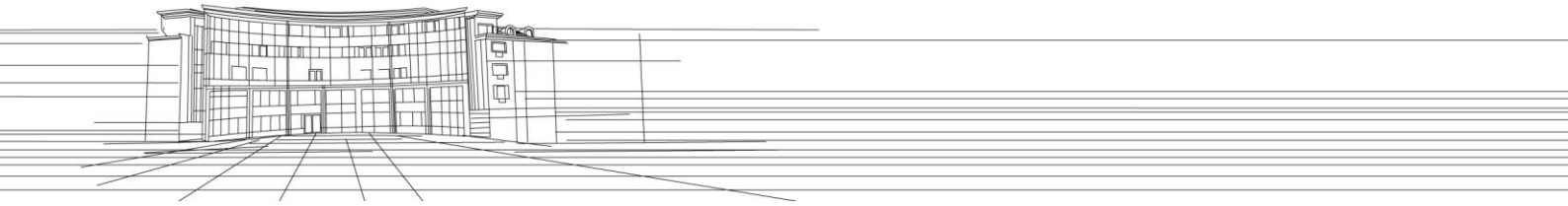

MASTER'S THESIS
INTERNATIONAL ADMINISTRATION
AND GLOBAL GOVERNANCE

Connecting the Disconnected

A field study about urban sanitation in Medellín, Colombia

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Abstract

Despite remarkable progress in Medellín, Colombia, many people do still not have access to improved sanitation. This master thesis explores why Medellín has been successful but also why the city is still failing, by examining the importance of economic income, housing tenure, and community participation. This is done by a quantitative OLS regression analysis between different neighbourhoods followed up by qualitative informant interviews analysed through a stakeholder analysis to make possible motives clear. The results show that economic income is the most important factor for access to sanitation in Medellín, but the other factors show to be important as well when conducting the interviews. Housing tenure is important when it comes to get included in the official network since the sanitary perimeter and the POT decides who should be included, and one essential requirement for that is housing tenure. Previously, research has focused on community participation *during* projects. That is important also in Medellín but this thesis also finds that it is essential for the community to be active *before* a project in order for it to actually take place. In addition, communities solve their necessities through local solutions.

Keywords: *Colombia, Medellín, urban sanitation, economy, housing tenure, community participation, social recruitment*

Number of words: *19 998*

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Abbreviations:

EPM	Empresas Públicas de Medellín/Public Enterprises of Medellín
MDG	Millennium Development Goals
NGO	Non-Governmental Organization
OLS	Ordinary Least Squares
POT	Plan de Ordenamiento Territorial/Land Use Plan
UN	United Nations
WB	The World Bank

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1. Introduction

"Sanitation is a sensitive issue. It is an unpopular subject. Perhaps that is why the sanitation crisis has not been met with the kind of response we need – but that must change." - UN Secretary-General Ban Ki-moon (UNICEF 2013:b).

Access to clean water and sanitation has been declared a human right by the General Assembly on July 28, 2010 (Resolution 64/292) and essential for fulfilling all human rights (UN n.d:b). WHO (2005:1) explains: "safe disposal of excreta and hygienic behaviours are essential for the dignity, status and wellbeing of every person, be they rich or poor, irrespective of whether they live in rural areas, small towns or urban centres". Despite this, people around the world are struggling with getting improved access to clean water and sanitation. Therefore, this thesis wants to study mechanisms behind access to sanitation. Focus lies on sanitation, but as sanitation is closely linked with water[1], also water is discussed although the results cannot automatically be transferred to include also water. As will be described in chapter 3, previous research has pointed at different important factors for achieving improved access to sanitation, which can be divided into three main categories: economy of both the individual and of the local and/or national government[2]; (land- and) housing tenure; and participation of the community to achieve improved access to sanitation, both through lobbying or cooperation with the local government, or through initializing local initiatives for improvement. But there is to my knowledge no previous study discussing these factors in relation to each other in one study, which will be a contribution of this study in learning both which of these factors is most important for achieving better access to sanitation, and how these factors relate to each other. Another contribution of this study is the results of the mixed methods approach in which these factors will be studied both quantitatively and qualitatively, where the different approaches allow studying the factors at different detail levels. The thesis is conducted as a field study in Medellín, Colombia as will be further discussed in the methodological chapter. Studying a city, the focus lies on urban sanitation which faces special challenges compared with rural sanitation[3].

[1] Chapter 2.1.1
[2] Further discussed in chapter 2 and 3
[3] Chapter 2

1.1 Disposition

The thesis is structured as follows: first, the background chapter presents the sanitation as challenge, and especially urban sanitation. After follows the previous research chapter which discusses previous research done within the field and identifies a research gap and the three variables which will be studied deeper in this thesis. The theoretical framework discusses these variables further and ends with an operationalization of the variables. After, the aim and research questions are presented. The methodological chapter explains the two different methodological approaches used in the thesis. Next, the chapter about Colombia presents shortly the history of the country and the sanitation status, as well as Medellín where the study is conducted, in order to give a context. After this the thesis moves into the empirical part, first into the quantitative analysis and then into the qualitative analysis. Each of these chapters ends with analysing and discussing the findings in relation to the theoretical framework. The conclusion chapter summarizes the findings and answer the research questions. In the end, the discussion chapter discusses the methodological approach and possible future research.

2. Background

This chapter will describe the sanitation challenge, its links with water and solid waste, urban sanitation and urban implications to give the reader a background on the topic.

2.1 Water and Sanitation

Sanitation refers to human excreta, while safe sanitation refers to its secure management (IRC 1998-2014:b). "An *improved sanitation facility* is defined as one that hygienically separates human excreta from human contact" (UNICEF 2009, Water.org 1990-2014:b). This thesis uses the below classification of improved and unimproved sanitation facilities:

Table 1: Key to Sanitation Data

Improved Sanitation Facilities	Unimproved Sanitation Facilities
Flush or pour-flush to: - piped sewer system - septic tank - pit latrine Ventilated improved pit latrine (VIP) Pit latrine with slab Composting toilet	Flush or pour-flush to elsewhere Pit latrine without slab or open pit Bucket Hanging toilet or hanging latrine No facilities or bush or field (open defecation) Public or shared sanitation facilities

(UNICEF 2009)

The above key includes both use and disposal. As a system, "sanitation" is a combination of some kind of toilet, excreta collection, transportation, treatment and a disposal- or re-use mechanism or process (IWA n.d:8,19). According to IWA (n.d:8), "a good sanitation system also minimizes or removes health risks and negative impacts on the environment".

There has been a lot of attention on water and sanitation with two decades dedicated. UN (n.d:a) states water as essential for survival, affecting a number of issues and critical to sustainable development. The challenge is likely to aggravate with growing urban population challenging urban water and sanitation access. While the MDG target concerning access to safe drinking water has already been met globally, access to sanitation is lagging behind despite attention (UNICEF 2013:a). Although 240 000 people gained access to improved sanitation every day between 1990 and 2011, 2.5 billion are still without access (UN n.d:c). OHCHR (1996-2012) explains this as a lack of political interest in sanitation, while water is more popular politically.

The UN highlights that 200 million people "gained access to improved water sources, improved sanitation facilities, or durable or less crowded housing, thereby exceeding the MDG target[4]" (UN n.d:c). But at a closer look, we learn that the *number* of slum dwellers have increased from 650 million in 1990 to 863 million in 2012, meaning there are more people than ever living in slums in absolute numbers. Although many cities have undergone a 'sanitary revolution' more people than ever live without improved access to sanitation (McGranahan et al. 2001:1). The urban sanitary situation may even be worse; IWA (n.d:7) explains that "coverage of urban areas is often counted in terms of whether a settlement has a system in place sometimes with little attention to the status of the system, rather than by assessing household access to services".

According to UNICEF (2013:b) "sanitation is fundamental to human development and security". Rather than a technical challenge, the problem is attitudes and adopting new behaviours. Low knowledge of consequences of inadequate sanitation makes it difficult to make people invest in sanitation and contributes to political leaders giving low priority. Being closely linked to behaviour it is necessary to revise behaviours before technology can make

[4] Target 7.d

difference (UNICEF 2013:b). Also, "technical measures must be combined with political will and structural reforms" (Durand-Lasserve et al. 2002:134).

2.1.1 Links between Water, Sanitation and Solid Waste

There are clear links between water, sanitation and solid waste. De la Harpe (n.d:9) explains that "water services cannot become sustainable unless sanitation problems are tackled". Water, sanitation and solid waste needs better integrated planning, and interdependencies between different infrastructure sectors need to be recognized (Garrick and Magpili 2007:121-122; Hardoy et al. 2014:211-218; Kessides 1993:22-23). Flooded sanitation systems lead to contamination. Drainage systems and solid waste management must function since solid waste tends to clog drainage systems (Hawkins et al. 2013; Kessides 1993:23; McGranahan 2001:28,30; Satterthwaite 2003:78). Solid waste is often mixed with faecal waste (McGranahan 2001:28). Usually, low income areas have the poorest service of garbage collecting (Satterthwaite 2003:78; WHO 2005:10).

2.2 Urban sanitation

Fay and Morrison (2007:18) explain that "rapid urbanization has put pressure on infrastructure, and access and quality are often inadequate in poor neighbourhoods". Slum dwellers often face poor sanitation (Hawkins et al. 2013). Governments frequently have difficulties financing infrastructure in slums (Tacoli et al. 2008:38). A large problem is inequality *within* urban areas where the poor tend to cluster in unplanned neighbourhoods without adequate services or public infrastructure (Hawkins et al. 2013; IWA n.d:7; Lall et al. 2012:46; WSP 2014). Although a city's wealth does make a difference, generalizations should not be assumed to translate to individual level; inappropriate measurements show data on urban sanitation without measuring *who* is having 'adequate' provision (Tacoli et al. 2001:37,39).

Although urban poor usually have better access to sanitation than rural poor, quality and reliability pose large challenges (Fay and Ruggeri Laderchi 2005:20). McGranahan (2001:25) states that middle income cities usually have the largest quantity of raw sewerage in waterways since sewerage systems often are built faster than treatment systems, contributing to health problems and environment degradation. The combination of non-universal coverage, poor quality and densely populated areas create health problems (Fay and Ruggeri Laderchi 2005:35-36). McGranahan et al. (2001:5) state that "one of the largest challenges nowadays is to ensure healthy environments for the urban poor". Lacking economic and social resources

and political power, the urban poor are the most exposed to environmental threats including poor water and sanitation or waste.

In developing countries there is often a mix between on- and off-site sanitation facilities provided by different actors; households, municipality or private, but there are often problems with construction, maintenance and/or collection (Hawkins et al. 2013:3-4). Poorly managed infrastructure because of ineffective institutions and poor maintenance often leads to poorly functioning systems.

Alternative suppliers are frequently used when there is no regular infrastructure or when it is too expensive, although alternative suppliers tend to be more expensive despite competition among them (Estache 2002:48-49). Fay and Morrison (2007:45) claim there are often illegal connections and low incentives for the police to stop it. About 100 million dwellers practice open defecation (Satterthwaite 2003:79).

2.2.1 Urban Implications

Poor sanitation affects both health and environment. Poor health because of water-related diseases is a heavy burden and major contributor to urban poverty (Balcazar 2008:14; Bitrán et al. 2005:187; Kessides 1993:21-22; McGranahan 2001:30-31; Satterthwaite 2003:76,78). Diseases risk people's quality of life together with education and productivity (Fay and Morrison 2007:15,19; Hawkins et al. 2013; Kessides 1993:21-22). In fact, according to Water.org (1990-2014:a) "investment in safe drinking water and sanitation contributes to economic growth".

It is important with a citywide approach due to contamination risks in dense areas (Hawkins et al. 2013). Density combined with inadequate drainage, septage and management of solid waste expose people to "pollution created by others" (Hawkins et al. 2013; Tacoli et al. 2008:49). Density can hence have consequences in a neighbourhood even if only parts lack access to sanitation, facilitating epidemics such as cholera or diarrhoea (Fay and Ruggeri Laderchi 2005:20; Satterthwaite 2003:77; Tacoli et al. 2001:39). About 94 percent of the diarrhoea cases are caused by poor water and sanitation why improving water and sanitation benefits both individual and society (Florez 2011:5; Kessides 1993:21-22; Satterthwaite 2003:78). But only improving infrastructure is not enough to improve health: improved hygiene practices are needed (Bitrán et al. 2005:189; Florez 2011:5; WHO 2005:70-73).

Bitrán et al. (2005:189) say “the impact of infrastructure on health increases with education”. Another challenge is lack of water treatment (Balcazar 2008:14).

According to Barrenberg and Stenström (2010), inadequate disposal of human waste is an important contributor to environmental degradation. Urban poor suffer disproportionally from environmental degradation contributing to urban poverty, and lack of basic services adds to vulnerability (Satterthwaite 2003:73-74; Tacoli et al. 2008:49). Environmental problems for urban poor are connected with poor infrastructure and services, discrimination, lack of political influence and lack of rule of law (Satterthwaite 2003:76). Water pollution destroys ecosystems, causes political instability and affects economic and social sustainability (Stålgren 2006:11).

3. Previous Research

This chapter presents an overview of some of the previous research done within the field of water and sanitation and especially urban sanitation, aiming to identify the research focus of this thesis.

Numerous studies concern water. Some cover many aspects of water, including urban use, ground water and water and conflict, such as Gleick et al. (2004), and some concern local knowledge-sharing on water such as Furlong and Tippett (2013). Boelens et al. (2011) write about water as a source of power in addition to a source of life and culture, giving examples from the Americas. Some explore links between water and sustainable development (Bennett et al. 2005:4; Dávila-Poblete and Nieves Rico 2005:34-35). Many studies tend to be technical, discussing for example water treatment (Hyde and Lackey 2013). IWA (n.d:14,33) turns attention towards how to apply technologies for urban sanitation pointing at the need for flexible planners since attitudes towards sanitation change with time and depend on awareness, financial possibilities, accessibility and influence possibilities (IWA n.d:16-17; WHO 2005:79). Others, such as Davis et al. (2008), look at potentials for involving microfinance to get improved access to water and sanitation finding it could be positive, while WHO (2005:42-43) point out that many microfinance schemes for sanitation have failed in the past, but have potentials if managed properly. None of these studies were relevant for this study as they do not discuss mechanisms behind obtaining improved access.

