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Equitable post-COVID-19 housing delivery: A practical framework to integrate sustainable development goals in Malaysia's low-cost housing provision

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Abstract: Studies show that the COVID-19 crisis may threaten to attain sustainable development goals connected with shelter in developing countries, including Malaysia. Low-cost housing provision has been identified as one tool for achieving sustainability goals via synergistic operations. However, studies about post-COVID-19 housing and sustainable development goals integration are scarce in Malaysia. The study investigated the state of post-COVID-19 housing and developed a framework to integrate Goals in housing provision in Malaysia. The study covered four major cities in Malaysia via qualitative research to achieve the study's objectives. The researchers engaged forty participants via semi-structured virtual interviews, and saturation was achieved. The study utilized a thematic analysis for the collated data and honed them with secondary sources. Findings show that COVID-19 reduced the possibility of low-income earners becoming homeowners. This is because the low-income groups were real losers of COVID-19 economic changes. Also, findings reveal that achieving four Goals from the 17 Goals will improve housing provision in Malaysia's post-COVID-19 era. The study encourages key housing stakeholders to improve housing delivery, especially for the low-income earners across Malaysia in the post-COVID-19 era. This will imply contributing to achieving four Goals because of the correlation, as part of the study's implications.

Keywords: framework; low-cost housing; Malaysia; post-COVID-19; sustainable development goals

1. Introduction

Housing equity is the opportunity for individuals to obtain the highest level of suitable housing possible. Housing equity is the largest element in many countries' typical household balance sheets (Benito, 2007; Ebekoziem et al., 2024b). It is more dispersed across households than other assets. Venti and Wise (1990) asserted that most elderly people's wealth is in housing equity. The housing wealth, it is claimed, is a potential source of support for the elderly as they age. Low-income households reduce housing equity compared to others. Despite the benefits of housing equity, especially for the elderly, disparities persist in housing delivery outcomes, especially

in developing countries, including Malaysia (Ebekoziens, 2019). Housing provision is germane for human existence. Thus, Abraham Maslow classified housing as a physiological need in his pyramid of needs (Maslow, 1943). The United Nations (UN) Habitat 11 (1996) supported Maslow's position regarding housing rights.

Despite the significance of housing, UN-Habitat (2011) and Wohl (2017) stated that about one billion of the global population live in dilapidated houses. Ebekoziens (2019) found that low-income earners (LIEs) are the worst hit, especially in developing countries. Managing this situation has been challenging with the limited resources and other encumbrances such as limited land availability in urban locations, LIEs access to housing finance, among others (Ebekoziens, 2019). Bank Negara Malaysia (BNM) Annual Report (2015) avowed that the gap between the households and the housing stock enlarged to 2.5 million units in 2015 from 2.1 million units in 2005. Hamzah and Murphy (2014) found that in 2010, the LCH gap was 561,919 units from a total planned 1,509,410 units. Records show that Malaysia's housing target from the 2nd Malaysia Plan (MP) 1971–1975 to the 10th MP experienced a shortfall of 1,007,423 units (43.8%) across the country (Ebekoziens, 2019). It was based on available data. The unplanned COVID-19 crisis that emerged fully in early 2020 may have compounded Malaysia's housing targets and achievements for the 11th (2016–2020) and 12th (2021–2025) Malaysia Plan (MP).

The COVID-19 era affected the built environment (Ayat et al., 2021; Deep et al., 2022), including LCH delivery, and by extension, may have affected the SDGs and targets because of the interconnection. Shulla et al. (2021) identified Goals 5, 9, 10, 11, and 17 as goals that may affect COVID-19 crisis. This is a threat to achieving the 2030 SDGs. LCH demand-supply gap in Malaysia before the COVID-19 crisis was already an issue of concern to many (Ebekoziens et al., 2020a). They found LCH leakages, problems surrounding LCH purchase, high development and construction costs, lax LIEs documentation, and lax housing state policy and enforcement as the root cause of the gap. This LCH demand-supply gap may have been compounded because of the COVID-19 crisis impact on the built environment (Deep et al., 2022), including the LCH development. The need to explore housing in the built environment with emphasis on LCH towards achieving SDGs in Malaysia cannot be overstated. A vibrant LCH delivery may achieve the relevant SDGs connected with housing. The spike of COVID-19 since early 2020 to date across all sectors need attention to assist build strong structures (Ebekoziens et al., 2021a). These are components of the research gaps. Also, there is a paucity of academic literature concerning integrating relevant SDGs in Malaysia's low-cost housing delivery in the post-COVID-19 era. Few scholars attempted not emphasise LCH and develop a framework that will integrate relevant SDGs, such as Ebekoziens et al. (2021a) and Tan and Zainon (2022). Ebekoziens et al. (2021a) focused on Nigeria's built environment post-COVID-19 recovery and ways to achieve SDGs. Tan and Zainon (2022) focused on COVID-19 impact on quantity surveyors' practices in Malaysia. This study intends to improve homeownership for low-income households and achieve relevant SDGs linked with housing provision.

