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Title of the Paper:

**The Hybrid Villa-Apartment as a Land-saving Housing Alternative:
Case Study of Greater Khartoum, Sudan**

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Author: Gamal M. Hamid, Ph.D.¹,

¹ Associate Professor, Faculty of Architecture, University of Khartoum,
gmhamid01@gmail.com

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Executive Summary

A recent study of land utilization in Khartoum has shown that housing consumes 60 per cent of land. It demonstrated that nine variations of *formal* land and housing supply mechanisms have benefited 55 per cent of households, whereas the remaining demand was satisfied through *informal* HLSMs.

Home-ownership in Sudan amounts to 80 per cent of total households. However, most of it is in the form of single-family housing, or hitherto undeveloped lands. Low-rise, single-family housing is dominant throughout Sudan, which results in massive sprawl and wasteful utilization of a valuable finite resource – land.

The hybrid villa-apartment has gained prominence recently as a nascent form of housing. Composed of a family villa, mostly on the ground floor, and rental units, mostly on upper floors, it represents an efficient form of housing that does not require substantial investments as do apartment blocks. At the same time, it constitutes an efficient form of land utilization that facilitates curbing urban sprawl.

Based primarily on secondary data, this paper traces the genesis of villa-apartments, explains their characteristics and assesses users' satisfaction with them. It advocates a change in planning and building by-laws to facilitate their promulgation, and introduction of flexible funding mechanisms to accelerate their proliferation.

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Introduction

With an area of 1.8 million square kilometres, Sudan ranks 3rd in the Arab world. Similarly, it ranked 3rd in the Arab world in terms of population, with about 40 million people in 2018. The alarming annual population growth rate of 2.8 per cent means that Sudan's population could double every 16 years. The concomitant demand for housing, jobs and services also doubles within this short period of time. With a stagnating national economy and runaway inflation, capital investments in housing and infrastructure are very limited, leading to a crisis situation in this important sector.

The objective of this paper is to investigate the recent transformations taking place in housing forms in Greater Khartoum in response to current heavy socio-economic pressures. In particular the paper focuses on a relatively new form of urban housing, hybrid villa-apartments, which is combination of both types of housing that has gained prominence in recent decades. According to a recent study (Osman, 2015), some 80 per

cent of new housing constructed in new upper-class neighbourhoods of Greater Khartoum are built as hybrid villa-apartments.

The paper puts forth the hypothesis that those transformations are resulting in more sustainable use of finite resources – namely, urban land, which has been irrationally used in the past through the adoption of wasteful planning standards.

Methodology

This research is a synthesis of a larger research project conducted at the Faculty of Architecture, University of Khartoum, on the genesis and ramifications of hybrid villa-apartments. Hence, the research methods adopted in this paper include desk study of relevant literature on housing and urban land in Sudan, including census data, several published and unpublished book, manuscripts, research papers and theses that were in turn based on fieldwork that involved documentation and analysis of stratified samples of in various parts of Greater Khartoum. The research methods used in those studies involved also semi-structured interviews with villa and apartment residents to elucidate their views vis-à-vis this budding form of urban housing.

Urbanization in Sudan and Greater Khartoum

During the past three decades Sudan has been experiencing rapid urbanization at an annual rate of 4.8 per cent. Based on the results of the first and the fifth population censuses, the percentage of urban population grew from 8.8 per cent of the total population in 1956 to about 30 per cent in 2008, (CBS, 2008). The main drivers of urbanization in Sudan are:

- (i) Climate change manifested in desertification and prolonged periods of drought which lead to failures of crops, and loss of forests and livestock; hence, force rural people to migrate to urban areas;
- (ii) Civil unrest and insecurity in some states, namely, Darfur, South Kordofan and Blue Nile, force people to flee rural areas in search of safe heavens at the outskirts of cities;
- (iii) Deteriorating rural economies due to protracted droughts, unfavourable terms of trade between rural and urban areas, where agricultural products are sold for low prices compared to manufactured and processed ones, and lack of alternative employment opportunities oblige many rural producers to move to urban areas;
- (iv) Inadequate services in rural areas (primarily potable water, education and health services), and concentration of specialized services, such as colleges, universities and hospitals in urban areas, also force people to migrate to them.

