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Constructing Housing Affordability Index in Malaysia

(*Membina Indeks Kemampuan Perumahan di Malaysia)*

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ABSTRACT

This study aims to construct a housing affordability index that incorporates the financial elements namely the household income, house prices and housing lending rate. It further measure the level of housing affordability by income classifications and by states. This study also examines the extent of unaffordability among the lowest income group. We use the National Association of Realtors (NAR)-based housing affordability index that requires three clusters of data namely, the household gross income, house price, and housing loans rate. We use Malaysian data from the Department of Statistics, National Property Information Centre, and Central Bank of Malaysia. The findings show that Melaka has a high level of housing affordability, whilst Sabah had a low level of housing affordability. Meanwhile, the bottom 40 percent (B40) of income group was detected to have very poor home affordability compared to that of middle 40 percent (M40) and top 20 percent (T20) groups in Malaysia. It further capture the level of unaffordability among the B40 segment of the population, which was lacking in previous studies. This study contributes to the literature by incorporating the financial element into the formulation of the index namely, the household income, house price, and loan rate. This is to ensure that the reliability and validity of the formula developed. This research benefits various stakeholders by providing a refined and better housing affordability index that can be utilized as a benchmark for certain levels of housing affordability.

Keywords: Housing affordability; index; bottom 40 percent (B40); middle 40 percent (M40); top 20 percent (T20); NAR Housing Affordability Index

ABSTRAK

Kajian ini bermatlamat untuk membina sebuah Indeks Kemampuan Perumahan yang lebih jitu dengan mengambilkira pendapatan isirumah, harga rumah dan kadar pembiayaan rumah. Ia juga mengukur tingkat kemampuan perumahan mengikut pendapatan, dan negeri. Kajian ini juga memeriksa sejauh mana ketidakmampuan kumpulan berpendapatan paling rendah. Kajian ini menggunakan Indeks Kemampuan Perumahan National Association of Realtors (NAR), yang memerlukan tiga kluster data iaitu pendapatan kasar isirumah median, harga rumah median dan kadar berkesan 35-tahun bagi pembiayaan perumahan. Kajian ini menggunakan data dari Jabatan Statistik, Pusat Maklumat Harta Kebangsaan, dan Bank Negara Malaysia. Dalam kajian ini, negeri Melaka didapati memiliki Indeks Kemampuan Perumahan yang kukuh sebaliknya, negeri Sabah pula menghadapi indeks yang lemah. Sementara itu, kumpulan pendapatan terendah 40 peratus (B40) mengalami kemampuan perumahan yang buruk berbanding kumpulan pendapatan 20 peratus tertinggi (T20) dan 40 peratus sederhana (M40) di Malaysia. Kajian ini juga memaparkan tahap ketidakmampuan perumahan yang dialami oleh kumpulan pendapatan B40, yang jarang dikeutarakan oleh kajian-kajian sebelum ini. Kajian ini menyumbang kepada literatur dengan mengambilkira elemen kewangan ke dalam formulasi indeks iaitu pendapatan isirumah, harga rumah dan kadar pembiayaan perumahan. Ini adalah untuk memastikan kebolehpercayaan formula

yang dibangunkan. Kajian ini memanfaat beberapa pihak yang berkepentingan untuk memiliki indeks yang berinovasi serta boleh digunakan sebagai penanda aras terhadap tahap kemampuan perumahan tertentu

Kata Kunci: Kemampuan perumahan; indeks; kumpulan pendapatan B40; kumpulan pendapatan M40; kumpulan pendapatan T20; Indeks Kemampuan Perumahan NAR
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INTRODUCTION

Housing is a key component of the 2030 Agenda for Sustainable Development and a key driver in reaching several of the Sustainable Development Goals. Adequate and affordable housing has a positive impact on health, education, and economic possibilities. For many families, the process of improving their housing serves as a stepping stone out of poverty (UN-Habitat 2021). Malaysia suffers from a housing affordability issues, with a housing deficit of 4 to 6 units per 1,000 people (Boon & Xin 2018). The term 'housing affordability' typically describes the relationship between housing expenditure (e.g., prices, mortgage payments, or rents) and household income (Construction Industry Development Board Malaysia 2019; Olanrewaju et al. 2016). There are various housing affordability indexes employed to measure the affordability level of purchasers. Among others, the Median Multiple index is the most common index used by many countries to quantify the level of affordability. The term Median Multiple was first developed in 1988 by the United Nations Centre for Human Settlement (UNCHS) and the World Bank under the Housing Indicators Programme and later used in the UN-Habitat Housing Indicators Programme.

Since then, the Median Multiple has been regularly used to compare housing affordability between markets by various organizations, such as the Joint Centre for Housing Studies at Harvard University, the Organization for Economic Cooperation and Development (OECD), the International Monetary Fund (IMF), The Economist, and others (Demographia 2020). The Median Multiple is widely used for evaluating housing affordability, and it can be easily computed by having the median house price divided by the median household income (Akma Musaddad et al. 2022; Jais 2022). Thereafter, the Median Multiple obtains certain scores, which can be categorized as follows:

Following that, the Median Multiple yields specific scores, which are classified into four unique levels. A property market with a Median Multiple scores of 5.1 or above is considered very unaffordable. Housing markets with a Median Multiple scores between 4.1 and 5.0 are considered severely unaffordable. A Median Multiple scores of 3.1 to 4.0 suggests a moderately overpriced housing market. A median multiple of 3.0 or less indicates an affordable housing market (Pinjaman & Kogid 2020).

However, neglecting the financial input in Median Multiple indexes misrepresents the actual level of housing affordability that could be afforded by people. Mortgage finance, according to Taltavull de la Paz and White (2012) should be included in housing models for a variety of reasons. They point out that the majority of home purchases are debt-financed, making mortgage credit vital for successful market demand. Thus, it is highly sensible to develop a housing affordability index that incorporates financial input into the calculation.

There are numerous housing affordability indexes (HAI) developed by researchers, but none of the indexes are accepted as national benchmarks or used in the international realm like the Median Multiple method. This could be attributed to the complexity of the formulation of affordability indexes and the requirement of specific data, which is not available in many countries. So far, in Malaysia, there is no housing affordability index that is constructed and published monthly or annually.

Identifying the gap that exists due to a lack of a standardized housing affordability index, this study aims to construct a Malaysian housing affordability index that incorporates the average lending rate (that represents the interest rate of a housing loan), house prices and the general level of income earned by Malaysians. Further to this objective, the study intends to measure the level of housing affordability by income classifications (B40, M40 and T20) and selected states of Malaysia. This study examines the extent of unaffordability among the B40 population segment. As a result, the findings of this study might be used to develop a 100-point HAI as a baseline to assist B40 people with planning and affordable housing schemes. This study also highlighted Malaysia's least affordable states in terms of home affordability. As a result, the federal government can target plans and projects related to affordable housing in individual states across the country.

In the past literature, there have been some limited studies in Malaysia that developed housing affordability measures. This measure is simply derived from the overall house price over Gross Domestic Product (GDP) (Mohd Yusof et al. 2017; Nasir 2022). The measure is known as ratio, not index. Furthermore, they did not incorporate the financial element into their measure. Comparatively, in this research, three primary elements are incorporated in the formulation of the housing affordability index: the median household gross income, the median house price, and the average loan rate. This effort is to ensure the reliability and validity of the formula developed.

BACKGROUND OF THE STUDY

In Malaysia, Bank Negara Malaysia and Khazanah Institute of Research have been constantly reporting the severity of housing unaffordability due to several reasons, such as mismatches of demand and supply, economic cyclicality, and institutional and cultural factors.

In fact, the housing affordability issue has remained critical in Malaysia even in recent years. According to the box article on 'Demystifying the Affordable Housing Issue in Malaysia' by BNM Annual Report 2016, the Median Multiple index demonstrates the severity of unaffordable issues in Malaysia. Several states, including Perak, Kelantan, Johor, Sabah, and Sarawak, are classified as severely unaffordable, with Median Multiple scores of 5.0 or above. In fact, the entire region of east Malaysia falls under the category of severely unaffordable, which is an alarming level of affordability under the Median Multiple method (Bank Negara Malaysia 2016).

Referring to the Special Report for the Formulation of the National Housing Policy (2018–2025), Rethinking Housing: Between State, Market, and Society, published by Khazanah Research Institute in 2019, there are generally three methods to measure the housing affordability index: Median Multiple (MM), Housing Cost Burden (HCB), and Residual Income (RI) (Construction Industry Development Board Malaysia 2019; Khazanah Research Institute 2019; Muzafar & Kunasekaran 2021; Tan 2021). Among the three methods, the Median Multiple was the most popular, as it was extensively used by researchers in their journal reports. The same Median Multiple method was extensively employed in BNM Box Articles to refer to housing affordability in their regular issues (Tan 2021).