Studies show that the COVID-19 crisis may threaten achieving sustainable development goals (SDGs) associated with housing in developing countries, including Malaysia. LCH provision has been identified as one tool for achieving sustainability

goals via synergistic operations. However, studies about post-COVID-19 housing and SDGs integration are scarce in Malaysia. The study investigated the state of post-COVID-19 housing and developed a framework to integrate relevant SDGs in LCH provision in Malaysia. The outcome intends to improve homeownership for low-income households and enhance achieving relevant SDGs linked with housing provision in Malaysia. The study's main aim will be accomplished through the following research objectives:

To investigate the state of post-COVID-19 Malaysia's low-cost housing delivery.

To develop a framework to integrate relevant SDGs in post-COVID-19 Malaysia's low-cost housing delivery.

The study is split into eight main sections. The first section focuses on the introduction, including part of the study's justifications. The second section highlights previous related literature and is followed by the theoretical framework. Next is the research method that involves collecting data from 40 participants via in-depth virtual interviews across four cities in Malaysia. The fifth section is the analysed results via a thematic approach and discussion with reviewed literature. The study's implications were captured in the sixth section. The study's limitations follow, and lastly, the concluding section.

2. LCH provision in the era of COVID-19 and SDGs targets

Virus outbreaks are not new, but the density and global spread of COVID-19 within short time was of concern stakeholders. There was travel restrictions and health regulatory guidelines by many countries (Ayat et al., 2021; Ebekozién et al., 2021a). Many countries introduced territorial containment mechanisms (White and White, 2020). This includes social distancing, public gatherings ban, regular handwashing, and self-isolation. The socioeconomic influence of the pandemic on housing delivery, especially low-cost housing in many developing countries, including Malaysia, with insignificant mechanisms to check housing delivery, cannot be over-emphasised. Researchers highlighted COVID-19 impact on the built environment industry, including housing delivery, but the doubt of the condition may have hindered the success. Gamil and Alhagar (2020), Ogunnusi et al. (2020), and Ebekozién et al. (2021a) worked on COVID-19 and the industry, but their studies were not tailored toward accomplishing SDGs, apart from Ebekozién et al. (2021a) in Nigeria's context. Ebekozién et al. (2021a) work did not capture a proposed framework. These gaps, among others, will be filled in this study. Ebekozién et al. (2021a) recommended innovative skill-building and technologies, management competence improvement, budget increase on infrastructure, and encouraging construction firm's digitalisation via enabling environment as part of the measures to direct the post-COVID-19 recovery phase to accomplish SDGs. These points are germane and may influence growth in LCH provision. Gamil and Alhagar (2020) discovered financial issues, construction projects deferral, workforce deficiency, construction cost and time overrun, building material shortage, disruption of planning and scheduling of site activities, restriction of movement on the work and travel bans, etc., as the impacts of COVID-19 on Malaysia's built environment.

The need for a link between low-cost housing provision and sustainable society and environment components cannot be overstated. It may offer measures for sustainable development issues. The construction industry, inclusive of LCH provision, is a centre of economic activities and society's cultural customs (Opoku, 2016). The new SDGs aim to promote wellbeing and wealth by offering measures to the social, environmental, and economic problems associated with daily issues (Ebekozién et al., 2024a; Santos et al., 2021). These transformational aims are pertinent to all countries because they are set to eliminate or mitigate extreme poverty and protect environmental sustainability (Sahni and Chopra, 2022; Zhou and Moinuddin 2021). The United Nations News (2020) described sustainability as an idea that pedals a human's mindset concerning conserving the current without bargaining for the future. The mechanisms, approaches, and measures toward achieving the 17 SDGs should be a multi-stakeholder procedure (Ebekozién et al., 2024a; Opoku, 2016).

Robust construction activities, including increasing housing provision, may contribute to achieving SDGs connected with housing. Ebekozién et al. (2019a) asserted that eight SDGs have a link with the built environment. They are Goal 1 (no extreme poverty), Goal 3 (good health and wellbeing), Goal 6 (good water and sanitation), Goal 7 (affordable and reliable energy), Goal 9 (infrastructure development), Goal 10 (reduced inequalities), Goal 11 (sustainable cities and communities), and Goal 15 (protect the ecosystem). Based on the study's preliminary findings, Goal 13 (climate action) has a relationship with housing and is missing here. This is because cities should be ready for disasters derived from climate change. Regarding SDGs with housing delivery, Ebekozién et al. (2021b) narrowed the Goals to four. This includes Goals (1, 3, 10, and 11). These four Goals connect because shelter delivery enhances employment chances (a form of wealth distribution), and the subsequent impact would be development and economic growth. The outcome will mitigate inequalities. Also, the wellbeing and health will improve because studies have shown that a habitable environment improves inhabitants' well-being (World Bank Press Release, 2017). The overall outcome may be sustainable cities and communities across Malaysia if policies and programs are well implemented to boost SDGs and housing delivery. These goals interrelate within the built environment, resulting in economic development. Major SDGs affected by COVID-19 include Goals 1, 2, 3, 4, 5, 8, 10, and 16 (Leal Filho, 2021).