Several studies look at sanitation in relation to schools as this can have a major impact on school performance and/or attendance (Chatterley et al. 2013). Many studies concern rural sanitation, such as Jones and Silva (2009) and Jones (2003) and also urban sanitation; Siddharth and Shivani (2005) discuss child health in Indian slums and poor sanitation, while McFarlane (2008) discusses political matter of sanitation infrastructure in colonial and post-colonial Bombay. Both Gandy (2006) and Acey (2007) discuss urban sanitation in Lagos in similar terms through a colonial perspective. In Ghana, Keraita et al. (2003) study urban wastewater use in agriculture. All these studies are interesting and important but did not serve to study mechanisms behind access to sanitation. When going through previous research, the majority of the studies in the field concern either Asia or Africa leaving a gap in Latin America.

There are strong links between water, sanitation and gender as showed by a number of scholars (Bennett et al. 2005; Castaño and Méndez 2007; Coles and Wallace 2005; Dávila-Poblete and Nieves Rico 2005; Hawkins et al. 2013; Joshi 2005; Satterthwaite 2003; Strang 2005; Zwarteveen and Bennett 2005:13). Some have pointed at the security situation for women without adequate sanitation services (Hawkins et al. 2013; WaterAid through Jansz and Wilbur, 2013), while others tend to discuss women's participation in projects concerning water and sanitation, where some say it is important (Bennett et al. 2005; Bhandari et al. 2005; Joshi 2005; Padawangi, 2010; Zwarteveen and Bennett 2005:13) and some say it is not (Stalker Prokopy 2004). The majority of these scholars point at the links between development, poverty, water and sanitation and gender. But Laurie (2011) state that despite scholars pointing at the need for and importance of gender analysis in relation to water, gender remains marginalized and under-theorized in much water literature. Upadhyay (2003) says there are even fewer linking this with poverty. Ncube and Pawandiwa (2013) say gender notions in sanitation literature are often 'blurry'. In addition, Dávila-Poblete and Nieves Rico (2005:44) express there has been little progress in bringing gender and water together in discussions. While recognizing that gender perspectives are important for reaching adequate water and sanitation for all, this thesis will not deal specifically with gender perspectives as that is not its aim.

When doing the literature review I found that the majority of the studies in the field talk about the links between economy and access to sanitation (Balcazar 2008:14; Davis et al. 2008; Garrick and Magpili 2007; Hardoy et al. 2014; Kessides 1993) why I found it relevant to

consider economic aspects in my study. Some studies focus on poor countries' inability or refusal to provide adequate sanitation (McGranahan 2001; Satterthwaite 2003) and some on poor individuals' inability or refusal to achieve adequate sanitation (Estache 2002:14; Fay and Wellenstein 2005:113; Hobbs 2004; McGranahan 2001). Many scholars talk about the relationship between economic growth and access to basic services (Garrick and Magpili 2007; Kessides 1993; Kim et al. in Samad et al. 2012) but Devarajan and Reinikka (2004) highlight that *only* economic growth is not enough to improve basic services. Some scholars focus on the inequalities in access to basic services (such as Fay and Wellenstein 2005; Kessides 1993; WB 2013:a) and some discuss the price of alternative providers (Davis et al. 2008; Kessides 1993; Solo 2003; WB 2013:a). The majority of the studies revised also tend to look at low income countries where poverty is large.

In Latin America, research has focused on the private sector's role in sanitation. Since the 1990s there has been a drastic shift in funding involving growth of the private sector. But water and sanitation are the infrastructure sectors receiving least private capital, Fay (2001:16,19) predicts investment shortfalls. Fay (2001:17) states it is unlikely that "private funds will suffice to finance infrastructure financing needs for some time". Bennett et al. (2005:191) agree, saying that often only the 'best infrastructure' is privatized and the state has to deal with the poor, often excluded from the privatized services because of payment difficulties. Despite the risk that the private sector only will operate in certain, profitably areas, Foster (1996:10,14) says the private sector can be a needed boost for the sector. But in many Latin American cities, tariffs have increased without correspondence to improvements (Bennett et al. 2005:192). Some research in Latin America has also focused on health aspects linked with sanitation (Bottazzi et al. 2008; Frenck and Londoño 1997). Chanduvi et al. (2009) made an interesting study measuring inequality opportunities which is closer to this study, but focuses on the urban-rural divide for sanitation which they say is the most important circumstance to explain inequality in access to sanitation. While the private sector plays a big and important role for water and sanitation in Latin America, I was more interested in economic income as a mechanism behind achieving access to sanitation. In addition, much research is quite dated.

Several studies also mention housing and land tenure as important factors for obtaining improved access to water and sanitation (Besley 1995; Deininger 2003; de Soto 1989; de Soto 2000; Durand-Lasserve and Royston 2002; Hardoy et al. 2014:211-218; Hawkins et al. 2013;

Fay and Wellenstein 2005; Payne 2002; Satterthwaite 2003; Sjöstedt 2008). Some have focused on slum restrictions affecting access to basic infrastructure (Montgomery 2008; Tacoli et al. 2008:38) and some on slum upgrading (Fay and Wellenstein 2005; Hawkins et al. 2013). Regarding sanitation consequences of obtaining housing- and land tenure, some scholars have focused more on investments by the households (Fay and Wellenstein 2005; Sjöstedt 2008; Water.org 1990-2014:a; WHO 2005) and some on investments made by the local government (Balcazar 2008; Fay and Wellenstein 2005; Solo 2003). Sjöstedt (2008) puts emphasis on the need for *credible* commitments by the government regarding land tenure for investments to be made in basic infrastructure with the example of water. In addition, Hardoy et al. (2014:211-218) mention that geography could play a role for gaining access. Housing tenure is hence pointed out as a factor for achieving access to sanitation and will be used as one of the factors studied in this thesis.

Attention on integrated management of water and sanitation has increased. Bennett et al. (2005:2-3) explain how water mismanagement creates water stress leading to further mismanagement in a vicious cycle. There are often large gaps between policies formulated at international level and their implementation locally (Bennett et al. 2005:4; Stålgren 2006). Since the recognition of the need for improved water management, the international regime Integrated Water Resource Management (IWRM) was developed, offering a set of norms each country needs to apply locally. IWRM's focus is on stakeholder participation, water's economic value and water as a part of ecosystems (Stålgren 2006:11). But Stålgren (2006) argues that understanding of IWRM varies in different contexts making it a *transformed* international regime; decreasing its usefulness. According to Garrick and Magpili (2007:129-130), community-based assessment is new to the water and sanitation infrastructure literature regarding management and planning, still, this is what is needed for sustained access. Dávila-Poblete and Nieves Rico (2005:32-33) state there is an apparent need for a participatory approach regarding integrated water and sanitation management. Devesa et al. (2008) discuss integrated management of sanitation infrastructure but takes a rather technical focus. The management focus has rather been on water than on sanitation. I found the aspects of integrated management and specially the participatory approach and stakeholder participation interesting and relevant for my topic and kept reading.

The importance of community participation for improved access to sanitation can be divided into two sub-groups. Some scholars have focused on the importance of local communities

participating in planning and implementation of sanitation services (Balcazar 2008; de la Harpe n.d; Fay and Morrison 2007; IRC 1998-2004:a; UNCHS 1996 in Elliot 2006; WHO 2005), while others have focused on participation in the sense of communities' local solutions to water and sanitation problems (Fay and Wellenstein 2005; Solo 2003; WHO 2005). A number of scholars mention the need of good governance in the matter, such as Balcazar (2008); de la Harpe (n.d); Elliot (2006); Fay and Morrison (2007); Fay and Ruggeri Laderchi (2005); IRC (1998-2004:b); McGranahan (2001); Satterthwaite (2003); WHO (2005).

As mentioned in the introduction, I have seen a tendency that many studies discuss the issues of economy, housing tenure and community participation independently, which all seem to be important factors for access to sanitation. But to my knowledge there is no previous quantitative or qualitative study including all three factors in one study, learning which factor is most important which is what this study will do. In addition, this study is combining quantitative and qualitative methods for exploring the relationships between these variables, which also has not been done. This study is hence scientifically arisen, but also because it fills a research gap by looking at a *middle income country* in *Latin America* and at the differences *within* a city in order to capture inequalities. In addition, Medellín is a successful case, which usually is not studied. It is also socially arisen as unimproved access to sanitation is a large problem worldwide affecting billions of people as discussed in chapter 2 (Esaiasson et al. 2007:31).

4. Theoretical Framework

When going through previous research in the field, three main themes could be identified in the research dealing with access to sanitation; the economic situation, an insufficient housing or land tenure situation and community participation. These three themes will hence form the basis of this thesis, why this chapter will go deeper into the themes and for each theme present different views and definitions, as well as the approach used in the analytical part of the thesis when interpreting and operationalizing the theory.

To begin with, the three independent variables share many links between each other and the dependent variable. Slum dwellers are considered often having serious shortages in one or more of tenure, water, sanitation, housing quality and crowding (Martine et al. 2008:73). Satterthwaite (2003:82) explains that low incomes and the refusal or inability of the

government to provide adequate shelter and services are factors contributing to a hazardous living situation with a lack of adequate sanitation which also depends on the political influence possibilities determining the effect of communities lobbying for a better situation, showing the theoretical relationship between the variables.

4.1 The Relationship between Economic Income and Access to Sanitation

The following section will elaborate the links between economic income and access to sanitation. Economic income can be divided into society level and individual level.

4.1.1 Society Level

Sanitation services are often absent or poor in low income communities (Balcazar 2008:14; Garrick and Magpili 2007:123). Lack of access to improved water and sanitation creates a vicious cycle of poverty, according to Garrick and Magpili (2007:121). The lack of access to basic services limits economic growth which will limit the resources to invest in sanitation services (Garrick and Magpili 2007:121; Kessides 1993:iii,ix,x; Kim et al. 2012:157). Affecting both production and consumption, the linkages between infrastructure and economy are complex: infrastructure can increase both productivity and economic return of other factors, such as labour. There is a dual causality in that infrastructure affects the economy, but the economy also affects infrastructure (Kessides 1993:x,1,2). Similarly, there could be a dual causality as to whether having a higher income enables people to have better infrastructure or whether better infrastructure enables higher incomes (Kessides 1993:18).

McGranahan (2001:17) explains that wealthier governments and people can better afford sanitation infrastructure. He states that management of urban water and sanitation is strongly connected to per capita income and whether cities are low or middle income (McGranahan 2001:24-25). At the same time, Fay and Wellenstein (2005:98) say there are large inequalities in access to basic services between rich and poor. Sewerage is among the services most unequally distributed. According to Kessides (1993:19,22-23), public spending on infrastructure often aggravates inequalities as they tend to favour better-off citizens, while Kim et al. (2012:157) claim that improving infrastructure can reduce inequalities. Public policies should strive to increase affordable infrastructure possibilities, such as alternative providers (Kessides 1993:23).

4.1.2 Individual Level

Households consuming infrastructure services such as water and sanitation contribute to economic welfare of the society (Kessides 1993:2). Kessides (1993:x) explains "the lack of affordable access to adequate infrastructure is a key factor determining the nature and persistence of poverty". Similarly, low income groups are in general those lacking access or having the lowest quality of infrastructure services. The availability of infrastructures can serve as a welfare measure (Ibid 1993:19). Kessides (1993:21) also suggests that the absence of infrastructure services may be influential for whether remaining in poverty, since this affects the labour productivity. Devarajan and Reinikka (2004:137-140) argue that in order to reach the MDGs, economic growth by itself and increased public expenditures are not enough as the services often do not reach the intended people for various reasons.

Davis et al. (2008:887) say that "poverty is a seemingly obvious explanation for the persistent lack of coverage with basic water and sanitation (W&S) services". But, research has shown that often the poorest are paying most since they need to use alternative services which are often labour intensive. Also, the poorest often survive on day-to-day and find it difficult to save money to invest in services or to pay a bill (Ibid 2008:887). The price of alternatives tend to be higher than the official infrastructure, especially for water (Kessides 1993:19; WB 2013:a:29), although Solo (2003:19) argue the opposite due to competition.

According to a number of scholars (Estache 2002:14; Fay and Wellenstein 2005:113; Hobbs 2004:32), affordability is an important part of access to improved sanitation. Sometimes even when there is infrastructure, households will not connect simply because they cannot afford it (Fay 2005:7; Fay and Wellenstein 2005:101). To adopt the correct policy it is important to know *why* households lack services, whether it is due to unavailability or unaffordability (Estache 2002:4; Fay and Morrison 2007:54). Similarly, there is a concern regarding prices. Oxfam for example has raised a concern regarding privatization of water and especially its commercialization with the risk of prices being too high. Oxfam states that "access to affordable, clean water is a right, not a consumer choice" (Hobbs 2004:32). Fay and Wellenstein (2005:113) discuss the need to promote access and affordability in order to make infrastructure work for the poor. The World Bank (WB 2013:a:29) suggests price discrimination (charging the rich more than the poor) as a method to reach higher equity.

4.2 Housing- and Land Tenure and Access to Sanitation

This section will describe tenure; first of all a short introduction to land and in particular housing tenure and actions towards informal settlements to give the reader a picture of the issues, and then how housing tenure is linked with access to sanitation.

Gaining access to housing is a key challenge for the urban poor (Fay and Ruggeri Laderchi 2005:20). As formal housing is out of reach for the majority of the urban poor, many live in informal housing instead, often in marginal areas with poor access to public services (Fay 2005:5-7). Demand for land increases with urbanization as land becomes increasingly scarce (Fay and Ruggeri Laderchi 2005:36; WB 2013:a:6).

4.2.1 Housing Tenure

Life as an urban poor is often very uncertain (Tacoli et al. 2008:49). In the slums it is common with social tensions and disputes over land ownership. Informal owners sometimes control land without formal ownership (Ibid 2008:38,43). In the informal housing sector, often a plot of land is occupied and then built upon. Fay and Wellenstein (2005:95-96) name this progressive housing and mention three phases: occupation, transition and consolidation. When land is occupied without opposition, more people move there: occupation and transition. The new citizens start to demand basic services and infrastructure. When they obtain this and title to the land, the consolidation occurs.

