

SES

Social Inclusion and Energy Management
for Informal Urban Settlements

CASE STUDY

INFORMAL URBAN SETTLEMENT: TYPOLOGY, DRIVING FORCES AND SOCIO-ECONOMIC FEATURES IN GONDAR, ETHIOPIA

Atsede Desta Tegegne



Funded by the
Erasmus+ Programme
of the European Union



CASE STUDY

INFORMAL URBAN SETTLEMENT: TYPOLOGY, DRIVING FORCES AND SOCIO-ECONOMIC FEATURES IN GONDAR, ETHIOPIA

Atsede Desta Tegegne

Funded by the Erasmus+ program of the European Union

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

The views expressed in this work and the accuracy of its findings is matters for the author and do not necessarily represent the views of or confer liability on the Center of Urban Equity.

© University of Gondar.



This work is made available under a Creative Commons Attribution 4.0 International Licence:
<https://creativecommons.org/licenses/by/4.0/>



ABSTRACT

This case study examines the drivers of informal settlement and the socio-economic profiles of occupants in Gondar, a historical city in Ethiopia. A mixed transdisciplinary method, combining qualitative information through multi-partner dialogue and quantitative data from 308 randomly selected households from three sites, helped to address the study's objectives. Contributing to the recent literature in Ethiopia, the study shows

that a single factor is not driving the proliferation of informal settlement in the city. We, thus, argue that the decision to live in informal housing should holistically be understood from socio-economic, policy/ governance and demographic perspectives. ♦

Keywords:

informal settlement, driving forces, socio-economic, Gondar, Ethiopia

CONTENTS

Abstract	3
PART 1	
Background	4
PART 2	
Study area and methods	6
PART 3	
Results of the study	10
PART 4	
Discussion	14
PART 5	
Conclusion	16
References	17

PART 1 BACKGROUND

Globally, urban is becoming predominant setting for life in the 20th century (Roberts and Okanya, 2018). Ethiopia is characterized by a low proportion of urban population but rapid rate of urbanization. In recent times housing challenge is notably severe in Ethiopia, where the proportion of urban population has grown from 13% in 1990 to 19% in 2014 and projected to reach 38% in 2050 (UN, 2014; WB, 2014). About one third of the urban population in developing countries is living in informal settlement (UN-Habitat, 2015).

Studies in the area have focused on evaluating informal settlement as a solution, stimulated by poor society where the formal housing channel cannot fulfil the demand (Wekesa, et.al, 2011; Amado et al. 2016). Others also view informal settlement as a problem of urban settings and failure of the state (Kamalipour and Dovey, 2019). While there are many forms of informality that vary depending on the contexts, usually literature attached the definition at least to the following features: i) if inhabitants have no security of land tenure or legal claim; ii) the neighbourhoods usually lack, or are cut off from basic services and city infrastructure; iii) the housing may not be in compliance with current planning and building regulations, and is often situated in environmentally hazardous areas (Lombard, 2014; UNHabitat, 2015; Zweig, 2016; Nassar & Elsayed, 2017).

Governments in many African countries like Ethiopian have failed to meet the housing demand of majority of urban residents. Recent steps taken by the Ethiopian government towards satisfying the housing demand of urban dwellers include regulation of tenure, providing plots for housing cooperatives, government housing development programme, among others. Despite these efforts, resolving informal urban settlements continues to be challenging due to a range of interrelated factors within the framework of socio-economic, political, demographic and environmental issues.

Informal settlement is not only seen as manifestation of poor standard housing but also a sign of administrative confusion and political uncertainties (Shabane et al., 2011; Marutlulle, 2015) as well as existence of inequality and weak land governance (Alemie et al., 2015). The phenomenon can be linked to a series of factors interacting continuously within the system. This suggests a need for understanding of drivers of informal settlement.

Like other cities in Ethiopia, the city of Gondar is home to much of informal settlers, but the drivers within the city context have received little attention of scholars. Identifying the major drivers of informal settlement and assessing the socio-economic features of the informal settlers in the city of Gondar is, hence, the focus of this case study. ♦

PART 2 STUDY AREA AND METHODS

2.1 Case study selection

This case study is part of a consortium project Social inclusion and Energy management for urban informal settlement in Ethiopia, SES involving three Ethiopian universities (University of Gondar-College of Social Sciences and the Humanities (CSSH); Mekelle University- Institute of Technology (EiTM) and Addis Ababa University-The Ethiopian Institute of Architecture, Building Construction and City Development (EiABC) and three European universities (University of Donau/ Krems, University of Kassel/Germany and University of Twente, ITC / the Netherlands). The primary objective of this project, funded by the European commission /EACEA/, was to build inclusive urban communities in Ethiopia.