3. Theoretical framework to integrate SDGs in Malaysia's LCH Provision

The study's framework was generated from quality improvement (QI) tools and principles. The framework was modified to integrate relevant SDGs in Malaysia's low-cost housing delivery for advancing housing equity in the post-COVID-19 era. The QI framework is a stepwise approach to executing QI projects (Hamilton et al., 2020). Although QI is frequently used in the healthcare sector (Ebekozién et al., 2020b), Bailie and Wayte (2006) and McCabe (2014) acknowledged the usage in the construction sector. Bailie and Wayte (2006) used the technique in maximising the impact of housing programs on indigenous health. McCabe (2014) avowed that

practical experience of the construction industry’s contractors was brought to the sector regarding quality management and how they are implemented. Quality management is the canopy term for approaches to quality. Bernstein et al. (2019) affirmed that QI emerged in the late 1990s and early 2000s from human research protection programs (HRPP). The QI is a mechanism that focuses on how human subjects’ protection programme could enhance their operations and better fulfil their envisioned goal via a framework/guidance (Bernstein et al., 2019). The focus is on improving the overall effectiveness and efficiency of the HRPP via the best practice standards. The proposed framework will integrate relevant SDGs in Malaysia’s low-cost housing delivery and stir stakeholders to improve on LCH delivery in the post-COVID-19 era, promote research integrity, and support the research community for compliance. The framework’s comprehensive design makes it an ideal and powerful tool for accelerating improvement regarding equities in post-COVID-19 LCH provision, as presented in **Figure 1**. The model for improvement is one of the common QI frameworks. Others are Lean, Six Sigma, and Comprehensive Unit-Based Safety Programme (Hamilton et al., 2020). The model for improvement framework is easy and aligns with the study’s aims, ‘accelerating improvement’ for homeownership and achieving relevant SDGs connected with housing in the post-COVID-19 era in Malaysia. The framework is flexible and easy to interpret compared to other types of QI. Xu et al. (2021) affirmed that technology could play a role in enhancing construction sustainability.

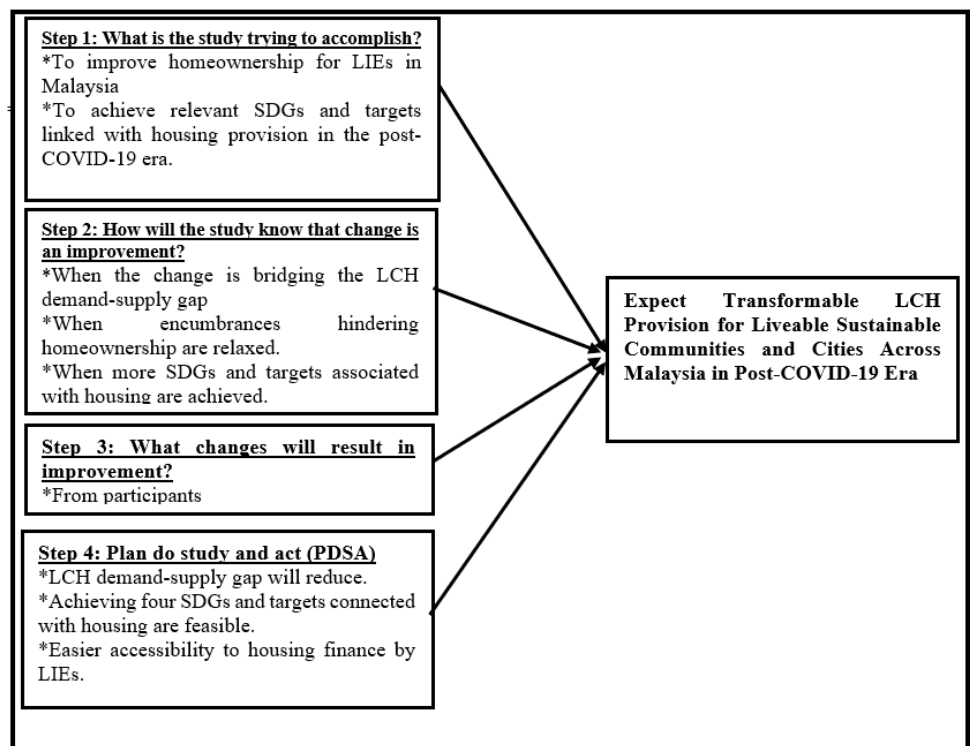


Figure 1. Proposed model for improvement framework.

Source: Modified from Braithwaite (2018); Hamilton et al. (2020).

