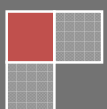# Status of Urban Slums in Gujarat and Rajasthan

A Case Study of Seven Cities

[The report examines seven urban slums from Gujarat and Rajasthan describing the current provision of basic services in these areas.]

Benjamin Stanwix

MHT

List of Contents

Acknowledgements

Many thanks to the people who made this research possible through their advice, organisation, and facilitation: Dr. Surashree Shome, Renana Jhabvala, and Bijal Bhatt. I must also mention my gratitude to the ladies at the Gujarat Mahila Housing SEWA Trust (MHT) who allowed me to feel welcome throughout my stay and helped to make it an enjoyable and educational experience. I sincerely hope that this report will serve its purpose and be valuable in assisting the work that is being done.[*]

Benjamin Stanwix

12th October 2009

EXECUTIVE SUMMARY

Dilapidated dwellings, overcrowding and lack of basic infrastructure, characterize neighbourhoods whose residents live in poor urban areas, faced with insecurity and squalor. The Mahila Housing SEWA Trust (MHT) ensures that the housing and infrastructural needs of these communities would not get neglected in the process of urbanization. Thus, MHT has collected data from slums of various cities to outline the communities' need for basic infrastructure and services in the hope that a clear overview and understanding of these areas will provide a foundation that allows for the necessary improvements to begin more easily. This report analyses data from seven urban slum settlements – four from Gujarat i.e. Ahmedabad, Nadiad, Godhra and Ankleshwar; and three from Rajasthan i.e. Jaipur, Bikaner and Jodhpur.

The main objectives of this report are to provide a basic picture of the conditions faced by the average household in these slums and to investigate some underlying relationships between the access to infrastructure with health and income of the households.

The report makes use of primary data from previous surveys, which cover the four cities from Gujarat and three from Rajasthan. Apart from these primary data various other studies are used to understand the current status of, and major issues facing, urban slums in India. STATA was the statistical analysis package used for most of the analysis and in some cases the data had to be re-coded for ease of use and analysis.

At first the report presents a profile for each of the seven cities where the important data was investigated and explained. The profile of the cities includes - the general information of the selected households, their income, their access to infrastructure and health. Additionally, within these profiles some regression analysis was used to explore links in the available data, like relationship between - access to infrastructure and expenditure on health/frequency of illness; ownership of house and investment on house; and household income and infrastructure.

1. General Household Information

- *Household size*
  The average number of people per household ranges from 3.7 to 6.3 with Bikaner and Jodhpur having the largest household size and Jaipur the smallest. Generally household sizes are larger in families with lower incomes, for example in this study Bikaner has an average household size of over 6 people and 92% of the population is poor while Jaipur has a household size below 4 and a poverty rate of 41%. This by no means proves a causal link but the relationship between income poverty and household size in India does exist and is worth noting (Ray, 2000).

	Ave. Household Size
Bikaner	6.3
Jodhpur	6.3
Ankleshwar	5.3

Godhra	5.0
Ahmedabad	4.6
Nadiad	4.6
Jaipur	3.7

- *Residency*

  The average number of years a household has lived in their current neighbourhood ranges between 18.6 years to 23.5 years with Ahmedabad and Bikaner. Clearly, most families have been residents for quite a number of years. The similar information is not available for Nadiad, Godhra and Ankleshwar.

	Ave. Years of Residency
Bikaner	23.5
Jodhpur	20.0
Ankleshwar	-
Godhra	-
Ahmedabad	18.6
Nadiad	-
Jaipur	19.6

- *House Type*

  There are quite large differences in 'house type' across the seven cities. For example 73% of residents in the Ahmedabad slums live in Kuccha houses while in Jodhpur only 7% do. It was not clear from the data which factors account for these differences, in some cities 'house type' was linked to income which may explain part of the story.

	Kuccha	Semi-Pucca	Pucca
Ahmedabad	73%	12%	15%
Nadiad	37%	35%	23%
Godhra	45%	38%	17%
Ankleshwar	75%	19%	6%
Jaipur	54%	19%	18%
Bikaner	36%	63%	1%
Jodhpur	7%	8%	74%

- *House and Land Ownership*

  In all the cities, except Jaipur, the majority of residents own their houses. The maximum is in Bikaner, where about 99 percent live in their own houses, followed by Ankleshwar, Nadiad, Jodhpur, Godhra and Ahmedabad. In contrast to house ownership most of the residents in these urban slums do not own the land on which their house is built, although they may own their house. And again those households, who do own land, do not have any proof of their legal ownership of land.

Ownership of House and Land and legal proof of their Land Ownership			
	House Owned	*Land Owned*	*Legal Land Ownership**
Ahmedabad	63%	33%	25%
Nadiad	85%	38%	N/A
Godhra	72%	6%	22%
Ankleshwar	86%	N/A	N/A
Jaipur	25%	10%	30%
Bikaner	99%	38%	47%
Jodhpur	83%	3%	N/A

Percentage of households with legal documents of land ownership within the percentage who said that they own land

2. Income, Savings and Loans

The analysis on per capita monthly income and also the percentage of the population in each city that is earning below the national poverty line shows that percentage of households below the poverty line is lower in bigger cities like Ahmedabad and Bikaner. Its above 70 percent in Jodhpur and above 80 in remaining four cites i.e. Ankleshwar, Nadiad, Godhra and Bikaner, which are comparatively much smaller in size and population then Ahmedabad and Jaipur.

Cities	Per Capita Monthly Income*	% Poor**
Ahmedabad	Rs.702	32%
Nadiad	Rs.374	85%
Godhra	Rs.366	87%
Ankleshwar	Rs.364	82%
Jaipur	Rs.672	41%
Bikaner	Rs.382	92%
Jodhpur	Rs.513	71%

*The average monthly income earned per person
**The percentage of the population below the National Poverty line (Rs.538.60/person/ month)

Not all the surveys provided data on savings but that which was available shows that not many households are saving money, with the highest saving rates being seen in Ahmedabad (which has the least number of poor households).