Which tenure form is suitable depends on the context why tenure can be very complex and differ between locations. Different systems can coexist within a city, often because the formal system fails to recognize the needs of the poor (Payne 2002:3-7). According to Fay and Wellenstein (2005:94) "low-income renting can be characterized as informal, as it operates without formal written contracts or observance of rental regulations". Durand-Lasserve and Royston (2002:7) explain that sometimes the one renting out is also in an informal situation. Other options can be lending and house sharing. Lending often occurs with untitled property or uncertain ownership. Typically though, the urban poor own their homes but with unsecure tenure (Fay and Wellenstein 2005:91-92,94). Surprisingly, homeownerships in slums can be as high as 70-80 percent.

Urban authorities often fail to provide access for the urban poor to adequate residential areas (Satterthwaite 2003:85). Many national governments try to restrict slums, sometimes using evictions and denying basic services, for instance water and sanitation (Montgomery 2008:26;

Tacoli et al. 2008:38). Such strategies have possibly only led to more poverty in the slums (Montgomery 2008:26). Most times, regulations render the settlements informal or illegal and do not serve to improve the situation (Tacoli et al. 2008:38). A solution discussed is slum upgrading which removes legal and political hinders leaving the slum outside of the normal public service framework. Legal reform is essential to improve the slums (Hawkins et al. 2013). Slum upgrading is cheaper than destruction and relocation, both financially and socially. It usually involves improvement of physical conditions such as water and sanitation, drainage and land tenure (Fay and Wellenstein 2005:111-112).

4.2.2 Links between Housing Tenure and Sanitation

Durand-Lasserve and Royston (2002:1,3,7) describe tenure security as one of the main challenges in urban management; a key in a poverty cycle which often hampers improvements of living conditions. An increase of informal settlements reflects an increase of inequalities regarding distribution of resources. Further, tenure security "has a direct impact on access to basic urban services and on investment at settlement level, and reinforces poverty and social exclusion" (Ibid 2002:7). Payne (1997:25-26) agrees although saying that formal tenure is not necessarily needed for increasing investments as long as the tenure is secure, but tenure policies should have as a primary objective to provide security, stimulating investments. In fact, Payne (1997:11) says "access to land with sufficient security to encourage investment for its efficient use and development is a vital component in development strategies", especially in urban areas. The Habitat II conference in 1996 stressed the importance of tenure and security of tenure: "the failure to adopt, at all levels, appropriate rural and urban land policies and land management practices remains a primary cause of inequity and poverty" (Durand-Lasserve and Royston 2002:2).

In order to manage land effectively it is necessary with clear values of land and definitions of property rights. Land use must be planned to include basic infrastructure for all urban residents (WB 2013:a:6). Payne (2002:5) defines tenure as "the mode by which land is held or owned, or the set of relationships among people concerning land or its product" and property rights as "a recognized interest in land or property vested in an individual or group and can apply separately to land or development on it". Sjöstedt (2008:28) defines property rights as "having the exclusive rights to a benefit stream", saying this usually means "rights to the fruits of one's labour", and there are several similar definitions (see Alston and Mueller 2005; Eggertsson 1990; Firmin-Sellers 1995; Furubotn and Pejovich 1974; Haber et al. 2004; North

1990; Riker and Sened 1991). Tenure and property rights are then thought to lead to better access to basic services as will be further elaborated below.

According to Sjöstedt (2008:37), "land tenure is in essence another name for property rights to land" since "a land tenure system is thus the institutional arrangement under which people gain access to land". Land tenure thus governs expectations. Sjöstedt (2008) puts emphasis on the need for *credible* commitments by the government regarding land tenure for investments to be made in basic infrastructure with the example of water. He also discusses the relations of property rights and investments with New Institutional Economics where individuals' actions are shaped by institutions defining the rules (Sjöstedt 2008:26-28). Further, Sjöstedt (2008:31) highlights the relationship between property rights and expectations of people's behaviour, explaining that "property rights determine resource use since they govern the expectations of how other resource users will behave".

Satterthwaite (2003:88) says that for a better urban environment it is critical for the urban poor to get access to safe land. It is also a question of getting access to other benefits such as credit or public services. As Payne (2002:3) describes it: "tenure therefore forms the foundation on which any effort to improve living conditions for the poor has to be built". The sense of security will define whether investments are long-term or short-term; uncertainty thwarts investments (Sjöstedt 2008:29,32). Informal housing often means gradually improving housing quality with time, including access to services and infrastructure (Fay and Wellenstein 2005:91,94-95). Fay and Wellenstein (2005:96) explain that "as households increase tenure security (through titling or other means) and therefore their sense of permanence, they tend to increase investment in their homes". Kundu (2002:136,154) argues that investments will only be made when there is some certainty there will not soon be an eviction. Private property rights is thought to stimulate investment although Sjöstedt (2008:38-44) argues this is not necessarily the case and highlights the need for *security* of property rights. WHO (2005:41) points at the relationship between willingness-to-pay for services and private ownership. The private investment increases with regularization of land tenure (Fay and Wellenstein 2005:111). Households are often the primary investor for on-site sanitation facilities but they need access to credit to be able to invest, which tenure could facilitate (Payne 1997:49-50; Water.org 1990-2014:a). On the other side of the spectra, in many countries services will not be provided when there is no registered title (Balcazar 2008:15; Fay and Wellenstein 2005:95; Sjöstedt 2008:9; Solo 2003:16). As such, tenure can

also stimulate investment by the local government (Sjöstedt 2008:9). According to Kundu (2002:155) "perceived tenure security in slum colonies, besides prompting individuals to make investments, also facilitates community organizations, NGOs and even private agencies to launch projects for improving basic amenities".

Payne (2002:305) highlights that simply providing the poor with individual titles may not be the correct solution depending on the context, although he does admit that formality is advisable. Still, tenure seems to be an important part of having access to urban infrastructure such as sanitation. Housing tenure can both mean more investment by the individual, which dares to make investments in infrastructure for the house, and investment by public entities which can extend their services when the housing is formal.

4.3 Community Participation for Access to Sanitation

The following section will go through the links between community participation and access to sanitation. In doing so, it will start with describing the role of governance in the matter, the importance of participation, and informal initiatives.

4.3.1 Governance

There are a number of global, conceptual frameworks for urban sanitation such as the Strategic Sanitation Approach, IWA's Sanitation 21 and SANDEC's Community-Led Urban Environmental Sanitation. They tend to put emphasis on the need for going beyond infrastructure, looking at the users' needs at local level. According to Hawkins et al. (2013:12), sanitation services fail primarily because of an inadequate service delivery chain rather than a lack of infrastructure. Tacoli et al. (2008:38) state that "the challenge of providing acceptable urban infrastructure and services to unacceptably poor urban-dwellers is as much a governance issue as a technical or financial one".

Governance is closely linked to community participation. There are many definitions of governance and according to Hedlund and Montin (2009:9) no consensus on its exact meaning. Here follows a short summary of what governance can be considered to be. In the literature, there seems to be two main views of governance; one is that the power of the state has been eroded and the other one that there is a change in the way the state govern (Hysing 2009:109), where I join the latter view. This change can be described as *from government to governance* with governance including a number of diverse stakeholders from different parts of the society (Hedlund and Montin 2009:7). At the same time, also the importance of the

civil society has increased (Kjaer 2004:4). According to Hedlund and Montin (2009:7), it is important to cooperate between different actors in the society when dealing with complex problems. de la Harpe (n.d:2) explains that "governance emerges from the formal and informal relationships that exist between people, institutions and government". It is exactly the participation part of governance regarding diverse stakeholders from different parts of society and in particular the civil society, which caught my mind and I wanted to learn more about how this is linked with access to sanitation.

There is also good governance, which will affect poverty alleviation in cities (Elliot 2006:194). A key of good governance is participation of different stakeholders, including the poor, in the decision-making process. If performed well, good governance results in access to basic infrastructure services (de la Harpe n.d:4). The water crisis of the urban poor can be referred to as a water governance crisis and governments' failure to prioritize it (De la Harpe n.d:5; Satterthwaite 2003:88). Similarly, Tacoli et al. 2001:38) say that better governance is needed for environmental challenges. Interurban differences in performance can partly be explained with quality of governance (McGranahan 2001:16).

4.3.2 Governance, Participation and Sanitation

Case studies have shown that 60 percent of the urban poor got service by communal action while more than 75 percent of the urban rich got access by a developer (Fay and Wellenstein 2005:99). On the other hand, Durand-Lasserve and Royston (2002:6-7) say "frequently there is a lack of any internal cohesion in these settlements, making it difficult for the populations to group together to defend themselves" but "the level and cohesion of community organization" is one of the factors contributing to households being protected from eviction.

Usually, a number of different actors are already included in sanitation management, but to achieve better results when improving systems it is important to involve these different actors (WHO 2005:16). WHO (2005:48-49) points at the need to involve as well government agencies (central and/or local), the private sector and the civil society, including the households themselves and community-based groups, and the need to focus on partnerships, accountability and equity. UNCHS (1996 in Elliot 2006:226) says that "establishing new alliances and partnerships and tapping into the knowledge and capacities of the local urban population are two core (interrelated) characteristics of 'good city governance' which is now regularly forwarded as a critical condition for sustainable urban development".

In order to achieve sustainable services of water and sanitation it is essential with good local governance says (de la Harpe n.d:2). Decentralization should facilitate local governance. Fay and Morrison (2007:57) explain that "decentralization and participatory planning can make infrastructure spending more responsive to local needs, but only if carefully implemented". The needs of a community can be better focused if consumers are involved (Ibid 2007:58). Local governance requires stakeholder participation at a local level such as local associations, community representatives and service users (de la Harpe n.d:2-3; IRC 1998-2004:a). The unserved or underserved people need to participate in the accessibility process (Balcazar 2008:43). The more decentralized a country is, the more likely it is that local governance is more developed (de la Harpe n.d:4).

According to WHO (2005:15), "the role of government is to balance public and private benefits of sanitation to ensure increased access at the household level while safeguarding society's wider interests", and to balance interests of different groups and include excluded people. But the political commitment regarding sanitation is not enough (Barrenberg and Stenström 2010). Satterthwaite (2003:88) points at the large problem of economic and political factors which tend to hinder the poor to obtain improved access to basic resources. In fact, governance failure lies behind most urban problems, including provision of basic services and infrastructure, and land planning for housing for the poor (Satterthwaite 2003:89; Fay and Ruggeri Laderchi 2005:20). In some cases this goes hand in hand with the level of economy in the country as local governance becomes more difficult when the economy is not steady (Satterthwaite 2003:89).

"Politically, the groups most at risk tend to be at a political disadvantage" according to Tacoli et al. (2001:38). They claim that in some cases groups with political power may have vested interests in a certain practice, contributing to its maintenance. Improvements are often seized by wealthier residents. McGranahan et al. (2008:81) claim that "generally, the politics of public housing and service provision do not favour loosely organized groups of low-income residents, whose principal political tools are electoral politics or protests". Politicians may use developments as political favours or to gain support of strategic importance; clientelistic politics.

In sum, extensive research point at participation as important for access to sanitation, but *how* is this linked? *How* can participation lead to better access? Is it before a project or during a project?

4.3.3 Informal Initiatives in Informal Setting

Households often invent their own ways to handle an unsatisfactory situation, especially where public institutions are failing (Solo 2003:19). WHO (2005:12) explains that "while many of these solutions are not perfect, they show that households have the potential to invest responsibly and make changes in personal hygiene practices". Even in cities with good coverage there are independent providers operating, although being particularly active in the slum without or underserved by public infrastructure services (Solo 2003:8,30). Individual providers often start to operate in new settlements. Solo (2003:16) says "the small operators' business appears to be unaffected by households' tenure status, family income, or the community's size: in close contact with the community, they seem to be more effective in tailoring services to local needs and resources, and in getting paid". These independent providers "can and will be a part of the solution", but their success depends on how the government acts as their policies can hinder or promote them; governments should learn from independent provider's actions before large investments (Solo 2003:10,28). Governments should see how to best support local initiatives (WHO 2005:12).

To conclude, there seems to be mainly two ways in which community participation links with access to improved sanitation. The first is when communities interact with the local government as discussed by Balcazar (2008:43), de la Harpe (n.d:2-3), Fay and Morrison (2007:57-58), IRC (1998-2004:a), UNCHS (1996 in Elliot 2006:226), and WHO (2005:48-49). But as will be further discussed in the operationalization section (4.4.) it is not clear in which phase the communities need to interact. The second way is when communities come up with local solutions to problems where the government fails to provide their services.

5. Aim and Research Questions

In this thesis the factors of economic income, housing tenure and community participation are discussed and the overarching aim of this master thesis is to explore mechanisms contributing to *getting* improved access to urban sanitation and the reasons for *not getting* improved access. As these three factors have been presented by previous research as important factors, but always studied independently, this thesis wants to learn which factor is *the* most important

in Medellín, Colombia[5], through a case study. The following research question will be answered:

-Out of economic income, housing tenure and community participation which factor is the most important for achieving access to sanitation in Medellín?

The first research question will be answered through a quantitative comparison between neighbourhoods in Medellín to capture inequalities *within* the city regarding inequality in income, housing and participation. The three main hypotheses which this thesis will test in the quantitative section are:

H1. The level of economic income is the most influential factor for access to sanitation.
H2. Having housing tenure is the most influential factor for access to sanitation.
H3. Participating in the community is the most influential factor for access to sanitation.

After exploring the above question quantitatively, informant interviews will be conducted to complement the answers from the quantitative part and to further investigate two of the factors which need more attention[6]; housing tenure and community participation. Hence, the two following research questions are:

- *What role can housing tenure play for access to sanitation in Medellín?*
- *How is community participation linked to access to sanitation in Medellín?*

The results of the informant interviews can provide further guidance for policy makers in Medellín in what challenges there are for providing improved access to sanitation. In combination with the quantitative analysis this can give an overlook of which policy interventions could be relevant in which neighbourhoods.

