses for rent that meet the requirements of the housing voucher scheme, they would not be limited to only renting houses located in low-income areas. This suggests that the scheme has the potential of meeting household's preferences. In addition, houses for rent earmarked for the housing voucher scheme must meet minimum quality standards, which should be determined by governmental agencies such as the NHC. This could serve as a potential strategy to see that low-income households have access to quality and houses at affordable rent price. As the housing subsidy is paid directly to the landlord by the governmental agency, it has the potential of reducing the tendency for a household to use the house rent subsidy for other purposes.

The findings show that an increase in number of bedrooms is strongly linked to an increase in house rent price. This is supported by previous published papers such as Salim [27] who found in a Turkish study that an increase in the number of rooms increases housing price and consequently house rent price. A possible reason is that, as the number of bedrooms increases, the floor size

is likely to increase, which potentially increases the house rent price. An increase in the number bedrooms also indicates that more people who live in the house could have their own privacy, which is an added value to the house. This suggests that in accounting for house rent price, planners and urban development managers should consider the number of bedrooms, especially in the course of developing low-cost houses for rent with the aim of increasing the housing affordability level among Port Moresby residents.

Central business district (CBD) is often an area associated with commercial activities, workplaces, and availability of trunk infrastructure and services, which often increases demand for houses for rent there. For this reason, CBD is likely to attract a higher house rent price compared to other segments of the city. Findings from this study support this premise, which is also in line with findings from previously published papers in the literature such as Mulliner et al. [15] and Kamal et al. [16]. The authors of these papers found that location and access to services influence house price and consequently house rent prices. It is important to note that commercial activities, which are often found in the CBD, have the potential to contribute towards pushing up house rent prices. For this reason, if the aim is to promote affordable house rent prices for Port Moresby residents, urban development managers and land use planners could focus on providing commercial houses such as shops and workplaces in the CBD and residential houses for rent in other segments of the city. It is necessary to consider decongesting the CBD by moving some workplaces and businesses from the CBD to other segments of Port Moresby. This has the potential of developing underdeveloped segments of the city, redistributing traffic in the city, as well as reducing house rent prices in the CBD.

The historically middle-income areas of Port Moresby such as Boroko and Korobosea have been residential areas where top government officials and expatriates live, which should be one of the reasons it is linked to increased house rent prices. This is because the areas are well supplied with all necessary trunk infrastructure and services. For example, there are lot of schools in Boroko, and the general post office and police station are also found there. Its proximity to the Port Moresby international airport and the CBD, and fewer security concerns makes Boroko and Korobosea an area of choice for most city residents, which might have influenced the house rent prices. It is also important to note that the Port Moresby general hospital and a stadium are found in Korobosea and Boroko and those areas have good road networks. These could be the possible reasons that the findings from this study revealed that the presence of middle-income areas increases house rent price. It is necessary to consider expanding the middle-income area toward the nearby historically low-income areas, which could promote development of less developed areas of the city, as well as might contribute to reducing house rent prices in the middle-income area.

Houses located in areas that are long distances from the CBD and have limited trunk infrastructure would likely attract a lower house rent price because only a few people might prefer to live there. The findings from this study support this assertion. This might be a possible reason that the presence of historically low-income areas was strongly linked to a decrease in house rent price. The presence of 8 Mile and 9 Mile suburbs also follow a similar trend as that of low-income areas. Most of these areas lack trunk infrastructure and services. Security concerns are often higher in 8 Mile and 9 Mile compared to middle-income areas and the CBD, which might be a possible reason for the lower house rent prices in these areas. To provide houses associated with affordable rent prices for Port Moresby residents, more houses could be built in low-income areas, such as 8 Mile and 9 Mile suburbs. This should be accompanied with the provision of necessary trunk infrastructure and services in these areas. It is also necessary to address the security concerns in these areas. The construction of more houses in historically low-income areas, and emerging areas such as 8 Mile and 9 Mile, has the potential of lowering house rent prices in these areas. However, it is important to note that residents of low-income areas might incur costs associated with travelling to and from the CBD for work and other business activities, which increases costs associated with renting a house. This suggests the need for urban development managers and planners to consider location and accessibility to trunk infrastructure and services in decisions regarding the supply of houses that meet affordable house rent prices.

In regards to the methodology, it is important to note that the data used for this study were obtained from newspapers. This indicates that houses that were not advertised in the newspapers were not captured in the analysis. For this reason, the monetary value reported in this study might not reflect the monetary value of all transactions related to house rentals that took place in Port Moresby during the period of the study. Like in most developing countries, the housing market in PNG and Port Moresby in particular is not well organised. There is a huge informal house rental market transactions in the city for which it is difficult to account [31]. In addition, other sources in which house rent price data could be accessed, such as real estate agencies, often find it difficult to provide such data. For this reason, the newspaper was used as data source. Numerous factors such as lot size, house age, maintenance history, and distance to the city centre have been identified as influencing house rent price. However, these factors were not included in the newspaper advertisements and could not be explored in this study.

Regarding information on houses that were advertised for rent by real estate agents, it is necessary for the agents to improve information related to properties being advertised. Currently, information asymmetry exists in most of the houses that were advertised for rent. For example, information regarding floor space size, size of rooms, maintenance history of the house, and age of the house were not often included in the advertisements, which makes it difficult for potential tenants to know whether the houses being offered to them for rent matches their preferences. To move the house rent market in Port Moresby forward, all relevant information related to the houses being advertised for rent must be included in the advertisement. Correct information on houses offered to potential tenants for rent will contribute towards providing proper valuation for the houses.