Composed of three cities (Omdurman, Khartoum and Khartoum North) separated by the Nile and its tributaries, the urban primacy of Greater Khartoum, the capital of Sudan, is evident: its estimated 2018 population of eight million people amounted to 43 per cent of

Sudan's urban population and to 19 per cent of the total population of Sudan (CBS, 2018). Statistical data from the fifth and last population census (2008) showed that its population was more than eight times the population of the second largest city, Nyala, and that one in every six Sudanese people lived in Khartoum.

The urbanized area of Greater Khartoum covered an area of 1,261 square kilometres in 2017 (Osman, 2020:43), and urban settlements stretch more than forty kilometres in an east–west and a north–south directions (Figure 1). “It is a city of low-density sprawl that has encroached upon the surrounding agricultural and unused dry-lands as it has grown outwards” (Khartoum Land Nexus Research Team, 2020). According to some estimates, Greater Khartoum has expanded in area by 17 folds since Independence in 1956 while its population has increased by 23 folds since then (Osman, 2020:6). Osman and Akram (2019) estimated that the transformation of agricultural land and unused semi-desert land into housing in Greater Khartoum during the period 1956 – 2017 at 38 square kilometres every year. This often takes place of fertile soil and irrigated farm lands, which in turn jeopardises food security in the national capital.

The strong pull of Greater Khartoum is due largely to the fact that most of the political power, economic, educational and medical institutions are concentrated in it. This is indeed a testimony to the failure of the regional and the federal systems of governance that were adopted in 1981 and 1991, respectively, with the intention of redistributing political power, services and facilities to the various regions and states of Sudan, thus sparking socio-economic development in them that lead to content residents that do not need to migrate in search of jobs and services. Apparently, those decentralization attempts have not yet achieved their objectives (Hamid, 2000).

Housing in Sudan and Greater Khartoum

As seen in Table 1, single-storey houses, whether constructed of mud or of concrete and bricks, were the dominant form of housing in *urban* Sudan, constituting 65 per cent of the total number of dwellings. The same was true for Greater Khartoum where they comprised 87.9 per cent of all housing stock. On the other hand, villas, apartments and multi-storey houses comprised insignificant percentages in Sudan and in its urban areas (less than 1.5 per cent).

The overall picture was not very different in Greater Khartoum where apartments, villas and multi-storey houses constituted 1.8 per cent, 0.2 per cent and 2.9 per cent, respectively, of the total housing stock,. However, when examining these three dwelling categories separately, it is noticeable that Greater Khartoum harboured 79 per cent, 79 per cent and 82 per cent, respectively, of their total numbers in urban areas of Sudan. This means that in all of Sudan these three dwelling categories were concentrated primarily in Greater Khartoum. As a relatively a new type of housing, hybrid villa-apartments did not figure in the 2008 census results. Although the category ‘multi-storey houses’, with its

small percentage then (1.2 per cent in urban Sudan, 2.9 per cent in Greater Khartoum) may have included some hybrid villa-apartments.

Greater Khartoum is besieged by a serious housing crisis manifested in the following:

- i) Skyrocketing housing rents where the monthly rent of a modest two-bedroom house outside the city centre is estimated to be more than triple the minimum wage of SDG 3000 (USD 55) (Wikipedia based on Radio Dabanga 16 April 2020).
- ii) Unsatisfied demand for housing caused by new arrivals to the city, estimated at 1000 people per day, newly-formed households, and limited affordable housing options for low-income households, migrants and internally displaced persons (IDPs).

Spiralling rents and unmet demand for housing force people to settle informally on any vacant land, whether it is an unattended farming land or a vacant land on the semi-desert fringes. Thus, proliferation of informal settlements has been a characteristic of urban development during the past four decades. By 1989, Greater Khartoum included 96 informal settlements that housed about 60 per cent of its residents (Banaga,1994; Osman, 1992).