Nevertheless, there is no specific housing affordability index officially used in Malaysia. Many researchers have developed various forms of affordability measurement for home ownership; however, none has been used as a benchmark or standard measurement for housing affordability. Bank Negara Malaysia (BNM) commonly uses the Median Multiple (MM) ratio as an indicator to capture the level of housing affordability in Malaysia in its research articles and scholarly literature.

However, this method omits one of the most important contents of its measurement, which is financial input. The Median Multiple ratio does not incorporate financial elements in their affordability measurement, and this was admitted as a flaw by BNM in their article published about the usage of the Median Multiple method (Bank Negara Malaysia 2016). There was also an article released by Khazanah Research Institute on 'Median Multiple Affordability: Use and considerations' mentioned five important limitations of the Median Multiple indicator (Muzafar & Kunasekaran 2021).

Muzafar and Kunasekaran (2021) primarily stipulated that the Median Multiple indicator assesses housing affordability based on house price and income variations but does not include the role of financing in its calculations (Bank Negara Malaysia 2016; Muzafar & Kunasekaran 2021; Rangel et al. 2017). The Median Multiple is an indicator that assesses market affordability rather than individual household affordability. Thus, it is not an appropriate measure to assess individual household affordability simply because everyone's circumstances are different. Individual household affordability depends on the household's ability to afford mortgage payments without facing a cost burden (Muzafar & Kunasekaran 2021). Furthermore, it is important to understand that the Median Multiple is not a tool to measure how much a household can afford to spend on housing expenditures, but a measure to benchmark how affordable the housing market is performing as a whole (Tan 2021).

Malaysians generally have good access to housing loan markets on par with developed nations to purchase their dream houses. In 2016, about 72% of housing loan borrowers were first-time buyers of homes priced below RM500,000 (Bank Negara Malaysia 2017b; Construction Industry Development Board Malaysia 2019; Khazanah Research Institute 2019 . Ministry of Finance Malaysia (2020) and National Property Information Centre (2020) reports indicate there is a high correlation between housing loan applications and Malaysian House Price Index (MHPI).

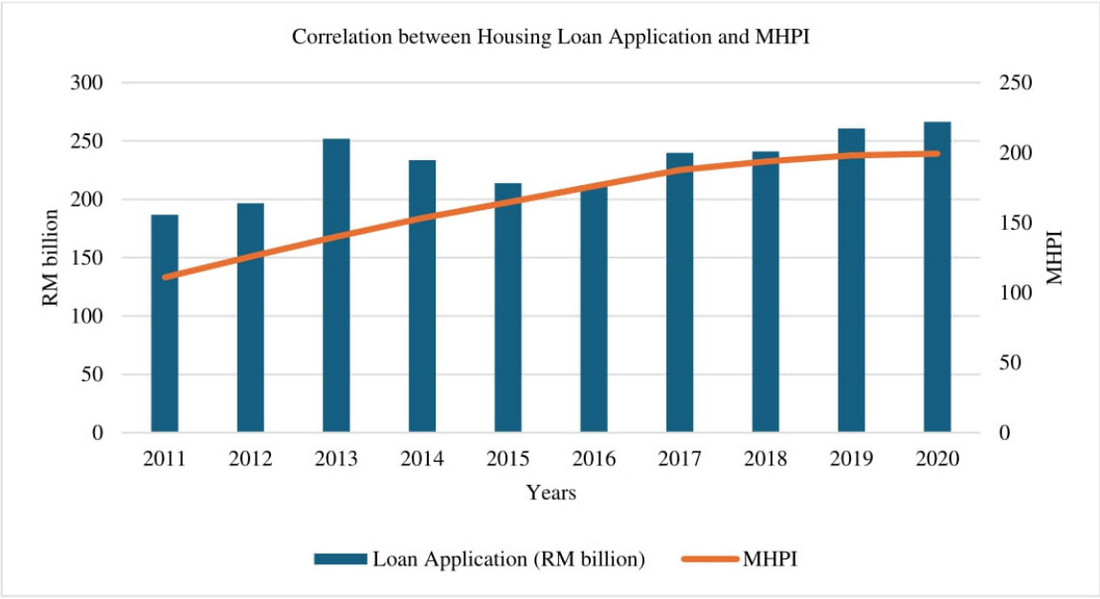

FIGURE 1. Correlation between housing loan application and Malaysian House Price Index (2011-2020).
Source: Property Market Report (2020). Valuation and Property Services Department. Ministry of Finance, Putrajaya and NAPIC (2020)

Figure 1 shows the correlation between housing loan application and Malaysian housing price index (MHPI). The MHPI line graph indicates a period of continuous growth in Malaysian housing price and peaked at 199.3 in 2020. Similarly, housing loan applications also grows continuously especially from the year 2016 to 2020 and reached the peak at RM266.4 billion in 2020. The correlation between them is 0.74 from the year 2011 to 2020 (Khazanah Research Institute 2019; National Property Information Centre 2020 . Thus, it is obvious the housing loan growth also moved in the same trajectory with house prices in Malaysia. This are the clear evidence to show Malaysians are generally dependent on housing loan to purchase homes.

Further to this argument, Khazanah Research Institute (2019) indicates that housing mortgages form the largest portion of household debt in Malaysia for the period 2006–2016, and it keeps increasing every year. Therefore, neglecting the mortgage impact and relying on the house price to income ratio analysis would only bring out less accurate results and be detrimental to the computation of the housing affordability index in Malaysia.

LITERATURE REVIEW

Research on housing affordability indexes revolves around Median Multiple (MM), Housing Cost Burden (HCB), and Residual Income (RI) in Malaysia. The index can be used to compare housing affordability across different regions and countries and to track changes in affordability over time. In this literature review, the focus is on the precision of calculating the housing affordability index in Malaysia.

MEASUREMENT OF HOUSING AFFORDABILITY

Globally, several housing affordability indexes have been produced in industrialized countries based on the demands and suitability of a national background and area. According to Zi Cai's research, there are six commonly used housing affordability indexes in the United States today: the NAR Housing Affordability Index, the HUD Guideline, the Amenity-Based Housing Affordability Index, the H+T Affordability Index, the Shelter Poverty Measure, and the Self-Sufficiency Standard. Many governments around the world have adopted some of these policies (Zi Cai 2017).

One of the most fascinating housing affordability measures was NAR's Housing Affordability Index. NAR stands for the National Association of Realtors. The National Association of Realtors (NAR) is a North American trade association for those who work in the real estate industry, and their member brokers are known as Realtors (member agents are known as Realtor associates). NAR's Housing Affordability Index is one of the most influential and widely cited relative measures in the USA (Goodman & Zhu 2020). It uses the most recent income and home price data to calculate whether a typical family's income can qualify for a conventional loan to purchase a typical home on a national and regional level (Anon 2023).

A typical family is defined as a family earning the median income, according to the U.S. Census Bureau. A typical home is an existing median-priced single-family home, as calculated by NAR. The loan interest rate is determined by the effective rate of loans closed on existing homes from the Federal Housing Finance Board. NAR uses these three components to calculate

the Housing Affordability Index, assuming a 20 percent down payment for the home. The monthly payment of the mortgage is no more than 25 percent of the typical family's income. (Bereitschaft 2019; Nwuba & Kalu 2018).

If the value of NAR's housing affordability index (HAI) is 100, it means that a family earning the median income has exactly enough money to qualify for a typical home loan. Values lower than 100 indicate that the typical family does not have enough money to qualify for a loan to purchase a typical house. And a value larger than 100 implies that the typical family has more than enough money to qualify for a loan for a typical house. For example, a composite HAI of 120 means a family earning the median family income has 120 percent of the income necessary to qualify for a conventional loan covering 80 percent of a median-priced existing single-family home. (Bereitschaft 2019; Nwuba & Kalu 2018).

According to Bujang et al. (2015), one of the main problems related to the issue of housing affordability is that many applicants are unqualified for home financing due to their inability to pay the monthly instalments, which are usually based on high interest rates (Bujang et al. 2015). Therefore, some scholars, including Bujang, had developed a unique method to indicate housing affordability via required monthly installments that were associated with mortgage rates and income for Malaysians. There is a specific calculation for these monthly installments, which is considered a housing affordability benchmark (Azmi et al. 2016).

