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Affordable housing for low-income households through floor area ratio incentive: the case of Manohara settlement in Kathmandu, Nepal

Prabhakar Lal Karn[a] and Joon Park[b]

[a]Ministry of Urban Development, Government of Nepal, Kathmandu, Nepal; [b]International School of Urban Sciences, University of Seoul, Seoul, South Korea

ABSTRACT

The mismatch between the fast-growing urban population and limited urban infrastructure has become a challenge in many emerging cities. The lack of affordable housing leads to burgeoning informal settlements and Manohara informal settlement in Kathmandu is not an exception. This study aims to investigate the current situation in Manohara informal settlement and examine the feasibility of floor area ratio (FAR) incentive in providing affordable housing. A household survey in Manohara informal settlement and simulation analyses of FAR incentive found the followings. Firstly, given the limited budget and little control over the land of Kathmandu by the government, a planning tool focusing on development gain is a suitable option for housing provision for low-income households. Secondly, FAR incentive simulation of land size of 50,000 sq. ft. in Kathmandu shows that 50%p incentive allowance can add 33–93% extra profit to the developers in a housing project, which can be secured for affordable housing for public interest.

1. Introduction

In the year 2030, 40% of the world population, i.e. nearly three billion people will need access to housing and basic infrastructure (UN DESA 2014). Rapid urbanisation, poor land administration, and decreasing capability of housing supply in urban areas were illustrated as the reasons behind the growth of informal settlements (UN Habitat 2016).

In spite of the inflow of migrants to urban areas seeking better job opportunities, educational facilities, and social security, government policies are not enough to address housing requirements of the low-income households in many emerging cities. The lack of affordable housing in cities lead to the formation of informal settlements, and Manohara informal settlement in Kathmandu of Nepal is not an exception.

Kathmandu has been rapidly urbanised, and the population of migrated people in search of jobs and other economic opportunities has been increasing

(Thapa et al. 2008). The poor migrated people formed informal settlements by informally occupying public land. The reason behind squatter settlements were identified as low economic growth, poor coping capacity with housing that lacks basic services, substandard shelter, and natural disaster prone sites with unhealthy environment (Shrestha 2010c). In Kathmandu Valley, there were 51 squatter settlements consisting of 3,500 families, having a population of 17,000 (Lumanti 2008). Nearly 85% of those squatter settlements were near the river bank (Lumanti, 2008).

Those informal settlements dwellers have no Lalpurja, a legal document for the land ownership in Nepal, and majority of them have temporary housing. The Town Development Act (TDA 1988), Local Self Governance Act (LSGA 1999), National Housing Policy (NHP 1996), National Urban Policy (NUP 2007), National Shelter Policy (NSP 2012), and Town Directives have provisions to address housing and urbanisation

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CONTACT Joon Park ✉ joon.park@uos.ac.kr 🏢 International School of Urban Sciences, University of Seoul, Seoul 02504, South Korea

Another affiliation for Prabhakar Lal Karn is International School of Urban Sciences, University of Seoul, Seoul, South Korea

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problems of the low-income households, but these policies and directives were found to be inadequate and insufficient with limited resources to address the issue of low-income housing, particularly in Kathmandu (Shukla 2015).

Nepal government promulgated the new Constitution in 2015 that grants housing as a basic right for every citizen, but the current role of government in providing housing for squatters and low-income households has been limited.[1] In Kathmandu, not only the government but also the private sector fails to provide housing for low-income households. The National Shelter Policy in 2012, with its primary objective of providing housing for low-income households, was not effective due to lack of budget and available land. Private developers mainly target upper-middle-income households leaving the low-income households unable to afford houses in the normal market.

In this circumstance, this study tries to highlight value of use of planning tool as more economically sustainable way given limited government resources. In emerging cities like Kathmandu where development gains are mainly taken by the private sector, governments can use planning control in return for affordable housing units. For example, government can secure affordable housing units for low-income households by giving floor area ratio (FAR) incentive to private developers.

This study investigates the current affordability gap of residents in Manohara informal settlement and examines the feasibility of FAR incentive in providing more housing units for low-income households. It tries to show that the increase of FAR in planning tool can be an active measure that can consistently secure additional affordable housing units for low-income households in emerging cities facing pseudo-urbanisation.

2. Literature review

Addressing the problem of lack of affordable housing and related informal settlements, multilateral banks and international agencies such as USAID directly financed housing projects in developing countries (Pugh 1994). However, this conventional approach of supplying public housing revealed its limits in addressing the affordable housing shortage problem (Gattoni 2009). Keivani and Werna (2001) regarded the approach as an expensive one with little number

of beneficiaries, leaving out most of the urban poor resorting to informal settlements. In this context, Pugh (1994) observed the changing role played by the international community as enablers with its project by project approach that failed to eliminate squatter settlements. The recent policy trend in international aid to support housing finance, as an alternative, hardly succeeded and resulted in increased debt among the urban poor (Jones 2012).

Criticising the top-down approach, a body of research focused on the importance of a bottom-up approach (Bredenoord et al. 2020; Gattoni 2009; Goethert 2010; Greene and Rojas 2008; Park et al. 2019; Siddiqui and Khan 1994; Wakely and Riley 2011). This body of research highlighted the effectiveness of the self-help housing approach as an alternative way of improving informal settlements in an affordable manner. For example, Smets et al. (2014) emphasised the affordability of this approach based on its feature of a step-by-step process by residents themselves when time, funding, or building materials become available. Zhang et al. (2003) argue that the key factors of this approach are a high degree of self-finance and informality in construction materials for housing and infrastructure for low-income households.

However, the self-help approach also encountered significant criticisms in the 1980s and 1990s (see Burgess, 1985; Ward 1982; Mathéy 1992). Indeed, the local government's support including land tenure security, technical assistance, and availability of sites in peripheral area for temporary or permanent relocation can boost the effectiveness of this approach. In the same vein, Bredenoord and van Lindert (2010) re-emphasised the potential of 'assisted self-help' approach arguing for the importance of municipal and international cooperation.

However, even a successful assisted self-help approach has two main limitations. First is efficiency in the use of land. As self-help approach is more appropriate for detached houses, the provision of housing units per given land is less than in other types of housing such as condominiums. Second is that the approach is still based on small-scale projects and, therefore, is inadequate to accommodate the sharply increasing urban poor in emerging cities. A large-scale measure with a higher density is better for densely populated areas. In this context, the case of Ethiopia's affordable condominium housing is evaluated as a successful one (UN-Habitat 2010). The

countries without strong control over land ownership, like Ethiopia, depend more on other measures such as direct budget or grant, earmarked funds, and tax incentives. The US has achieved reasonably good results from block grant and Low-Income Housing Tax Credit (Orlebeke 2000). Most of the European countries adopted the combined set of social housing policies using grant, earmarked funds, and tax incentives (Scanlon et al. 2015). In addition to the combined set of measures, South Korea also showed effectiveness in providing large-scale social housing by adopting large-scale public-led land development with expropriation (see Ha 2002; La Grange and Jung 2004; Kim and Park 2016).