Gondar, the study's target city, is situated in North-western highlands of Ethiopia, 727 kms from the capital city, Addis Ababa. The city encompasses about a total area of 192.3 km² with undulating mountainous topography and is located at an average elevation of 2200 meter above sea level. According to the Central Statistics Agency (CSA,2013) , the population of Gondar was estimated to be 323,875 by 2015 and was projected to increase to 360,600 in 2017.

Together with European and Ethiopian project partners, field observation was carried out in 2017 to understand the features of the city and its informal settlement. The city comprises six sub-cities - Azezo-Teda, Fasil, Maraki, Zobil, Jantekel and Arada - containing a total of 23 kebeles (lower administrative level). Based on the result of our field observation and consultation with the city administration, three informal settlement areas around the periphery

of three kebeles, Gebriel, Lideta and Hidase, were purposively selected as the case study areas due to their representativeness of informal settlements. The three selected kebeles are found in two administrative sub-cities- Zobil and Maraki sub-city.

2.2 Research design and methods of data collection

Case studies are one of the major research methods used by social scientist by focusing on specific temporal and spatial scale to provide real-life context evidence (Yin, 2009). This case study relies on complementary set of data collection methods that allow generating both qualitative and quantitative data in different phases of the study, complemented by literature review and personal observation.

The field observation in the first phase of the case study was valuable to explore the lifestyle of informal settlers in Gondar. In the next phase, participatory workshop was conducted on April 29th, 2018 in Gondar city. Its contribution was to integrate knowledge through multi-partner dialogue on identification of informal settlement drivers and informal settlement typologies. During the workshop a total of 25 participants: a combination of academicians (9), students (6), government officials (6) and community representatives (4) were discussed on the key drivers of informal settlement in the city of Gondar. To keep homogeneity and to increase the level of trust participants were categorized into three groups - academicians including university teachers and students; community representatives (informal settlers) and government officials.

CASE STUDY

INFORMAL URBAN SETTLEMENT: TYPOLOGY, DRIVING FORCES AND SOCIO-ECONOMIC FEATURES IN GONDAR, ETHIOPIA

Guiding questions in order to identify the drivers of informal settlement refer to the economic, political/governance, social, environmental and

demographic related drivers of informality in settlement. The following photos provide some insights about the workshops.