Savings			
	Yes	*No*	*Rs.*
Ahmedabad	23%	77%	451
Ankleshwar	10%	90%	460
Godhra	3%	97%	452
Nadiad	-	-	-
Jaipur	19%	81%	608
Jodhpur	-	-	-
Bikaner	2%	98%	-

Data on loans was available for three cities only viz. Ahmedabad, Ankleshwar and Godhra. However, the available data shows that Ahmedabad has the highest percentage of households taking loans, followed by Ankleshwar and Godhra.

Taking Loans?		
	Yes	No
Ahmedabad	74%	26%
Ankleshwar	33%	67%
Godhra	20%	80%

3. Infrastructure
- *Water*

   Access to water is varied across cities; Ahmedabad, Ankleshwar and Bikaner have over 60% of households with access to their own tap. However, Godhra and Jaipur have a relatively small percentage of households with similar access.

Water Facility	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
In-House Tap	66%	40%	27%	65%	26%	66%	57%
Public Tap	14%	17%	21%		37%		
Neighbour	8%	43%	36%		17%		
Private Seller	4%	0%	0%	35%	8%	34%	43%
Hand Pump	0%	0%	15%		0%		

- *Toilet*

   The problem of toilet access is quite bad in certain cities, as per the available information about half of the population in Nadiad, Godhra, Jaipur and Bikaner are using an open area. However, in Ankleshwar, most of the households have in-house toilets or they are using neighbour's toilet.

Toilet Facility	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
In-House	72%	43%	37%	76%	40%	43%	75%
Neighbour	3%	0%	0%	24%	0%	0%	
Public	11%	4%	5%	0%	2%	1%	25%
Open Area	14%	51%	57%	0%	49%	56%	

- *Drainage*

   Concerning drainage the facilities are mixed and in particular the households in Bikaner and Jodhpur have extremely poor drainage infrastructure. It is best in Ahmedabad where 85 percent of the households have the drainage facility.

Sewerage/ Drainage	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
Yes	85%	31%	7%	77%	40%	2%	32%
No	15%	42%	93%	23%	60%	98%	68%

- *Electricity*

   When compared to the other facilities the access that households have to electricity in all the cities is good, particularly Ahmedabad where almost all

households have electricity. It can be attributed to the poor friendly policies of Ahmedabad Municipal Corporation which has made it possible to achieve such a high percentage of electricity in the slums.

Electricity	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
Yes	92%	70%	71%	65%	82%	65%	68%
No	8%	25%	29%	35%	10%	35%	32%

4. Health

- *Preferred Medical Facility*
  The data on medical facilities is again mixed with no clear majority preferring private care over public care across all the cities; one would expect that the poorer populations would use public health care.

Medical Facility	Ahmedabad	Ankleshwar	Godhra	Nadiad	Jaipur	Jodhpur	Bikaner
Public	28%	-	56%	50%	45%	-	85%
Private	72%	-	42%	50%	30%	-	15%

- *Average Monthly Health Expenditure*
  Unfortunately the data on health expenditure is available for four cities only. According to available data the annual expenditure on health ranges between Rs.190 to Rs.270 with Godhra having the minimum expenditure and Jaipur having the maximum.

Health Expenditure (Rs.)	
Ahmedabad	220
Ankleshwar	-
Godhra	190
Nadiad	-
Jaipur	270
Jodhpur	-
Bikaner	228

5. Regression Analysis

Firstly, investigation of the 'health-infrastructure' link found that household health is correlated with the access to basic amenities; those households who did not have access to water, a toilet, and drainage (sewerage and storm water) were spending more money on monthly healthcare than those with these services, and they also reported more frequent illnesses. Secondly, it was clear that a relationship exists between income and access to infrastructure, that is, the poorer households are also those who lack access to water, toilets, drainage and so on. Thirdly, in Ahmedabad specifically, the data revealed that spending on household upgrading and acquiring basic amenities was much higher if the house and the land were owned by the family. Spending was also positively correlated with income. Fourthly, the data showed that 'house type' generally differed by income, with the families earning higher income living in better housing. Finally, analysis also revealed that saving was much higher among richer households.

SECTION 1
BACKGROUND OF THE STUDY

1.1   Introduction

The rapid increase in urbanisation together with the expanding number of urban slums[†] in India poses considerable challenges to the construction of suitable and sustainable human settlements and to the process of socio-economic development in general. Unsound dwellings, overcrowding, and lack of basic infrastructure[‡], characterize neighbourhoods whose residents live in poor urban areas, faced with insecurity and squalor. The housing and infrastructural needs of these communities must not be neglected. Beginning their work in Ahmedabad, Gujarat, and slowly expanding to neighbouring states, the Mahila Housing SEWA Trust (MHT)[§] is working to ensure that this does not happen to these poor residents. MHT partners with the community itself, the government, and the private sector to successfully bring about the upgrading of slums. As a small part of that process this paper analyses data from seven urban slums in Gujarat and Rajasthan, outlining the communities' need for basic infrastructure and services in the hope that a clear overview and understanding of these areas will provide a foundation that allows for the necessary improvements to begin more easily.

1.2   Objectives

The main objectives of this report are twofold: firstly, to provide a basic picture of the conditions facing the average household in these slums by presenting and examining data on household characteristics; and secondly, this report seeks to investigate some underlying relationships in the data which help to tell the story of these households more accurately. To achieve the latter objective a few relationships which are shown to be significant in other studies are tested. Specifically, the two key associations are:

 i)   The hypothesis that households without adequate access to basic amenities such as piped water, toilets, drainage and waste disposal, have more illnesses and thus spend more money on healthcare than households with adequate access. The supposition is that a lack of access to this basic infrastructure means that households are living in unsanitary conditions and thus members have more illnesses.

[†] A UN Expert Group has created an operational definition of a slum as: "an area that combines to various extents the following characteristics: inadequate access to safe water; inadequate access to sanitation and other infrastructure; poor structural quality of housing; overcrowding; and insecure residential status" (UN-Habitat, 2007). The description serves as an accurate working definition for use in this report.