However, a majority of the rapidly catching up countries lack these measures. Nepal is not an exception. Nepal has no public developer and little control over the land market (World Bank 2013; Ishtiaque et al. 2017), and its fiscal and financial capacity is not yet mature enough to provide grant or establish earmarked funds for social housing.

Regulatory approach with engagement in development gain, then, can be an alternative. There is some research on the practices that involve the use of development gain to provide affordable housing (Duncan 1989; Oxley 2006; Crook et al. 2015). In addition to the practices in Sweden and the UK, the Inclusionary Housing Program in New York also takes the regulatory approach in providing affordable housing for low-income households in exchange of allowance of 'bonus' FAR.[2] FAR has been mainly used to control externalities like congestion, but as population of cities grow, increase in FAR can be used as an active option for urban management, such as promoting redevelopment or green building, securing public space or affordable housing for low-income households, etc. (Nobel et al. 1993; Qian et al. 2016; Shenvi and Slangen 2018).

There are few studies on the practice of FAR incentives in the emerging cities. In Mumbai, a new approach called slum redevelopment on site instead of slum clearance or slum upgrading was introduced by giving FAR incentives to private developers (Mukhija 2000). Although long time lags due to on-site redevelopment was a drawback of the case, this showed the potential of FAR incentive approach in providing affordable condominium housing in highly populated cities.

In spite of the potential of FAR in affordable housing, there are few studies that examine the feasibility of its application in local contexts using data. This study examines the feasibility of FAR incentive in securing houses for low-income households based on the enumeration of an informal settlement in Kathmandu.

3. Materials and methods

This study adopted research methodology of literature review, questionnaire survey, interview, and simulation analysis. The main research data were obtained from questionnaire survey on residents in Manohara informal settlement, and interview and survey on public officials.

The history of the housing projects and policies for low-income households was described to highlight the current conditions and available options left for housing policy for low-income households in Nepal. This was conducted by reviewing government official reports and academic literature, which was later confirmed by interviewees.

To understand the situation of low-income households, a household survey was conducted in Manohara, a typical informal settlement in Kathmandu. The case area, Manohara settlement, was formed in 2005 and has grown since with low-income households (see Figure 1). This particular settlement was chosen as the case in this study as it represents a typical informal settlement located in public land like river banks or hills near city centres. The estimated population of Manohara settlement is around 4,800 with 700 low-income households, and the population density was 470 persons per hectare in 2014 (Shukla 2015).

The main objective of the questionnaire survey was to find out the income levels, existing condition of houses, services in the living environment, socio-economic information, and preferences to housing type of the low-income households. The questionnaire survey lasted for nearly one month for some reasons. Firstly, most residents avoided the survey as they feared government evacuation and assumed that the survey was related to it. Secondly, residents also evaded the survey as the questionnaire included many questions regarding their private information which they did not want to reveal. Lastly, there was time constraint as most of the heads of households had to leave for work early morning. With the help of community leaders who understand the survey's academic purpose and shared this with the other residents, we were able to set representative households
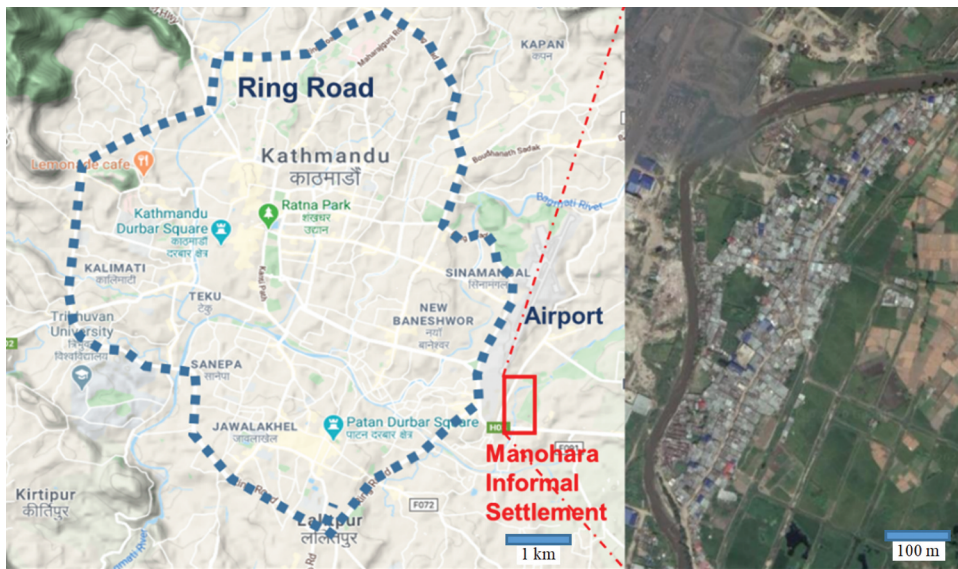
Figure 1. Location of Manohara settlement in Kathmandu.

and interview them. Due to the nature of jobs of the household heads, the survey had to be conducted before 8 AM and it took nearly one month for covering a total of 35 households. We used stratified sampling by block in the area and systematic sampling in each block for unbiased sampling.

The questionnaire, with mostly multiple choice questions, consists of five parts with 39 questions. The five parts are socio-economic information, living environment and services, current housing information and preferences to housing type. Questions were mainly about income, savings, water connection, waste disposal, road access, public transportation, house size, building material, reason of settlement, tenure status, preferred location for resettlement, preference to condominium type, willingness of moving into public rental housing, and rental payment level they can afford in public rental housing. In total, 160 responses were collected.

A series of interviews with nine professional engineers and architects in Kathmandu was conducted to find out the government's current housing policy, construction cost, and low-income households' current housing situation. Senior divisional engineers and architects from the Department of Urban Development and Building Construction (DUDBC) were chosen for the interview as DUDBC is responsible for the construction

and maintenance of government buildings, approved condominium building, and monitoring of condominium construction in Kathmandu. To calculate the construction cost of buildings, rate of construction materials was taken from the municipalities of Kathmandu and Bhaktapur.

In order to examine the feasibility of FAR incentive for affordable housing, we conducted an FAR simulation analysis based on land price, construction cost of condominium, and expected revenue with the market price. For the simulation analysis, the data related to land price were taken online real estate platforms in Nepal[3] and applied to the analysis. For the revenue with sales price of houses in the simulation, the estimation from the Nepal Land and Housing Developer Association (NLHDA) was adopted.[4] For the simulation analysis, it was assumed that the total exclusive residential floor area is 85% and 15% of the developed area is used for communal space such as staircase and open spaces.