Referring to **Figure 1**, the framework is divided into two parts: part 1 (steps 1, 2, and 3) and part 2 (step 4). In step 1, two major issues are what the study is trying to accomplish. This includes improving homeownership for LIEs in Malaysia and

achieving relevant SDGs and targets linked with housing provision in the post-COVID-19 era. In step 2, the study identifies three possible main changes that will show evidence of an improvement because of the change that has taken place. This includes when the change bridges the LCH demand-supply gap, when encumbrances hindering homeownership are relaxed, and when more SDGs and targets associated with housing are achieved. In step 3, the study will proffer the measures to improve LCH delivery in the post-COVID-19 era, focusing more on SDGs linked with housing. Whether measures from Ebekoziem et al. (2020a) such as increasing investment in homeownership, infusing housing education and advocacy, strengthening the safety net concept, enhancing LCH registration system to mitigate leakages via computerised open system, establishing sustainable housing finance for LIEs, and procuring land in urban areas for developers have been implemented, remain unresolved.

4. Research method

The study utilized a qualitative research design. Chandra and Shang (2019) avowed that a qualitative research design is rooted in interpretivism. Interpretivism takes instinctively as a social construct (Ebekoziem et al., 2022). The research was observed from a phenomenological perspective. Paley (2016) described the term “phenomenologically” that derived the “meaning” of the situation by engaging a group of persons via questioning. Thus, the study utilized a phenomenology research design, as presented in **Figure 2**.

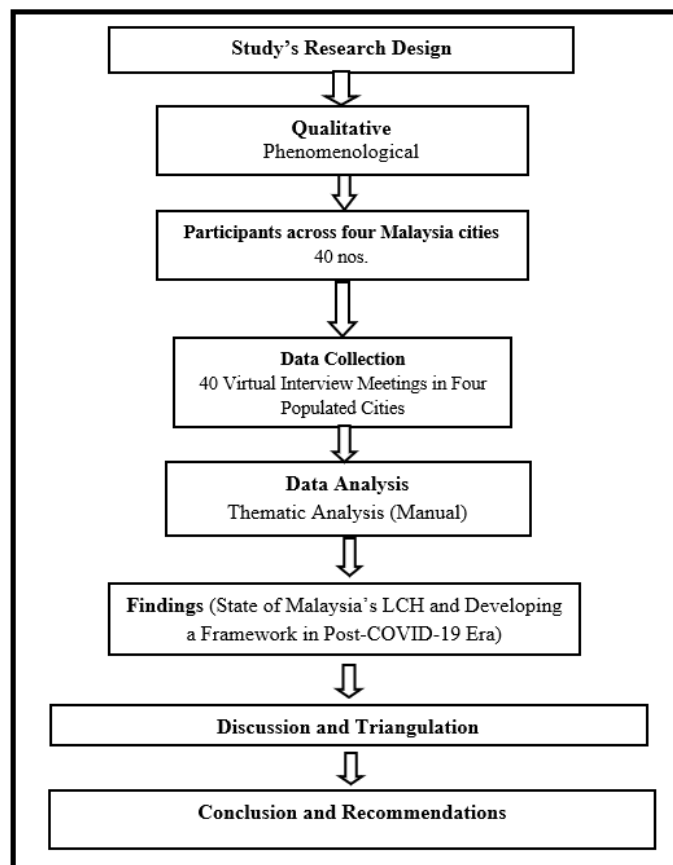


Figure 2. Framework of the study's research design.

Source: Modified from Ebekoziem et al. (2022, p. 8).

The research employed a purposeful sampling technique. Jaafar et al. (2021) and Ibrahim et al. (2022) opined that purposeful sampling targets interviewees who are considered well-informed in the subject matter. The researchers covered four Malaysia cities’ (Putrajaya, Kuching, Kuala Lumpur, and Pulau Pinang) in line with Ebekozién et al. (2022). They investigated the role of 4IR in managing Malaysia’s cities LCH solid waste in the COVID-19 era. Forty virtual interviews were conducted with selected experts who indicated interest. The study achieved saturation. The interviewees were selected from state/city housing department staff, housing developers, estate managers and valuers, LCH residents, and NGOs in housing and SDGs matters within the selected Malaysian cities were selected. Ebekozién (2019) affirmed that the study’s chosen cities were among the top populated Malaysian cities. The virtual interview was from April 2022 to early July 2022. A brief background description of the participants is presented in **Table 1**. The virtual interview took an average of 52 minutes. The study’s saturation was achieved with 40 interviewees. The interviewees were informed about the study’s aim and agreed to participate. Semi-structured questions were asked surrounding the state of Malaysia’s low-cost housing delivery in the post-COVID-19 era, SDGs linked with housing provision, ways to integrate relevant SDGs in Malaysia’s low-cost housing delivery, and measures to improve LCH delivery. The participants’ answers were presented in an anonymous form.

Table 1. Interviewees’ background description.