5.1. Operationalization

Previous research points at economy as important for access to sanitation. Two approaches can be identified in the discussion on the connection between ***income*** and access to sanitation; the society level and whether the central or local government can afford to pay, and the

[5] Chapter 3
[6] For explanation see chapter 8

household or individual level and their payment ability. Since Colombia is a middle-income country and not in urgent need for further financial resources, the focus will rather be on household/individual level than on society level, and also serves to capture inequalities *within* the city. Hence, individual income will be used as the main independent variable in the quantitative part of the thesis.

In the quantitative part a ***housing tenure*** variable will be used as a control variable as housing tenure seems to be important. This thesis does not aim to examine different tenure possibilities as that would be a thesis in its own (see Payne 1997; 2002; Durand-Lasserve and Royston 2002). Also it does not aim to discuss the degree of tenure security. Rather it will make a distinction between general formal tenure and tenure without title.

Balcazar (2008), Durand-Lasserve and Royston (2002), Fay and Wellenstein (2005), Kundu (2002), Payne (1997, 2002), Sjöstedt (2008) and Solo (2003) are among the researchers claiming that (land and) housing tenure is important for improving access to basic services such as water and sanitation although they have slightly different approaches. The basic idea is that increasing property security would lead to increasing investments by the individual or by the local government. In the qualitative part, the role of housing tenure for access to sanitation will be discussed in order to explore deeper in what way it can affect access to sanitation in Medellín.

The quantitative part uses ***community participation*** as a control variable to see if activeness in the society affects access to sanitation, but as this variable is not able to differentiate *how* community participation is linked to access to sanitation, the interviews serve as a deeper exploration of the variable. Since it is not clear in which phase of a project the communities need to interact with the local government, *before or during* a project, this thesis will study both the *during* process regarding planning and implementation of projects but also the *before* process in order to learn whether communities can lobby the local government to get better access to sanitation.

In order to understand *how*, the starting point will be discussing processes. The focus is on governance and stakeholder participation and especially participation by local communities in line with Balcazar (2008), de la Harpe (n.d), Fay and Morrison (2007), Fay and Ruggeri Laderchi (2005), IRC (1998-2004:a), Satterthwaite (2003), WHO (2005) and UNCHS (1996

in Elliot 2006). Discussions will hence concern *who* needs to participate and *who takes the initiative* of a change; whether it was the decision-makers or the community. This will cover the two possible phases; before and during a process. Discussions will also concern any local initiatives for improving access to sanitation in line with Solo (2003:8,10,19,28,30), WHO (2005:12), Tacoli et al. (2008:38) and Fay and Wellenstein (2005:99).

6. Methodology

The following chapter describes the methodology used to study the research questions. The design is of mixed methods as it is based on quantitative research subsequently going on to informant interviews to get a deeper knowledge. Before going through the quantitative and qualitative parts of the methodology a general discussion follows.

In order to get up to date with the research in the field, a scan of previous research has been done[7]. From the relevant research material forming the base for the thesis, a theoretical framework[8] has been elaborated. This has been operationalized with the analyses. Both primary and secondary sources have been used, such as interviews, data, books, academic journals and other literature (GUB 2011). Through clear motivations and accounts for the choice of definitions and approaches, the aim has been to give the reader the opportunity to critically evaluate validity and reliability of the results.

6.1. Case Selection

When going through previous research as well as the work of international organizations, it shows that studies tend to focus on Asia and/or Africa since they are considered to have larger problems. The situation for water and sanitation in Latin America at a general level looks better than before mentioned regions (Balcazar 2008:7; IWA n.d.). Probably due to this it tends to be overlooked. I argue this is a mistake considering the large inequalities *within* Latin America leaving large groups excluded. Colombia being a middle income country[9] but struggling with among the largest inequalities in the world makes it an interesting case for exploring intra-urban differences in improved access to sanitation (ABColombia, n.d; WB 2014:a).

[7] Chapter 3
[8] Chapter 4
[9] GNI per capita between $1,045 and $12,746 (The World Bank 2014:b)

This thesis will study the case of the city of Medellín[10]. Medellín is interesting because it has managed to increase improved access to sanitation, although not yet at a universal scale (Balcazar 2008:9,28-29, WaterLex 2014; World Water Forum 2012:23). It is therefore instructive to learn in what way Medellín has been successful and not successful in relation to the three main factors. In addition, Medellín is chosen because it has data broken down by neighbourhoods, allowing for analysis *within* the city.

6.2. Quantitative

In order to answer the research question *"Out of housing tenure, community participation and economic income, which factor is the most important for achieving access to sanitation in Medellín?"* a multivariate Ordinary Least Squares (OLS) regression analysis[11] has been conducted to predict the effect of the independent variables on the dependent variable (Sundell 2009). However, establishing cause and effect can be difficult due to a risk of reversed causality (Field 2009:173-174). To really know the causality panel data could be used but that is beyond the scope of this study. When controlling for different factors one take into account factors which according to theory may be of importance to explain the relationship (Esaiasson et al. 2007:109, Sundell 2009,2012). In statistical analysis there is always a risk to fail recognizing important factors to explain the phenomenon. When analysing the results it is important to be aware of that risk (Esaiasson et al. 2007:109-110). This study can be argued to be limited since there are a limited amount of control factors available due to the material, but I argue that the study is important to conduct and significant due to the varieties *within* Medellín and that the control variables chosen are relevant according to theory.

To get sufficient analytical power the sample size should be large but also in harmony with the number of independent variables. For this thesis, there are only 17 units of analysis available which could be argued to be too small. But for the purpose of the thesis there is an interest in looking at these 17 units as they represent 17 different neighbourhoods of Medellín. Unfortunately I could not collect data for more units because these units already cover the whole city. In the analysis the small sample size will be taken into consideration (Field 2009:222-223). Special consideration will be given to type I and type II errors; for

[10] Chapter 7 will discuss Colombia and Medellín for a better understanding of the context

[11] I also tried Multilevel Regression Analysis but as the data would not converge and gave a warning message saying "validity of the model fit is uncertain" probably due to too few cases, I decided to do an OLS Regression Analysis instead.

assuming there is an effect when in fact there is not and assuming there is no effect when in fact there is. Because of the small sample size, the largest risk lies in committing a type II error (Field 2009:56).

6.2.1. DANE

DANE, the National Administrative Department of Statistics, handles official statistics in Colombia (DANE 2014). About every 10 year a national census surveys the whole population of Colombia (Maldonado Gómez et al. 2009:45). The last census was made in 2005 which could be argued to be a bit dated, but can still serve its purposes to identify internal city differences. The collection period lasted for about a year and was conducted in phases (Ibid 2009:20,47). In order to guarantee data quality, a number of tests were conducted[12] (Ibid 2009:80-82). For further information of the methodology used by DANE when conducting the census, please refer to Maldonado Gómez et al. (2009).

6.3. Qualitative

After conducting the quantitative part, the qualitative part consisted of informant interviews in Medellín acting as a complement to the quantitative part (Esaiasson et al. 2007:289).

Informants are people considered having a large knowledge within the relevant field. With this knowledge the informants can provide information which can be considered as sources. This is hence different from using respondents where the primary aim is to learn about the respondents' own views. In this thesis informants are used to provide information about the situation in Medellín. When doing informant interviews there is no need to ask the same questions to all informants as different informants can provide different information depending on their knowledge (Esaiasson et al. 2007:257-258). The informants are working in Medellín and chosen from different sectors related to sanitation (Appendix 2). They were selected partly by contacting people having a central position when regarding knowledge of the topic and the context and partly by using the "snowball effect"; one informant points at another (Ibid 2007:291). The informants are made anonymous to protect their safety[13]. A total of 11 interviews were conducted but I also talked with more people who are not on the informant list but helped giving better understanding of the situation. As the informants are

[12] The tests were conducted by supervisors by observing interviews, checking surveyed units (the supervisor visit people already visited repeating the process to verify the quality), or analysis of inconsistencies to control that the data reported is consistent with reality.
[13] See chapter 9

selected from different sectors and all have an interest in the topic they can be considered stakeholders.

There are different ways to define a stakeholder but this thesis will use the following classic definition: "a stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman 1984). A rather more narrow definition focuses on the stakeholders which are crucial for the survival of the organization (Mitchell 1997). A stakeholder analysis analyses stakeholder's attitudes towards something. "Stakeholder analysis is a term (…) to describe a process where all the individuals or groups that are likely to be affected by a proposed action are identified and then sorted according to how much they can affect the action and how much the action can affect them" (Rengasamy n.d:3-4). The information can be used for policy-making, to improve actions, to predict and manage risks and conflicts. When doing a stakeholder analysis one should ask "whose problem?" and "who will benefit?" according to Rengasamy (n.d:3,5,9). The analysis is conducted through a stakeholder analysis in order to make differences in answers from different informants clear[14].

The interview guide (Appendix 3) developed is of a semi-structured character to create flexibility and opportunities for open answers (Bryman 2011:206,413-415). When developing the interview guide the point of departure was the theoretical framework and the results of the quantitative study. Accuracy in developing the interview guide increases internal validity (Merriam 1994:177).

The interviews were conducted with consciousness to not steer the discussion too much in order to reach the informants' own perceptions (Holme and Solvang 1997:100-101). Follow-up questions were used to get more information. All interviews started with a few questions about the person´s work to get a better view of the knowledge the person can provide (Esaiasson et al. 2007:298). The interviews were conducted in Spanish and recorded with a Dictaphone. The decision to not work with a translator derived from a wish to have a direct relation with the informants and the language did not show any significant challenges.

From the text material of the transcribed and translated interviews I have conducted a systematizing qualitative text analysis from a stakeholder analysis perspective, departing from the theoretical framework (Esaiasson et al. 2007:237-238). The transcriptions have been

[14] See chapter 9

analysed vis-à-vis the theoretical framework. In the qualitative part of the thesis, the theoretical framework works as a classification scheme; a kind of content analysis where the theoretical framework has served to classify the empirical material in respective research category. The classifying has served to organize the qualitative material and to describe the empirics (Merriam 1994:145-149,152). The analytical work started with transcribing and translating the material which was then categorized. This first categorization is an analysis in itself as this decides how to treat the information (Merriam 1994:152). After the first categorization, the material was analysed from the theoretical framework point of view. The focus has been on the manifest but with attention to the latent (Bergström and Boréus 2005:45).

7. Case Description: Colombia

This chapter offers a background of Colombia as well as the sanitary situation in Colombia in general and in Medellín.

7.1. History/present politics

Colombia is the fourth largest country in South America and its third most populous country (Lindahl 2011). During the past 45 years in Colombia there has been a violent internal conflict between the state's security forces and the guerrillas FARC and ELN and later also the paramilitaries; a group originating from the military. The conflict has its roots in social and economic injustice and poverty combined with weak state institutions in the vast territory. The conflict has affected civilians seriously due to attacks from all actors towards civilians. Consequences include a humanitarian crisis with violated human rights. The numbers of Internally Displaced Persons (IDPs) are estimated to be between 3,5 and 5 million (Nordström 2011). Many IDP:s have come to the cities, increasing urbanization.

For welfare it is necessary with political stability (El Coordinador Residente y Humanitario 2012-2013:18). Largely due to increasing safety in Colombia, there has been an increase of foreign investments and economic growth during the 21st century (Nordström 2011). Both Gini (measuring inequality) and urban poverty has decreased (DNP 2013; WB 2011). But despite being a middle income country, poverty is still a large problem and not the least inequality. ABColombia (n.d.) say that "while the correlation between poverty, inequality and

social conflict is complex, it is important to remember that the Colombian conflict has its origin, in part, in the absence of human security (security on the land, security of employment, security of access to quality health care and education)". ABColombia (n.d.) refer to a vicious cycle of conflict, poverty and inequality. Living conditions have improved for some with economic growth, but a lack of basic services and their low quality remain problems for many people (Lozano-Gracia et al. 2012:114-115). This has connections with the conflict and the IDP:s seeking shelter in the cities.

7.2. Inequalities and urban infrastructure in Latin America and Colombia

Solo (2003:16) says that "poor and untenured neighbourhoods in Latin America are sprawling faster than the municipal utilities can reach them". In Latin America, most low-income families obtain housing through the informal market as they cannot afford the formal (Fay and Wellenstein 2005:94-95). Homeownership in Latin America is very high: 73 percent, but about a third is informal tenures (Ibid 2005:92). One explanation is the informality; another is underdeveloped rental markets (Fay 2005:6; Fay and Wellenstein 2005:94-96).

Inequality is among the largest problems for Latin America (Samad et al. 2012:5; Lall et al. 2012:42). According to the World Bank (WB 2013:b), "many of the water-related challenges in Latin America and the Caribbean are associated with inequalities in living standards". Infrastructure improvements have been limited and so has poverty reduction and elimination of inequalities. Also, infrastructure improvements have not always benefitted the poor (Fay and Morrison 2007:24-26). Fay and Morrison (2007:18) explain how inequality in Latin America is both reflected and reinforced by its access to infrastructure. In Latin America, "inadequate infrastructure undermines the region's growth and competitiveness and hampers the fight against poverty, exclusion, and inequality" (Ibid 2007:15). Reducing inequality is difficult, but access to and quality of infrastructure services can have a significant effect on inequality, providing economic opportunities for poor people (Ibid 2007:19,24-26). Similarly, Payne (1997:49) says tenure policy can improve equity. It is essential to invest in urban infrastructures to achieve inclusive cities (Samad et al. 2012:6). In general, there are large gaps in financing of infrastructure in Colombia (Kim et al. 2012:157).

Studies in Colombia show that denser cities manage to provide more services to their inhabitants but often with unintended consequences such as shortages of housing and land, and public resources (Lall et al. 2012:40-41). The urban population in Colombia has grown

fast; three fourths now lives in cities (Lindahl 2013; Samad et al. 2012:2). With higher levels of urbanization the infrastructure is put under pressure. According to the 2005 Census, more than 2.4 million households live in inadequate housing without satisfactory access to basic services (Kim et al. 2012:177,194). This should be understood in relation to the conflict and the IDP:s.