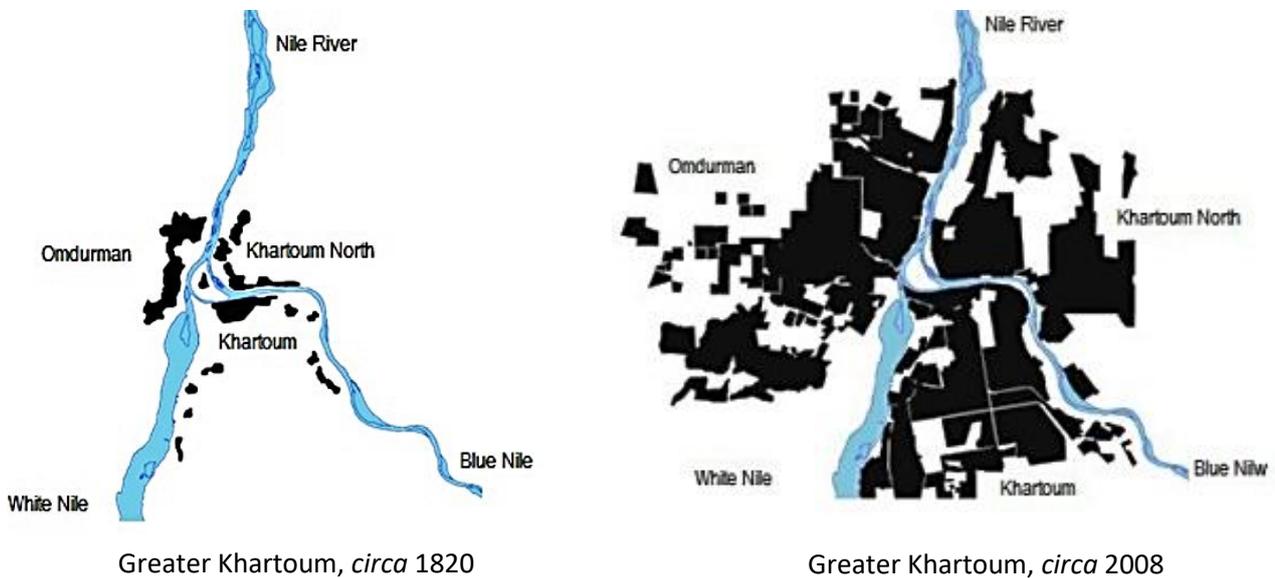


Figure 1: location and Horizontal Expansion of Greater Khartoum
Source: (Hamid and Bahreldin, 2014:13)

	Households	Flat/ Apartment	Villa	Single- Storey House	Multi- Storey House	Other ¹
Sudan Total	6,651,414	18,006	2,965	2,658,604	25,181	3,946,659
Sudan Urban	1,992,512	15,530	2,147	1,290,760	24,658	659,417
Greater Khartoum (G.K.)	688,810	12,208	1,697	605,494	20,132	49,279
Sudan Housing Types		0.3%	0.0%	40%	0.4%	59%
Urban Sudan Housing Types		0.8%	0.1%	65%	1.2%	33%
G. K. Housing Types as % of Urban Sudan's		79%	79%	47%	82%	7%
G. Khartoum Housing Types		1.8%	0.2%	87.9%	2.9%	7.2%

Table 1: Household Numbers and Housing Types in Sudan and Greater Khartoum

¹ Other types of dwellings include tents, those built of straw, mats, and unreported cases.

Source: CBS, 2008, extracted and calculated by Author from Table H1

Since then informal settlements have been dealt with and incorporated into the urban fabric through four mechanisms that included (Three City Land Nexus Research Team, 2020: 47-48):

- (i) On-site re-planning and land re-adjustment;
- (ii) Resettlement to newly planned locations;
- (iii) On-site upgrading of infrastructure and services;
- (iv) Demolition of settlements that have been built on incongruous sites, such as industrial waste disposal sites.

Nevertheless, informal land subdivision persists and informal settlements endure as primary sources of housing on the city fringes.