4 A review on housing for low-income households in Kathmandu

In 2001, there were around 4.1 million houses and 4.2 million households with housing supply ratio of 0.98 in Nepal. Sharp increase of population in 10 years

Table 1. Housing supply ratio of Nepal.

Year	2001	2011	2021
Total number of houses (1)	4,174,374	4,623,653	5,643,945
Number of households (2)	4,253,220	5,423,297	6,761,059
Housing supply ratio (1)/(2)	0.98	0.85	0.84

Data: Central Bureau of Statistics, 2001, 2011, 2021.

with stagnated increase of housing stock led to a fall in the ratio to 0.85 with 4.6 million houses and 5.4 million households in 2011. There has been significant increase of housing provision of around 1 million in the following 10 years, but increase of households of 13 million made the ratio fall to 0.84 (see Table 1).

Kathmandu Valley, the capital city of Nepal, with an area of 721.87 km^2 (KVDA, 2016), accommodates around 2.9 million people (Preliminary Data of National Census 2021). It has been rapidly urbanised due to uneven resource allocation and rural-urban migration for higher job opportunities resulting in a high proportion of migrated population (Thapa et al. 2008). In 10 years from 2001 to 2011, the population of the capital increased by more than 50% and is expected to double by 2025 (KVDA 2011). Due to rapid urbanisation, Kathmandu Valley faces severe housing demands from the increasing population (see Table 2).

In Kathmandu, 62.5% of the households live in their own houses, while 33.1% of the individual housing stocks were available for rental purpose (GoN, 2010). In case of household and house size, 95% of

in the period of 2006–2020 in which 603,000 houses were needed in the urban areas, i.e. 60–70% of new construction of the total required housing. According to the Kathmandu Valley Development Authority (KVDA 2011), 435,662 additional housing units for the entire increasing population and an additional 14,376 units for low-income households who are under the poverty line are required by 2021. In spite of these forecasts and plans from the government, little stock of affordable housing has been provided as housing supply in Kathmandu heavily depends on the private sector.

As the capital became the political and economic hub that attracts people searching for jobs and economic opportunities, informal settlements in Kathmandu Valley is growing. Moreover, the civil war in Nepal from 1996 to 2006 was a major reason behind the increasing number of informal settlements with low-income households (Thapa et al. 2008). The informal settlers would like to take up complete ownership of land under their occupation and, if necessary, pay a nominal price much lesser than the market price to obtain the land ownership certificate. A majority of these informal settlements, nearly 85%, were along major rivers of the valley as it was easy to informally occupy public land there. Number of informal settlements and the squatter population has continuously increased and the growth rate between 1985 and 2002 was 25%

Table 2. Profile of Kathmandu valley.

District	Area (km^2)	Population (2001, Census)	Population (2011, Census)	Preliminary Data of 2021 Census	2025[a]
Kathmandu	395	1,081,845	1,740,977	2017,532	2,456,000
Lalitpur[b]	385	337,785	466,784	548,401	581,000
Bhaktpur	119	225,461	303,027	430,408	402,000
Total	899	1,645,091	2,510,788	2,996,341	3,439,000

Data: Census 2001, 2011, and 2021 (KVDA 2011; Government of Nepal 2012a; GoN, 2021).
http://www.kvda.gov.np/uploads/form/SDMP%20part1.pdf, http://www.kvda.gov.np/uploads/form/1521522245.pdf
[a]Estimation.
[b]There is areas of Lalitpur district which is not part of the Kathmandu Valley. However, the population of the entire district is provided here due to calculation complexities as the boundaries demarcation of the municipalities have changed several times between 2001 and 2021.

the families in Kathmandu have an average size of 4.8 persons with single rooms rented out and an average room size of 120 sq. ft. (Government of Nepal 2012a). According to the National Shelter Policy (Government of Nepal 2012b), in total, 3,015,000 additional houses were required in Nepal

Table 3. Growth trend of informal settlements in Kathmandu.

Year	Number of Informal Settlements	Number of Households (no.)	Squatter Populations
1987	17	NA	4000
2006	45	2844	13,243
2010	51	3500	17,000

Source: NEST (2010).

(Shrestha 2013). According to NEST (2010), the squatter population in Kathmandu increased from 4000 in 1987 to 17,000 by 2010 (see Table 3)

Although the government acknowledged the need for addressing housing issues for low-income households in the National Shelter Policy (Government of Nepal 2012b), existing policies and guidelines fail to provide affordable housing for them with the few stocks of public housing in Nepal.

There had been several government-led housing projects in Nepal. At the beginning of 1970, the government adopted sites-and-services approach as the subsidised housing approach, while in 1980, the approach shifted towards land pooling projects for providing serviced land for housing for mainly middle-income households (Shrestha 2010b; Shah and Mishra 2018). The government-initiated sites-and-services project in 1977, named 'Kuleswore Housing Project,' on 26.5 hectare of land, was the first housing project for government officials who had no land and house in Kathmandu Valley; but it was unsuccessful due to land acquisition problems (Shrestha 2010c). The introduction of land pooling in 1988 in Kathmandu was quite successful in providing serviced land for middle-income people, but its benefits did not reach the low-income households (Shah and Mishra 2018). After converting agriculture land to urban serviced land, the original land owners get 300% to 600% increase in their land value (Shrestha 2010b) as the government provides other facilities like water supply, electricity, and communication in these serviced areas. The low-income households' access to this type of land pooling plots was restricted as they had no land rights and could not afford the high price of the serviced plots.

Kirtipur housing project that was in line with the assisted self-help approach tried to upgrade a squatter area in Kathmandu Valley (Lumanti, 2005; Shrestha 2010c). Concerted efforts of the Kathmandu Metropolitan City, Urban Community Support Fund (UCSF), Asian Coalition for Housing Rights (ACHR), Slum Dwellers International, Action Aid Nepal, and Water Aid Nepal resulted in 44 two-storey houses (Lumanti, 2005; Shrestha 2010c). In spite of the achievement, issues regarding prolonged time of the project due to land tenure, inefficiency of land use caused by detached housing, and relocation of some residents still remain.

The government promulgated the Apartment Ownership Act in 1997 to increase private sector's involvement in the housing market, which resulted in the construction of private housing in Kathmandu. Although the government and private sector took initiatives of providing land and housing at a very early stage in 1970, the real benefits of these went to middle-income and high-income households rather than low-income households. With the Apartment Ownership Act, the private sector began to construct apartments targeting higher-income and higher-middle-income people, leaving the low-income households with little access to them (Shrestha 2010a, 2010c).