Description	Cities				Total
	A	B	C	D	
State/City housing department staff	P1, P2	P3, P4	P5, P6	P7, P8	8
Housing developers	P9, P10	P11, P12	P13, P14	P15, P16	8
Estate Managers and Valuers	P17	P18	P19	P20	4
LCH residents	P21, P22, P23	P24, P25, P26	P27, P28, P29	P30, P31, P32	12
NGOs (Housing and SDGs matters)	P33, P34	P35, P36	P37, P38	P39, P40	8
Total	10	10	10	10	40

Source: Authors work.

The researchers labelled words and sentences regarding the analysed data through the thematic system as the label. The label is to enhance the study’s generation variables in line with the objectives. The study utilized an open coding system of coding, for the transcription of interview data. Narrative, *invivo*, emotion, and themeing coding methods were utilized (Corbin and Strauss, 2015). Sixty-two codes were developed and re-ordered based on reference, frequency, and occurrence. Eight sub-themes were derived from the 62 codes and re-ranged to two main themes. The study eased fears about the validity of results via the triangulation of the data collection method (Tajeddini and Mueller, 2009). The analysed data and succeeding reporting of the results were based on 40 interviewees’ viewpoints.

5. Findings and discussion

The section presents the study's findings and discussion that emerged from the two main themes as follows.

5.1. Theme one: State of Malaysia's LCH

In this sub-section, the study's interviewees agree that the state of Malaysia's LCH delivery in the post-COVID-19 era is pathetic. Findings reveal that Malaysia struggled to tackle the LCH demand-supply gap across the country before the hit of COVID-19 in early 2020. The pandemic compounded the housing existing housing challenges, especially for the low-income groups that are always disadvantaged (P34, P36, & P40). Results align with Hamzah and Murphy (2014), BNM Annual Report (2015), and Ebekoziem (2019). Hamzah and Murphy (2014) found that in 2010, the LCH gap was 561,919 units from a total planned 1,509,410 units. BNM Annual Report (2015) reported that the gap between the households and the housing stock enlarged to 2.5 million units in 2015 from 2.1 million units in 2005. Ebekoziem (2019) found that Malaysia's housing target from the 2nd MP 1971–1975) to the 10th MP experienced a shortfall of 1,007,423 units (43.8%). Participants P6, P8, P20, P25, & P33 opine that various governments (state and federal) were trying to bridge the gap before the pandemic erupted and persisting with no clear end to the pandemic. Participant P6 says, “the unintentional COVID-19 crisis compounded some of the on-going LCH projects for rent-to-own schemes in some locations. The housing developers could not continue but recently re-mobilised to sites. We hope for normalcy, and full-scale construction work shall resume in two LCH sites. The government is eager to provide housing to the disadvantaged with limited resources. We have created the enabling environment and supported developers to develop LCH too...”. Results align with Ebekoziem et al. (2019b) and found that the government had made several attempts to improve housing delivery for this group via various programs and policies in the past. Housing provision threat is all-inclusive if not curtailed. Also, some SDGs and targets relate to housing provision (P34 & P38).

Findings reveal that besides COVID-19 influence on LCH provision, many other factors had and still influence LCH provision in Malaysia in the post-COVID-19 era. “in many developing countries, including Malaysia, a family should never spend more than 30% of their income on a home. In the pre-COVID-19 era, many urban poor (LIEs) were spending more than half or more of their income on a place to live because of housing scarcity in urban or semi-urban locations in Malaysia. Currently (post-COVID-19 era), as the significant economic impacts of COVID-19 continue to unfold, the number of families struggling to make ends meet is growing...”. Findings agree with Department of Statistics Malaysia (DOSM) (2020) and Joo et al. (2021). They affirmed that Malaysia's population is grouped into top 20 (T20), middle 40 (M40), and bottom 40 (B40). The household monthly earnings of the B40 are not above RM4,850 (US\$1/RM4.2), with a mean monthly income of RM3,166. Most of these groups live in LCH, if the job is not affected.

The core goal of ‘Malaysia's homeownership for all’ regarding the LIEs has failed (P11, P20, P25, & P33). Findings reveal that the existing housing system fails to provide sufficient policies and programs to mitigate unforeseen crises such as

COVID-19 against the most vulnerable households. The post-COVID-19 pandemic has compounded accessibility to safe, affordability, and stable housing. Millions of LIEs pay large portions of their income on house rent or live in indecent houses. This is a threat to achieving SDGs connected with housing. Participant P40 says, "...it has triggered chronic economic instability that may undermine the security and well-being of the disadvantaged. This may pull more LIEs households deeper into poverty and enhanced housing and economic insecurity if not checked...". Findings agree with Desmond and Gershenson (2016), Galvez et al. (2017), and Sachs et al. (2022). Desmond and Gershenson (2016) discovered that housing shortage could contribute to making low-income households fall prey to manipulative house owners, leading to unsustainable high rent burdens. Galvez et al. (2017) found that low-income families and children suffered more regarding housing. Also, there is a connection between housing insecurity and economic insecurity. Also, the global poverty rate has increased from 8.3% in 2019 to 9.2% in 2020, and households below the international poverty line increased from 6.7% in 2019 to 7.2% in 2020 (Sachs et al., 2022), Malaysia is not exempted. "The COVID-19 era compounded the existing issue. We saw construction sites shut down and workers, majorly LIEs laid off their jobs, and many placed on compulsory leave without pay...". The shot-down affected LCH delivery..." said Participant P7.