Figure 1

Driving force identification workshop in Gondar city



Source: Picture taken by author, 2018

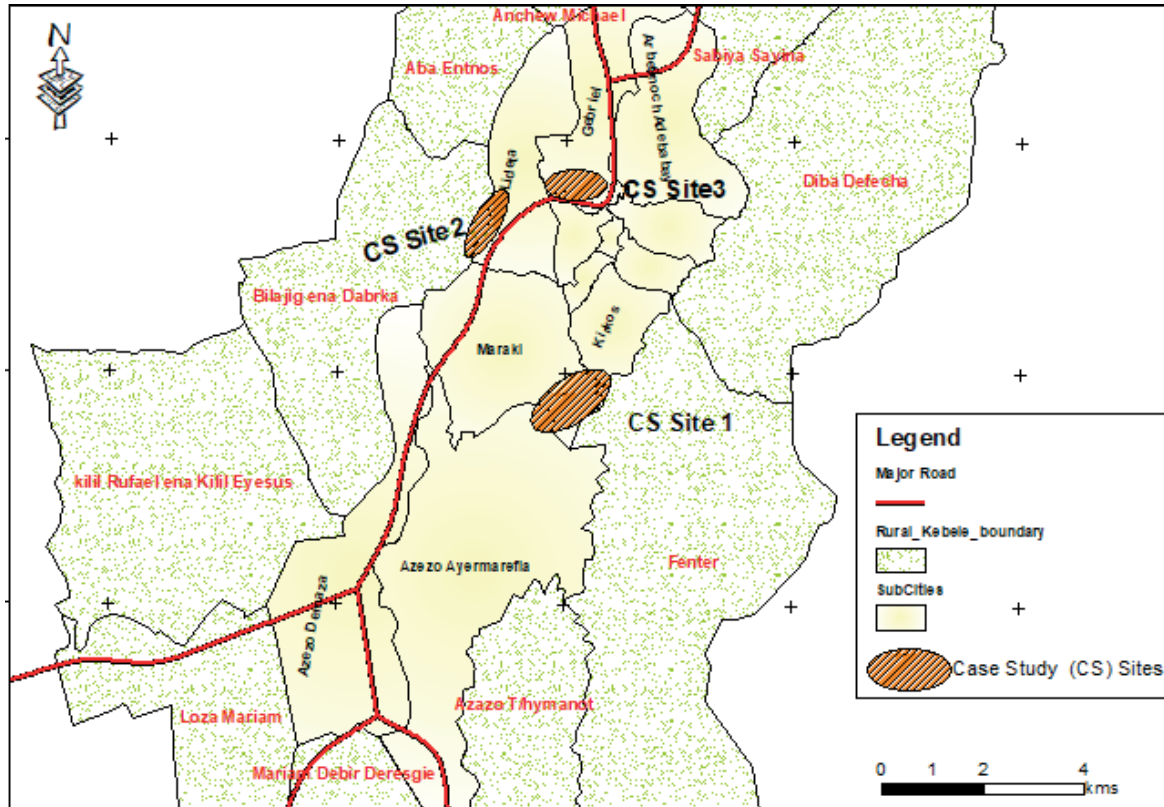
After the workshop, household survey was designed and administered to 312 informal houses within the three selected case study areas. Reasons for micro-level behaviour and decisions pertaining to construction of informal housing were obtained from household survey data conducted from 11 to

29 June, 2018. Four research assistants were trained by the principal author to carry out face-to-face interviews. The first study site, Kebele 18 (Hidase), had been represented by 201 households; Kebele 16 (Lideta) represented by 64 households and K15 (Gebriel) represented by 47 households.

CASE STUDY
INFORMAL URBAN SETTLEMENT: TYPOLOGY, DRIVING FORCES
AND SOCIO-ECONOMIC FEATURES IN GONDAR, ETHIOPIA

Figure 2

Map of study sites in Gondar city, Ethiopia



Source: Author based on 2011 CSA data

2.3. Data analysis

After the data collection process, varied types of analysis were done. During the participatory workshop rapid analysis was conducted to get contextualize

information and to include into structured household survey questionnaire. During the workshop, in the first step participants of the three groups identified the drivers of informal settlement independently and then integrated them as systemic picture (see Figure 2).

Figure 3

Systemic map of integrated drivers of informal settlement



Source: Driving force identification workshop

In the second step, based on context specific relevance of the drivers on the development of informal settlement, each participant prioritized/ ranked the integrated drivers individually from 'being most important' to 'being not important' for their decision to live in the informal neighbourhood. Then, based on the median value, the top ranked driving forces (from 1 to 16) were presented. The result shows that the local level decision to live in informal settlement areas was influenced by both micro- and macro level drivers. The final identified and listed drivers of informal settlement from the workshop provided options for answering category for close-ended question during the household survey (second phase).

After collecting the household survey data, the first author of this case study cleaned and checked all the data and the non-response rates of the survey. After data cleaning and checking, we were able to include a total of 309 household data collected from three sites in Gondar city (1.3% non-response rate). Finally, we described the background characteristics of the households with descriptive statistics and presented the quantified drivers from the survey by comparing with the result from the participatory workshop. ♦

PART 3 RESULTS OF THE STUDY

3.1 Background characteristics of the sampled informal households

Socioeconomic status and demographic characteristics of inhabitants have an impact on quality of life and may drive the household decision on their settlement areas. This section describes the background characteristics of the sampled households in the case study sites in Gondar city.

As Table 1 shows 95% of the total of 309 sampled households were Orthodox Christians while the remainder were Muslims. A relatively young age (mean age about 29.8 years) was typical for the head of informal households, and households had on average four family members. 84% of households were headed by males, and majority of the respondents (79%) were married, followed by the unmarried (11%).

As can be seen in the table, about 45% of household heads had no formal education, and the share of household heads with secondary and above education was only 27%. Table 1 also shows that majority of the informal settler (73%) were engaged in informal economic activities including seasonal migration while only 22 % were government employees.