7.2.1. Water and Sanitation in Colombia

Although Latin America has a higher coverage of water and sanitation than some other regions many people have no or poor access. Also quality of services and differences between formal and informal settlements within cities differ (Balcazar 2008:7,12-13). The table below shows access to improved sanitation facilities in urban areas in Colombia over time.

Table 2: Percentage of population with improved coverage

Year	Urban (%)
1990	79
2000	81
2011	82

Source: (WHO and UNICEF 2013)

As can be seen in the table, urban areas have improved very slowly. In absolute numbers, people without access to improved sanitation in urban areas have increased; according to UNICEF (2013:a) the urbanization rate is larger than the pace of improving sanitation. Colombia is off track to reach the MDG target for sanitation and with the current pace it will be reached by 2038 according to WSSCC (2010). Also, access is not the same as quality of services, which is still lower than international standards (Lall et al. 2012:34). In Latin America, hygiene awareness tends to be quite high but still proper hygiene habits are not adopted (Florez 2011:20). In Colombia intra-urban differences in health inequality between income groups are very large and reasons seem to be access to infrastructure, education and medical service (Bitrán et al. 2005:184-185).

Colombia's water and sanitation sector is completely decentralized (Foster 1996:7; Lall et al. 2012:53; Kim et al. 2012:159). Although Lall et al. (2012:34) suggest that decentralization has contributed to improvements for access to basic services, they point out the need for service delivery coordination across municipalities as this could increase coverage and quality

of services crossing regional boundaries, such as water and sewerage (Ibid 2012:51; Lozano-Gracia et al. 2012:111). Samad et al. (2012:12) also say coordination could prevent epidemics caused by untreated water. But decentralization will not automatically turn into a more efficient local government. In Colombia, decentralization has resulted in weak internal party discipline and a domination of short-term incentives (Lozano-Gracia et al. 2012:115,117-118).

7.3. Medellín

Medellín used to be known as the most dangerous city in the world due to its high crime rates, being controlled by Pablo Escobar and his drug cartel. Although there are still large problems, the city has undergone a transformation (Abrahamson 2013; Zamphler n.d.). To achieve this, an approach called "educational civic urbanism" has focused on public space (Bagley 2013). Medellín is Colombia's second largest city with about 2,5 million inhabitants, situated in a valley (Medellín Cómo Vamos 2014). On the surrounding hills, slums have grown and many inhabitants are displaced because of violence (Bagley 2013). On the hills population density is very high with poor housing, lack of many social and infrastructure services, high unemployment and often still high criminality and violence (Balcazar 2008:29).

Medellín's municipality is responsible for providing public services such as water and sanitation through Public Enterprises of Medellín (EPM) (Balcazar 2008:28-29, WaterLex 2014; World Water Forum 2012:23). EPM is a public company belonging to Medellín's municipality but which is autonomous. EPM is considered very successful with presence in several Latin American countries. Vélez Álvarez (2013:5) claims autonomy as the key for success; financial *and* administrative autonomy.

But some claim (Balcazar 2008:28-29, WaterLex 2014; World Water Forum 2012:23) EPM excludes informal settlements considered illegal where the poorest live. At an aggregated level in Medellín, lack of improved access to sanitation corresponds to 1,85 % (Calculated from DANE) of the population, which could be argued to be a small share, but tells nothing about the quality. Neighbourhoods without formal connection tend to connect illegally (water), throw it away (wastewater) or obtain alternative connection (Balcazar 2008:28; WaterLex 2014). Some areas have entered into EPM's coverage area due to legalization of land tenancy as this has allowed people to request services, but the *process* is not researched. EPM has worked together with organized communities to improve services through "social

recruitment" (Balcazar 2008:28-29, WaterLex 2014; World Water Forum 2012:23). Balcazar (2008:9) points out participation in both execution and financing, and social organization as crucial for social recruitment but the main obstacle seems to be the legal status. According to Balcazar (2008:31) the biggest challenge for Medellín is how to provide services to areas considered illegal but she has no solution. In addition to above mentioned social problems, access can be difficult as these areas often are located in mountainous areas.

At the alternative forum of the World Urban Forum 7, carried out in Medellín in April 2014, a large number of civil society organizations agreed that Medellín is one of the most unequal cities of Latin America, being excluding and insecure. They also said that people are evicted from their homes both by the city itself in its wish to be innovative, meaning that people who are in the way for its urban plans will be sent away, and by criminal gangs (Foro Social Urbano Alternativo y Popular 2014). As will be shown further in this thesis, many obstacles are often closely related to the IDP:s.

8. Quantitative analysis

As discussed in the methodological chapter, data from Census 2005 of DANE (2008) is used in an OLS multivariate regression in SPSS. From this data I extracted the raw data for the variables and created my own dataset where all variables but income level[15] were recoded into percentage of the population, turning them into interval variables. The data is collected on individual level and aggregated to neighbourhood level as the aim of the quantitative part of this thesis is to learn which factor behind access to sanitation is the most important in Medellín which is done by comparing neighbourhoods. Since sanitation infrastructure rarely is built for individuals, but rather for a neighbourhood, comparing neighbourhoods allow for an analysis to be done at neighbourhood level.

This chapter will guide the reader through the empirical part of the quantitative investigation. First of all, the variables will be explained before continuing with diagnostics and the statistical analysis.

[15] See below for further explanation of the recoding of the income variable.

8.1. Variables

The dependent variable is *availability and type of sanitation service*[16], it : *indicates the existence of sanitation service, and if it exists, specifies whether it is toilet connected to sewer or toilet connected to septic tank or disconnected toilet*. It contains the following alternatives: (a) toilet connected to sewage; (b) toilet connected to septic tank; (c) toilet without connection, latrine; and (d) no. The variable has been recoded to include the percentage of the population which has access to (a) toilet connected to sewage; and (b) toilet connected to septic tank by adding these two. This means that the variable includes the people who have reported having a sanitation facility with a connection, which means that excreta are definitely separated from having any contact with the user. The variable excludes hence (c) the people who reported having a sanitation facility without a connection as it is not sure excreta is separated from human contact and (d) the people reporting having no sanitation facility. By this coding, the variable will capture the people having improved access to sanitation.

As previous research points at the importance of economy for improved access to sanitation, which has been further developed in the theoretical framework, the main independent variable is *adequate level of monthly income* presenting *level ranges in monthly income in Colombian pesos, adequate to cover basic household expenses, according to the opinion or consideration of respondent*. It contains the following possible answers: 0-200 000; 200 001-400 000; 400 001-700 000; 700 001-1 000 000; 1 000 0001-1 500 000; 1 500 001-2 000 000; 2 000 001-3 000 000; 3 000 001-4 500 000; 4 500 001 and above; not reported; does not know. Since the answers had different ranges, the mean for each neighbourhood was counted and included as a variable and can only be used to compare neighbourhoods with each other[17]. In the new variable, 1 corresponds to the lowest income group and 9 to the highest. The variable was recoded to exclude "not reported" and "does not know" by counting the base of statistics for all other answers. This coding allows learning about the importance of income related to access to sanitation, being pointed out as an important factor in previous research.

In addition, other variables which might affect the dependent variable need to be controlled for. In relation to above discussed factors which according to the literature might affect access

[16] The text in italic in this section indicates that the text has been translated by the author from Spanish into English.

[17] Mode is not used as this would give skewed results for some areas with steep salaries, and as using mode would give relatively little spread in the statistics and make it more difficult to compare neighbourhoods with each other.

to sanitation, *housing tenure* and *community participation* will serve as control variables, as previous research also points at the need for these factors.

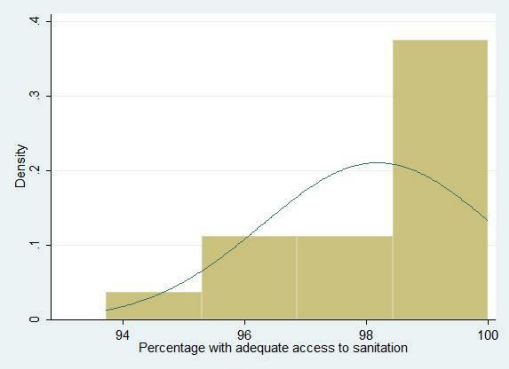
Hence, the first control variable is *housing tenure*, which: *refers to the form of housing tenure inhabited: own, for rent, fully paid, being paid, etc*. It contains the following alternatives: (a) lives in lease or sublease; (b) lives in own home and is fully paid; (c) lives in own home and is paying; (d) lives in the house with the owner's permission, without payment; (e) lives in the house without title, or common property; (f) lives in another situation; (g) not reported. As above, the variable was recoded to exclude (g) by counting the base of statistics for all other answers. The variable was recoded to include the percentage of people answering (a), (b), (c), adding these together, and exclude (d), (e) and (f) since they point at a housing situation which is not clearly formal. This is theoretically motivated since it is interesting to differentiate between formal tenure and tenure without a title. This coding allows exploring the theories concerning formal housing tenure.

Community participation is a variable which: *indicates the existence of active participation of any member of the household in community beneficial organizations*. It contains the alternatives: (a) yes; and (b) no. The variable was recoded to include percentage of the population reporting (a) yes to capture the level of community activity since community participation according to previous research is an important factor to get access to sanitation.

8.2. Diagnostics

The data needs to be normally distributed to not be misleading and to describe the data in a representative way (Field 2009:24-26).

Graph 1: Histogram



Graph 1 presents the distribution of the observations of the dependent variable. It does not show perfectly normal distribution as it is skewed to the left indicating that many of the observations are near the maximum. It could also be seen in the descriptive statistics (Table 3) that this variable did not show large variations, which is important to be aware of when making the analysis. I tried statistical

transformations of the dependent variable to make the distribution more normal but squaring the variable did not change it much (see the histogram and regression table for the squared dependent variable in Appendix 1:5,6) why I decided to use the original variable.

Ideally, skewness (showing symmetry) and kurtosis (showing pointiness) should be 0 (Field 2009:19). Running frequencies of the dependent variable showed a negative skewness of -1.020 and a kurtosis of .190. The Z scores for skewness (-1.85) and kurtosis (0.18) were both below 1.96 and a histogram showed an almost bell-shaped curve why no transformation was necessary (Appendix 1). Below is the descriptive table for the variables used in the analysis.

Table 3: Descriptive statistics

	N	Mean	Min	Max
Access to sanitation (dependent variable)/percentage	17	98,18	93,73	100
Housing tenure/percentage	17	97,69	96,49	99,42
Community participation/percentage	17	5,50	2,68	8,92
Income level	17	4,61	3,47	7,40

When plotting residuals against predicted values for each independent variable, all scatterplots showed that the assumption for homoscedasticity is not violated except for the scatterplot between access to sanitation and income level, showing a pattern in their distribution (Appendix 1:3). This suggests that there might be heteroscadasticity problems. However, Field (2009:251) highlights that it is possible to draw conclusions even if assumptions are violated although generalizing beyond the sample will be difficult, but as that is not the scope of this thesis this is not a problem. There were no problems with multi-collinearity which means that the independent variables are not correlated with each other as there were no correlations above .80, no tolerance values below 0.2 and no VIF values above 5 (Xezonakis 2013).

Lastly I checked whether there were observations influencing the model disproportionally. Looking at Studentized Deleted Residuals and Cook's distance it could be stated there were no outliers in the data (Field 2009:217). High leverage[18] showed on nine units of analysis on

[18] Leverage is measured as: 2*4/17=0.24

variable 2 and 3, and high influence[19] as well. It is important to keep this in mind but as there were no outliers I could continue with the analysis.

8.3. Statistics

The unit of analysis is neighbourhoods of Medellín, called *localidades*; administrative divisions with a relative homogeneity regarding geography, economy, culture and social aspects and have a local mayor (El Congreso de Colombia 2002). Medellín has 17 localidades which does not give enough quantitative analytical power to express any certainty in the observations made. But I argue that it is still an interesting and important analysis since it can give indicators of the situation in the different localidades of Medellín.

When conducting a regression analysis without panel data it is important to be aware of the risk of reversed causality. I argue that in this case it is more probable that living in an informal housing situation is leading to a situation of a lack of access to sanitation than lack of access to sanitation leading to living in informal housing, because theory points out that when living in an informal housing situation it is more likely that the society will fail to provide the house with public infrastructure and the individual will not invest as much in infrastructure because of the eviction risk.

8.4. Analysis

The analytical part started with running a bivariate regression between the dependent variable and each independent variable added consecutively (Model 1). The results are reported using the B coefficient and R2. Since the data contains the whole population and not a sample, there is no need to report adjusted R2 (Field 2009:202,221-222). Model 2 includes the dependent and the main independent variable and the first control variable. Model 3 adds the last control variable.

[19] Influence is measured as: 2/sqrt17=2/4.1231=0.48

Table 3, Bivariate and multivariate regression analysis: the effect of housing tenure, community participation and monthly income level on access to sanitation.

DV: Access to Sanitation (93.73-100)	Bivariate	Model 2	Model 3
x_1, Income Level (3.47-7.40)	1,184***	1.265*	1.774***
	(.373)	(.54)	(.547)
x_2, Housing Tenure (96.49-99.42)	.489	-.180	-.301
	(.506)	(.54)	(.465)
x_3, Community Participation (2.68-8.92)	.243		-,475
	(.315)		(.324)
Constant		109.912 (51.38)	122.057* (44.587)
R^2		.412	.492
N		17	17

*p<0.10 ** p<0.05 ***p<0.01. Standard errors within parentheses. Data: DANE 2005

The table shows that in the bivariate regressions the main independent variable of monthly income level is the only statistically significant variable at level .01 and also the only variable which did not break the confidence interval, therefore it cannot be excluded that the regression results for the other variables are due to chance. The table also shows that the only independent variable being significant in the multivariate models is income level. The result should be interpreted as: having a higher income level means it is likely to have better access to sanitation, going hand in hand with the theories from the theoretical framework. An increase of 1 unit in the levels of income would lead to an increase of access to sanitation of 1.774 percentages according to Model 3.