[‡] Throughout the report 'infrastructure' is taken to include basic facilities such as access to water, toilets, drainage, electricity, and so on.

[§] The Mahila Housing SEWA Trust (MHT) was registered in 1994 with the objectives of improving the housing and infrastructural conditions of urban as well as poor women.

ii)   The hypothesis that it is the poorer households (in terms of income) who are usually lacking access to this basic infrastructure. Families with lower incomes cannot afford to have basic infrastructure, also those without basic infrastructure could have less time to allocate to productive activities and may be having to spend more money on expenses (such as healthcare, if the hypothesis above is true) which could contribute to keeping them poor. So the link would run in both directions.

In addition to these two hypotheses, parts of the report investigate the link between savings and income, and also the link between property ownership and investment in household upgrading. Regression analysis is the primary tool used to explore these links and test the two hypotheses above but throughout the report there are tables which also help to provide supporting insights.

1.3   Report Structure

In Section 1.1 the subject of this report has been briefly introduced with the main objectives stated in section 1.2. The methodology is explained in section 1.4 where the limitations of the study are also addressed. A report overview is given in Section 1.5 which provides a breakdown of how the analysis of each city was conducted and sets out the structure which has been used throughout. The overview goes on to introduce and discuss the main topics which are explored in the analysis of each city. Section 2 contains a separate report for each of the seven cities where the survey data is presented and investigated under the headings laid out in the report overview. Section 3.1 brings together a large portion of the data on all seven cities and presents a comparison between them. Finally, some conclusions are drawn in Section 3.2.

1.4   Methodology

The report makes use of primary data from previous surveys, which cover the seven cities in question, drawing on the data which is relevant. The data has been taken from surveys which MHT contracted or carried out for various other studies. Apart from these primary data various other studies are used to understand the current status of, and major issues facing, urban slums in India[**]. STATA was the statistical analysis package used for most of the analysis and in some cases the data had to be re-coded for ease of use and analysis. Each survey was done independently and thus they all differed in their design and the questions asked, some being more comprehensive than others depending on their initial purpose. This may affect the comparative accuracy of the estimates presented, in all cases the data has been adjusted for sample size and the population in question. Despite the differences among them, all the surveys include enough basic questions of interest to make a study of this nature possible and useful. Having said this there are some limitations which must be mentioned.

[**] SEWA's UPRS and SYS2P studies were used for this purpose

The major constraint which restricted the scope of this report was that the survey data had been collected for various purposes and thus lacked some depth for the purpose of this study. Specific limitations are listed here. In most of the surveys information on household health is inadequate – only the NIUA survey of Ahmedabad has substantial data on the frequency and type of illnesses –, for some other areas there is data only on monthly health expenditure, while some have no information on health at all. Given this most of the investigation into health levels had to be based on health expenditure which is a poor proxy at best – especially given that some households use public healthcare and others private, which was not always specified. However, this was the only available option for investigating health in some of the cities and the results do suggest that despite these limitations it does provide some worthwhile insight.

The data on household demographics is generally limited to family size, caste and religion, while data on occupations or employment was scarce. Information on savings and loans is varied and for some cities is completely absent. Some of the surveys, such as Jodhpur's, have a very small sample size and also several surveys lacked data on household expenditure. More generally, when compared to studies such as the UPRS or SY2SP (where the questions were prepared specifically) these questionnaires do not ask very detailed questions. Thus while the information provided is adequate to create a profile of the basic conditions in each area the scope for any detailed analysis is quite limited.

1.5   Report Overview

The analysis on each city is broken down into the following 6 divisions:

i. **General Household Information** - this looks at household size, caste, type of housing, property ownership, and length of residency
ii. **Income** - monthly per capita income is examined along with a poverty analysis based two poverty lines, available data on savings and loans is also presented
iii. **Infrastructure** - the community's access to water, toilets, sewerage, drainage and electricity are examined
iv. **Health** - the available data on health is investigated
v. **Regression analysis** - regressions are run for each city to analyse possible relationships which help to tell the story of the average household - choice of analysis depended heavily on the availability of data for the region
vi. **Summary** - the findings and key features of the data are summarised

In the section below the subjects above are introduced and discussed in more detail, a few salient points from the data are also mentioned. This may serve as an extensive executive summary, providing a discussion of the different problems facing slum dwellers which other studies have noted and also explaining how the data has been analysed in this case. The following paragraphs are a discussion of the divisions (1-5), above.

i.   **General Household Information**

This is the starting-point of analysis on each city and uses available data to provide a description of the general household and their housing conditions.

- **Household Size**
Average household size gives an indication of how many people make up the typical family and how many children the parents are providing for. Generally household sizes are larger in families with lower incomes, for example in this study Bikaner has an average household size of over 6 people and 92% of the population is poor while Jaipur has a household size below 4 and a poverty rate of 41%. This by no means proves a causal link but the relationship between income poverty and household size in India does exist and is worth noting (Ray, 2000).

- **Caste**
Data on the split between different castes is shown, where available, as this can influence the functioning of a community in certain cases, especially where caste divisions still translate into class divisions. The development worker would be better off at least having knowledge of these divisions. It was also found that in certain cities such as Jaipur and Bikaner incomes differed significantly dependent on caste.

- **Type of Housing**
Examining the type of housing in the slums gives an initial indication of the living conditions of residents. The data showed that it is generally the poorer residents who reside in the worst housing. The house is possibly the most important asset for the poor, and can be used to access other funds and opportunities. In many cases the home is a living area, a place of work, and an asset which can be used for access to credit (SEWA Academy 2002, Chen 2000). A Pucca house is the most desirable; it is a standard dwelling made with bricks and cement and has a solid roof. A Kuccha house can be made up of various makeshift materials; this is problematic as such houses are less durable and more likely to leak in the rainy season. Furthermore, these houses can be difficult to service as they are often constructed haphazardly and are usually not initially built with drainage, sewerage facilities, or electrical installations. There are also houses which are a combination of both Kuccha and Pucca, they are generally referred to as Semi-Pucca or Mixed in this report. Ankleshwar has the highest percentage of Kuccha houses while Jodhpur has the highest percentage of Pucca.