Table 1

Socio- economic and demographic characteristics of the sample households

VARIABLES	OVERALL (N=309)	
	Min/Max	Mean (SD)
Household head age	15/70	29.8 (8.65)
Household size	1/9	3.77 (1.630)
Monthly income	200/30000	1966.8 (2081.67)
Categorical variable	N=309	%
Household head sex (Male)	259	83.8
Households' Marital status(%)		
Never married	35	11.3
Currently married	244	79.0
Widow/widower	17	5.5
Divorced	13	4.2
Religion		
Orthodox Christian	293	94.8
Muslim	16	5.2
Household educational level		
No formal education	139	45.0
Primary level	88	28.5
Secondary and above	82	26.5
Source of income		
Government employed	68	22.1
Daily labourer	172	55.8
Temporary migration (agricultural& non-agricultural)	24	7.8
Trade (informal)	28	9.1
others (eg-family support)	16	5.1

Source: household interviews carried out in 2018

3.2 Drivers of informal settlement in the case study areas

The formation of informal settlement can be triggered by a number of factors. During participatory workshop, participants had made a great deal of discussion and debate to identify the key driving forces of informal settlement in the city from different scales: macro- and micro-level (context specific).

Participants considered Ten main macro-level factors including population growth (due to natural growth and migration), land lease proclamation, cost of living (poverty), low level of compensation, inefficient housing provision, low institutional capacity, relocation program, corruption, lack of housing policy, and inconsistency in land legislation.

Lack of access to land, unaffordable house rent, high cost to standard house construction, lack of networked information system and less community participation on decisions were identified as local-context related drivers (micro-level) which can be controlled over either by communities or by the city. Both the micro- and macro-level factors interact each other and contribute to the sprawling of informal settlements in the city.

Once understanding of drivers towards informal settlement was made primarily from participatory workshop, household interview was also used to validate the findings from the workshop and to quantify the major drivers of informal settlement decisions. Table 2 indicates the important driving forces identified by the respondents of household survey. Cost of renting house (68%) followed by urban attraction (18%), lack of legal access to land (6%) and cost of living (5%) were identified as the main reasons that contributed to informal settlement.

Table 2

Socio-economic triggers of informal settlement

REASONS FOR INFORMALITY	FREQUENCY (N=308)	PERCENT
Unaffordable house rent	209	67.8
Urban attraction/ Access to employ	56	18.1
Lack of legal land access	18	5.8
Poverty/cost of living	15	4.8
Inherited land	8	2.6
Displacement for development	2	0.6

Source: household interview carried out in 2018

In the case study areas, original peri- urban farmland holders have also participated in the development of informal housing since they assumed that their land will be expropriated for urban expansion programme and the compensation they will get is not enough. As a result, they prefer to subdivide and sell their plots to get better cash by themselves. To differentiate the informal settlements land tenure is one of the most useful criteria. We can distinguish between squatter settlements on public land and informal settlements on private agricultural land. During the household interview, heads of the household were asked about the tenure status of the plot on which to construct a house they were living in. 85% of the respondents were stated that their house existed on privately owned agricultural land bought by relatively low price under eviction uncertainty, and only 3% of households hold public lands. Twelve per cent of respondents had no idea about the tenure status of the plot. In the case study areas informal settlers bought land from farmers with the hope that they would get legitimate holding or compensated by other residential land.

In Ethiopia, besides the natural increase, the explosion of population in urban areas occurs due to migration. Rapid urbanization is observed in those urban destinations. Consequently, sampled households were also requested about their place of birth as well as their former residence (prior to residing in the settlement).

Table 3

Land and housing ownership of respondents

VARIABLES	FREQUENCY (N=309)	PERCENT
Place of birth		
Other rural area	201	65.0
Other urban area	47	15.2
Gondar	61	19.7
Place of former residence		
Gondar	144	46.6
other rural area	131	42.4
other urban area	34	11.0
Housing ownership		
Private	248	80.3
Rented	61	19.7
Land Holding		
Bought from Farmers	263	85.1
Public	10	3.2
I don't Know	36	11.7

Source: household interview carried out in 2018

Table 3 shows that, 80% of household heads were migrants, either from the rural (65%) or from other urban areas (15%). This statistic verifies the information obtained from participatory workshop that migration to the city was identified as the main driving force of informal settlement. From both results, we, thus, conclude that informal settlements are dominantly formed by migrants who are unable to afford formal housing. Only 33% of the total of 248 migrants lived in rented house in the inner city earlier and then transferred to the informal neighbourhoods while the remainder migrants directly settled in the informal houses.