In addition to informal housing and land supply mechanisms (iHLSMs), formal housing and land supply mechanisms (fHLSMs) have contributed considerably to housing provision. Eight fHLSMs have been discerned (Hamid, 2020):

- a. Formal "housing plans", i.e. sites-and-services schemes, prepared and allocated by the government to deserving households based on eligibility criteria top among which are socio-economic status, household size, current housing conditions (Hamid and Elhassan, 2014) . Since colonial times, residential areas in Sudanese towns have been classified into (i) first-class areas for upper-income households; (ii) second-class areas for middle-income households; (iii) third-class areas for low-income households; and

(iv) fourth-class areas for lower-income, temporary residents. This classification system is reflected in large plots and higher service standards in first- and second-class areas, and lower ones in third- and fourth-class ones. Since Independence the fourth-class category has been abolished but the other three areas persist till today (Three City land Nexus Research Team, 2020:42).

- b. Private subdivisions of serviced plots sold by local and international real estate investors (e.g. the Social Insurance Fund).
- c. 50,000 plots allocated since the 1990s to IDPs in what is called Dar es-Salam townships in the three cities composing Greater Khartoum.
- d. Popular and subsidized housing units sold by Khartoum State Housing Fund (KSHF) to low-income households.
- e. “Investment” housing units sold by KSHF to high-income households.
- f. Housing units sold by private real estate investors to capable households as villas and apartments.
- g. Housing units built by the army, police and security forces to their cadre while they are on service.
- h. High-class housing units built and sold by real estate investors to rich households in closed compounds as gated communities.

No doubt fLHSMs have contributed significantly to the provision of land and housing in Greater Khartoum. Estimates of their contribution stood at 643,468 plots and housing units, benefiting on average about 4.12 million people (at 6.4 persons per household) – i.e. about 50 per cent of Khartoum’s 2018 residents, while iHLSMs and extant neighbourhoods that formed the nuclei of the city since the turn of the 20th century have contributed the rest (*ibid*).

Among the eight fHLSMs modes, sites-and-services schemes have undoubtedly contributed the lion’s share, with 311,792 plots allocated by the government during the period 1956 to 2007. First introduced in the mid-1950s by the post-independence Sudanese governments in Greater Khartoum to house new residents of the budding capital – mainly government officials, newly-formed families, recent migrants, etc. – it soon spread to other Sudanese towns. Sites-and-services schemes are pivoted on a tripartite arrangement between (i) the government (the central government at that time then local governments after 1981) who prepares land for housing and its allied social services; (ii) state-owned water, electricity and roads agencies who supplied that land with infrastructure networks financed through budgets allocated to them by the government and payments by beneficiaries; and (iii) households who satisfy the selection criteria (size,

income, length of stay in Khartoum, lack of ownership of plots in other sites-and-services schemes) are allocated those plots randomly in the towns they have selected to live in. The cost recovery system in sites-and-services schemes is based on the following formula: (i) the cost of the land and essential services (water and flood control) is 80 per cent borne by the government; (ii) 20 per cent of the cost of basic services (e.g. electricity and rubbish disposal) is borne by the government and 80 per cent by the beneficiaries; (iii) 100 per cent of the cost of the houses is shouldered by the beneficiaries; (iv) the cost of social facilities is usually raised by the community through donations, self-help and community mobilization (Three City Land Nexus Research Team, 2020:20).

The escalating cost of building materials, especially steel and cement, have made building a house a daunting task for the vast majority of site-and-services plot owners even though the cost of land for them is virtually zero. The lack of housing finance mechanisms, as dictated by the Central Bank of Sudan regulations in order to curb inflation, has aggravated the situation. Most home-owners finance their house construction through their own resources add it to it those of their families. Hence, construction projects usually take decades because of inadequate resources and erratic cash flows. Thus a large percentage of plots either remain vacant, or are bought off by real estate investors or wealthy people because of their relatively good locations

To complicate matters even more, Khartoum State government issued a decree in 2015 to stop land allocation through sites-and-services schemes arguing that they contribute to wasteful urban sprawl. However, private investors were allowed to continue to subdivide, service, and sell land for housing purposes. Hence, a substantial market has been created for those investors – some of whom are non-Sudanese – to acquire white lands or brown fields at low prices, add a modicum of infrastructure (e.g. a few asphalt roads and some electricity poles) and sell them at high prices – mainly to high and upper-middle income groups – promising them to complete the infrastructure and services but never make good on their promises.