Bank Negara Malaysia (BNM), the central bank of Malaysia, has accepted three main indicators to measure housing affordability: Median Multiple (MM), Housing Cost Burden (HCB), and Residual Income (RI). Among the three methods, BNM prefers to use the Median Multiple ratio to indicate housing affordability levels in Malaysia (Bank Negara Malaysia 2017a, 2021; Khazanah Research Institute 2019; Muzafar & Kunasekaran 2021).

Consequently, many researchers have adopted the Median Multiple method to indicate housing affordability due to its simplicity of computation and worldwide acceptance. The Median Multiple is obtainable by having the median house price divided by the median household income (Md. Sani @ Abd. Rahim 2015). According to the Median Multiple methodology, a house is considered affordable if the annual house price is less than three times a household's median annual income (Bank Negara Malaysia 2016) . However, in this method, financing of banks for houses in Malaysia was not incorporated.

There was also some improvisation on this Median Multiple method. Mohd Yusof et al. (2017) use the median house price over GDP per capita (a proxy for household income) as the affordability of home financing, which was treated as a dependent variable in the research (Mohd Yusof et al. 2017; Nasir et al. 2022) . However, this method still resembles the Median Multiple proposed by UNCHS and widely adopted by BNM in their official reports (Bank Negara Malaysia 2017c). In addition to the Median Multiple method, this research proposes to include one more vital element of housing affordability, namely the mortgage rate, in the computation of the housing affordability index. This effort is to ensure the banking housing expenditure (mortgage expenses) is fully captured in the housing affordability index.

In the HCB method, the focus is on 30 percent of housing expenditure (e.g., mortgage repayment) from household income. Anyone with more than 30 percent of housing expenditure against their income would be regarded as unaffordable or even termed as having housing stress (MacDonald 2011; Md. Sani @ Abd. Rahim 2015; Rowley & Ong 2012). This particular method was popularly employed by Organisation for Economic Co-operation and Development (OECD) countries and other countries such as the United States of America and Australia. However, in Malaysia, individual financial institutions apply the 30 percent housing expenditure rule on their own accord. There were no national standardised rules or methods (Tan 2021). Furthermore, the rigidity of the 30 percent rule in this method affects the accuracy of cross-country comparisons as differences do exist in the cost of living and repayment structure of mortgage loans throughout the country. (Bank Negara Malaysia 2016).

In the Residual Income method, it looks at the balance (residual) of income that one possesses after subtracting from all the non-housing necessities (Md Sani 2013; Sivitanides 2018; Sohaimi et al. 2018). BNM has provided some illustrations of how the Residual Income method can be applied, as shown in Table 1 below (Bank Negara Malaysia 2017b).

TABLE 1. Housing affordability measure using Residual Income method

Household Income	RM
Assumed household monthly income	5,000
Net monthly income after statutory deductions	4,272
Housing loan (RM300,000) monthly instalment	1,283
Household monthly expenditures	2,946
Residual monthly income for savings and emergencies	43

Source: Box article on 'Debunking the Myth: Property Measures Have Led to Higher Loan Rejection Rates' in BNM Annual Report 2017

Table 1 indicates how housing affordability can be measured by using the Residual Income method. However, this method was not widely employed due to a similar problem to the HCB method, whereby the cross-country comparison cannot be applied since the structure of non-housing expenditure can be different for a different household (Bank Negara Malaysia 2016). Moreover, this method requires detailed data on household income and attributes, the cost of living, and housing costs. Hence, the impractical use of the above method for Malaysia is due to a lack of the required data and statistics. Therefore, a housing affordability index that encompasses credit scores, general house prices, and household income would be more beneficial. In this study, a housing affordability index will be developed encompassing the above attributes.

In Malaysia, banks remained the largest lenders to the domestic property market. Based on the report released by Cagamas (the National Mortgage Corporation of Malaysia) in 2018 under the heading Development of Malaysia's Housing Finance Market, as of the end of 2017, out of RM817.3 billion of banks' exposures to the property market, 90% were related to the purchase of residential and non-residential properties (Cagamas 2018). According to Zull Kepili (2020), a country can make a huge contribution to credit development while also raising concerns when its property prices outpace its income. Malaysia ranked 14th in real credit growth in 2019, showing an increase in house loans that does not correspond to income growth. Moreover, the rising cost of living in Malaysia has encouraged increased money borrowing among the two primary income groups, namely the lower and middle classes (Latimaha et al. 2019).Thus, it indicates the cruciality of incorporating the financing input into the formation of the housing affordability index. Therefore, in this study, there will be the construction of a new housing affordability index that incorporates mortgage loans, income, and house prices.

REVIEW OF RELEVANT THEORETICAL MODELS

Many countries had their house price indexes influenced by macroeconomic variables depending on the economic condition and policies of that particular country. Scholars have proven that house price changes could directly impact the change in housing affordability (Amador-Torres et al. 2018; Mohd Yusof et al. 2017). Theoretically, housing affordability can be linked to housing prices, which are related to housing demand. The theory of housing demand indicates that macroeconomic factors such as GDP could affect housing prices together with other microeconomic factors such as the price of the individual house (Shiau et al. 2018).

Fisher and Brueggeman (2011) asserted that houses are not only a basic need of people but can also be used for investment purposes to increase their wealth accumulation, thus having net benefits. They have acknowledged that increases in interest rates would have a negative impact on housing demand (Fisher & Brueggeman 2011). Pontiggia and Sivitanides (2020), in their research, identified various economic factors such as house prices, household income, population growth, and interest rates that could affect demand for housing. They suggested implementation of good economic growth policies will boost GDP growth and per capita income of a country since their analysis indicates construction costs and GDP per capita had the strongest impact on house prices. When house prices increase, it will cause lower qualifying income, thus generating a lower housing affordability index (Pontiggia 2020).

According to Mankiw (2009) in his textbook titled 'Macroeconomics', the importance of macroeconomic determinants of housing prices such as real interest rates and credit availability was analyzed. Both real interest rates and credit availability could stimulate housing demand and, subsequently, residential investment in the country (Mankiw 2009).

RESEARCH METHODOLOGY

In this research, there will be the construction of a housing affordability index for Malaysia. Using the NAR's housing affordability index as the substructure, there is an avenue to create a Malaysian housing affordability index due to its simplicity and the availability of data from the Department of Statistics, Malaysia (DOSM), the National Property Information Centre (NAPIC), and Bank Negara Malaysia (BNM). To adopt the NAR-based housing affordability index, it requires three important clusters of data: median household gross income, median house price, and the 35-year effective rate of housing loans. This study initiates a formula to compute the housing affordability index for various income groups and states in Malaysia.

COMPONENTS OF THE HOUSING AFFORDABILITY INDEX

There are three vital components of the Housing Affordability Index (HAI), namely the average lending rate, gross median household income (annual), and median house price. They can be illustrated as follows:

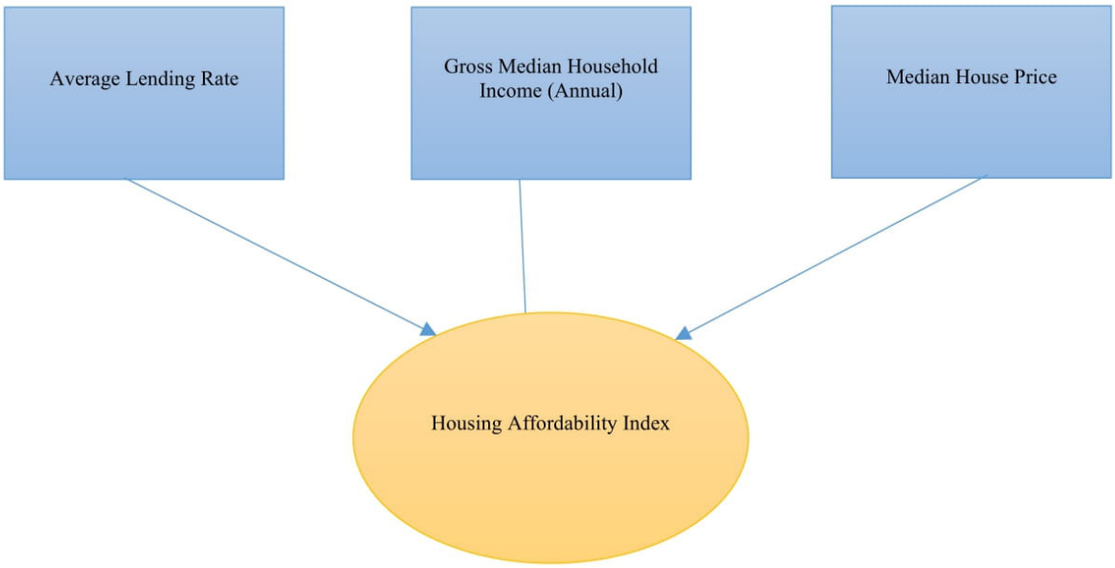

FIGURE 2. Conceptual framework for Housing Affordability Index

HOUSING AFFORDABILITY INDEX IN MALAYSIA

Over the last twenty years, the Malaysian residential property market has seen tremendous price growth, with prices rising at a faster rate in some states. According to economic theory, prices are the most important factor influencing consumer purchases and affordability (Teoh et al. 2022). In Malaysia, NAPIC provides sufficient amounts of data pertaining to median and mean prices of various types of houses (National Property Information Centre 2019), DOSM reveals median household income through its Household Income & Basic Amenities Survey Reports (Department of Statistics Malaysia 2014, 2019) and BNM exposes lending rates in terms of base lending rate (BLR), average lending rate (ALR), and weighted average lending rate (Bank Negara Malaysia 2022; International Monetary Fund 2020). The average lending rate is more precise as it generalizes and incorporates almost all the banks' lending rates in Malaysia.