3.3 Housing Condition of the settlement

Houses in the area of informal settlement have been constructed without state control; the designs of the houses have no permanent structure or are sub-standard. We collected empirical evidence from respondents about type of materials used to build the houses and the number of rooms in the housing unit. Our findings show that a higher percentage of houses (99%) in the study sites were constructed on a piece of land which was made by muddy and wooden walls and almost all of the houses had roof of iron sheet with earth floor (see Table 4).

Figure 4

Informal settlement in "Hidase neighbourhood", 2018



Source: Picture taken by author, 2018

Like in other African cities, informal settlements in Ethiopia are characterised by lack of access to basic infrastructure such as water and sewerage, roads, electricity and sanitation facilities. Regarding access to sanitation, more than half of sampled households (58%) reported that they had *no any toilet access* and relied exclusively on open spaces while the remainder reported that they had access to pit Latrine around their plots, either shared or privately owned.

CASE STUDY
**INFORMAL URBAN SETTLEMENT: TYPOLOGY, DRIVING FORCES
 AND SOCIO-ECONOMIC FEATURES IN GONDAR, ETHIOPIA**

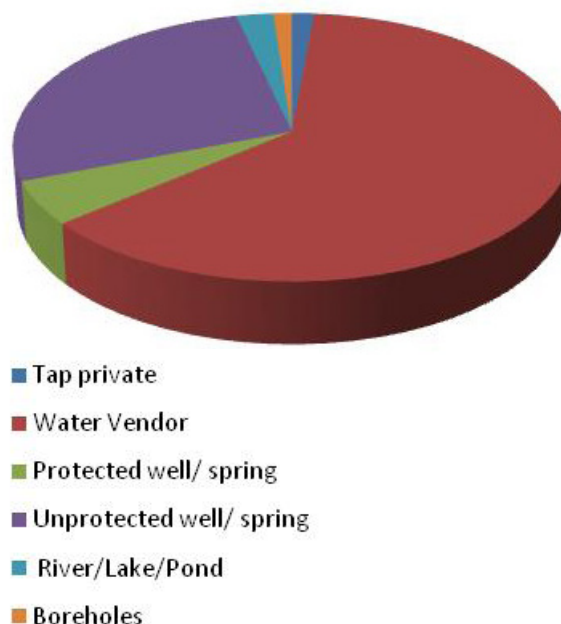
Table 4
 Housing characteristics of the informal settlement areas

VARIABLE (CONTINUOUS)	OVERALL (N=309)	
	Min/Max	Mean(SD)
Age of the house (N=288)	0/20	2.99 / 2.148
Number of rooms of the house	1/5	1.30 / 0.641
Variable (categorical)	N=309	%
Type of walls		
Wood and mud	307	99.4
Stone and mud	2	0.6
Type of roofs		
Iron sheet	308	99.7
Plastic	1	0.3
Type of Floor		
Earth	303	98.1
Cement	6	1.9
Kitchen availability		
No kitchen	208	67.3
Kitchen outside the housing unit	101	32.7
Toilet availability		
No toilet	180	58.3
Pit Latrine	129	41.7

Source: household interview carried out in 2018

Poor access to drinking water remains a serious concern in the case study areas. Residents in the informal settlement areas are seriously suffering from lack of access to water. In the study sites majority of the households obtained tap water from vendors or got water by filling water containers from protected and unprotected well or spring and this increased the burdens of women in carrying the water containers. ♦

Figure 5
 Water sources in case study areas



Source: household interview carried out in 2018

PART 4 DISCUSSION

The objectives of the current study were to identify the critical drivers of informal settlement and examine socio-economic characteristics of the settlers in Gondar. The results of this case study suggest that the decision on informal settlement encompass a range of factors which have mutual interaction. For better understanding the authors categorize them into the following three clusters.