- **Tenure**
Issues of tenure are important because they deal with housing security and affect the decisions a family makes about spending on their home. If tenure is insecure and families could be forced out unexpectedly they are likely to spend less money on renovations to make the home a permanent work-space, or on acquiring basic services and making it an acceptable living-space. The data for Ahmedabad supports this, showing that when property is owned households have spent over Rs 10,000 more on upgrading their house and

12

acquiring new facilities. A further concern related to tenure is that without ownership the home cannot be used as collateral for a loan in many cases.

- **Residency**

    Finally, the length of time residents have stayed in the area is important to note and can influence the type of project initiated in a community. For example, it is plausible that longer-term residents may be more organised as a community which would make work easier, but they also may be unwilling to relocate if necessary.

ii. **Income, savings and loans**

- **Income**

    In this study income was the most reliable form of welfare measure available for every household and thus it was used to examine the general wealth of households. Specifically, per capita monthly income is used to construct a poverty profile for each city. Two techniques of examining income poverty are employed; the first is a Cumulative Density Function (CDF), and the second is a set of measures called the Foster-Greer-Thorbecke (FGT) measures. An example of a CDF, shown below, illustrates the spread of per capita income across the surveyed population. On the y-axis is the population and on the x-axis is monthly per capita income. This way of illustrating income allows one to escape the constraints of a fixed poverty line and get a sense of both the extent and depth of poverty.
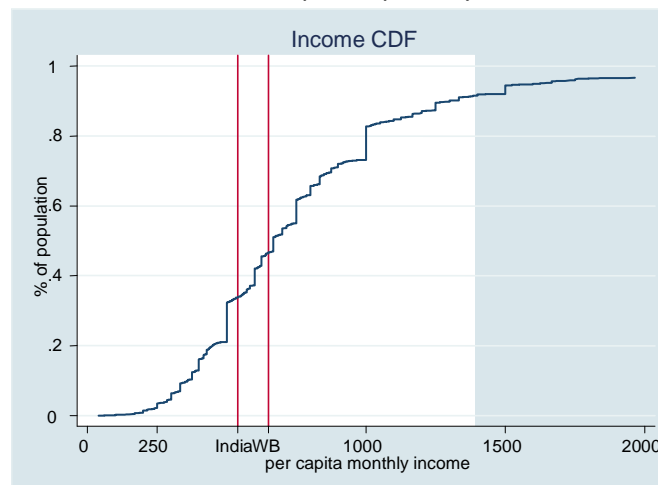
    The two red lines indicate first India's national poverty line, and secondly the new World Bank (WB) poverty line, which is chosen as an international measure. India's national poverty line for urban areas as per 61st National Sample Survey is Rs. 538.60 per month (2006). The international poverty line is calculated at $1.25 per day (2005 PPP) which is approximately Rs.650 per month (Chen & Ravallion, 2008). From the CDF above one can see that around 30% of the population are below the national poverty line and approximately half are below the international line.

To get more precise poverty statistics use of the FGT measures is helpful. This is a generalised way of measuring poverty and gives exact figures for a chosen poverty line††. The FGT measures provide information on the extent of poverty and the intensity/depth of poverty. The results shown below were calculated for the national poverty line (Rs. 538.60), using the same population as the CDF above.

Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.3376	0.0833	0.0317
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

The output shows that 33.76% of the population are living below the national poverty line - this is the headcount ratio (a=0) -, while the poverty gap (a=1) tells us that, among these poor who fall below the poverty line the average household is 8.33% below the line. That is, their average earnings are 8.33% below the line of Rs.538; this is the 'depth' of poverty. The normalised poverty gap (a=2) has no easy interpretation as it is essentially the squared distance below the poverty line, thus giving more weight to those at the bottom-end of the distribution, it is therefore most useful for comparison but will not be mentioned in this report. Among the cities in this report Bikaner has the highest percentage of poor households at 92% while Ahmedabad (which has been used as the example here) has the lowest at 34%.

- **Savings**
  The practice of saving is important, especially for poorer families as a cushion in times of financial shock it avoids the unnecessary taking on of debt (Rakodi, 2000). It is obvious from the data that most families do not save; the highest percentage of households saving is 23% in Ahmedabad, the lowest is Bikaner with only 2%. Intuitively one can understand that poorer households are less likely to save because they simply have less money.

- **Loans**
  Concerning loans the data was minimal but what could be gleaned is presented in the reports. The only available data on loan sources was available for Ahmedabad and here it is clear that the majority of households take loans from informal sources such as Private Money Lenders (PML) and relatives. There may be two main reasons for this: firstly, most households may not own the assets necessary for acquiring a loan from formal institutions; and secondly, in the case of a financial emergency such as a family death when money is needed urgently, loans from private lenders and family are easily accessible and require no paperwork – furthermore,

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†† The general formula for calculating FGT measures is given in the Appendix

borrowing from relatives generally means that no interest is charged. In Ahmedabad 74% of households borrow money but in other cities this figure falls to less than 50%. The recent success of micro-lending schemes in many poor areas of the world suggests that more thorough data on loaning activities could provide valuable insights for development.

iii.   **Infrastructure – water, toilets, drainage, waste disposal, electricity**
There are a number of strong arguments for improving and upgrading the infrastructure of slum settlements, many of which are interrelated: improving living conditions can bring gains to the quality of life, health, and productivity of slum residents, it can help to break the cycle of poverty, ease the burden on women, and can also be a public good with positive spill-over effects on the wider economy and society. These arguments are outlined in more detail below.