The control variable housing tenure showed a positive slope both in the bivariate model, indicating that with a more formal housing situation, there tends to be better access to sanitation. In Model 2 and 3 though, this curve turned into a negative curve, which is contrary to the main theoretical assumptions. This might be explained by the strong effects of the independent variable of income level "wiping out" the effects of housing tenure. The fact that the curve changes from a positive to a negative curve might indicate that we are facing a possible spurious relation, where the true effect might come from income level (Sundell 2012). Moreover, the variable does not show statistically significant results in any of the models, with high standard errors. As this goes against the theories put forward in the

theoretical framework this will be further explored in the interviews. This variable broke the confidence interval in all three models and it cannot be excluded that the results are due to chance.

The independent variable of community participation showed a positive curve in the bivariate model, but as for housing tenure, it turned into a negative curve in Model 3. Also for this variable the effect is "wiped out" by the main independent variable, and there is a risk of a spurious relation (Sundell 2012). Moreover, as this variable did not indicate *which kind of* community participation was conducted, this result could indicate that it was not the kind of community participation which strives to achieve a better access to sanitation.

When interpreting the effect of the independent variables on the dependent (the Beta coefficients) it should be noted that the variables are measured differently (percentage and levels of income). This could hence affect the results of the Beta coefficients.

R2 tells us that Model 2 explains quite a lot of variation in the dependent variable with .412 while Model 3 offered slightly more with .492 in R2. When looking at the bivariate analyses it was clear that R2 was much higher for income level than for the other variables (Appendix 1:2) which suggests that monthly income level is a very important explanation for access to sanitation. However it should be noted that there might be other possible explanations not included in this model. It should also be considered that a small sample makes it more difficult to get significant results, why it will be more relevant to look at the direction of the relationship.

All bivariate models follow the theories put forward in the theoretical framework; higher income levels, formal housing tenure and a higher level of community participation all separately increase the likelihood to have better access to sanitation. The quantitative part aimed to reply to the first research question: *Out of housing tenure, community participation and economic income, which factor is the most important for achieving access to sanitation in Medellín?* After conducting the analysis it can be concluded that income is the most important factor for achieving access to sanitation in Medellín. This was also quite expected as the theory pointed out economy as an important factor. This means that H1 has been corroborated while H2 and H3 were not supported. But as has been highlighted, the small sample might not give as robust results why the qualitative analysis will serve to get a deeper understanding of

the factors that were less important according to the quantitative analysis. The bivariate analyses showed that housing tenure and community participation also do play a role in Medellín, although less important than income. Previous research has pointed out housing tenure and community participation as important factors. The qualitative part will serve to explore more about these factors and especially *how* they are important.

9. Qualitative analysis

The qualitative part explores more about *how* the factors housing tenure and community participation are important in Medellín by discussing processes with informants, and aims to answer the research questions: - *What role can housing tenure play for access to sanitation in Medellín?* and - *How is community participation linked to access to sanitation in Medellín?* The structure of the chapter derives from the theoretical framework which is used to analyse the interview material. The informants are listed in appendix 2.

In order to understand the answers given by the informants it is important to understand the position of the informants why this chapter will use a stakeholder analysis when discussing the above research questions.

There is a vast literature on stakeholder theories where a large share concern the relationship between companies and its stakeholders (such as Freeman 1984 and Mitchell 1997) and another large share concern stakeholder analysis in a development context. One of the more famous theories is Mithell's (1997) model on stakeholder classification based on power, legitimacy and urgency. Stakeholders are often grouped into primary stakeholders, secondary stakeholders and key stakeholders. The primary stakeholders are those ultimately affected, secondary are those with an interest or intermediary role, and key stakeholders can have a significant influence on the activity and can belong to the before mentioned groups. External stakeholders are such who are not directly involved but which can have an impact (Rengasamy n.d:5,9).

In order to visualize how different answers from the informants may derive from which kind of stakeholders they are, a simple classification scheme is used (Table 5) where the informants are divided into three types of groups: grass roots, decision-makers and external. The aim is not to conduct a more advanced stakeholder analysis such as Mitchell's (1997)

classical model, but rather to classify the informants into stakeholder groups in order to see if there is a pattern in their answers, where the table will be used as an analysis tool. Grassroots are defined by several different sources as people gathering at a local level often to respond to a problem in the community which they seek to change by turning towards decision-makers; grassroots are seen as a contrast to the political power (Ask 2014; Dictionary.com 2014; Merriam-Webster 2014; Nationalencyklopedin 2014; Wisegeek 2013-2014). The grassroots, especially the community, belongs to the primary stakeholders as they are ultimately affected, while the NGO together with the decision-makers belong to the secondary stakeholders as they have an interest and/or an intermediary role.

Among the informants in this thesis there is a clear divide between grassroots and decision-makers, but there is also a third category of informants: universities. As the universities are not directly involved but can have an impact, these are here classified as "external" stakeholders. The universities will here take a rather neutral role and will therefore show up in both categories in an explaining role where they sometimes tend to speak more for the grassroots and sometimes more for the decision-makers.

Table 5: Stakeholder Scheme

Grassroots	**Decision-makers**	**External**
NGO – A	**Regional government** – E	**University** – <u>K</u>, <u>L</u>
Community – B, C	**Municipality** – F, G	
	EPM – H	
User Representative *and* Board Member EPM – *D*		
	Previously: EPM, now: EAFIT University – *J*	

As can be seen in the table above though, two of the informants fall into two categories due to their present or previous role. These two informants will in the analysis show up in both their respective categories. This is an analysis in itself, showing how they in their argumentation stand in-between of their two roles. These two informants will in the analysis be marked with *italic*, while the external stakeholder informants will be <u>underlined</u> to make the reader aware of them in the text. The letter coding is presented in the table below.

Table 6: Reference Scheme Stakeholders

Type of stakeholder	Referred to as	Sector	Function
Grassroot	A	NGO	Lawyer
Grassroot	B	Community	Council leader
Grassroot	C	Community	Council leader
Grassroot *and* Decision-maker	*D*	EPM	User Representative *and* Board Member EPM
Decision-maker	E	Regional Government	Sanitary Engineer, specialist in environmental engineering
Decision-maker	F	Municipality	Sub-secretary of Public Services
Decision-maker	G	Municipality	Sanitary Engineer, Health Secretariat
Decision-maker	H	EPM	Planning Professional
Decision-maker *and* External	*J*	University	Previously: EPM, now: EAFIT University
External	K	University	Water and Sanitation engineer
External	L	University	Sanitary Engineer

9.1. Housing Tenure

There are different views on the role and importance of housing tenure for access to sanitation which is visible when analysing the interviews through the stakeholder scheme presented above.

Starting with the ***decision-makers***, F and *J* claim that housing tenure does not play a big role as EPM cannot look at this condition when deciding whether to bring services or not; by law there can be no such discrimination. EPM *has to* provide services to *geologically suitable areas*. But this is the key, because as L says; within the "sanitary perimeter", where it is geologically suitable, people normally have documentation for their house. The sanitary perimeter is a border defining the area where services can be provided. Outside the border there are invasions and services cannot be provided because of landslide risks due to high inclination. The perimeter tries to control that houses are not constructed outside of the border. But this is the problem; the poor build their houses outside. The POT defines the cities parameters, what kind of land is suitable for what and says that EPM has to bring services within the perimeter. Outside the perimeter, the municipality decides what to do, but F says

the municipality would not take any initiative to develop the risk zones or the invaded areas because they have to comply with the POT. G says that EPM cannot cover invaded areas. It has to be your own area, within the perimeter. According to L the municipality tries to help but due to the risk zones they always try to not let people remain there; providing services will mean they are not leaving. When people write themselves in the cadastre and start to pay taxes they can then get services says *D*. (L says that in theory the government cannot permit people to live in risk zones, but in practice it is a problem of displaced people). The difference hence lies between people living within the perimeter with no problem getting access to services, and outside where they need to search for alternatives according to L; by law, the municipality has to give services within the perimeter but not outside. H and E agree. H confirms by saying that the philosophy of EPM is to provide services according to the idea of universality, that is, within the perimeter. "The universality" is carried out through establishing ways of payment, for example prepayment. H adds that for EPM, the main factor is the municipality's evaluation deciding which areas carry landslide risks, denial of service does not exist under normal conditions but in high risk zones it is not possible to legalize service as "urban development is explicitly prohibited". Still he says that "there are very clear laws, from the constitution itself: service is a civil right".

D tells about a pact in a neighbourhood, where the municipality would provide the pipes, EPM would help out with the pipes and the community would promise to not allow more people move to the neighbourhood. The idea was creating a win-win situation for the municipality to not receive more people and for the community to receive better services.

G says it is very expensive to construct on the mountains and mention economy and geography because of risk zones and technical challenges as the main factors which may hinder access to sanitation in Medellín. The arrival of services to certain neighbourhoods has physical problems according to *J*, E and F. Geological issues hinder services to become regularized because of landslide risks. Giving high risk zones regularized services, people will believe they can stay and it will be harder to relocate them when possible says *J*. In high risk areas the authorities are strict and people need to leave, sometimes sent away by police, mainly in areas with previous disasters. In areas with less risk people stay but without services. People living in dangerous areas are supposed to be relocated to safer places but L says: "in areas with less risk you need to wait for it to be risky until something will change. It is very cruel, but more or less how it is".

F says that outside the perimeter there are also social problems with very low socioeconomic level with little education, unemployment or informal employment. E adds that in some way housing tenure *does* play a role for access to sanitation because EPMs need to charge the users to give services. There are households in sectors with many problems which receive services but they do have some kind of title.

Regarding the ***grassroots***, A says that "the legal status of the dwelling is essential". The housing right has to be secure to get right to services. The fight concerns the dwelling's location; high risk zones are central in the discussion. A dwelling located in the mountain will probably not have public services. Serna says that cheap land means high risk zone, but high risk zones are high cost zones for the municipality and EPM; "they could be suitable for living but are not recognized as such. We consider the definition of zones as high risk as the excuse to not invest there". A says Medellín has a lot of resources but does not want to address the soil problems because that would mean making investments and recognizing a responsibility for public services, health and education; "Medellín is making urban processes where there is no space for the poor, they do not fit in. It seems like the priority of the municipality is to not attract more people to the city, they would probably like to close the city!". A continues: "Medellín is a city that does not want the poor and therefore will not invest in the neighbourhoods because that would establish them more in the city. It is discrimination". B agrees, saying that the municipality automatically discriminates the invaded neighbourhoods by not making investments. In her neighbourhood the people own their houses since a requirement for social recruitment[20] is legal contracts; the projects bring costs for the households why people have to be property owners; tenants may not be there tomorrow. Her neighbourhood was legalized with the first titles in sectors outside of the high risk zones.

A says "previously EPM gave services easier to invaded neighbourhoods with the aim to expand and sell, but not anymore. With more control to not receive invasions it gets more difficult to get services because EPM is not supposed to deliver services to unsuitable areas". *D* agrees. A, C and *D* tell that during the 60s-70s there were many invasions and it was easier to invade since there was not as much control. Now people have to pay for land according to L and A. The problem is that land is often sold without formal tenure through "pirate

[20] To learn more about the social recruitments, see 9.2.

urbanization"; an informal and illegal sale. The informal documents are not recognized and the municipality claims the land to be theirs. A says: "in many neighbourhoods people have no legal documents. When buying property, people think it is legal".

To change the POT and the perimeter, (very expensive) soil studies followed by risk mitigation are necessary be according to A and B. L says that the perimeter *has* been moved *sometimes*, mostly because of pressure from developers; the big building companies want their projects within the perimeter to increases its value. The perimeter could also be moved when a neighbourhood reaches a certain level of stability and land tenure. By obtaining legal housing documents and being outside a high risk zone, they could be integrated in the basic services system.

B says that before a soil study neighbourhoods are usually classified as high risk, and afterwards as high risk recoverable, meaning that the soil can be physically supported by infrastructure, or non-recoverable. A says: "if the municipality *wants* to make a project it will do it, like the Spanish Library where the municipality mitigated the risk to construct". Mitigation is made where the municipality has a strategic interest. There are no examples of mitigation only for the well-being of the people; "there is no interest in improving the lives of the poor". The municipality does not want to invest resources in risk mitigation; this shows in the budget. Each study makes recommendations which in general are not followed according to A. Risk mitigation include construction of retaining walls, stairs, aqueducts and sewerage, canalizing wastewater and rainwater to prevent water to infiltrate the mountain creating destabilizations and landslides.

Regardless type of stakeholder, ***everyone agrees*** the security situation in the country affects the situation in Medellín as many displaced due to violence and the civil war come to the cities for protection. F says "we need to solve the problem of Medellín's disordered growth to get full infrastructure cover". K says "an insecure country generates problems. When a country demonstrates insecurity it is because of social imbalance. Without security there will be no investments". According to H and F the biggest problem is inequalities, leading to insecurity, but also lack of education and opportunities. Medellín is the second city receiving most IDPs and the majority of the neighbourhoods were constructed by IDPs invading land according to A, L and F. F also says that Medellín is the most unequal city in the country. L, F and H talk about a paradox: as Medellín has resolved problems this has attracted more

people. H explains how displacement has created large pressure on services; many people want to come to Medellín for a better life. A says there is also an urban conflict with many intra-urban displaced people and a relationship between urban conflict and urban transformation in Medellín.

Concluding

It is clear that group affinity has an impact on the argumentation of the relationship between housing tenure and access to sanitation. This analysis has shown that the grassroots point out housing tenure as a factor affecting access to sanitation. They see the role of housing tenure as a factor since you need to be included in the perimeter to get access to sanitation, but you need housing tenure to be included in the perimeter because *not* having legal tenure often happens in the invaded high risk areas. The grassroots hence see housing tenure as a step on the way to get access to sanitation and other basic infrastructure.

The decision-makers on the other hand tend to argue that housing tenure does not play a role for achieving access to sanitation. They simply say it is not a factor but tend to overlook that housing tenure is a step on the way. They also refer to the law and the perimeter instead of recognizing the role of housing tenure in the matter on the way towards access. Still, the emphasis in their argumentation lies on the impossibility to provide services to invaded areas: i.e. areas without housing tenure.

We can also see that among the external stakeholders, i.e. informants from the universities, the informant which used to work for EPM has an argumentation more similar to the decision-makers, while the other ones have an argumentation closer to the one of the grassroots.