4.1 Demographic

Urban population growth as the result of natural growth and migration have been among the critical factors of failure to address housing issues and the continued flourish of housing informality (UN-Habitat, 2015). The results of this study reveal that dwellers living in the study areas came from a variety of places. Most of the informal settlers came from rural areas while others grew up in the city. The settlers indicated that they were unable to access adequate housing through the formal channels and thus considered the informal neighbourhood as the only viable place for them to live, socialize and work. This finding confirms previous studies in Ethiopia (Ambaye, 2011; Alemie et al., 2015) and elsewhere (Young, 2010; Marutlulle, 2017). In recent times, urban areas are becoming places to live and work at for people who could no longer make a living from farming, and significant number of rural youths migrate to the cities to search their livelihoods. Rural-urban migrants, particularly young men in Africa are adapting to very mobile forms of livelihood and live in inadequately serviced urban settlements (Zweig, 2016) and informal settlement becomes the only option

for the migrants to live (Cavalcanti, 2017). Beyond this the result suggests valuable insight on the economic implication of labour, affordable housing and informal settlement for future studies.

4.2 Political and Administrative

Corruption and poor governance, poor service delivery of institutions (in our case unaffordable houses and inefficient housing provision, lack of access to urban land), and poor institutional information system constituted the **political and administrative variables**, driving the proliferation of informal settlement in Gondar. According to World Bank (2012) poor governance refers to the policies, institutions, processes and actors. In the city in focus they weakly interacted to manage the use of natural resources including land.

Studies for Bahir Dar also confirms the same finding that informal settlement is a sign of poor urban governance which motivates people to take action and interaction with land through informal rules (Ambaye, 2011; Adam, 2014; Alemie et al. 2015). The finding of this case study is also in agreement with international literature. A study in other African countries among others in South Africa (Marutlulle, 2015); South Sudan (McMichael, 2015); Ghana (Paller, 2015) also support the finding that corruption and poor governance have played significant roles to the continuing development of informal settlement in the respective cities. Corruption, which hinders delivery of affordable housing in the cities, is one of the manifestations of poor governance in Africa (Marutlulle, 2015).

4.3 Rapid urbanization and unavailability of land

Urbanization is a process of settling vast number of people in very small areas (Tegenu, 2010). In the process of urbanization, the population increases usually due to migration than the natural way of population increments in urban centres. This migration-led urbanization in Ethiopia is characterized by unbalanced expansion of towns and cities without government urban planning (Tegenu, 2010). This kind of rapid and unplanned urban growth coupled with poor governance result in poor access to land and housing (Alemie et al. 2015; Marutlulle, 2017), contribute to the flourish of informal settlement in the cities (Wekesa et al., 2011; Young & Flacke, 2010; Alemie et al. 2015).

Unavailability of land is the critical constraint of housing delivery (Marutlulle, 2017). In Ethiopia land is owned by the state. Informal settlers who are not recognized as integral part of the city have no access to land so they consider alternative approach like an informal land market to access land and housing.

4.4 Socio-economic

Poor information systems, unemployment, economic vulnerability (which refers to cost of living related to high cost of rental house and lack of affordable housing), underpaid work in the city are among the critical socio-economic causes that have been able to flourish housing informality in Gondar. The result aligns with the study in Bahir Dar by Alemie et al. (2015) and other African countries such as South Africa (Marutlulle, 2015).

According to Alemie et al. (2015), the proliferation of informal settlements is a sign of economic inequality. Consistent with our finding (see section 3.1) a study in South Africa shows that migrants are engaged in law paid jobs as entry point into the labour market in the cities (Marutlulle, 2017). The inverse relationship between low micro-level income and housing price is found to be the main factor that determines the location decisions of individual or households (Young & Flacke, 2010; Marutlulle, 2017). Thus, informal settlement provides shelter to the majority of the urban poor. ♦

PART 5 CONCLUSION

The study identifies the conceptual link between the drivers of informal settlement which are interactive within the political, demographic and socio-economic framework. The dominant inhabitants living in the informal settlement areas of the city are migrants who are forced by rural push or urban pull factors. The location of their residents i.e informal settlement are isolated from the inner cities and social service utilization, shows the need to minimize the rate of migration to the cities and concomitant development programs required for the cities and rural areas. ♦