"...many Malaysians, especially the LIEs face greater housing unaffordability and insecurity. This is unacceptable. This cut across all races and produced deep-root gaps in wealth, enhancing segregation within the community because of lack of housing finance and privileges for affordable housing...". These factors contribute to a lack of equity in housing and a threat to housing as a safety net for low-income groups and, by extension, to SDGs connected with housing. Housing finance is one critical issue with many LIEs households in Malaysia. Results align with Ebekozen et al. (2019b), and it was discovered that there is a high rejection rate of LIEs eligibility for housing finance in Malaysia. The perception of entitlement mentality has not helped matter before and after the COVID-19 peak (P16, P22, P34, & P38). Participant P22 says, "...many of us believe that homeownership is a constitutional right but forgotten the Clause that talks about the availability of funds...".

5.2. Theme two: Develop a framework

From the all-embracing reviewed literature and findings, integrating relevant SDGs in the developed Malaysia's framework to improve LCH provision in the post-COVID-19 era is feasible, as presented in **Figure 3**. As previously discussed, the study adopted the developed framework from the model for improvement framework (Hamilton et al., 2020), a type of QI frameworks. It has four steps and further sub-grouped into two sections, as explained in Section Three. Findings reveal that the study's developed framework heart is step 3 where feasible measures emerged from the analysed data and were used to develop the framework. Findings across the board agree that the outcome improves transformable LCH provision for livable, sustainable communities and cities across Malaysia. The possibility of achieving SDGs associated with housing provision will be brightened with this transformation (P33, P37, & P39). The first two steps are the study's aim and research/problem statement.

In step 3, the study will proffer measures to improve LCH delivery in the post-COVID-19 era, focusing more on SDGs link with housing. First, findings across the board agree that Goal 1 (no extreme poverty), Goal 3 (good health and wellbeing), Goal 10 (reduced inequalities), and Goal 11 (sustainable cities and communities) are the major Goals that can be linked with housing delivery, especially as regards LIEs. Results align with Ebekoziem et al. (2021b) and slightly disagree with Ebekoziem et al. (2019a). Ebekoziem et al. (2019a) identified SDGs related to the entire built environment compared to Ebekoziem et al. (2021b), which reviewed only SDGs associated with housing provision. Second, the suggested measures that will improve LCH in the post-COVID-19 era and enhance SDGs related to housing were grouped into general and specific measures. The general cut across the board. The general includes increased investment in homeownership, infused housing education and advocacy, enhanced LCH registration system to mitigate leakages via computerised open system, procure land in urban areas for developers, relaxed conditions to access down payment, and establish sustainable housing finance for LIEs. For the specific measures including strength safety net concept, state vision should be integrated into housing policymaking, SDGs connected with housing should be given attention ‘win-win-scenario,’ and rent-to-own and rental schemes to be managed by the autonomous firm and subsidised, as presented in step 3, **Figure 3**.