All informants did agree that the security situation in the country is what ultimately creates the current situation, as people flee into the cities; illegally invade land in the outskirts which the municipality refuses to recognize why they cannot receive official public services.

Despite different views of the informants it is clear that housing tenure does impact people's possibility to access services, although in an indirect way due to the geography. It is important to remember that the informants grouped into the same stakeholder groups tend to reply in a similar way and that there might be conflicting interests becoming visible in their

argumentation. In this case, the decision-makers might have an interest when saying that housing tenure does not play a role by referring to the law because referring to the law means there is no need to take an actual responsibility. Just as Balcazar (2008), Durand-Lasserve and Royston (2002), Fay and Wellenstein (2005), Kundu (2002), Payne (1997,2002), Sjöstedt (2008) and Solo (2003) I will therefore argue that housing tenure does play a role also in Medellín as it is a step on the way towards improved access to sanitation. Although there are examples of individuals investing in infrastructure, the interviews show that what will definitely increase access is when the housing tenure is officially legal and included in the perimeter, why this shows that housing tenure is important especially for increasing government's investments. In addition, this case strengthens Hardoy et al.'s (2014) belief that geography could be important for access, as geography is extremely important in Medellín. But as it is harder to change the geography I would suggest that it is important to continue to work with housing tenure and inclusion in the perimeter.

9.2.Community Participation

Also regarding community participation, there are different views differing sometimes depending on the type of stakeholder. This part is structured in accordance with the theoretical framework discussing community participation ***before***, ***during***, and ***local solutions*** within which the stakeholder type is also discussed.

Several informants agree that community participation can be important both before (lobbying) and during (planning and implementation) a process. L and E say that organizing of communities is very important. E believes the community needs to be included all the time because it is important to work with the grassroots. Stakeholder participation and participation by local communities is hence being discussed as important.

Community participation before

When here starting with the ***grassroots***, B says that until 2006 her neighbourhood was classified as high risk meaning that the municipality said they could not obey to the needs of the community. She says this was the excuse to do nothing; "in front of this situation we organized ourselves as a community". In 2006 a group of leaders came together and demanded a new POT which showed the area was recoverable with mitigation. "Without organization of the neighbourhoods and pressure of the leaders to make a new POT there would be nothing!". B says this is where the Councils become important: they organize

themselves and ask the municipality to become included. First then the municipality starts with soil studies. The process is born out of necessity. The Council (junta de acción communal) is a group of voluntary leaders coming together for the neighbourhood's needs, with a board with a legal representative who can do a social recruitment contract, committees make diagnostic needs and work with topics important to the neighbourhood.

Also C gives a picture from his neighbourhood saying that many years ago, EPM and/or the municipality came to them, now it is different. Now the communities approach EPM to show them their needs. "With the invasion boom we got stigmatized". In his neighbourhood there are still informal sectors. The community leaders united to make the neighbourhood legal; "I want to make it very clear that no one will come to ask what your problem is. It is the community, tired of having many problems, which goes and tells their needs to the administration. *We* asked EPM to come here to make a study; not the other way around". C says they started with collecting proofs such as photos and signatures. The process to get a high risk zone classified as recoverable was a consultation between municipal planning and EPM officials who made a soil study. C's community has been fighting since 10-12 years when everything was denied. But with the organization of the councils, things changed. C says: "sometimes it seems like the POT and EPM say 'high risk zone' just because they do not feel like visiting – they decide without physical evidence. Often they work from the desk with a city plan, visualizing 'high risk zone' on the map. Once you win the battle and receive officials in the neighbourhood to make physical evidence everything becomes easier". C says it is not acceptable denying rights just because an area is *considered* high risk, therefore it is important proving whether it is recoverable; "some sectors exist since 15 or 25 years, how come no one ever came to these sectors to learn about their problems? It is not fair".

Despite the important role of the communities through the Councils, A says there are two main problems with the Councils; since they are executing projects they will not criticize the municipality and risk losing money; and the Councils tend to favour the state and the paramilitaries. But A still says that the role of the community in the process of making dwellings legal and to get connected to services has been very important. The communities have been fighting since the 60s-70s for access to public services; it is a sensible issue.

A also claims that public policy in Medellín favours state and business interests; people are not consulted. As an example: EPM has large incomes but only 30 % is given to the

municipality and we do not know what happens to the rest. Also, the municipality does not oblige EPM to provide services in a favourable way, for example lowering tariffs; there is no interest. A says it is all a façade; "the practice towards the poor is very different from the discourse".

Discussing the ***decision-makers***, E, L, F and A all say that both the authorities and the community *can* take initiative of a process. The municipality then works in parallel with the community with technic and administrative training; "we have a very direct relation with the community, Medellín has many mechanisms for community participation" says F.

D says the user representatives search the Councils and offer help, but the Councils also often invite the representatives who forward information to EPM, who goes there to see what they can do *within* the law as the mountains create a legal restriction. But the representatives cannot make reclamation for the people; the people need to make it.

E explains the process to identify a problem which starts with assessments of the situation leading to project formulation. The work is done together with the community by supporting them with education, technical assessment and evaluation. It is not possible to give services completely for free but the cost needs to be at minimum. There is also the component to strengthen the community organizations; they themselves need to manage technique and administration. *J* explains that in neighbourhoods without organizations, EPM promoted their creation to train people to perform work. *D* says it is good to take advantage of existing organizations to distribute information.

Community participation during

Social recruitment is an interesting example of a role that community participation can play. B from the ***grassroots*** tells about the process where EPM provide funds to hire people in the neighbourhoods, give them training and provide them with material so that the community itself can build their own projects through the Council supported by EPM; involvement of the community in the actual work. Still though, people need to pay for the services. According to B social recruitment is the best thing EPM has done because it has generated employment in her neighbourhood, improved quality of life and of public services; "I will summarize social recruitment in two words: opportunity and community care". She also says that they pay the services without pain because they are of good quality since they are built by trained people

from the neighbourhood who really care about the outcomes. C says he is very happy that his neighbourhood has just qualified to start their own social recruitment.

Also the ***decision-makers*** bring up social recruitment as good examples of community participation. H explains that the community both get services and learn in the matter. He also mentions participation with EPM through the user league representatives in the EPM board. *J* describes how EPM helped with low cost connections and loans to turn irregular users regular, accompanied by social recruitment since irregular connections were a problem for EPM, leading EPM trying to regularize services. E tells that the municipality works directly with the communities to surveillance the sanitary situation, risk factors and epidemiologic.

G says that water is a right, people can go to a judge to report being without services, saying their rights are violated and do not live in dignity. The judge reports to the municipality which has to do something about the situation. This is quite common. If the municipality does not comply with a report there will be legal consequences, but this has not happened so far in Medellín, as Medellín has resources. F says that although this allows for the citizens to demand their human rights, this creates large problems for the municipality because sometimes it is very difficult to reach these areas for technical reasons. But when the judge tells us to bring services we have to do it in areas where we *should* not; this is a problem between the law system and the public administration.

Local Solutions

Also for the local solutions ***everyone agrees*** regardless type of stakeholder; both that they exist and that they can be important for the individual although they do have some differing opinions on it. Without services, communities have to invent solutions. A says that when EPM does not provide services people need to take them illegally, but G explains that sometimes people buy services and sometimes they get them informally. E, G and L say people search their own solutions to get water, treat it and to throw away wastewater, often leaving it in streams running to Rio Medellín.

C says it is common that neighbours unite to achieve needs, for example constructing sewerage. The pipes they have in his neighbourhood were constructed unofficially by the community 40 years ago. Also B says that public services were solved out of necessities. Her neighbourhood started as an invasion 40 years ago. With the formation of the Council 35

years ago they began to think about services. The sewerages were constructed by the community, 25 years ago, and used to be of poor quality with many problems which was also reflected in people's health B.

Concluding

These different examples all point at supporting the theories highlighted in the theoretical framework when discussing the need for governance and local participation by communities in the processes. The examples clearly show how important community participation is in the processes *both before and during a process* and the examples put forward could also serve as inspiration for other cities trying to initiate projects.

What brings the different stakeholders together here is that it is clear that all informants do find community participation important in one way or another. But there is a clear difference in the argumentation for who initiates the process, where the grassroots claim that they are always the ones initiating a process while the decision-makers claim it could either way. The NGO-representative though, supports the decision-makers in that it could be either way although she is sceptical to the *way* the decision-makers have acted so far as she sees the decision-makers only favouring their own interest. Also one of the university representatives support the decision-makers in that it could be either way. However, it is clear that the councils play a very important role in influencing the decision-makers in order to get access to basic public services such as sanitation.

As governance theories point out the need for different stakeholders to interact in a process, the "during-process" in Medellín can show as a good example of how this could take place. As all stakeholders interviewed agree that social recruitment is working well this could serve as a platform for further discussions and inclusions on other levels of society as well, and as a model for how to work according to the governance principle of participation.

Also regarding local solutions the different stakeholders agree about the different solutions, where they mention illegal connections, throwing away wastewater and community members gathering to help each other. This clearly shows examples of local initiatives for improving access to sanitation, supporting the theories of Fay and Wellenstein (2005), Solo (2003), Tacoli et al. (2008) and WHO (2005).

The examples from Medellín support the theories put forward by for example Balcazar (2008:43), de la Harpe (n.d:2-3), Fay and Morrison (2007:58), Fay and Ruggeri Laderchi (2005:20), IRC (1998-2004:a), Satterthwaite (2003:88-89), WHO (2005:15-16,48-49) and UNCHS (1996 in Elliot 2006:226) discussing the importance of (good) governance and stakeholder participation for access to sanitation. The importance of the civil society is obvious, just as Kjaer (2004:4) states. Especially the local solutions show how important the civil society can be for filling a gap where the state is not present. This thesis has served to provide some examples of *how* this could take place. We have seen *how* community participation is important in the process *before* and *during* a project and how community participation can help the communities through *local solutions*, being them legitimate or not.

10.Conclusion

This thesis has aimed to reply to three research questions: *Out of housing tenure, community participation and economic income, which factor is the most important for achieving access to sanitation in Medellín?*; - *What role can housing tenure play for access to sanitation in Medellín?* and - *How is community participation linked to access to sanitation in Medellín?* After conducting a quantitative OLS Regression Analysis to answer the first research question it can be concluded that economy is the most important factor in Medellín, corroborating H1. But as there were so few cases to rely on (17) and theory pointed at housing tenure and community participation as very important factors, qualitative interviews were conducted to explore these factors deeper.

The qualitative part aimed to reply to the research questions: - *What role can housing tenure play for access to sanitation in Medellín?* and - *How is community participation linked to access to sanitation in Medellín?* After analysing the interviews made it can be concluded that although some of the informants claim that housing tenure is not an important factor, indirectly it is anyway because the geography of Medellín decides who lives in a high risk area and living in a high risk area non recoverable means that you will not get legal recognition of your dwelling and hence no public services. This is especially clear in the case of social recruitment where this project cannot be implemented where the housing tenure is not clear. The conclusion is hence that housing tenure does play a role, although in an indirect way. As argued above, housing tenure could be an important step on the road, which is the role it can play in Medellín for access to sanitation. It is also especially connected to the high

risk areas outside the sanitary perimeter. In addition, it seems as housing tenure plays a particularly important role in Medellín for increasing the local government's investments.

Regarding community participation, this thesis has strengthened existing theories in the field, showing how community participation in Medellín is linked to improve access to sanitation. The thesis has answered the research question about *how* community participation is linked with access to sanitation. As theory has indicated, community participation is active in two ways, and so also in Medellín. One is when local communities gather and solve their needs through *local solutions* as has happened in Medellín in several cases. The other way is when communities interact with the local governments. This thesis has showed that this interaction does not only take place in the *during* phase of a project as much previous research has dealt with, but also, and more importantly in this case, *before* a project is started. This means that communities organize themselves to lobby the authorities to get access to public services. In Medellín there are several cases of how communities have managed to get access to public services in this way. This is also how community participation and housing tenure are linked, because as has been shown in Medellín, there is often a sort of "chain reaction" where communities lobby the authorities, the authorities study the soil and (often) decide it is recoverable, which leads to a strengthening of housing tenure which in the end leads to obtaining better access to public services. In Medellín I have also found how important another main way of community participation is for the communities, the social recruitment programs where the local communities are trained and hired to execute infrastructure projects. This has been very successful in Medellín and could be fruitful for other cities to explore. This is also a contribution to the existing literature of community participation in infrastructure projects such as sanitation projects. The answer to this research question is hence that in Medellín, community participation is linked to access to sanitation through lobbying (*before*), implementation (*during*, a good example is social recruitment) and through *local solutions*. These are all important and complement each other, but the lobbying part usually foregoes social recruitment programs.

11. Discussion

As the conclusions show, economy is the factor which according to the quantitative analysis is the most important for achieving improved access to sanitation. But the quantitative analysis did show that there is a relationship also with housing tenure and community

participation, why the qualitative analysis served to understand these, it shows, also important relationships.

This thesis has been studying Medellín and should be treated as a case study. But Medellín is an exceptionally interesting case regarding access to urban sanitation as it is seen as a role model for its large success a lot thanks to EPM, but also as it still struggles with how to integrate the areas high up on the mountains. Medellín can hence be seen partly as a successful case and partly as a case which still has a lot to learn and achieve. This case study can teach other cities about how you can solve issues but also about challenges. The mountainous Latin American region has many cities facing a similar geography, so Medellín is not unique in that sense. This thesis has also made some important contributions to the existing literature on access to urban sanitation in that it has strengthened the previous discussions regarding access to urban sanitation, but especially it is the only study to combine the three factors of housing tenure, community participation and economic income in one study; most studies focus on one factor. But as I saw how these three areas are interlinked I wanted to combine them to see how they stand in relation to each other and to learn which factor can be considered the most important, which is another contribution of this thesis. In addition, this thesis has deepened the knowledge about housing tenure and community participation in the matter.

This thesis has especially made an important contribution in showing how the relationship looks between community participation and access to sanitation. Previous research focused on the *during* process, but this thesis has showed that the *before* process is extremely important for any project to even take place in many cases in Medellín. This is definitely an important research contribution to the existing literature and could be interesting for decision-makers to pick up in order to facilitate the lobbying processes for the communities. This would give them better lobbying opportunities which could lead to decision-makers getting knowledge about the situation in the communities and how they can make a change.