CASE STUDY

INFORMAL URBAN SETTLEMENT: TYPOLOGY, DRIVING FORCES AND SOCIO-ECONOMIC FEATURES IN GONDAR, ETHIOPIA

REFERENCES

- Adam, A. G.** (2014). Informal settlements in the peri-urban areas of Bahir Dar, Ethiopia: An institutional analysis. *Habitat International* 43 90-97.
- Alemie B.K., Rohan M., Bennett, Zevenbergen, J.**(2015). A socio-spatial methodology for evaluating urban land governance: the case of informal settlements. *Journal of Spatial Science*, DOI: 10.1080/14498596.2015.1004654
- Amado, M.P., Ramalhe, I., Amado, A. R., Freitas J. C** (2016). Regeneration of informal areas: An integrated approach. *Cities* 58: 59–69.
- Ambaye D.W.** (2011). Informal Settlement in Ethiopia, the Case of two Kebeles in Bahir Dar City. *Informal Settlement Issues, Spatial Development, Planning and Governance. FIG Working Week, 18-22 May 2011, Morocco.*
- Cavalcanti, A. R.C.** (2017). Work, Slums, and Informal Settlement Traditions: Architecture of the Favela Do Telegrafo. *Traditional Dwellings and Settlements Review*, (28)2. pp. 71-81.
- Central Statistical Agency (CSA)** (2013). Population Projection of Ethiopia for All Regions at Wereda Level from 2014 – 2017.
- Kamalipoura H. and Dovey, K.** (2019). Mapping the visibility of informal settlements, *Habitat International* 85: 63–75.
- Lombard, M.** (2014). Constructing ordinary places: Place-making in urban informal settlements in Mexico. *Progress in Planning* 94, 1–53.
- Marutulle, N.K.**(2015). Obstacles to Housing Delivery in Ekurhuleni Metropolitan Municipality: *A Critical Review of Output and Input.* Africa's Public Service Delivery & Performance Review (141-163).
- Marutulle, N.K.** (2017). Causes of informal settlements in Ekurhuleni Metropolitan Municipality: An exploration. *Africa's Public Service Delivery and Performance Review* 5(1), a131. <https://doi.org/10.4102/apsdpr.v5i1.131>
- McMichael Gabriella** (2015). Land conflict and informal settlements in Juba, South Sudan. *Urban Studies journal* PP, 1–17.
- Nassar, D. M. and Elsayed, H.G.**(2017). From Informal Settlements to sustainable communities. *Alexandria Engineering Journal*.
- Paller J. W** (2015). Informal Networks and Access to Power to Obtain Housing in Urban Slums in Ghana. *Africa Today* (Fall 2015), pp. 31-55, Indiana University Press Vol. 62(1).
- Roberts, R. E., Okanya, O** (2018). Measuring the socio-economic impact of forced evictions and illegal demolition; A comparative study between displaced and existing informal settlements. *The Social Science Journal*.
- Shabane, I. Nkambwe, M., Chanda,R.** (2011). Land use, policy, and squatter settlements: The case of peri-urban areas in Botswana. *Applied Geography* 31: 677–686.
- Tegenu, T.** (2010). Urbanization in Ethiopia: Study on Growth, Patterns, Functions and Alternative Policy Strategy. Department of Human Geography, Stockholm University, Stockholm.
- UN-Habitat**, 2015, *Informal settlements*, Report 31 May 2015, Routledge, Taylor and Francis Group, New York.
- United Nations** (2014). Department of Economic and Social Affairs (Population Division). *World Urbanization Prospects, The 2014 Revision*
- Wekesa, B.W., Steyn, G.S. Otieno, F.A.O** (2011). A review of physical and socio-economic characteristics and intervention approaches of informal settlements. *Habitat International* 35: 238-245.
- World Bank** (2012) *The Land Governance Assessment Framework: Identifying and Monitoring Good Practice in the Land Sector*, World Bank, Washington, DC.
- Yin, R.** 2009. *Case Study Research: Design and Methods (4th ed)*. New York: Sage Publications.
- Young, G.** (2010). Socioeconomic Analysis of Informal Settlement growth in Dar es salaam: The concept for an agent-based model. Unpublished MSc thesis submitted to the International Institute for Geo-information Sciences and Earth Observation.
- Young, G.F. and Flacke, J.** (2010). Agent-based model of the growth of an informal settlement in Dares Salaam, Tanzania: An empirically informed concept. 5th International Congress on Environmental Modelling and Software - Ottawa, Ontario, Canada.
- Zweig, P.** (2016). Lost in space? Considering young men as drivers of urban informal settlement risk. *Urban Forum*. DOI 10.1007/s12132-016-9292-x.