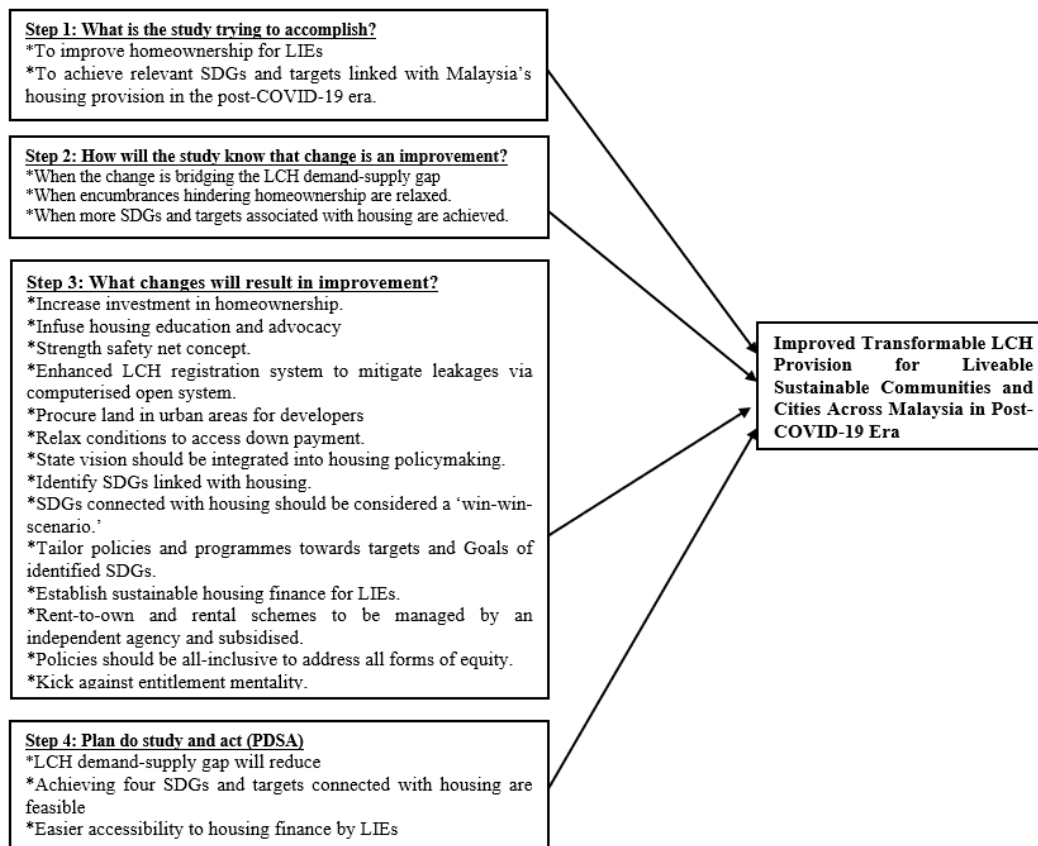


Figure 3. Developed framework to enhance achieving SDGs connected to housing and improve Malaysia’s LCH delivery in the post-COVID-19 era.

Source: Authors work.

It should be all-inclusive to address Malaysia's housing equity post-COVID-19 era (P2, P23, P36, & P39). Findings reveal that racial, class, gender, health, economic, and other forms of equity in housing should be addressed via feasible support at national and state levels. Participant P2 says, "... these programs and policies should promote and preserve affordable housing and generate innovative tools for housing stability...". Participants P13, P19, P23, P37 & P40 opine that policies and programs that will increase and broaden access to safe and adequate housing finance for underserved communities should be encouraged. This includes expanding funds for down payment assistance, encouraging mortgage institutions for fair lending, reviewing land use policies to be all-inclusionary and promoting equal opportunities for all, broadening economic mobility and access to communities with opportunities, etc. P37 says, "... equity in post-COVID-19 housing delivery is achievable if key SDGs connected with housing are promoted via better policies that can make it happen..." Findings show that there is no shortcut and quick approach to housing inequity. Key stakeholders need to understand this principle. "... focus should be on promoting feasible policies and programs solutions towards housing supply and preservation, especially for the underserved populations and communities in the post-COVID-19 era..." said Participant P33.

To strengthen the concept of 'housing as a safety net', findings suggest measures to explore via reform (P16). This includes housing support for low-income urban renters (P22), strengthening the legal framework for low-income renters (P33), and transforming the pattern housing aid is offered (P16 & P39). The outcome will enhance achieving SDGs linked with the housing via a policy framework. Regarding the issue of 'entitlement mentality,' it is an attitude that relevant stakeholders, especially non-governmental organizations should address. In this regard, enlightenment is critical, and information about available housing support, their rights as intending house owners or tenants, and eviction policies and practices cannot be over-emphasized (P37). The infusion of housing education and advocacy in the proposed framework will mitigate the negative outcome of the entitlement mentality of some Malaysians (P4, P8, P12, P18, P33, & P35). Results aligned with Galvez et al. (2017) and suggested that intending house owners and tenants may require information about available housing help and related matters.

For almost three years, the pandemic remains and transformed into various forms with harmful implications for LCH delivery. The shutdown of construction sites across the country in line with the movement control order (MCO) affected the supply chain of LCH to the LIEs households. Thus, findings suggest an increased investment in homeownership and rental assistance. It implies that Malaysia's Government should be willing to increase LCH budgets to cover the losses for the past three years (P4, P9, & P30). Addressing this issue via an extra LCH budget will promote housing for equity and inclusion. Findings agree with Bipartisan Policy Centre's Housing Commission (BPC 2013) and Desmond (2016). They affirmed that readdressing and increasing housing help to offer universal housing support for extremely LIEs would deeply impact households undergoing economic uncertainty. Besides the developed framework improving Malaysia's LCH delivery in the post-COVID-19 era, it will

enhance achieving SDGs connected to the housing. This is a dual benefit for Malaysia's livable, sustainable communities and cities.

6. Study's implications

This section presents the study's theoretical and practical implications.