The phenomenon of land grabbing particularly of agricultural land on the urban fringes has proliferated in recent years hand in hand with informal transformation of farmlands into housing (Khartoum Land Nexus Research Team, 2020). Coupled with land speculation and using land as a buffer against runaway inflation (estimated by the Central bureau of Statistics November 2020 at 254 per cent) this has exacerbated the unabated horizontal expansion of the city and the wasteful utilization of land as a finite resource. In addition to iHLSMs, fHLSMs have also contributed to the unrestrained city sprawl because of their wasteful use of land and adoption of primarily low-rise, single-family types of housing. Although serious attempts have been made during the past decade to curb urban sprawl through planning decrees, calls for intensification of land use and easing restrictions on the maximum number of floors that can be built in certain districts, horizontal expansion continues mainly due to the high cost of building, higher buildings and lack of restrictions on real estate finance imposed by the Central Bank of Sudan. Due to this, only few medium-to-high rise housing block have been built by real estate investors and public housing funds.

Housing Types in Greater Khartoum

At least six modes of housing can be identified in Greater Khartoum and arguably in most Sudanese cities. Following is a description of their main characteristics (Photos 1, 2, 3, 4, 5):

a. The dominant housing type in Greater Khartoum is undoubtedly the single families, single floor detached or semi-detached house. According to the 2008 census data it constituted 87.9 per cent of total housing (Table 1). This is due mainly to a cultural trait in the Sudanese society that cherishes this type of housing. It can also be argued that this type is more convenient to build incrementally whenever family resources are available. It can be built initially in raw adobe bricks that can be replaced by fired adobe bricks when resources are available. This type has been prevalent in extant villages and early settlements that formed the nuclei of Greater Khartoum. Subsequently, it has been promulgated by government-initiated “housing plans” (*khutat ishaniyya*), based on the site-and-services approach, that has been the main source of housing plots since Independence.

b. Multi-storey, single-family detached villas built in baked adobe bricks or reinforced concrete which constituted 0.2 per cent of Greater Khartoum total housing in the 2008 census. This type appeared in the post-independence era in “first-class” housing neighbourhoods that have been designated as such by the “housing plans” and were allocated to government officials and some businessmen. The epitome of neighbourhoods where this type originated is Al-Amarat to the south of Khartoum in the early 1960s, Since then, this type gradually crept into other neighbourhoods in Omdurman and Khartoum North that have been designated as “first-class”.

c. Multi-storey, multi-family apartment blocks built primarily in reinforced concrete with brick infill walls. This type is fairly new in Greater Khartoum and constitutes a negligible percentage of housing in it. According to Ministry of Physical Planning estimates there were 3,530 of such blocks by 2018. Due to their high construction cost, they are usually built by real estate investors or wealthy business people who are seeking a more guaranteed form of investment.

d. Exclusive single-family, detached villas and a few apartment blocks in gated communities that have sprung in Greater Khartoum during the past two decades. According to some estimates, the total number of housing units in such communities is 6,688 (Elhadary and Ali, 2017).

e. Single- or multi-family, single floor houses built in informal settlements from perishable materials, mainly adobe. In 2017, this type of housing was estimated to constitute about 8 per cent of the total area of Greater Khartoum (Osman, 2020: 44)

f. Hybrid villa-apartments that have gained prominence during the past two decade, as an emerging form of urban housing. Composed of a family house, or villa, mostly built on the ground floor of a detached plot, and several rental units on upper floors, hybrid villa-

apartments represent a form of small-scale housing investment that could be implemented by individual homeowners whereas big real estate companies would be more interested in bigger apartment blocks.