Thus, this statistical information suffices to create a housing affordability index for Malaysia using NAR's basis. Unfortunately, the DOSM statistics on household income are not constant and are only disclosed in selected years. Therefore, some mediation or interpolation was done to fill up the missing numbers using the compound annual growth rate (CAGR) method. But interestingly, they do report household income in the classes of B40, M40, and T20, which allows the formation of a housing affordability index in those categories. This research initiates the development of the housing affordability index with the following formula:

$$\text{Housing Affordability Index} = \frac{Median\ Household\ Income}{(Qualifying\ Income)} X\ 100 \quad (1)$$

$$= \left(\frac{0.30y}{12m}\right) X\ 100 \quad (2)$$

$$= \left(\frac{y}{12\ X\ m\ X\ 3.33}\right) X\ 100 \quad (3)$$

whereby,
y - median household income
m - monthly commitment of mortgage loan

This housing affordability index measures whether a typical household could qualify for a mortgage loan on a typical home. The median household income in equation 1 is the income amount that divides a population into two equal groups, with half having an income above that amount and half having an income below that amount. It should be distinguished from the median income. The median household income for Malaysia can be easily obtained from NAPIC reports. In equation 2, the median household income was proportioned to 30% by indicating This was done to resemble the 30% of gross household income that was allocated to pay mortgage loans. As a rule of thumb, a housing loan is considered affordable if the monthly loan installments cost less than 30% of the gross monthly household income. If household expenditures exceed 30% of monthly household income, then it falls under the category of housing stress (Azillah et al. 2019; Bereitschaft 2019; MacDonald 2011; Md. Sani @ Abd. Rahim 2015; Mohd Yusof et al. 2017; Rowley & Ong 2012).

The qualifying income in equation 1 is more technical to determine. It was stipulated as '12m' in equation 2 to indicate 12 months (an annual commitment) of mortgage loans that were undertaken to pay the borrowed financial institution. However, to designate the exact amount of the 12 months' mortgage payments, it can only be determined through a different set of formulas, which will be discussed in this study. In equation 3, the formula was rearranged from equation 2. The specified figure '12 X m X 3.33' indicates 12 months of anticipated mortgage loans times the figure 3.33, due to the restructure of the formula from equation 2. The monthly mortgage payment, which was indicated as '12m' in equation 2, can be engineered or invented through the following formula:

$$\text{Monthly payment} = \frac{(1-0.1)v\left(\frac{r}{12}\right)}{1-\left(\frac{1}{\left(1+\left(\frac{r}{12}\right)\right)^{420}}\right)} \quad (4)$$

whereby,
v - median house price
r - effective rate of mortgage loan

Equation 4 was engineered to determine the precise amount of monthly payment for which one qualifies. The first half of the numerator in the formula '$(1-0.1)v$' resembles a 90% loan-to-value (LTV) ratio against the median house price. In Malaysia, it is common to secure 90% financing from mortgage loans, especially for first and second home purchasers (Osmani & Abdullah 2010). Therefore, '$(1-0.1)v$' reflects 90% of the median home price. The second half of the numerator in the formula $\left(\frac{r}{12}\right)$ denotes the effective mortgage loan rate over a one-year period. The power of in the denominator depicts the maximum amount of loan tenure, which is 35 years or 420 months, allowed for a mortgage loan in the country (Pillaiyan 2015; Zainal Abidin 2010). Overall, equation 4 shows the monthly payment that one qualifies for depending on the housing price, the current interest rate, and the maximum amount of loan tenure. Once the monthly payment value is obtained, it will be substituted in equation 3 to derive the housing affordability index.

THE FORMATION OF THE HOUSING AFFORDABILITY INDEX USING MALAYSIAN ECONOMIC STATISTICS

The impact of the housing affordability index can only be realized if the index is tested for feasibility using domestic data sets. The constructed formula of the housing affordability index can be utilized to generate housing affordability indexes in Malaysia by using the actual domestic data sets. Thus, the following table will be useful as it captures the required statistical data from BNM, DOSM, and NAPIC in Malaysia.

TABLE 2. Selected information on house price, household income and lending rate

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)
2019	5873	70476	289646	4.70
2016	5228	62736	298000	4.52
2014	4585	55020	270000	4.67
2012	3626	43512	170000	4.70

Source: Household Income and Expenditure Survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

Table 2 provides information only on selected years and not constants. This shortfall was due to the irregularity of publishing data from the Household Income and Expenditure Survey (2014 and 2019), by the Department of Statistics in Malaysia. Using the above information, the housing affordability index can be computed. As an example, the following method is shown to enumerate the housing affordability index specifically for the year 2019:

$$\text{Monthly payment} = \frac{(1-0.1)v\left(\frac{r}{12}\right)}{1-\left(\frac{1}{\left(1+\left(\frac{r}{12}\right)\right)^{420}}\right)} \tag{5}$$

$$\text{Monthly payment} = \frac{(1-0.1)289646\left(\frac{4.7\%}{12}\right)}{1-\left(\frac{1}{\left(1+\left(\frac{4.7\%}{12}\right)\right)^{420}}\right)} \tag{6}$$

$$\text{Monthly payment} = \frac{260681.4\ X\ 0.003916}{1-\left(\frac{1}{(1+0.00392)^{420}}\right)} \tag{7}$$

$$\text{Monthly payment} = \frac{1021.00215}{1-\left(\frac{1}{5.172159}\right)} \tag{8}$$

$$\text{Monthly payment} = \frac{1021.00215}{1-0.193342} \tag{9}$$

$$\text{Monthly payment} = \text{RM } 1266$$

Hence, the monthly payment (m) figure above and the median of monthly household gross income in annual terms are substituted in equation 4 to derive the housing affordability index as per below:

$$\text{Housing Affordability Index} = \left(\frac{y}{12\ X\ m\ X\ 3.33}\right) X\ 100 \tag{10}$$

$$\text{Housing Affordability Index} = \left(\frac{70476}{12\ X\ 1266\ X\ 3.33}\right) X\ 100 \tag{11}$$

$$\text{Housing Affordability Index} = \left(\frac{70476}{50589.36}\right) X\ 100 \tag{12}$$

$$\text{Housing Affordability Index} = 139$$

Due to the above simulation, the housing affordability index for the year 2019 was 139. This index indicates the household earning the median income has 139% of the income necessary to qualify for a conventional loan covering 90% of the median-priced home. Basically, the index recognizes that people are more affordable when purchasing homes. Working on a similar simulation process, the housing affordability index can be procured for the following years.

TABLE 3. Deriving housing affordability index for selected years in Malaysia

Year	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordability Index (HAI)*
2019	70476	289646	4.70	139
2016	62736	298000	4.52	123
2014	55020	270000	4.67	117
2012	43512	170000	4.70	146

Source: Household Income and Expenditure Survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

Using the housing affordability index formula that was developed in this study, Table 3 lists the housing affordability index for selected years. One can easily observe from the table that the housing affordability index was the lowest in 2014, which is 117 compared to the rest of the years. This had happened due to high housing prices relative to household income. In fact, BNM made several efforts in 2013 to weed out growing house prices, which are deemed to be caused by speculative activities (Mohd Sidek 2018). Since then, house prices have stabilized; the median house price from 2016 to 2019 did not change much, revolving around RM 290,000. Therefore, the housing affordability index improved and reached 139 as the median household income increased significantly in the pre-covid-19 era.