The positive impact of infrastructure improvement on the quality of life of residents is itself a valid reason for undertaking such an activity. Life in the absence of adequate access to basic services such as water and ablutions can be precarious; it is detrimental to the health, safety and the dignity of communities (Karn et al., 2003). Many commentators have highlighted this link between poor living conditions which characterise slums, and ill health; this relationship between health and infrastructure is also explored in the report (Hancock 2000, Devas et al. 2001). Lack of safe drinking water and poor sanitation can lead to a range of diseases, while factors such as overcrowding and pollution can also contribute to health problems (UN-Habitat 2008). Providing good access to water and sanitation can reduce the amount of stagnant water and thus the risk of malaria and a variety of water-borne diseases (WHO 2000, UN-Habitat 2008). Regarding water and sanitation; in Jaipur only 26% of households have their own tap, while in Godhra 57% of households use an open area for their defecation which alone poses a serious health risk.

Illnesses also force households to pay extra medical expenditure which can push them deeper into poverty and indebtedness (UN-Habitat, 2003). Furthermore, the number of working days for self-employed women and others are reduced when family members become ill, this lowers income even more. Amis (2001) notes how illness may lead to asset depletion and debt in order to fund private healthcare, and thus "is one of the most powerful forces pushing households into poverty" (Amis, 2001:106). Good sanitation and sewage facilities ensure a safer, healthier lifestyle contributing to a healthy workforce with higher productive capacity and less money spent on illnesses. In the long-term these health gains benefit not just the individuals concerned but the wider economy and society, one can expect that public expenditure on healthcare will be lower and a more productive and healthy workforce is created. The WHO estimates that simply meeting the Millennium Development Goals (MDG) target on water and sanitation could result in an annual cost saving to the health sector of $7 billion, and an

annual global saving to the value of $750 million from working days gained as a result of improved health (WHO, 2003).

Life in these circumstances is particularly difficult for women as the burden of household work in the absence of infrastructure usually falls to them, for example fetching and carrying water (Chen, 2000). They must also struggle to maintain household hygiene in the context of poor drainage and sanitation. It is women who are most vulnerable to harassment or assault when using open areas in the absence of toilet facilities, or due to insufficient street lighting at night (UN Habitat, 2003). Thus women may derive the greatest benefit from improvements in infrastructure (Amis 2001, Rakodi 2002). Improvements in water supply, access to toilets, and drainage reduce this burden on women and increase their time for other activities. Access to water, for example, is a vital part of everyday life; without reliable and easy access to this resource much time and effort has to be dedicated to acquiring it. In the Ahmedabad slums 3200 person-hours are spent each morning just collecting water. This time could be productively spent elsewhere if households had access to their own reliable water source. Especially housewives and home-based workers benefit from the increased space for household and income-earning activities (WHO, 2003). Provision of street lights can increase their personal security, allow the use of more outside spaces and lengthen the working day (Amis 2001, Devas et al. 2001). Benefits such as these are also in line with the MDG of promoting gender equality and empowering women.

Improvements to slum areas can also improve the overall 'image' of the slum, and can therefore stimulate investment and business/service growth in the area. Amis (2001) found that the provision of paved roads provided a powerful confirmation of the legality of the slum settlements, and hence led to subsequent investment. It has also been noted that one effect of slum improvement is to integrate the slum settlements into the wider life of the city (Amis, 2001).

Provision of affordable infrastructure and services in the urban slums thus has numerous benefits and makes a key contribution to urban poverty reduction. Projects such as MHT's Parivartan, where the results of installing basic services and infrastructure in urban slums have been documented, provide a compelling example of the difference that this makes to a community (SEWA Academy 2002, UPRS). Such local evidence is well-supported in international literature and in particular research done by the United Nations (UN-Habitat, 2003, 2008). Not only does the provision of basic infrastructure increase their standard of living but it creates more time for family members to engage in productive work and contribute to family earnings. Importantly, access to water, toilets and proper drainage has significant health benefits.

iv.   **Health**

Health is obviously a key aspect of human well-being and it's relation to the living conditions in urban slums has been mentioned in the discussion above. Unfortunately the data on health for many of the cities was limited and thus relationships between health and infrastructure were only analysed where possible (this was done in the regression analysis, section 5).

v.   **Regression Analysis**

The last section on each city examines some of the relationships in the data using basic linear regression analysis. The choice of variables was generally dictated by the availability of data and for every city the connection between income and infrastructure was examined – here it was generally found that higher income is related to better access to infrastructure which is what one would expect. Where data on health was available the links between health and access to infrastructure (water, toilets, drainage, waste disposal) were explored. For Ahmedabad the relationship between property ownership and investment on infrastructure is investigated. All the regression output has been presented after checking for multicollinearity, heteroscedasticity, and autocorrelation which were not problematic in these regressions. There was surprisingly little correlation between infrastructural variables such as water, toilets, and drainage, suggesting that households which have access to one facility do not necessarily have access to the others. The regression output tables give the coefficients, standard errors and statistical significance of each variable, additionally the Adjusted R^2 - which gives the explanatory power of the regression – and the sample size (number of observations), is shown.

The city-by-city analysis follows where the data is presented for each of the sections discussed above, each section ends with a brief summary of the findings.

SECTION 2
# STATUS OF SLUMS IN SELECTED CITIES

2.1   Gujarat
2.1.1. Ahmedabad

In Ahmedabad, the financial and industrial capital of Gujarat, there were approximately 1,000 slums in 2006 (AMC, 2006). However, the population of the slums in Ahmedabad has been growing faster than that of the overall population, almost doubling in the two decades since 1976 to over 41% of the total population (Dutta and Batley, 1999). It is therefore likely that the number of slums has grown in the last three years. Data for this analysis is taken from the 2007 NIUA dataset, which surveyed 12,773 households in 39 urban slums of the city.

i.   Household Information

The average household size in these urban slums of Ahmedabad is 4.6, and approximately 40% of households have more than 3 people living in one room. Regarding residency, the average household has lived in the same area for the last 19 years. From figure 1, below, it is clear that by far the majority of residents live in Kuccha houses (72%).