In 2009–2010, the government took a direct initiative to provide housing for low-income households through its People's Housing Programs called 'Janta Awas Karyakram' (Shah and Mishra 2018). The people's housing program was conducted in 27 different districts of Nepal for the people of marginalised groups with lower income, with a prerequisite of using locally available construction materials. In Kathmandu, unfortunately, this program was not launched, as land was not available. Another effort to provide housing for low-income households was launched in Kathmandu under the name of 'Ichangu Housing Project' with the Town Development Fund (Mishra 2019). A total of 233 units with a size of 30 sq. m. were constructed but the policy was not prepared for allotment as the housing units could not meet the actual demand. In addition, the government was unable to start similar projects for low-income households due to lack of funds, which shows the limits of such one-time projects.

Current measures to provide affordable housing for low-income households in Kathmandu face barriers of limited resources of grants or funds and little control over land. Some projects showed the limits of housing projects based on detached houses that cannot match housing needs. As Kathmandu's housing market is handled by private developers under governmental regulations and the government has little resources including land, an inducement policy on the private sector focusing on the distribution of development gain is one of the few options available. In this context, a planning tool of FAR incentive from condominium development needs to be highlighted as an option for sustainable housing provisions for low-income households in Kathmandu.
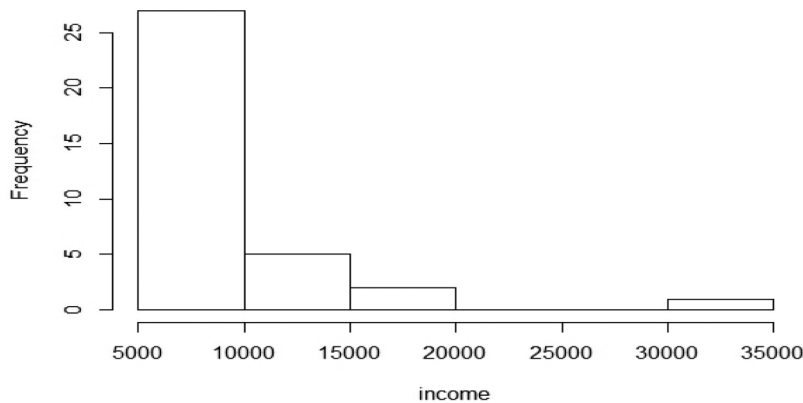
Figure 2. Distribution of households' income in Manohara settlement. Note: 1US\$ = 122 NRs.

5. Results and analysis

5.1. Questionnaire survey to household

From analysing the responses from the survey in Manohara settlement, it was found that the average household size was 4.57 persons, similar to the national index of 4.9 persons per family. 57% of the householders were self-employed. The average monthly income was found as NRs[5] 12,906 (US\$ 105.8); it lies between the first and second quintiles defined by the NLSS (GoN, 2015a).

From Figure 2, it can be seen that the income of most households (77%) in the settlement is less than NRs 10,000; it gives us the idea that distribution of income is similar among the residents. The standard deviation in income was NRs 4,952; this gives the idea of variation of income from the average income of households. The income variance of the households shows their difficulties towards housing affordability, because of inconsistent incomes.

The annual income of the people in urban Nepal was NRs 388,032 in 2014–2015 (GoN, 2015), and the annual income in the settlement was NRs 154,872, which shows that the average income of low-income households was less than half of the average income of people in urban Nepal. As the data is from 2014–2015, comparing it with the data from 2016–2017 will give us a scenario of less income of households.

Among the households, 34.3% save less than 10% of their income, 57.1% saved less than 30% and 8.6% of the households saved up to 30–50% of their monthly income. This means that a majority of
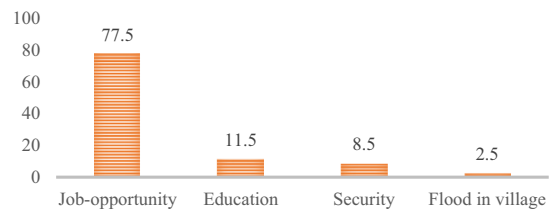
Figure 3. Motives of migration to Kathmandu.
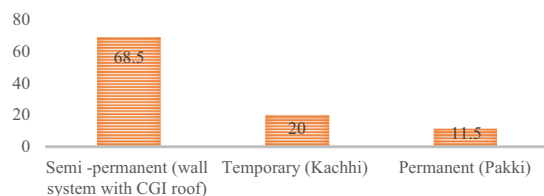
Figure 4. Types of housing in Manohara settlement.

households saved less than 30% of their average monthly income that was less than NRs 3,871; i.e. they saved only up to NRs 46,461 per year.

Majority of the households, nearly 60%, has at least a member who has completed 12 years of formal education. Seventy-seven per cent of the respondents have lived in the settlement for more than eight years, while 90% of them came from the eastern part of Nepal. Job opportunity was the major reason behind internal migration towards the capital after completing education (see Figure 3). In the initial days of their migration, people chose the particular settlement because of cheap rent (49%) and job accessibility

Figure 5. Current living condition of Manohara settlement.

(45%). The majority of the respondents, once settled down, incrementally constructed their own dwellings (94%) without ownership of land (100%).

Most of the responded households (82%) had occupied land of less than 856 sq. ft., with a single-storey house (80%) and with housing size less than 400 sq. ft. (82%). Majority of the houses were semi-permanent type houses with brick walls and corrugated galvanised sheet (CGI) roofing (68%) whereas 82% of the houses had cement plaster flooring (see Figures 4, 5).

Most of the responded households in the settlement were dissatisfied with their living environment due to poor access to water supply and services (91%), air pollution (80%), and access to road (57%). Poor access to drainage system (43%), waste management (41%), and public transportation (40%) were followed (see Figure 6).