In 2012, the housing affordability index was the highest at 146; this could be attributed to low median house prices at that time. Since the affordability level was high, people started to increase their wealth by purchasing homes with the intention of selling them later. This action triggered the risk of bubbles in the property market (Pillaiyan 2015) and required prompt BNM cooling measures (Yip et al. 2017).

RESULTS AND DISCUSSION

The aim of this study is to develop a housing affordability index for Malaysia that incorporates financial elements. Thereafter, using the said index to determine the level of housing affordability in selected Malaysian states as well as income categories T20, M40, and B40. The operationality of the Housing Affordability Index (HAI) will be explained in this section using annual data from 2002 to 2020, based on the methodology described before. The HAI will be formed for the general Malaysian population, B40, M40, T20, and selected Malaysian states.

THE OPERATIONALITY OF THE HOUSING AFFORDABILITY INDEX

The construction of the housing affordability index was based on the following equation, which was explained previously in methodology. A complete formula for HAI shown in equation 14 is applicable for Malaysia.

$$\text{Housing Affordability Index} = \frac{Median\ Household\ Income}{(Qualifying\ Income)} X\ 100 \tag{13}$$

$$= \left(\frac{y}{12\ X \frac{(1-0.1)v\left(\frac{r}{12}\right)}{1-\left(\frac{1}{\left(1+\left(\frac{r}{12}\right)\right)^{420}}\right)} X\ 3.33} \right) X\ 100 \tag{14}$$

Based on equation 14, if the HAI is equal to 100, then it indicates household earning the perfect median income to qualify for a conventional loan covering 90% of median home price. If the HAI attained anything above 100, it signifies people do afford to own homes and the higher the index goes the higher the affordability level will be. Whereas if the HAI obtained below 100 it indicates unaffordability of owning homes and the lesser it goes, the lesser affordability level will be.

HOUSING AFFORDABILITY INDEX FOR GENERAL MALAYSIAN POPULATION

The following table shows HAI for the general Malaysian population from the period 2002 to 2020:

TABLE 4. Deriving housing affordability index from 2002 – 2020 in Malaysia

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordability Index (HAI)*	Median Multiple (MM)
2002	2,049.00	24,588.00	100,000.00	6.53	112.68	4.07
2003	2,128.46	25,541.52	107,238.52	6.30	112.06	4.20
2004	2,211.00	26,532.00	115,001.00	6.05	111.75	4.33
2005	2,319.28	27,831.36	121,314.39	5.95	112.44	4.36
2006	2,432.86	29,194.32	127,974.39	6.49	105.02	4.38
2007	2,552.00	30,624.00	135,000.00	6.41	105.39	4.41
2008	2,692.63	32,311.56	141,827.36	6.08	109.96	4.39
2009	2,841.00	34,092.00	149,000.00	5.08	124.68	4.37
2010	3,081.70	36,980.40	158,000.00	5.00	128.83	4.27

continue ...

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2011	3,342.79	40,113.48	165,000.00	4.92	135.18	4.11
2012	3,626.00	43,512.00	170,000.00	4.79	144.71	3.91
2013	4,077.40	48,928.80	250,000.00	4.65	112.66	5.11
2014	4,585.00	55,020.00	270,000.00	4.59	118.22	4.91
2015	4,895.96	58,751.52	295,402.00	4.57	115.69	5.03
2016	5,228.00	62,736.00	298,000.00	4.53	123.10	4.75
2017	5,434.72	65,216.64	303,000.00	4.61	124.55	4.65
2018	5,649.61	67,795.32	296,944.00	4.93	126.79	4.38
2019	5,873.00	70,476.00	289,646.00	4.88	135.99	4.11
2020	5,209.00	62,508.00	295,000.00	3.94	134.03	4.72

Source: Household Income and Expenditure Survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

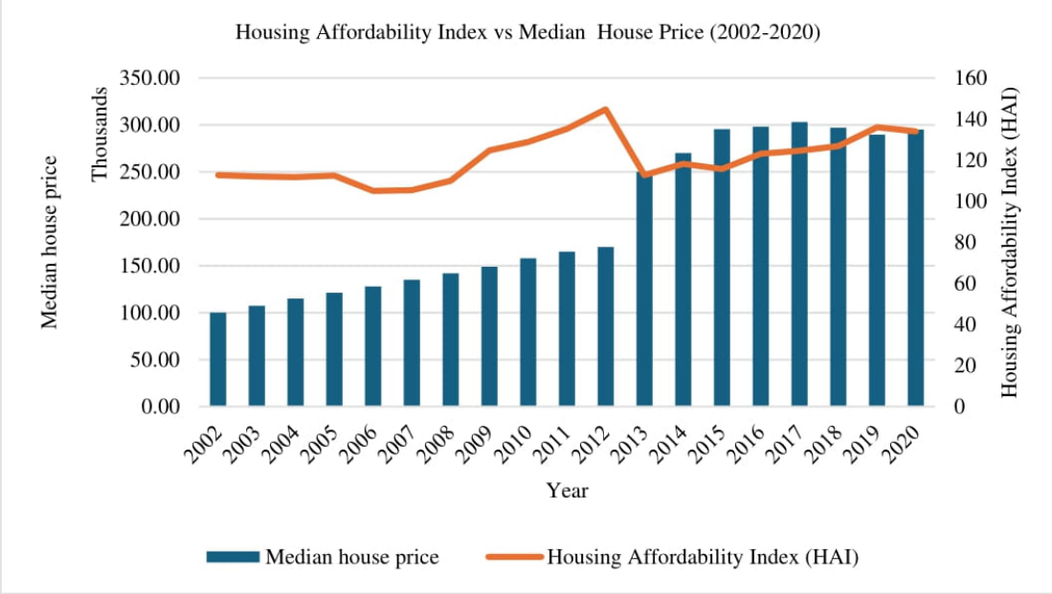

FIGURE 3. Housing Affordability Index and median house price from 2002 to 2020 in Malaysia.
Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation

The HAI that was obtained for Malaysia from 2002 to 2020 indicates that, generally, Malaysians can afford to purchase homes, especially when they rely on buying houses through bank loans. However, the HAI trend shows clearly the impact of Malaysian monetary policy and interest rates on housing affordability. If it were not for the declining lending rate, HAI would have worsened in Malaysia. Looking at Table 4, for instance, in 2006, when the lending rate was quite high at 6.49%, HAI was recorded the least at 105.02. Similarly, the following year, in 2007, the lending rate was still high at 6.41%, and therefore, HAI obtained 105.49. HAI at 105 indicates only 5% more affordability in housing for Malaysians. Malaysia recorded the lowest HAI in 2006 and 2007 due to the high lending rates of financial institutions. In contrast, when the lending rate turns out to be the lowest, HAI seems to perform well. For instance, in 2020, when the lending rate was registered at 3.94%, HAI was comfortable at 134.03 despite having negative national economic growth at 5.5% (World Bank 2021). Overall, it is observable that the HAI works oppositely to average lending rates.

In Figure 3, we observe a sudden crash in HAI in 2012–2013. HAI declined about 15% despite an increase in annual household income and a reduction in the average lending rate. This happened due to the median house price surge in 2013, when house prices increased sharply from RM170,000 to RM250,000, which is almost a 50% increase. Pillaiyan (2015), a research scholar pertaining to house prices in Malaysia, mentioned house prices in Malaysia had the symptoms of 'asset bubbling' (Pillaiyan 2015) and if it is left unchecked, it could lead to a national economic disaster, similar to the subprime mortgage crisis in the US (Dooley & Hutchison 2009). Rightfully, BNM was alerted, and they came up hard with

the re-introduction of Real Property Gains Tax (RPGT), demolishing the Developer Interest Bearing Scheme (DIBS), and reducing the maximum tenure of financing to 35 years in 2013 (Bank Negara Malaysia 2015). BNM did not hike up the Overnight Policy Rate (OPR) then, as they were very certain that the effort taken was only to suppress speculative activities in housing ownership.