If the aim of the government is to provide houses for rent at affordable levels for Port Moresby residents, it is necessary to facilitate the private sector in supplying more houses for rent in low-income areas such as Gerehu, Hohola, and Tokarara, as well as in areas located long distances from the CBD such as 8 Mile and 9 Mile as advocated by Ezebilo [47]. However, the supply of more houses for rent to these areas must be accompanied with the introduction of necessary trunk infrastructure and services. It is also necessary to increase the capacity of electricity, water supply, and sewerage in the areas to meet demand. Incentives and facilities that could attract more investments to areas such as 8 Mile and 9 Mile could be introduced so that residents could be more comfortable living there. This has the potential of decongesting areas in and around the CBD, which could contribute towards reducing house rent prices there. The supply of more houses for rent to low-income areas and in areas such as 8 Mile and 9 Mile has the potential of providing houses for rent at affordable prices, and more jobs might be created for the teeming population.

Policy Lessons for PNG Government

There are several housing policy lessons that could be drawn from the findings of this study that could be useful for urban development managers and land use planners in making informed decisions that could promote access to houses with affordable rent prices in major cities of PNG, including Port Moresby. The policy lessons are:

- Low to middle-income public service workers cannot afford house rent prices in Port Moresby. House rent prices in Port Moresby are beyond the reach of low-income and middle-income workers, which appear to constitute the greater percentage of workers in the city. This might have adverse effects on the welfare of the workers' households. To increase house rent price affordability level for these household groups, governmental agencies such as NHC could facilitate private sectors to construct more low-cost houses for rent in historically low-income areas, as well as 8 Mile and 9 Mile suburbs. The private sector could be motivated to supply low-cost houses for rent by providing them tax credits.
- Land is one of the most important factors of production that contributes to cost of constructing a house and consequently house rent prices. Access to secure land has been a long-standing issue that limits the housing industry in PNG. Attention has shifted from state-owned land often

cherished by property developers to customarily-owned land, because the state land is almost exhausted [48]. It is necessary for the state to put more effort in developing an effective strategy for unlocking more secure customary land to supplement the remaining state-owned land. In the short-term, it is necessary to promote the construction of high-rise multi-family house units for rent at affordable prices. This will help maximise the use of the available land resources. In the long-term, access to secure customary land could be improved by invoking Section 10 of the PNG Land Act 1996 as advocated by Dr Charles Yala, the former Director of the PNG National Research Institute. This involves landowners leasing their land to the state through an urban development lease (UDL) processed by the Department of Lands and Physical Planning. The UDL (land title) is issued to the landowners without advertising it. This has the potential of releasing more lands for constructing more houses for rent.

- Real estate agents do not often disclose some important information required by potential tenants for proper valuation of houses that are advertised for rent. To protect the interest of tenants, it is necessary for governmental agencies such as ICCC to develop guidelines for advertising houses for rent. The advertisement of houses for rent must be monitored by the agency to see that real estate agents adhere to the guidelines. It is also necessary for the NHC to monitor the quality of houses offered for rent.
- Construction of more houses for rent in low-income areas should be accompanied with the establishment of trunk infrastructure there so that people could be attracted to move to those areas. The state attempted to provide more houses and consequently houses for rent at 8 Mile through the Duran Farm Housing project, as well as in Gerehu through the Stage 3B housing project, but it has not been successful [47]. Basic trunk infrastructure was not introduced to the areas, which makes it difficult for completed houses to be occupied, as reported by Nao and Ezebilo [45]. For housing projects for providing houses for rent to be more effective in PNG, governmental agencies such as NHC must focus at playing facilitating roles, whereas private sectors must focus on building houses for rent as advocated by Webster et al. [37]. In addition, Ezebilo and Hamago [36] found that private property developers have the potential of financing the development of trunk infrastructure. However, the state will need to compensate the developers through schemes such as tax credits, which should contribute to reducing house rent prices in urban areas.
- Areas in and around CBD are becoming congested, and this has led to the high house rent prices due to an increase in demand for houses there relative to supply. For this reason, there is a need to renew the areas by providing more houses for rent in the fringes of Port Moresby. This might be used for decongesting the city, which has the potential of reducing house rent prices in the CBD.

5. Conclusions

This study provides insight into house rent prices in Port Moresby, factors influencing them, and affordability of the prices. The findings revealed that house rent price is strongly linked to the number of bedrooms and the location of a house. Houses located in areas where basic trunk infrastructure and services are lacking attract the lowest rent price, whereas houses located in and around the CBD had a higher rent price. Most public service workers cannot afford house rent prices in Port Moresby.

Some policy related lessons that could be drawn from findings of this study include the need to provide more low-cost houses for rent in historically low-income areas and areas long distances from the CBD, which low-middle income households could afford. More high-rise multi-family low-cost house units for rent should be constructed to maximise use of the available land, which is similar to the model Singapore have used for limited land. There is a need to unlock more secure customary land for housing development to lower the cost of constructing houses, which could provide opportunities for people to construct more houses for rent, which could push-down house rent prices at affordable level for low income households. There is a need for more transparency regarding the information on houses advertised for rent. It is necessary to provide more information which could provide potential tenants with a better understanding of the valuation of the houses advertised for rent. To determine

the necessary information required for advertising houses for rent, PNG could draw lessons from Sweden, where most information on characteristics of houses advertised for rent is often supplied.

If the aim is to increase the ability of Port Moresby residents to afford house rent prices, there is a need to build more houses for rent in low-income areas. It is important to reduce transport costs from these areas to the CBD where some people that live in low-income areas work by improving road networks. This could encourage people to live in low-income areas at a lower house rent price while they work in and around the CBD. The findings from this study contribute to potential strategies for increasing households' affordability level of house rent prices and the need for disclosing necessary information related to houses advertised for rent. This should assist urban development managers and land use planners in making informed decisions by considering house rent prices in Port Moresby.

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