The people in the settlement have been living there since around 2005 without legal rights. Most of the respondents said that they would shift to
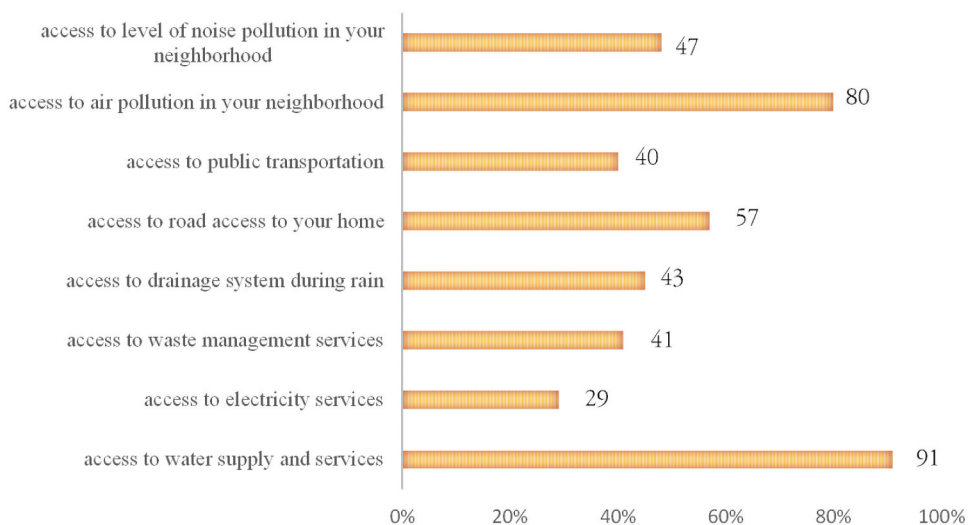

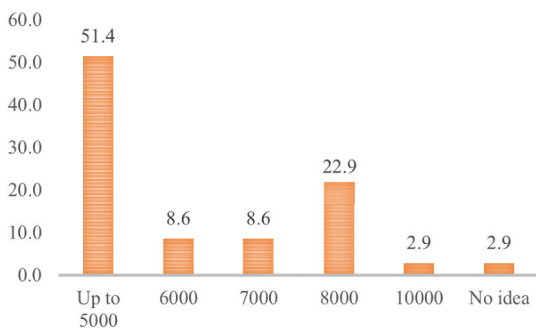**Figure 6.** Dissatisfaction level of households in Manohara settlement.

Figure 7. Willingness to pay for rental housing in Manohara settlement.

other informal settlements in case of government evacuation, as they have limited access to the formal housing market with their incomes.

Regarding housing and land finance, 66% of the households had no access to financial institutes while 33% knew about these institutes. Lack of proper mortgages also restricts them from investing in houses.

The majority of the responded households preferred a dwelling size of more than three rooms (45%). Only 25% of the households had moderate preferences for living in condominiums. Although, preferences of condominium were low, in case of public rental housing, households that were willing to pay rent on a monthly basis were surveyed.

In Figure 7, among the households, 51.4% were willing to pay up to NRs 5,000, 42.85% from NRs 5,000 to NRs 10,000, and 2% had no idea that they could get housing from the government on rental basis. It can be seen that a majority were willing to pay if the government provided adequate housing. Based on this, it was argued that the households were willing to pay a certain amount of money if the government provided public rental housing.

The survey showed that although people had limited access to financial institutes, their purpose was to get a house. They were willing to pay a certain amount on a monthly basis, if they were provided with better housing options by the government that strengthens the concept of condominium housing as public rental housing.

Thus, it is argued that the living environment of the settlement is unsatisfactory in the informally occupied public land; people's housing affordability is far below than those living in urban areas and their preference

to condominium is taken as positive. Households are willing to pay a monthly amount if the government provides adequate public rental housing.

5.2. Interview with engineers/architects

Most of experts, the interviewees, thought that land is not sufficient to build housing units for all the households, indicating land scarcity in Kathmandu. They thought that the government's role in providing housing to low-income households is not enough and the role of private developers is negligible in this regard. Two-thirds of them agreed that it is possible to provide affordable condominiums for low- and middle-income households in market in Kathmandu if there is a proper engagement of government.

The professionals also verified the calculation of construction cost based on the published rate of construction materials, rates of skilled labour, and other costs. As in case of Kathmandu valley, Kathmandu metropolitan city, Lalitpur metropolitan city and Bhaktapur metropolitan city were prepared and published rate of construction materials (GoN, 2016a; 2017a) From the rate of construction material, agencies in charge prepare rate analysis on the basis of norm for estimating cost of construction. For building construction, the officers of DUDBC including the interviewees take the rate form and prepare the standard estimates. The major provision on publication has rates of main construction material used in different type of construction.

On the basis of material rates in Table 4, the nine engineers and architects conduct rate analysis. There were variation of rate due to the factor that the engineers and architects were from different sections like Apartment section, People's housing Programme and different divisions in which they are involved in different type of housing estimation. The average estimated construction cost for condominium type of housing per unit area of sq. ft. can be calculated as NRs 3,778 per sq. ft. (US$ 31) on the basis of the rates.

Table 4. Rate of main construction materials.

Material	Cement OPC (For 50 kg)	Steel Bar (16 mm) (Per kg)	Brick (For 1,000)	Skilled Labour per Day
Rate (NRs)	910	74	14,500	910

Source: Kathmandu District/Construction material/Civil Rate 2073–74 (GoN, 2016; 2017).

Table 5. Major regulations and codes of condominium(apartment) in Kathmandu Valley.

Ground coverage ratio	50–80%
Floor area ratio (FAR)	175–400%
Minimum area of open land Surface	20% of plot area
Open area	30%
Front setback	6 and 8 m
Side and rear setback	4 and 6 m
Distance between two blocks	6 m

Source: Government of Nepal, Housing Bylaw 2064, Kathmandu Valley Development Authority.

5.3. FAR simulation

Compared with the direct provision of affordable housing including public rental housing, securing housing stocks for public rental housing through the planning tool of FAR incentive is less costly and more feasible. It is one of the few options available in the emerging cities where other measures of tax incentives, grants, funds or land provisions are not available or the scale is not significant.

This study tried to check the feasibility of FAR incentive in the Kathmandu context. For this, the current provision of building norms in Kathmandu metropolitan city was investigated according to the regulations and codes of the KVDA, which is the responsible government agency for preparing and regulating building bylaws in the area. In case of condominium, major regulations and codes are as follows in Table 5. Ground coverage ratio varies from 50% to 80%, and FAR varies from 175% to 400%. The ratio varies by different subdivisions such as conservation area, commercial area, mixed old residential area, and dense mixed residential area. There are also codes front, rear, and side setbacks.

In the simulation analysis, ground coverage ratio was assumed to be 60% and baseline FAR was assumed to be 200%. The analysis checked the extra profit from the allowance of 50%p more

FAR in each case and, then, calculated how many housing units for public rental housing can be secured from the extra profit.

Land price was calculated on the basis of the market price.[6] Based on the survey on the marketland price, this study takes the land price of 20,000 NRs/sq. ft. for inside Ring Road,[7] 7,000 NRs/sq. ft. for outside Ring Road.[8] For the Manohara site 7,500 NRs/sq. ft. is taken. For the calculation of the revenue with sales price of houses in the simulation, information from market price and the NLHDA was adopted. This gives the unit revenue for developers as NRs 21,621 per sq. ft. for inside Ring Road and NRs 14,221 per sq. ft. outside Ring Road.

The details of cost and revenue based on land price, cost of construction, expected sales price, and management cost assumed as 5% of the total cost are as follows in Table 6.