HOUSING AFFORDABILITY INDEX FOR B40 IN MALAYSIA

The following table shows HAI for the B40 segment of the Malaysian population from the period 2002 to 2019:

TABLE 5. Deriving housing affordability index from 2002 – 2019 for B40

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordability Index (HAI)*
2002	1,025.00	12,300.00	100,000.00	6.53	56.37
2003	1,063.77	12,765.24	107,238.52	6.30	56.00
2004	1,104.00	3,248.00	115,001.00	6.05	55.80
2005	1,199.50	14,394.00	121,314.39	5.95	58.15
2006	1,303.26	5,639.12	127,974.39	6.49	56.26
2007	1,416.00	16,992.00	135,000.00	6.41	58.47
2008	1,427.95	17,135.40	141,827.36	6.08	58.31
2009	1,440.00	17,280.00	149,000.00	5.08	63.20
2010	1,565.99	18,791.88	158,000.00	5.00	65.47
2011	1,703.00	20,436.00	165,000.00	4.92	68.87
2012	1,852.00	22,224.00	170,000.00	4.79	73.91
2013	2,206.56	26,478.72	250,000.00	4.65	60.97
2014	2,629.00	31,548.00	270,000.00	4.59	67.79
2015	2,808.38	33,700.56	295,402.00	4.57	66.36
2016	3,000.00	36,000.00	298,000.00	4.53	70.64
2017	3,054.34	36,652.08	303,000.00	4.61	70.00
2018	3,109.67	37,316.04	296,944.00	4.93	69.79
2019	3,166.00	37,992.00	289,646.00	4.88	73.31

Source: Household Income and Expenditure Survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

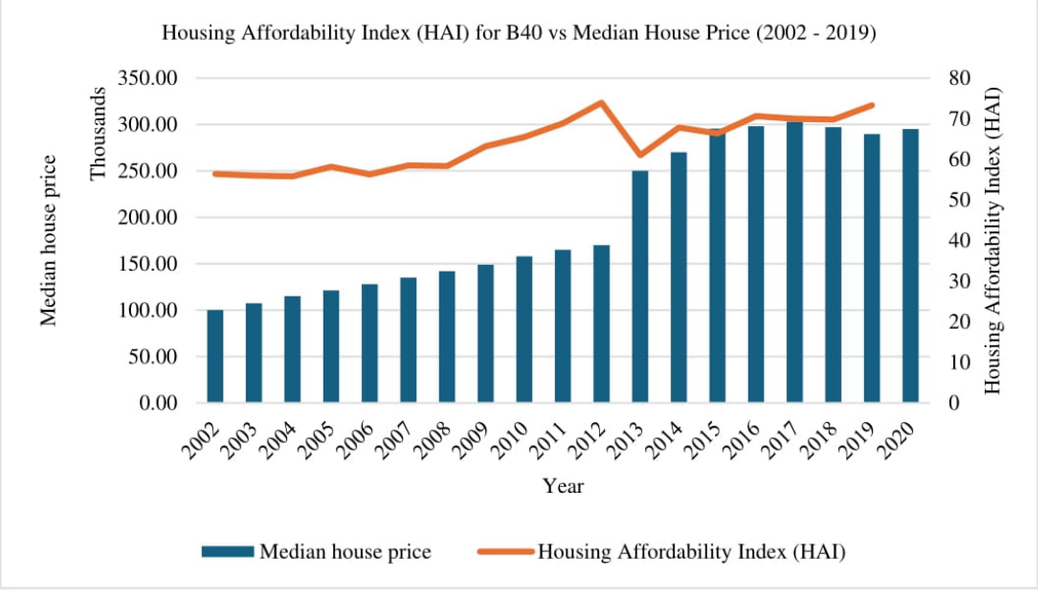

FIGURE 4. Housing Affordability Index and median house price from 2002 to 2019 in Malaysia.
Source: Household Income and Expenditure Survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation

When HAI is lower than 100 index points, it indicates housing unaffordability or very low housing affordability. Information from Table 5 shows that the B40 group generally suffered from housing unaffordability throughout the years from 2002 to 2019. That indicates Malaysians in the B40 segment generally suffered from an environment of unaffordability at all times. However, Figure 4 shows there was a slight improvement within the time range of 2002 to 2019. In the year 2002, almost half of the B40 population was categorized as unaffordable for housing, with the HAI at 56.37, which means 43.63% cannot afford mortgage facilities to secure home ownership. Nevertheless, the HAI ameliorated to 73.31 in 2019, so the unaffordability rate stands at 26.69%. This situation is still not good enough for a developing nation, although some improvements have been noted. The B40 population has a very low HAI due to the less monthly income they earn. Comparing Table 5 with Table 7, one can notice the stark difference in the median income earnings between B40 and T20. In 2019, the B40 earns less than RM142,380 in annual income compared to the T20. That would be a huge deficit for B40 if they were hunting down the same type of houses that T20 look for. Fortunately, Malaysian housing agencies already had plans to build adequate affordable homes for B40, although there are affordability issues related to this effort (Abdul Latiff et al. 2020).

HOUSING AFFORDABILITY INDEX FOR M40 IN MALAYSIA

The following table shows HAI for the M40 segment of the Malaysian population from the period 2002 to 2019:

TABLE 6. Deriving housing affordability index from 2002 – 2019 for M40

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordability Index (HAI)*
2002	2,536.00	30,432.00	100,000.00	6.53	139.46
2003	2,631.69	31,580.28	107,238.52	6.30	138.55
2004	2,731.00	32,772.00	115,001.00	6.05	138.03
2005	2,905.31	34,863.72	121,314.39	5.95	140.85
2006	3,090.74	37,088.88	127,974.39	6.49	133.42
2007	3,288.00	39,456.00	135,000.00	6.41	135.78
2008	3,390.89	40,690.68	141,827.36	6.08	138.48
2009	3,497.00	41,964.00	149,000.00	5.08	153.47
2010	3,767.24	45,206.88	158,000.00	5.00	157.49
2011	4,058.37	48,700.44	165,000.00	4.92	164.12
2012	4,372.00	52,464.00	170,000.00	4.79	174.48
2013	4,888.04	58,656.48	250,000.00	4.65	135.06
2014	5,465.00	65,580.00	270,000.00	4.59	140.91
2015	5,856.01	70,272.12	295,402.00	4.57	138.37
2016	6,275.00	75,300.00	298,000.00	4.53	147.75
2017	6,536.61	78,439.32	303,000.00	4.61	149.80
2018	6,809.12	81,709.44	296,944.00	4.93	152.82
2019	7,093.00	85,116.00	289,646.00	4.88	164.24

Source: Household Income and Expenditure Survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

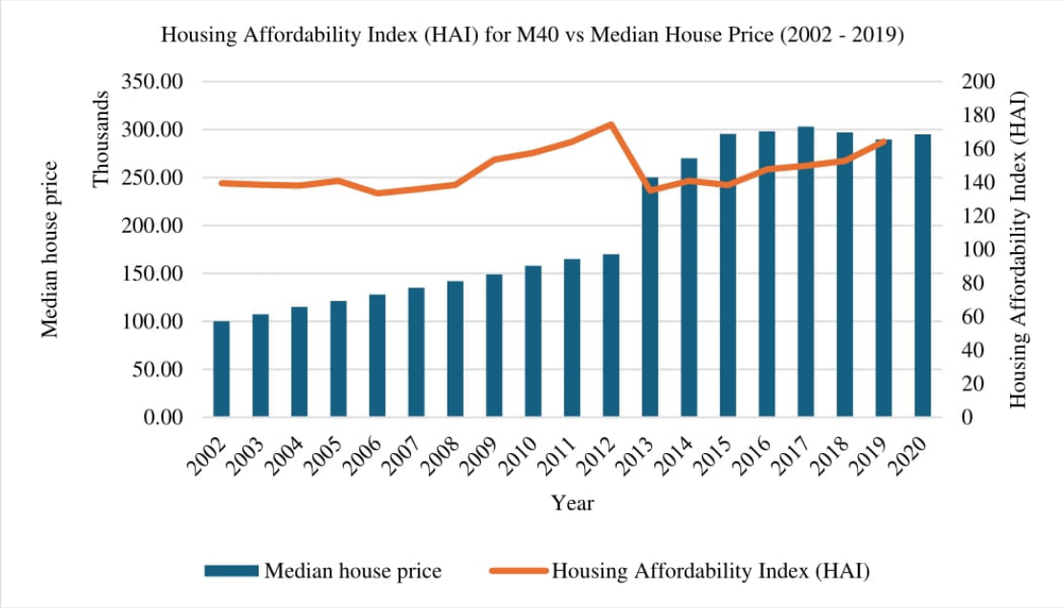

FIGURE 5. Housing Affordability Index and median house price from 2002 to 2019 in Malaysia.
Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation

Overall, the HAI for the M40 segment of Malaysian society looks very positive and encouraging within the years 2002–2019. Table 6 shows HAI obtained in the region of 130 to 170, which indicates a comfortable level of home affordability for M40. In 2006, HAI obtained 133.42 when the lending rate soared to 6.49%. In contrast, when the lending rate was determined at 4.79% in 2012, HAI obtained 174.48. This shows that the average lending rate was a major determinant of housing affordability. In general, HAI for M40 somewhat improved throughout the years from 2002 to 2019.