Figure 1
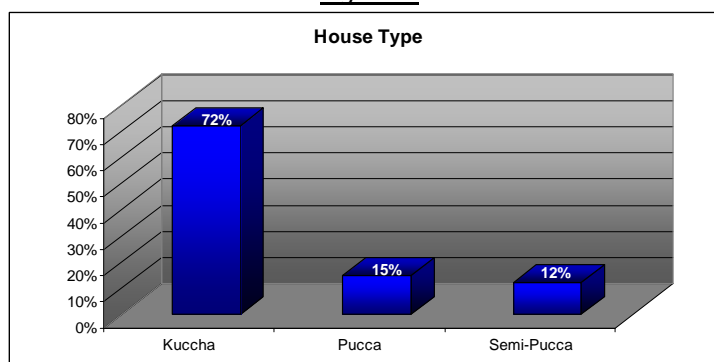
It is useful to examine whether the type of house that a family lives in is related to their income. Table 1, below, separates the monthly per capita income of all households into 5 groups (or quantiles) and tabulates this alongside the type of house which the family occupies. The data shows that, out of those living in Kuccha and Semi-Pucca houses, the highest number come from the 1st (poorest) quantile. Of those living in Pucca houses, 35% are in the richest (5th) quantile. Overall the data reveals a relationship which one would expect to see – those with higher incomes live in better houses and vice versa.

Table 1

Income quantiles	Type of House		
	Kuccha	*Semi-Pucca*	*Pucca*
1	29%	44%	17%
2	12%	11%	10%

3	22%	18%	17%
4	19%	14%	21%
5	18%	13%	35%
Total	100%	100%	100%

Another aspect of the housing situation is tenure. In these slums 60% of families own their houses and 40% rent, where the average rent paid is Rs. 495 per month. Only 33% of families own the land on which their house is built. Moreover, many families who own property or a house do not have any legal proof of this ownership. The table below suggests that 'type of house' seems to differ slightly based on whether the household owns or rents their house. A higher percentage of residents who own their houses live in Pucca houses, while a higher percentage who rent live in Kuccha houses. Intuitively this could suggest that when a house is owned by the family they are more likely to spend money to upgrade it, this hypothesis is investigated later in more detail.

Table 2

Ownership	Type of House			
	Pucca	*Semi-Pucca*	*Kuccha*	*Total*
Own	17%	12%	70%	100%
Rent	10%	12%	78%	100%

Concerning ownership and spending, table 3 shows that families who own their land invest more into their property than to those who do not own their land. On average Rs. 10,444 more is spent by those who own the land on upgrading and acquiring basic facilities. This is also explored further in the regression analysis.
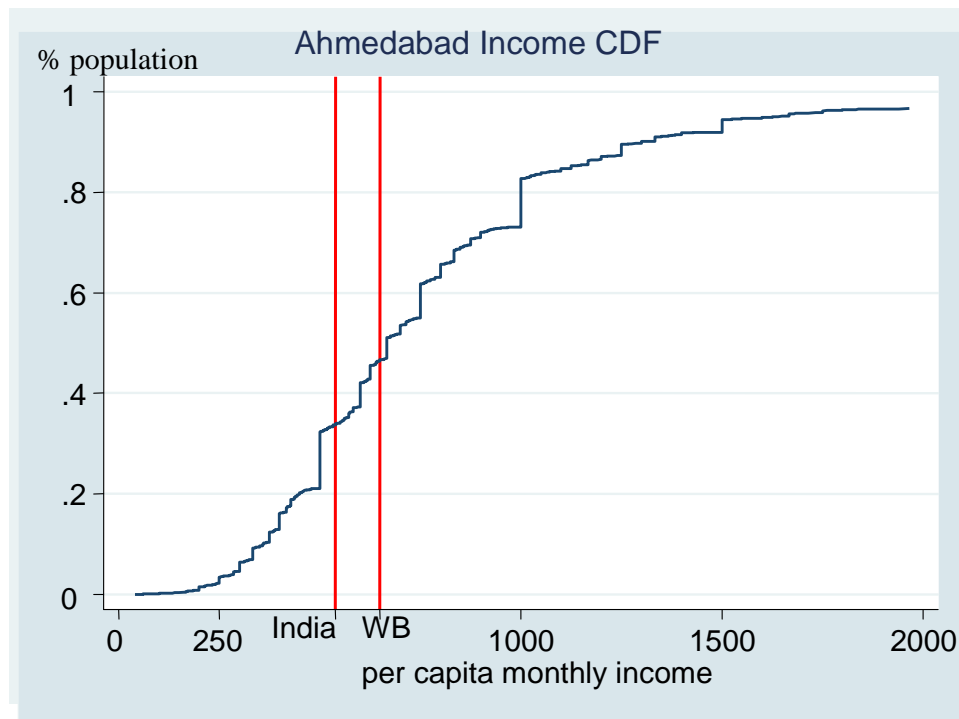
Table 3

Summary of Investment After Purchase	
	Ave. Amount (Rs.)
Own Land	50,450.14
Do Not Own Land	40,005.36

ii. Income

In these slums the average per capita monthly income is Rs. 702. Below is a CDF which illustrates the spread of per capita income across the survey population, the national and international poverty lines are shown in red.

Figure 2

Ahmedabad Income CDF

It can be seen that around 30% of the population are below the national poverty line. Looking at international poverty line, Rs.650, one can see that approximately half of this slum population would be regarded as poor.

To get a sense of the exact measure of poverty the FGT measures are presented here, they are calculated using the Indian poverty line of Rs. 538.60/month.

Table 4

Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.3376	0.0833	0.0317
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

The output \suggests that 33.76% of the population are living below the national poverty line (this is the headcount ratio) while the poverty gap tells us that these poor who fall below the poverty line are 8.33% below the line, on average. The situation regarding ration cards is that 70% of households have a ration card. This is important given that the ration card is the only available from of identity card for many poor households.

- *Savings*

In these communities 23% of households save an average amount of Rs. 451 per month, the rest do not save. Majority of saving is done through formal institutions, such as the SEWA and Nationalised Banks, this is shown below in table 5.