On the basis of these, FAR simulation analysis was conducted in the scenario of increasing FAR by 10%p up to 50%p in the cases of Manohara settlement, inside Ring Road, and outside Ring Road.

Table 7 shows the results of the simulation analysis in Manohara settlement. The unit cost and unit revenue per sq. ft. in Manohara settlement were found to be NRs 9,323 and NRs 21,621, respectively. As it is located outside but adjacent to the Ring Road and close to the city centre sales price similar to that of the inside Ring Road are applied. If 50%p of FAR incentive is allowed, the total cost increases by 12.5%, up to 892 million NRs, and total revenue increases by 25% up to 2,297 million NRs, given the 50,000 sq. ft. of land and base FAR of 2.0. This will allow 360 million NRs worth of extra profit which can enable the developers to provide extra 42,891 sq. ft. which is equivalent to 128 units of houses with a minimum dwelling size of 323 sq. ft (30 sq. m) on site.

Table 6. Details of cost and revenue in house building in Kathmandu valley (unit: NRs/sq. ft.).

Location	Cost			UnitRevenue
	Construction	Land Price*	Management Cost	
Manohara settlement	3,778	7,500	5% of total cost	21,621
Inside Ring Road	3,778	20,000	5% of total cost	21,621
Outside Ring Road	3,778	7,000	5% of total cost	14,221

Note: [a]Land prices are taken from three areas of Manohara, Soltimode inside Ring Road, and Naikap outside Ring Road.

Table 7. FAR simulation in Manohara settlement (units: sq. ft., million NRs).

Land Area	FAR	Built-up Area	Usable Built-up Area[a]	Total Cost[b]	Total Revenue[c]	Total Profit	Extra Profit	Extra Floor Area 1[d]	Extra Unit 1[e]	Extra Floor Area 2[f]	Extra Unit 2[g]
50,000	200	100,000	85,000	792	1838	1045	0	0	0	0	0
50,000	210	105,000	89,250	812	1930	1117	72	4250	13	7911	24
50,000	220	110,000	93,500	832	2022	1189	144	8500	26	16,180	48
50,000	230	115,000	97,750	852	2113	1261	216	12,750	39	24,781	74
50,000	240	120,000	102,000	872	2205	1333	288	17,000	53	33,692	101
50,000	250	125,000	106,250	892	2297	1405	360	21,250	66	42,891	128

Note: [a]Exclusive residential floor area is 85% taking out 15% for staircase, lifts, etc.
[b]Unit cost per sq. ft. is NRs 9,323.
[c]Unit revenue per sq. ft. is NRs 21,621.
[d, f]Direct increase in floor area from FAR incentive and that calculated back with extra profit.
[e, g]Extra unit of housing unit from the increase in built-up area from extra floor areas 1 and 2.
  323 sq. ft. (30 sq. m) of minimum dwelling size is applied.

Table 8. FAR simulation model inside Ring Road (units: sq. ft., million NRs).

Land Area	FAR	Built-up Area	Usable Built-up Area[a]	Total Cost[b]	Total Revenue[c]	Total Profit	Extra Profit	Extra Floor Area 1[d]	Extra Unit 1[e]	Extra Floor Area 2[f]	Extra Unit 2[g]
50,000	200	100,000	85,000	1450	1838	387	0	0	0	0	0
50,000	210	105,000	89,250	1470	1930	459	72	4250	13	4371	13
50,000	220	110,000	93,500	1490	2022	531	144	8500	26	9036	27
50,000	230	115,000	97,750	1510	2113	603	216	12,750	39	13,984	42
50,000	240	120,000	102,000	1530	2205	675	288	17,000	53	19,203	57
50,000	250	125,000	106,250	1550	2297	747	360	21,250	66	24,683	74

Note: [a]Exclusive residential floor area is 85% taking out 15% for staircase, lifts, etc.
[b]Unit cost per sq. ft. is NRs. 17,063.
[c]Unit revenue per sq. ft. is NRs. 21,621.
[d, f]Direct increase in floor area from FAR incentive and that calculated back with extra profit.
[e, g]Extra unit of housing unit from the increase in built-up area from extra floor areas 1 and 2.
  323 sq. ft. (30 sq. m) of minimum dwelling size is applied.

Table 9. FAR simulation model outside Ring Road (units: sq. ft., million NRs).

Land Area	FAR	Built-up Area	Usable Built-up Area[a]	Total Cost[b]	Total Revenue[c]	Total Profit	Extra Profit	Extra Floor Area 1[d]	Extra Unit 1[e]	Extra Floor Area 2[f]	Extra Unit 2[g]
50,000	200	100,000	85,000	590	1209	619	0	0	0	0	0
50,000	210	105,000	89,250	610	1269	659	41	4250	13	5935	18
50,000	220	110,000	93,500	630	1330	700	81	8500	26	12,043	36
50,000	230	115,000	97,750	650	1390	741	122	12,750	39	18,308	55
50,000	240	120,000	102,000	669	1451	781	162	17,000	53	24,715	74
50,000	250	125,000	106,250	689	1511	822	203	21,250	66	31,253	93

Note: [a]Exclusive residential floor area is 85% taking out 15% for staircase, lifts, etc.
[b]Unit cost per sq. ft. is NRs. 6,941.
[c]Unit revenue per sq. ft. is NRs. 14,221.
[d,f]Direct increase in floor area from FAR incentive and that calculated back with extra profit.
[e,g]Extra unit of housing unit from the increase in built-up area from extra floor areas 1 and 2.
  323 sq. ft. (30 sq. m) of minimum dwelling size is applied.

Table 8 shows the results of the simulation analysis inside Ring Road. In the second simulation, unit cost and unit revenue per sq. ft. of NRs 17,063 and NRs 21,621, respectively, are applied in a site within the Ring Road area. If 50%p of FAR incentive is allowed, the total cost increases by 6.9%, up to 1,550 million NRs, and total revenue increases by 25% up to 2,297 million NRs, given the 50,000 sq. ft. of land and base FAR of 2.0. This will allow 360 million NRs worth of extra profit which can enable the developers to provide extra 24,683 sq. ft. which is equivalent to 74 units of houses with a minimum dwelling size of 323 sq. ft (30 sq. m) on site.

Table 9 shows the results of the simulation analysis outside Ring Road. In the third simulation, unit cost and unit revenue per sq. ft. of NRs 6,941 and NRs 14,221 respectively are applied in a site outside the Ring Road area. If 50%p of FAR incentive is allowed, the total cost increases by 16.9%, up to 689 million NRs, and total revenue increases by 25% up to 1,511 million NRs, given the 50,000 sq. ft. of land and base FAR of 2.0. This will allow 203 million NRs worth of extra profit which can enable the developers to provide extra 31,253 sq. ft. which is equivalent to 93 units of houses with a minimum dwelling size of 323 sq. ft (30 sq. m) on site. However, in all cases, as the maximum increased floor area by FAR incentive is 21,250 sq. ft., the planning authority can secure a maximum of 66 more units with a minimum dwelling size on site. The planning authority can levy the leftover of it and use it to provide affordable housing in other areas. The authority may secure these 66 units for public rental housing or try to increase the number of affordable housing by regulating the price of certain number of units, for instance 100 units at half the price, guaranteeing profit to the developers.