6.1. The study's theory implication

The study examined the state of Malaysia's LCH delivery and developed a framework that can integrate relevant SDGs in LCH delivery in the post-COVID-19 era. Findings show LCH demand-supply gap is getting worse and should be curtailed. This indicates that developing a framework via QI mechanism is pertinent to improving LCH delivery in the post-COVID-19 era. Fourteen perceived measures emerged as the possible changes that will improve LCH provision in the post-COVID-19 era and enhance the identified four SDGs related to housing provision in Malaysia. The identified four SDGs are Goals 1, 3, 10, and 11. For the 14 perceived measures, refer to **Figure 3** for the highlights. Besides the previous studies not investigating the post-COVID-19 status of Malaysia's LCH and integrating related housing SDGs, developing a framework via QI was missing in past studies and formed part of the theoretical implications. The developed framework will enhance present housing helps and wide-ranging opportunities for inclusion, including environmental sustainability. The developed improvement framework is easy and aligns with the study's aims, 'accelerating improvement' for homeownership and achieving relevant SDGs connected with housing in the post-COVID-19 era in Malaysia.

6.2. The study's practice implication

Concerning the study's practical implication, the research offers stakeholders and policymakers the opportunities to explore measures that will assist affordable housing for the disadvantaged and focus on achieving SDGs connected with housing. Apart from these measures tailored toward inclusion, environmental sustainability, and economic security and mobility, they should be robust, equitable, and secure for all income groups in the 21st century post-COVID-19 era. This is germane and can be achieved. The emerged changes that will enhance improvement might benefit policymakers, housing developers, researchers, and other stakeholders to start looking beyond the post-COVID-19 era but focus on policies and programs that will promote affordable and accessible homes for all in the form of homeownership and tenancy agreements in urban locations. Housing policymakers, developers, and researchers might benefit from the changes that will improve Malaysia's LCH delivery in the post-COVID-19 era. From the international viewpoint, other countries with similar supposed LCH issues before and after the pandemic peak may modify and adapt to the perceived changes.

7. Limitations and areas for future study

This research is not excused from limitations. The study used a qualitative research design and covered only four populated cities (Putrajaya, Kuching, Kuala Lumpur, and Pulau Pinang). Also, the study used only 40 interviewees. The research

shows that this does not impact the quality of the results. Regarding future studies, the qualitative research design could be used in other developing cities with similar post-COVID-19 LCH issues. Future studies could be conducted to validate the study's findings. Also, there is a need to enlarge the scope for future studies via a mixed-methods or quantitative approach. This should be inspired.

8. Conclusion

The study investigated Malaysia's low-cost housing situation and developed a framework to integrate relevant SDGs in Malaysia's housing in the post-COVID-19 era through a phenomenology qualitative research design across four selected cities. The developed framework will improve housing delivery in the post-COVID-19 era, and relevant sustainable development goals connected with housing will be enhanced and tailored toward a positive outcome. This will lead to improved transformable housing provision for livable, sustainable communities. This mechanism will reawaken the stakeholders, especially the housing policymaker's and other government agencies/ministries/departments related to housing provision, to tailor their housing policies and programs toward the disadvantaged in Malaysia's housing provision. This is germane to bridge the demand-supply gap created before and during the pandemic. This study presented two outcomes: state of low-cost housing provision in the post-COVID-19 era and the developed framework to enhance achieving Goals connected to the housing and improve Malaysia's housing delivery. Findings showed that the state of Malaysia's low-cost housing delivery in the post-COVID-19 era is pathetic. This is a threat to the identified four Goals connected with housing provision if not addressed. Thus, the role of QI via a framework to improve housing delivery cannot be over-emphasized. Thus, the developed framework via the feasible emerging changes can be used to improve Malaysia's post-COVID-19 era housing delivery, as presented in **Figure 3**. The study's findings developed a framework that will expand stakeholders' knowledge. In practice, the framework should expand the knowledge of housing stakeholders concerning how to improve housing in the post-COVID-19 era and enhance achieving sustainable development goals related to housing. This is part of the study's contribution. The developed framework is all-inclusive, simple, and flexible.

In conclusion, a feasible framework to enhance achieving Goals connected to housing and improve Malaysia's housing delivery in the post-COVID-19 era will lead to improved transformable housing provision for livable, sustainable communities across Malaysia's cities. Thus, the government should consider emerging changes that will result in improving housing as part of the commitment to lead and improve housing provision in the post-COVID-19 era. This can enhance sustainable low-cost housing provision outcomes in Malaysia's post-COVID-19 era and in other developing nations with the same housing challenges. This study's outcome is intended to stir up key stakeholders.

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SAA, OA, MZS, and NANA; formal analysis, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA; investigation, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA; resources, AE, MAHA, CA, and MSS; data curation, AE, MAHA, CA, MSS, SAA, and OA; writing—original draft preparation, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA; writing—review and editing, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA; visualization, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA; supervision, AE, MAHA, CA, and MSS; project administration, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA; funding acquisition, AE, MAHA, CA, MSS, SAA, OA, MZS, and NANA. All authors have read and agreed to the published version of the manuscript.

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