Table 5

Saving Options	
Nationalised Bank	38.32%
SEWA Bank	27.89%
SHG's	12.37%
Relatives	8.81%
V.C	5.78%
At Home	0.36%
Others	6.47%

Tabulating those who save against household income, in table 6, it is clear that the majority of poorest households are not saving – almost 50% are from the poorest two quantiles –, while almost 70% of those saving are households in the highest two income brackets.

Table 6

Income Quantile	Not Saving	Saving
1	36%	9%
2	12%	10%
3	23%	13%
4	16%	26%
5	13%	43%
Total	100%	100%

- *Loans*

Seventy-four percent of households in these slums borrow money and the various sources of this credit are listed in table 7. It is clear that the majority of households take loans from informal sources such as Private Lenders and relatives.

Table 7

Loans	
Private Lender	46.16%
Nationalised Bank	11.09%
Relatives	9.25%
SEWA Bank	6.43%
Institutional	1.53%
Employer	0.14%
Others	2.32%
Not Loaning	23.08%

- *Other 'Assets'*

Regarding insurance, 78% of households do not have insurance, but only 14% of these families who had no insurance desired it. Information on other household assets is minimal but the average total value of household assets comes to Rs. 29,754 for this community (this includes houses, land, and cattle).

iii. Infrastructure

- *Water*

The majority of households in these slums have an in-house tap (66%) but there are still a large number of households who must fetch water.

Figure 3
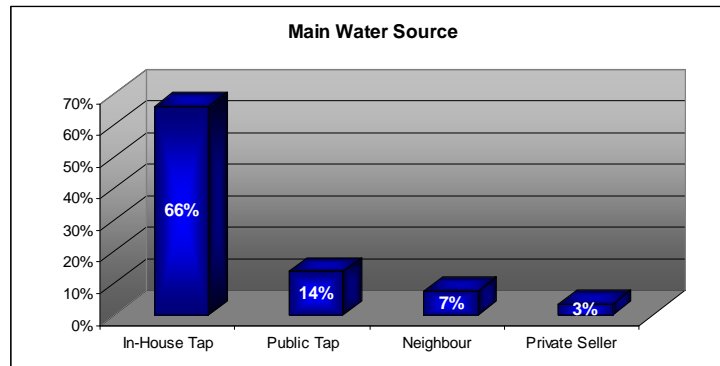
Fifty-eight percent of households spend more than 30 minutes filling water, per trip, and 27% of families have to travel more than 1 kilometre to obtain water. In addition, for those who use public taps the municipality water supply is only available for 2.5 hours per day on average. Table 8 examines time spent fetching water by comparing the time spent collecting water for households who have a tap against those who do not, ninety-nine percent of households who have their own water facility spend little time collecting water, while clearly a large number who do not have their own tap spend substantial time on water collection – in total these households spend 3200 person-hours every morning to collect a basic necessity.

Table 8

Time Spent	Own Water	
	No	Yes
0-1hr	42.1%	99.3%
1-2hrs	46.5%	0.1%
2+hrs	11.2%	0.0%

This highlights the time which could be saved and spent more productively if more families had access to their own water facility.

When asked to rate the importance of water out of 10 (1 being the lowest), an average rating of 8.6 was given. In relation to all other amenities which residents would like to have installed or upgraded in their communities, water was notably the most important. This is shown in table 9.
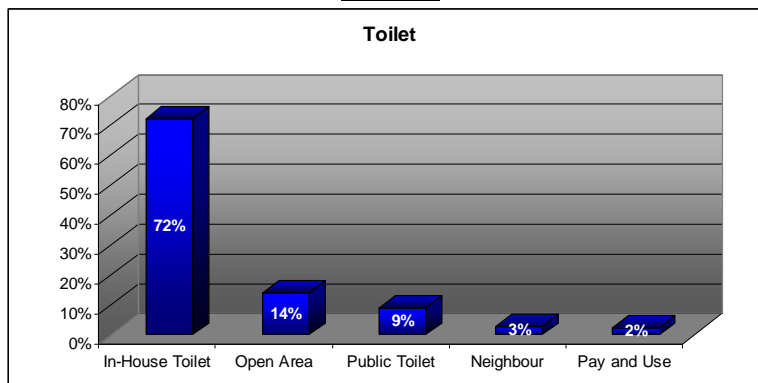
Table 9

Most important facilities	
Water	69.66%
Toilet	14.17%
Gutter	11.55%
Garbage disposal	2.11%
Street light	1.65%
Public transport	0.87%

- *Toilet/Sanitation*

The majority of families in these slums have in-house toilets (74%), but there are a large number whose members must defecate in the open (14% or 1827 households).

Figure 5

Toilet

Regarding those who do not have their own toilet facilities, 2700 households stated that they urgently required a toilet in their house and of these families 80% said they would be willing to pay to acquire a toilet. The average payment offered was Rs. 338.


- *Drainage and Sewerage*

Seventeen percent of households do not have any storm water drainage, and only 10% have no gutter for sewerage. Of those that do have some drainage, 20% report problems with water clogging and in total one-third of all households have had to pay for repairs on their houses in the rainy season due to their drains either not working or being non-existent. The regression analysis later in the report looks at the relationships these can have with health.

- *Waste Disposal*

In many of the slums solid waste is not properly collected. The Ahmedabad Municipal Corporation has provided collection bins to some of the slums. Figure 6 shows that most residents have a dustbin at home. Nineteen percent of households make use of a common dustbin to dispose of their waste, 10% throw it into the street, and only a small number of households burn their waste.

Figure 6

Waste Disposal
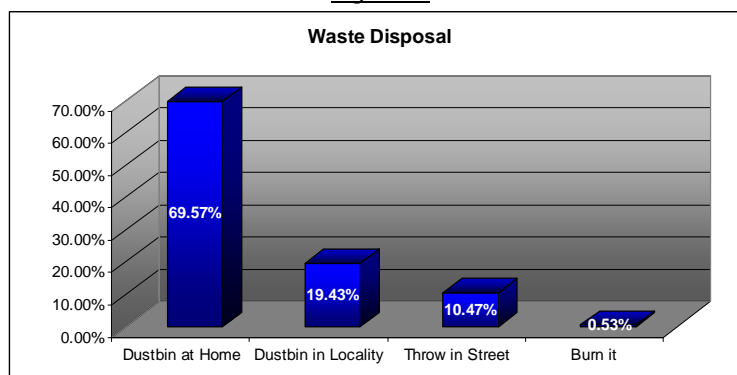
Concerning recyclable waste over 95% percent of families say that their waste gets recycled.