6. Conclusion

The single effort of low-income households is insufficient to afford a housing unit as land and housing prices were much higher than their affordability level in Kathmandu. The current measures of government to provide affordable housing for low-income households in Kathmandu are also inadequate. There are barriers of limited resources for grants, funds, or financial schemes and little control over land. Small-scale projects of detached houses showed the limit in matching the increasing needs for affordable housing. Considering the domination of private developers in the housing market in Kathmandu, an inducement policy on the private sector focusing on the distribution of development gain is one of the options available. In this context, this study examined the feasibility of a planning tool of FAR incentive with a simulation analysis on Manohara settlement and Kathmandu valley as a measure to secure affordable housing units.

As the National Shelter Policy, 2012 failed to address the housing needs of low-income households in Kathmandu, a separate policy for them needs to be considered. In the set of new policies, FAR incentive in

return of affordable housing can be used as a useful measure, in the same way of New York zoning and the UK's section 106 in the Town and Country Planning Act.

Notes

1. The government is planning to provide land to the landless and formalise the informality from 2022. See more information at https://english.onlinekhabar.com/land-commission-assurance-landless.html.
2. https://www1.nyc.gov/site/planning/zoning/districts-tools/inclusionary-housing.page accessed on 2022.5.3.
3. See more at www.gharghaderi.com.
4. Kathmandu Valley Development Authority. 2007. Housing Bylaw 2064.
5. Nepalese Rupee, 1US$ = 122 NRs as of March 2020.
6. Although there is minimum land valuation book by the Land Revenue Office of Government of Nepal based on the local offices that collect revenue from land sales (Government of Nepal 2015b, 2016b, 2017b), but the it is underestimated.
7. This is from Soltimode inside Ring Road.
8. This is from Naikap, Bishnu Devi Mandir outside Ring Road.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Prabhakar Lal Karn is a senior engineer in the Ministry of Urban Development, Government of Nepal. With full scholarship by KOICA, he joined the master programme for Urban and Regional Development in International School of Urban Sciences in University of Seoul. After successful completion of the degree, he returned to his department and work for the redevelopment of residential area in Nepal. His major research interests covers affordable housing, redevelopment, resilence agains natural disaster, and sustainable architecture. maxplk26@gmail.com

Joon Park is an urban economist working mainly in the fields of land/urban economics, housing market analysis, spatial analysis, smart city, and international development. He worked as an associate research fellow in Korea Research Institute for Human Settlements (KRIHS) mainly engaging in projects of land, housing, and real estate policies. Major themes in his recent research have

included the structure of land rents in an urban context; impacts of expansion of cities on house prices; urban structure and CO2 emissions; transformation of spatial housing submarkets; assisted self-help housing; sustainable urban development; and more broadly the application of land rent theory and spatial analysis to questions of the structure of cities. joon.park@uos.ac.kr.

References

Bredenoord J, Park J, Kim K. 2020. The significance of community training centers in building affordable housing and developing settlements. Sustainability. 12(7):2952. doi:10.3390/su12072952.

Bredenoord J, van Lindert P. 2010. Pro-poor housing policies: rethinking the potential of assisted self-help housing. Habitat Int. 34(3):278–287. doi:10.1016/j.habitatint.2009.12.001.

Burgess R. 1985. The limits of state self–help housing programmes. Dev Change. 16(2):271–312. doi:10.1111/j.1467-7660.1985.tb00211.x.

Crook T, Henneberry J, and Whitehead C. 2015. Planning gain: providing infrastructure and affordable housing. Oxford: John Wiley & Sons.

Duncan S. 1989. Development gains and housing provision in Britain and Sweden. Trans Inst Br Geogr. 14(2):157–172. doi:10.2307/622810.

Gattoni G. 2009. A case for the incremental housing process in sites-and-services programs and comments on a new initiative in Guyana.

Goethert R. 2010. Incremental housing. Monday Dev. 9:23–25.

Government of Nepal. 2010. Nepal living standard survey, 2010/11. Kathmandu:Central Bureau of Statistics, Nepal.

Government of Nepal. 2012a. National population and housing census 2011. Kathmandu:Central Bureau of Statistics, Nepal.

Government of Nepal. 2012b. The shelter policy. Kathmandu: Ministry of Urban Development.

Government of Nepal. 2015a. Fifth Household Budget Survey, Nepal (Mid-February 2014 – mid-February 2015). Kathmandu: Nepal Rastra Bank.

Government of Nepal. 2015b. Minimum land valuation book. Kathmandu (Bhaktapur and Lalitpur):Land Revenue Office.

Government of Nepal. 2016a. Construction material rate. Kathmandu: Kathmandu Metropolitan City.

Government of Nepal. 2016b. Minimum land valuation book. Kathmandu (Bhaktapur and Lalitpur):Land Revenue Office.

Government of Nepal. 2017a. Construction material rate. Kathmandu:District Development Office.

Government of Nepal. 2017b. Minimum land valuation book. Kathmandu (Bhaktapur and Lalitpur):Land Revenue Office.

Government of Nepal, 2021, Final preliminary report of national population census 2021.

Greene M, Rojas E. 2008. Incremental construction: a strategy to facilitate access to housing. Environ Urban. 20(1):89–108. doi:10.1177/0956247808089150.

Ha SK. 2002. The urban poor; rental accommodations, and housing policy in Korea. Cities. 19(3):195–203. doi:10.1016/S0264-2751(02)00016-1.

Ishtiaque A, Milan Shrestha M, Chhetri N. 2017. Rapid urban growth in the Kathmandu Valley, Nepal: monitoring land use land cover dynamics of a Himalayan city with Landsat imageries. Environments. 4(72):72. doi:10.3390/environments4040072.

Jones BG. 2012. 'Bankable slums': the global politics of slum upgrading. Third World Q. 33(5):769–789. doi:10.1080/01436597.2012.679027.

Kathmandu Valley Development Authority. 2016. 20 Years Strategic Development Master Plan (2015 – 2035) for Kathmandu Valley Draft Report.

Keivani R, Werna E. 2001. Modes of housing provision in developing countries. Prog Plann. 55(2):65–118. doi:10.1016/S0305-9006(00)00022-2.