As has been clear in the qualitative analysis, Colombia has a problem with millions of IDP:s lowing into the cities which the cities find hard to take care of. As has been brought up by the informants, ultimately it comes down to the security situation in the country. If the security situation in the country would improve, people would not have to cluster in the outskirts of

the cities to such a large extent. But until that day, the cities need to find a way to deal with these people because they are citizens too!

The methodological approach of mixed methods has been a challenge due to difficulties to keep the thesis together and to the format of a master thesis. On the other hand, the mixed methods can be seen as strength as this clearly shows how qualitative research can complement quantitative research. In addition, the mixed methods approach give a unique and more complete picture of the situation in Medellín related to the research questions.

Future research within the field is needed given the large need of access to urban sanitation; a need which will grow as the urban population grows. Medellín can serve as a good example regarding alternatives to organize improved access, for example with social recruitment. But given its geography it would be interesting to do a similar study in a city with different geographic conditions, although there are many cities in Latin America in a similar setting. Also, given the importance of gender as seen in the previous research chapter, future research could add a gender aspect to similar research. Also a colonial perspective could be interesting to incorporate since also Colombia used to be a colony, to see how the results would differ from previous studies made in Bombay (McFarlane 2008) and Lagos (Gandy 2006 and Acey 2007).

As a further call for future research within this important field, this thesis will end by agreeing with Balcazar (2008:52) who explains that if the issues of water and sanitation persist in Latin America, they will remain a ’time bomb’ and a source of social inequality with a social and political dissatisfaction. It is therefore important to continue to look at both successful and unsuccessful cases to understand how to solve these issues.

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Appendix 1: Diagnostics

1. Frequencies for the dependent variable

Statistics

Percentage with adequate access to sanitation

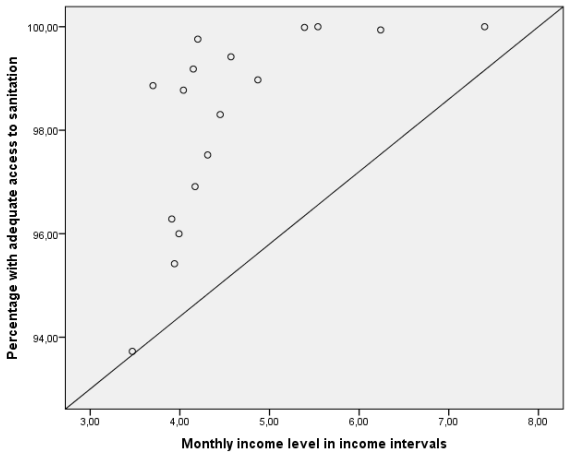
N	Valid	17
	Missing	0
Mean		98,1800
Std. Error of Mean		,45910
Median		98,8620
Mode		100,00
Std. Deviation		1,89292
Skewness		-1,020
Std. Error of Skewness		,550
Kurtosis		,190
Std. Error of Kurtosis		1,063
Minimum		93,73
Maximum		100,00

2. Amount of explained variance, bivariate analyses

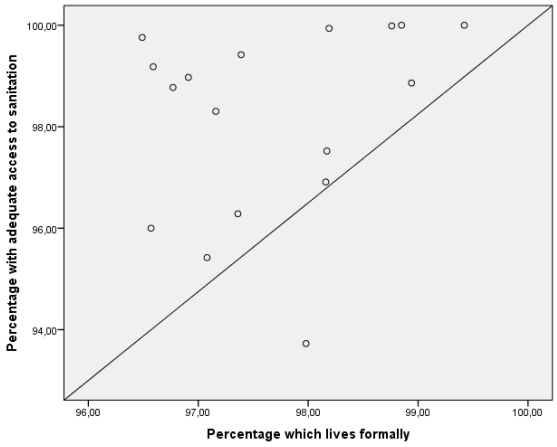
Bivariate analyses	**R2**
Access to Sanitation and Income Level	.402
Access to Sanitation and Housing Tenure	.059
Access to Sanitation and Community Participation	.038

3. Scatterplots checking linearity:

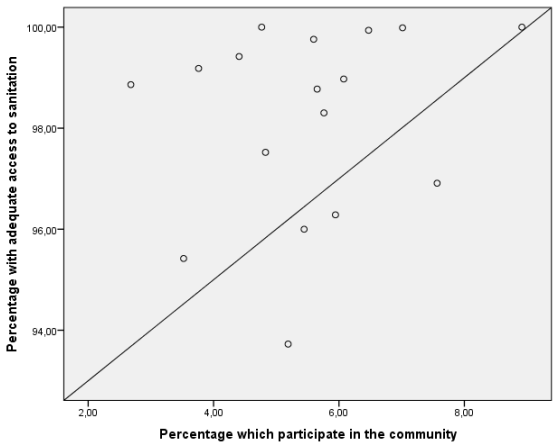
a). Access to sanitation and monthly income levels



b). Access to sanitation and housing tenure

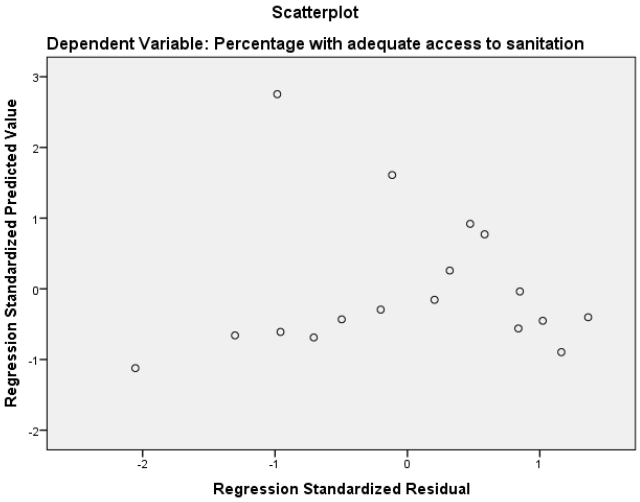


c). Access to sanitation and community participation

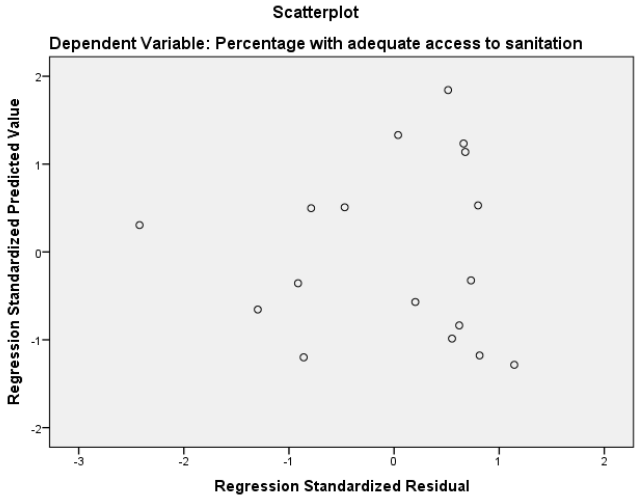


4. Homoscedasticity

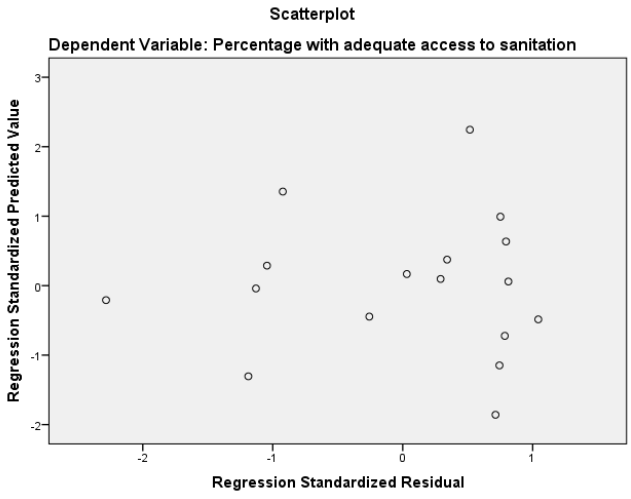
a). Access to sanitation and monthly income levels



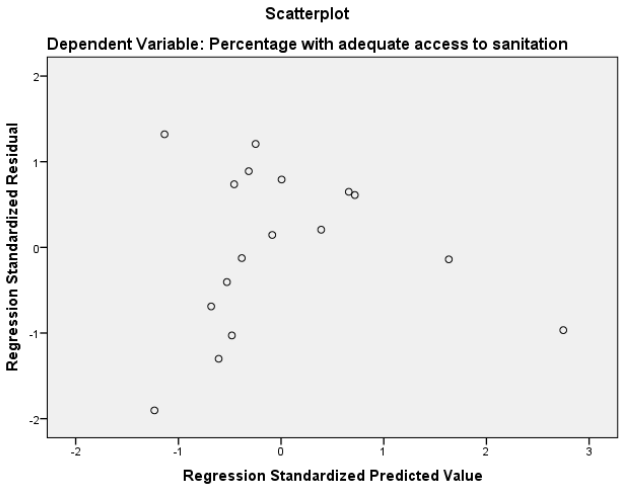
b). Access to sanitation and housing tenure



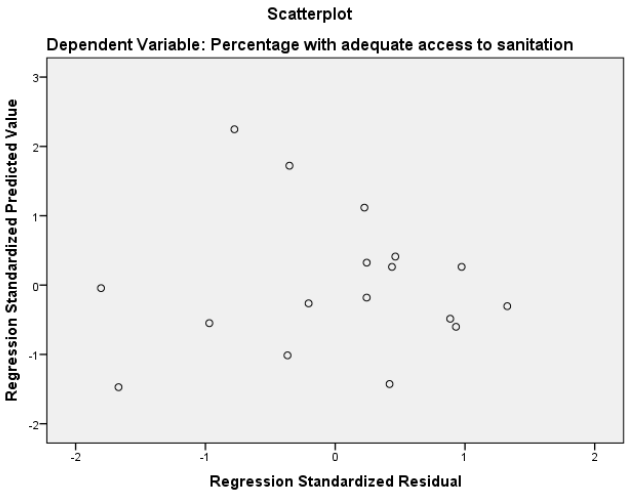
c). Access to sanitation and community participation



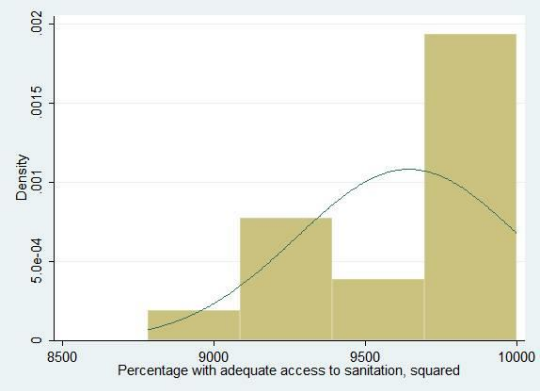
d). Access to sanitation, monthly income levels and housing tenure



e). Access to sanitation, monthly income levels, housing tenure, and community participation



5. Histogram with squared dependent variable



6. Regression analysis with squared dependent variable

Table A, Bivariate and multivariate regression analysis with the squared dependent variable: the effect of housing tenure, community participation and monthly income level on access to sanitation.

DV: Access to Sanitation (93.73-100)	Bivariate	Model 2	Model 3
x_1, Income Level (3.47-7.40)	231.532**	246.946*	346.165**
	(77.48)	(103.61)	(103.34)
x_2, Housing Tenure (96.49-99.42)	96.465	-34.139	-57.837
	(77.65)	(105.31)	(91.8)
x_3, Community Participation (2.68-8.92)	47.592		-92.582
	(50.64)		(60.14)
Constant		11839.854	14207.918
		(9970.08)	(8788.28)
R^2		0.4116	0.4956
N	17	17	17

Appendix 2: List of Informants

1. A

Lawyer at an NGO working with citizen's rights to basic public services such as water and sanitation with a special focus on disconnected

2. B

Legal representative and president of a Community Action Council

3. C

President of the Community Action Council

4. D

User Representative and Member of the Board of EPM

5. E

Sanitary Engineer, specialist in environmental engineering, Regional Government of Antioquia

6. F

Sub-secretary of Public Services, municipality of Medellín

7. G

Sanitary Engineer, Health Secretariat, municipality of Medellín

8. H

Planning profesional, Empresas Públicas de Medellín - EPM

9. I

Economist working for EAFIT University and Public Services consultant for Fundación ECSIM. Previous: EPM, the World Bank etc.

10. J

Water and Sanitation engineer at Universidad de Medellín, head of the Laboratory centre

11. K

Sanitary Engineer, PhD. Grupo de Investigación en Gestión y Modelación Ambiental –GAIA – Sanitary Engineering Department and Environment Engineering Faculty, Universidad de Antioquia.

In addition, I have talked with the following people in the barrio of Comuna 13, Nuevos Conquistadores parte baja, who are connected to the social recruitment project: Project Accountant; Civil Engineer; Directly hired, Indirectly hired providing material like for example sand.

Appendix 3: Interview Guide

This interview guide has been semi-structured and questions have varied a bit between different informants depending on their knowledge. The guide below should hence be seen as an indicator to what has been discussed during the interviews.

Interview guide

- Could you briefly describe your work and your position?
- Could you describe the sanitation situation in Medellín?
- Are there any differences in access to sanitation depending on the neighbourhood or area of the city?

Housing tenure

- Is there any connection between housing tenure and access to sanitation?
- If so, could you describe how housing tenure and access to sanitation are connected?
- In what way would it be different for someone not having a tenure title regarding adequate access to sanitation and other basic infrastructure services?
- Are there any examples of areas which have increased their access to sanitation after being formally recognized by the authorities?

Community participation

- Could community participation increase access to sanitation? Could you describe how?
- Would you say that community participation is most important before (lobbying) or during (planning and implementation) the process?
- Do you have any examples of neighbourhoods where community participation played an important role? Could you tell about the process?
- Who takes the initiative of a process or a partnership?
- To your knowledge, are there any local initiatives for better access to sanitation?

Concluding:

- What else do you think would be important factors hindering people to get adequate access to sanitation?