HOUSING AFFORDABILITY INDEX FOR T20 IN MALAYSIA

The following table shows HAI for the T20 segment of the Malaysian population from the period 2002 to 2019:

TABLE 7. Deriving housing affordability index from 2002 – 2019 for T20

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordabilit Index (HAI)*
2002	6,120.00	73,440.00	100,000.00	6.53	336.55
2003	6,324.58	75,894.96	107,238.52	6.30	332.97
2004	6,536.00	78,432.00	115,001.00	6.05	330.34
2005	6,854.56	82,254.72	121,314.39	5.95	332.30
2006	7,188.64	86,263.68	127,974.39	6.49	310.31
2007	7,539.00	90,468.00	135,000.00	6.41	311.32
2008	7,770.45	93,245.40	141,827.36	6.08	317.33
2009	8,009.00	96,108.00	149,000.00	5.08	351.49
2010	8,565.15	102,781.80	158,000.00	5.00	358.08
2011	9,159.93	109,919.16	165,000.00	4.92	370.43
2012	9,796.00	117,552.00	170,000.00	4.79	390.94
2013	10,664.50	127,974.00	250,000.00	4.65	294.68
2014	11,610.00	139,320.00	270,000.00	4.59	299.36
2015	12,355.09	148,261.08	295,402.00	4.57	291.94
2016	13,148.00	157,776.00	298,000.00	4.53	309.57

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2017	13,747.88	164,974.56	303,000.00	4.61	315.06
2018	14,375.13	172,501.56	296,944.00	4.93	322.62
2019	15,031.00	180,372.00	289,646.00	4.88	348.04

Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

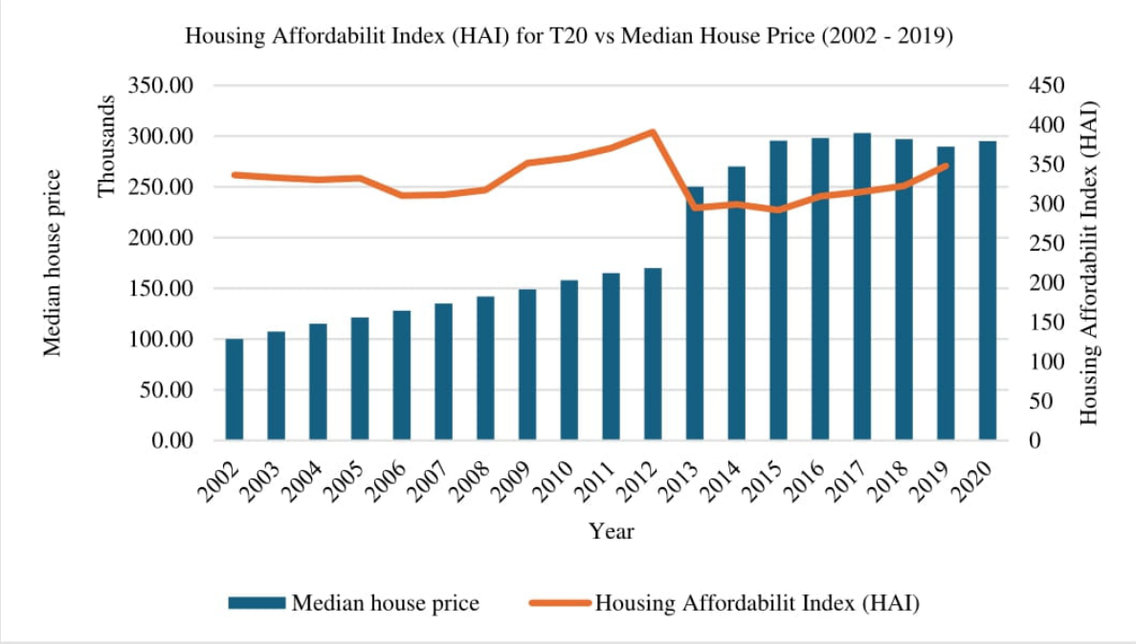

FIGURE 6. Housing Affordability Index and median house prices from 2002 to 2019 in Malaysia.
Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation

The HAI for the T20 segment of the population looks colorful and impressive. This is the rich group of the population that does not face any housing affordability issues. Table 7 shows HAI is in the region of 294 to 390, which indicates a high level of affordability. However, one must realize that most of the T20 group lives in a particular geographic area of Malaysia. Using the statistical information provided by DOSM's 2019 Household Income and Basic Amenities Survey (Department of Statistics Malaysia 2014, 2019), it was noted that more than half, or 53.8%, of the T20 Malaysia households are actually living in Klang Valley (Yeap 2020). Thus, although T20 shows a high level of affordability, it raises the issue of inequality within the states of the country.

HOUSING AFFORDABILITY INDEX FOR SELECTED STATES IN MALAYSIA

HAI can be procured for all the states in Malaysia since there is availability of median house price data from NAPIC and median household income data from DOSM for each state. However, there is a limitation to obtaining the median house price for each state from NAPIC. The NAPIC department, which is the only source to obtain median house price data, provides the data for each state only from the year 2015. Therefore, HAI can only be generated beginning in 2015. Since it is too lengthy to choose all the states in Malaysia, the research only focuses on the strongest and weakest states in terms of HAI in Malaysia. This research has listed the average HAI obtained from the years 2015 to 2020 and identified Melaka as the strongest state in the country (obtained 195.71 HAI), whereas Sabah is the weakest state (obtained 96.99 HAI). Table 7 lists the average HAI obtained by all the states in Malaysia, from the strongest to the weakest.

TABLE 8. List of HAI from strongest to weakest by states in Malaysia (2015 – 2020)

No.	States of Malaysia	Average HAI*	HAI						Remarks
			2015	2016	2017	2018	2019	2020	
1	Melaka	195.71	170.77	191.43	199.44	196.59	203.20	212.84	
2	Kedah	145.04	140.76	136.55	139.53	150.31	145.82	157.25	Strong
3	Perlis	139.56	141.05	130.06	130.85	141.67	140.18	153.58	
4	Negeri Sembilan	133.85	121.50	119.10	117.08	134.98	162.50	147.92	
5	Selangor	133.24	118.51	125.28	131.00	137.38	145.03	142.21	
6	Kuala Lumpur	129.94	116.18	122.54	125.11	124.38	147.53	143.92	
7	Terengganu	127.80	108.95	118.58	127.73	135.61	145.97	129.97	
8	Perak	127.56	118.72	128.58	129.31	132.84	132.43	123.47	Moderate
9	Pahang	123.97	105.58	116.92	118.53	129.79	136.72	136.30	
10	Johor	123.27	132.86	120.28	120.59	117.35	123.27	125.30	
11	Pulau Pinang	123.23	100.05	108.53	109.10	130.46	145.30	145.92	
12	Sarawak	109.66	139.93	127.11	114.58	89.75	97.45	89.14	
13	Kelantan	108.11	91.83	108.17	109.59	125.76	113.89	99.43	Weaker
14	Sabah	96.99	104.22	103.83	96.17	87.40	94.76	95.55	

Source: Author's computation

Table 8 indicates the HAI of all 13 states in Malaysia and the Malaysian capital city, Kuala Lumpur. The study focuses on two states of diverse housing affordability, one highly affordable, which is Melaka, and the other least affordable, which is Sabah. Therefore, the analysis begins with Melaka.