As mentioned before the hybrid villa-apartment is a relatively new type of housing that did not figure in the 2008 census results. However, recent studies have estimated that about 80 per cent of new housing constructed in new urban neighbourhoods in Greater Khartoum is in the form of hybrid villa-apartments (Osman 2015; Abdalla, 2020). Apparently, they resemble a marriage of convenience between landowners who seek to invest their limited capital in a rather secure type of investment, or to provide housing for their married sons and daughters, on one hand; and small and/or young families who seek rental housing units in serviced neighbourhoods at reasonable rents, on the other hand. Evidently, hybrid villa-apartments have managed to meet users' requirements in terms of adequacy, services and affordability (Elsawi, 2016).

Land Utilization by Housing Types

The vast horizontal expansion of Greater Khartoum shown in Figure 1 above can be attributed to wasteful land utilization (Hamid, 1986) through the use of large residential plots in site-and-services schemes (200-299 square meters in third-class areas, 300-399 square meters in second-class areas, 400-600 square meters in first-class areas), primarily for single-family detached houses and villas. These large plot sizes are coupled with numerous and large open spaces (2,500 – 10,000 square meters on average) spread out through each neighbourhood; and wide roads, 10 – 40 meter roads in residential areas, 50 – 60 meter thoroughfares that connect various housing districts.

Earlier site-and-services schemes implemented in the 1960s and 1970s adopted 400, 500, 800 square meter plots as average plots in third-, second- and first-class areas, respectively. But since then average plot sizes have been reduced due to exorbitant costs of infrastructure networks and also in response to calls by enlightened individuals who pointed out the negative ramifications of these high space standards. Major planning schemes, such as the 2009 Khartoum Physical Plan (KPP5), also advocated intensification of land use as a prudent strategy to curb urban sprawl, but it has not been accompanied by binding implementation by-laws.

With their inclusion of multiple housing units on each plot of land, hybrid villa-apartments constitute a more efficient form of land utilization which could go a long way in preserving urban land and curbing urban sprawl. A typical 500 square meter plot in a first-class residential area where the maximum height allowed by building regulations is five stories can accommodate on average up to eight apartments on top of a villa on the ground floor. The villa owner could still enjoy a private parking space and a small garden within the plot since building regulations specify minimum unbuilt set-backs from neighbours that could be used for these functions (cf. Figure 2).



Photo No. 1: Apartment Block, Khartoum
Photo by Gamal M. Hamid



Photo No. 2: Hybrid Villa-apartments, Khartoum
Photo by Gamal M. Hamid



Photo No. 3: Villa, Khartoum North
Photo by Gamal M. Hamid



Photo No. 4: Single-family House, Khartoum
Photo by Gamal M. Hamid



Photo No. 5: Informal Housing, Omdurman
Photo by Gamal M. Hamid

The proliferation of hybrid villa-apartments in recent decades, albeit totally spontaneous and not based on any research or planning regulations, results in higher residential densities and shorter infrastructure networks. They also represent a more efficient form of housing that does not require substantial investments as do apartment blocks. Hence, they don't face the same financing challenges faced by medium-to-high rise apartment blocks.

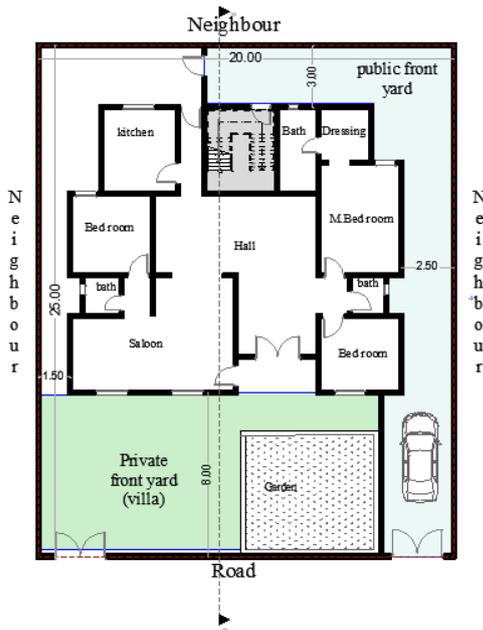
In terms of privacy, the villa owners in hybrid villa-apartments face some challenges due to their sharing the same plot with other families. Abdalla (2020) has examined three types of such privacy challenges in hybrid villa-apartments: visual, olfactory and acoustic. The levels of privacy, Abdalla argues, is affected by the following parameters: plot dimensions, plot location, entrance location, staircase location, front and back yards, balconies, door and window dimensions and locations, and parking areas. With the exception of the first two parameters that are usually *de facto* constraints pertaining to the plot itself, the remaining six parameters can be manipulated by the designer(s) to achieve a higher level of privacy.