Kim KH, Park M, 2016. Housing policy in the Republic of Korea. ADBI Working Paper 570, Tokyo: Asian Development Bank Institute.

KVDA. 2011. Kathmandu valley 2035 and Beyond: 20 years strategic development master plan 2015-2035 for Kathmandu Valley. Kathmandu: KVDA.

NEST. 2010. physical mapping of the squatter settlements suitable along the Bagmati river corridor (East-West) in the Kathmandu valley, ministry of physical planning and works. Kathmandu: Government of Nepal.

La Grange A, Jung HN. 2004. The commodification of land and housing: the case of South Korea. Hous Stud. 19(4):557–580. doi:10.1080/0267303042000221963.

Lumanti Support Group for Shelter. 2005. New beginnings: housing the urban poor, A case study of Kirtipur housing project, Kathmandu, Lumanti.

Lumanti Support Group for Shelter. 2008. Status of squatter communities along the Bagmati River and its tributaries in the Kathmandu Valley, Kathmandu, Lumanti.

Mathéy K. Eds. 1992. Beyond self-help housing. London (England): Mansell.

Mishra AK. 2019. Housing needs fulfilment for low-income group. Intl J Livable Space. 4(2):40–47. doi:10.25105/livas.v4i2.5630.

Mukhija V. 2000. Squatters as developers? Mumbai Slum dwellers as equity partners in redevelopment. Partial Fulfillment of the Requirement for the Degree of Doctor of Philosophy in Urban Development & Planning. Cambridge: Massachusetts Institute of Technology; p. 141–187.

Nobel AM, Nobel GA, Costa JF. 1993. Floor area ratio as an urban development tool, The case of West Palm Beach. Land Use Policy. 10(2):127–139. doi:10.1016/0264-8377(93)90004-T.

Orlebeke CJ. 2000. The evolution of Low-Income housing policy, 1949 to 1999. Hous Policy Debate. 11(2):489–520. doi:10.1080/10511482.2000.9521375.

Oxley M. 2006. The gain from the planning–gain supplement: a consideration of the proposal for a new tax to boost housing supply in the UK. Eur J Housing Policy. 6(1):101–113. doi:10.1080/14616710600585757.

Park J, Lim Y, Kim K, Wang H. 2019. Revisit to incremental housing focusing on the role of a comprehensive community centre: the case of Jinja, Uganda. Int J Urban Sci. 23(2):226–245. doi:10.1080/12265934.2018.1488605.

Pugh C. 1994. Housing policy development in developing countries, The World Bank and Internationalization,1972-93. Cities. 11(3):159–180. doi:10.1016/0264-2751(94)90057-4.

Qian QK, Fan K, Chan EH. 2016. Regulatory incentives for green buildings: gross floor area concessions. Build Res Inf. 44(5–6):675–693. doi:10.1080/09613218.2016.1181874.

Scanlon K, Fernández Arrigoitia M, Whitehead CM. 2015. Social housing in Europe. Eur Policy Anal. 17:1–12.

Shah SK, Mishra AK. 2018. Review on global practice of housing demand fulfilment for low income group people.

Shenvi A, Slangen RH, 2018. Enabling smart urban redevelopment in India through floor area ratio incentives. ADB South Asia Working Paper series No. 58

Shrestha BK. 2010a. Squatter settlement of the Kathmandu Valley: looking through the prism of land right and tenure security, Urban Land Market Conference- Rethinking Emerging Land Markets in rapidly growing Southern African Cities. 31st Oct. -3rd Nov.-2010, South Africa

Shrestha BK. 2010b. Housing provision in the Kathmandu Valley: public agency and private sector initiation. Urbani izziv. 21(2):85–95. doi:10.5379/urbani-izziv-en-2010-21-02-002.

Shrestha BK. 2010c. Safer and affordable housing for urban poor: a case for Kathmandu Valley. ADB: Government of Nepal.

Shrestha BK. 2013. Squatter settlements in the Kathmandu Valley: looking through the prism of land rights and tenure security. Kathmandu: Urban Forum. doi:10.1007/s12132-013-9189-x

Shukla TK. 2015. From Occupied to Legitimized, Role of Social Capital in Legitimization of Land- case of Squatter Settlements in Kathmandu Nepal [MSc. Thesis]. Norwegian University of Science and Technology, pp. 1–37

Siddiqui TA, Khan MA. 1994. The incremental development scheme. Third World Plann Rev. 16(3):277–291. doi:10.3828/twpr.16.3.l5633l422q67067q.

Smets P, Bredenoor J, Van Lindert P. 2014. Introduction: governance, sustainability and affordability of low-income housing. In: Bredenoord J, Van Lindert P, Smets P, editors. Affordable housing in the urban global south. New York (USA): Earthscan; p. 1–14.

Thapa RB, Murayama Y, Ale S. 2008. City profile Kathmandu. Cities. 25(1):45–57. doi:10.1016/j.cities.2007.10.001.

UN DESA. 2014. World urbanization prospects: the 2014 revision.

UN-Habitat. 2010. The Ethiopia case of condominium housing: the integrated housing development programme. Nairobi: United Nations Human Settlements Programme.

UN Habitat, 2016. Slum Almanac 2015-2016.

Wakely P, Riley E. 2011. The case for incremental housing. Washington (D.C., U.S.A): Cities Alliance.

Ward PM. Eds. 1982. Self-help housing: a critique. London (England): Mansell.

World Bank. 2013. Nepal Kathmandu Valley urban policy dialogue. Washington, DC: World Bank South Asia Urban Unit.

Zhang LSXB, Zhao SX, Tian JP. 2003. Self-help in housing and chengzhongcun in China's urbanization. Int J Urban Reg Res. 27(4):912–937. doi:10.1111/j.0309-1317.2003.00491.x.

Appendix: Interviewee lists

No.	Name	Affiliation	Position	Main questions
1	Parikshit Kadariya	DUDBC	Senior Divisional Engineer	- Housing affordability of low-income households
2	Pratigya Manandhar	DUDBC	Senior Divisional Engineer	- Available public supports for low-income households
3	Chandra Sekhar Mahato	DUDBC	Senior Divisional Engineer	- Appropriate housing type for low-income households - Evaluation of the current housing policy for low-income households
4	Dipak Shrestha	DUDBC	Urban Planner	- Housing affordability of low-income households
5	Bijay Keshar Khanal	DUDBC	Urban Planner	- Evaluation of the current housing policy for low-income households
6	Aashish Shrestha	DUDBC	Civil Engineer	- Building costs and revenue for condominium housing
7	Rudra Narayan Mishra	DUDBC	Civil Engineer	- Appropriate housing type for low-income households
8	Sashi Yadav	DUDBC	Civil Engineer	
9	Kritish Raj Shrestha	DUDBC	Civil Engineer	