HOUSING AFFORDABILITY INDEX FOR THE STATE OF MELAKA

The following table shows HAI for the state of Melaka from 2015 to 2020:

TABLE 9. Deriving housing affordability index from 2015 - 2020 for Melaka

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordability Index (HAI)*
2015	5301.14	63613.68	216878.00	4.57	170.77
2016	5588.00	67056.00	205000.00	4.53	191.43
2017	5739.20	68870.40	200000.00	4.61	199.44
2018	5894.50	70734.00	200000.00	4.93	196.59
2019	6054.00	72648.00	200000.00	4.88	203.20
2020	5547.00	66564.00	198000.00	3.94	212.84

Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

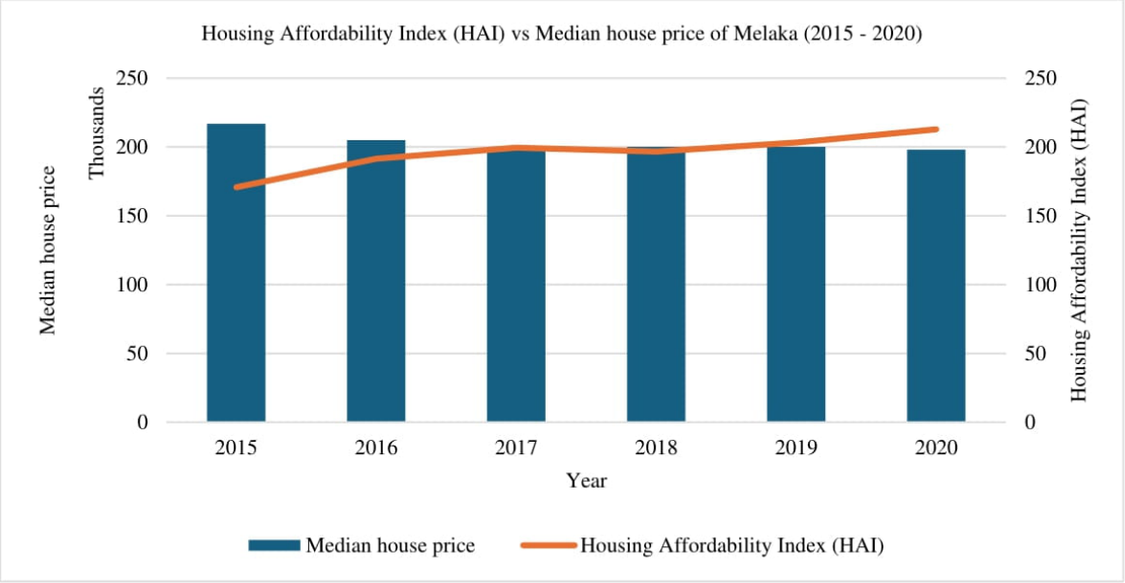

FIGURE 7. Housing Affordability Index and median house price from 2015 to 2020 for Melaka.
Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation

HAI in the state of Melaka looks more fascinating and encouraging. Melaka was found to be the best state in Malaysia for having superior housing affordability. Table 9 shows that the median house price in Melaka continuously declined from 2015 to 2020, and at the same time, annual household income in Melaka improved except for the year 2020. This had successfully made Melaka sustain remarkable housing affordability. Table 9 also reveals HAI rose continuously during the time span of 2015–2020, and it reached a peak of 212.84 in 2020 despite the impact of the covid-19 pandemic during this time period. Melaka had a slight reduction in annual household income growth in 2020 due to the stunted national economic growth; however, the reduction in mortgage rates had assisted Melaka to sustain a higher HAI. Figure 7 exhibits the HAI line as a smooth and continuous increase, indicating uninterrupted progress in housing affordability in Melaka. Melaka is one of the few states to have established its own efficient Housing Board, known as the Lembaga Perumahan Melaka (LPM). They have effectively launched several affordable homes and had joint ventures with private developers.

HOUSING AFFORDABILITY INDEX FOR THE STATE OF SABAH

The following table shows HAI for the state of Sabah from 2015 to 2020:

TABLE 10. Deriving housing affordability index from 2015 - 2020 for Sabah

Year	Median of monthly household gross income (RM)	Median of monthly household gross income in annual terms (RM)*	Median house price (RM)	Average Lending rate at month of Dec each year (%)	Housing Affordability Index (HAI)*
2015	3923.26	47079.12	263000.00	4.57	104.22
2016	4110.00	49320.00	278000.00	4.53	103.83
2017	4151.25	49815.00	300000.00	4.61	96.17
2018	4192.92	50315.04	320000.00	4.93	87.40
2019	4235.00	50820.00	300000.00	4.88	94.76
2020	3773.00	45276.00	300000.00	3.94	95.55

Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation*

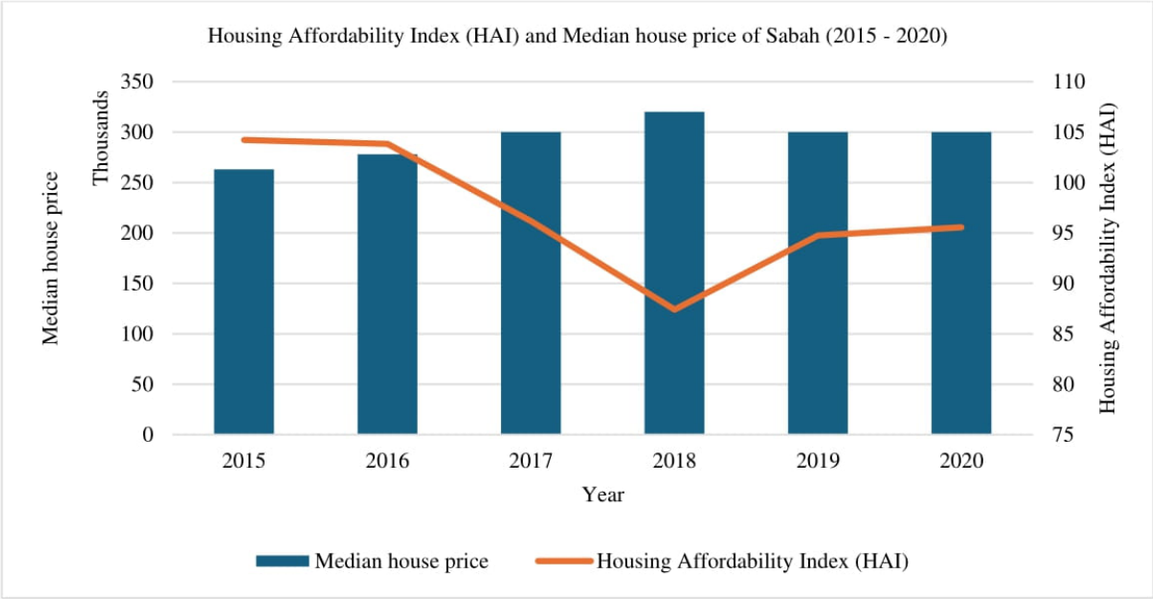

FIGURE 8. Housing Affordability Index and median house price from 2015 to 2020 in Sabah.
Source: Household income and expenditure survey (2014 and 2019), DOSM, NAPIC, BNM and author's computation

Overall, the state of Sabah fared poorly in housing affordability compared to other states in Malaysia. The housing affordability index hardly reached the minimum index point of 100. The HAI has to be at least 100 to indicate purchasers are able to secure housing loans to buy houses. However, Sabahans barely reached the 100-index point between 2017 and 2020. Observing Table 10, Sabah obtained minimum HAI in 2015 and 2016, but since 2017, HAI has eroded and did not recover until 2020. This happened due to the regressing and low annual income in the state, together with high median house prices. The reduction in the national lending rate did not help Sabah much in attaining the minimum HAI benchmark in 2020. Figure 8 shows the HAI line had a major downfall from 2016 to 2018, thereafter having a slight recovery but staying at the unaffordable level. Sabah seriously needs the support of the state and federal governments to uplift the HAI, which never regained the minimum benchmark of 100.

CONCLUSION

This study is predicted to have two major outcome. To begin, this study concludes that the existing housing affordability index is insufficient and does not capture the entire degree of home affordability in Malaysia. As a result, this study provides an improved version of the housing affordability index that may be used and benefited by a variety of stakeholders, including government agencies, policymakers, and academic researchers.

Second, despite the existence of home finance facilities in the country, this study captures the level of unaffordability among the B40 segment of the population. As a result, this research might be used to obtain a 100-point HAI as a baseline to assist B40 residents with planning and affordable housing programmes. This research also revealed Malaysia's weakest states in terms of housing affordability. Thus, the federal government is able to narrow down plans and programmes connected to affordable housing to specific states across the country.

This research can be utilized for future references and analysis if studies on mortgage rates and their implications for housing affordability are undertaken. In fact, there are suggestions to BNM to encourage different lending rates for different states depending on the financial circumstances, such as average income and house price, of each state in Malaysia. This would make each state have its own unique average lending rate and could easily boost the housing affordability of poorer states.

There are limitations to this study. The most notable limitations would be the use of the median house price and the median gross income of households in computing the HAI. In each state, urban houses cost much more than rural ones. Furthermore, houses are categorized as condominiums, apartments, terraced houses, low- and medium-cost houses, cluster houses, detached houses, townhouses, flats, and many more. Thus, the actual housing affordability can vary significantly between regions and localities within a country, and HAI might not accurately reflect it.

Similarly, the median gross income of a household measures only the financial aspect of housing affordability and does not take into account other factors such as the quality of housing, access to services and amenities, or the social and cultural environment. Therefore, HAI can be accepted as a useful but not precise tool to indicate housing affordability. In the future, more departmentalized or segmented house price and income data could enhance the accuracy of HAI.

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