In terms of space efficiency in hybrid villa-apartments, Elsawi (2016) has concluded that corner plots have the potential to produce higher levels of efficiency. The location of the staircase is also an important factor, where a centre-edge location is prone to yield higher space efficiency. In terms of plot dimensions, Elsawi concluded that elongated plots are liable to produce higher space efficiency than do deep plots. This conclusion is counter to the more intuitive conclusion that deep plots require shorter infrastructure networks to serve them than do elongated plots.

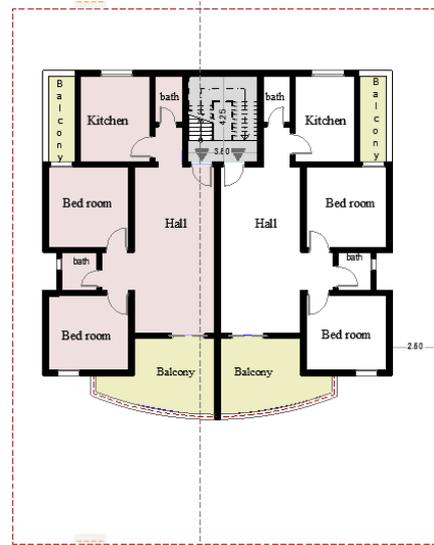
Conclusion

In conclusion, this paper has demonstrated that a distinct transformation of housing layouts has been taking place in Greater Khartoum over the past twenty years whereby the conventional villa has evolved into a hybrid villa-apartment in response to significant economic pressures and social changes that obliged multi-nuclear families that used to live in large family houses to split into nuclear families each living independently in a separate housing unit. It has also evolved in response to economic pressures caused by high land prices, high building costs and high inflation rates that encourage capable homeowners to invest in a number of rental apartments that they build incrementally through self-finance.

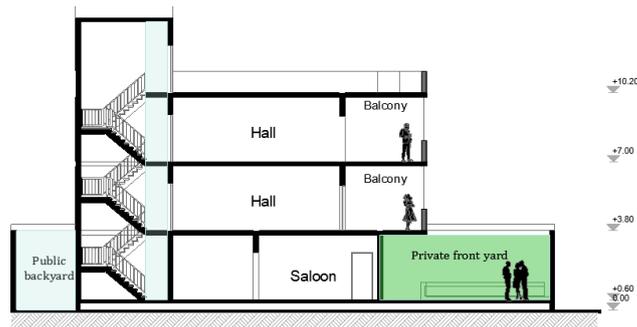
The paper supports the change in housing form that the hybrid villa-apartments represents due to their considerable land saving potential, which will be reflected in reduced cost of infrastructure networks and less pressure on valuable agricultural lands. Hence, the paper advocates a change in building regulations and land planning by-laws to facilitate the promulgation of hybrid villa-apartments. Issues of location, space efficiency, privacy and economies of scale need to be carefully considered so that the new generation of hybrid villa-apartments achieves its multiple benefits. The paper also encourages introduction of flexible small-to-medium scale funding mechanisms through the formal banking system, or through housing cooperatives, in order to accelerate the proliferation of hybrid villa-apartments through loans to villa owners as well to apartment residents.



Ground Floor Plan



Typical Floor Plan



Longitudinal Section

Figure 2: Example of a hybrid villa-apartment built on a 500 square meter plot with a villa on the ground floor and four apartments on top, two symmetrical apartments on each floor.

Since the plot faces one street only, the apartments are accessible through a back door that leads to the only staircase in the building. The villa owner ensures security and limited privacy by building walls at the front and back yards to separate the villa from the apartments.

Drawings courtesy of Khartoum State Ministry of Physical Planning Archives as presented in Abdalla (2020: 24

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