23

- *Electricity*

Ninety-two percent of households in these areas have access to electricity in their homes, with a vast majority of these using an in-house meter. It is important to mention here that the policy of the Ahmedabad Municipal Corporation regarding electrification in the slums has made it possible to achieve such a high percentage. On average households report that they pay Rs. 235 per month for their electricity.

iv.   Health

In the year preceding this survey households report that family members suffered from a number of diseases, many of these are related to poor sanitation and water-borne bacteria. The data is present in Table 10. It must be noted that this data relies on the memory of the respondent and it is not clear whether these illnesses were professionally diagnosed or not.

Table 10

| Annual Illnesses	Observations
Diarrhoea	695
Malaria	464
Typhoid	352
Chikun Gunia	5805
Cholera	317
Other	2411

The negative effects of falling ill are not only those affecting the patient physically but also valuable work days lost, Table 11 presents the number of household who report members missing work due to illness (recall that the total number of households is 12,773). A large portion of the population missed more than 15 days of work due to illness.

Table 11

| Workdays Lost due to Illness (per year)	
< 10	2164
10 – 15	817
15+	1084

Illness can also require spending on medical care and on average these households spend Rs.220 for monthly medical expenses. The table below shows the breakdown of this spending, with the bulk of households spending between Rs.50 and Rs.200.

Figure 7
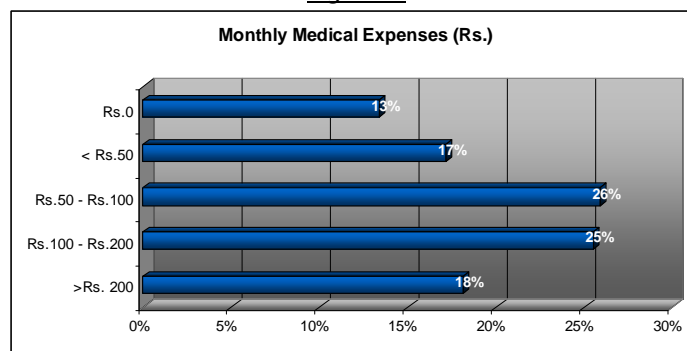
Regarding medical facilities, families in these slums report that in most cases a private facility is used, with the main reason being the poor service provided by public hospitals.

Figure 8

Preferred Medical Facility

27.44%

71.99%

■ Private
■ Municipality
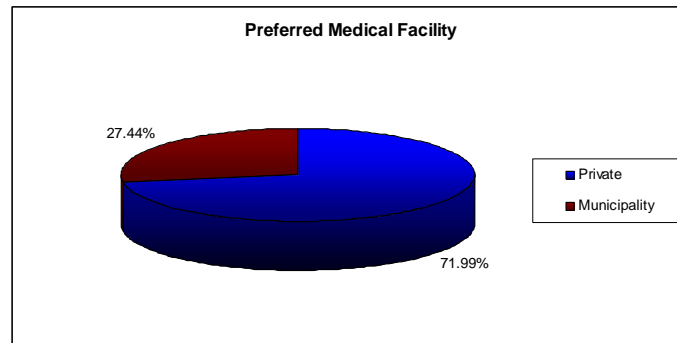
v.   Regression Analysis

In the following section some multiple regression equations have been formulated in order to better analyse the data and explore three main relationships. The first two regressions look at the relationship between infrastructure and health; the second one examines the effect of ownership on household investments; the third explores the link between income and infrastructure.

Equation 1(a)

This first equation tries to estimate the relationship between health expenditure and infrastructure (access to basic services). Monthly health expenditure is the dependent variable and is regressed against a series of categorical variables: Water, Toilet, Sewerage and Drainage (storm water). These report '1' if the service is present and '0' otherwise. The equation is:

$Health\ Exp. = C + β1(Water) + β2(Toilet) + β3(Sewerage) + β4(Drainage) +$

Regression Output 1

Health Expenditure	Coefficient	Std. Error	P-Value
Water*	-13.16	4.62	0.07
Toilet*	-9.31	7.79	0.09
Sewerage*	-81.53	5.9	0.08
Drain	-15.91	4.57	0.7
C (constant)	283.48	76.14	0

Observations   8,386
Adjusted R²   0.1
*10% Significance

The above results seem to support the common beliefs. Analyzing the output in the order it is presented we see that:

o   If a household has access to water their monthly spending on health will be Rs. 13.16 lower, on average, than if they did not.

o   If the household has access to a toilet then on average they will spend Rs.9.31 less than if they had no toilet.

25

- o   If the family does not have sewerage facilities they will spend Rs.81.53 more than families who have facilities. This is the most prominent in magnitude.
- o   If the house has drainage the mean monthly spending on healthcare will be Rs.15.91 lower than if they had no drainage, although this is statistically insignificant.
- o   The interpretation of the constant term is that, when a household has none of these facilities they will spend an average of Rs.283.48 per month on healthcare – this then decreases with added facilities. The adjusted R-Squared tells us that 10% of the variation in health expenditure can be explained by these four variables.

Equation 1(b)

No. of Illnesses= C + β1(Water) + β2(Toilet) + β3(Sewerage) + β4(Drainage) +

The regression here is essentially presenting the same hypothesis as the one above, - that basic services have an effect on health. The difference being that in this case health is measured by, 'the number of illnesses in the household over 1 year' as opposed to 'monthly expenditure on healthcare' in the previous case. However, similar results are evident which is encouraging for the reliability of analysis which uses health expenditure as a proxy for family health.

Regression Output 2

No. Illnesses	Coef.	Std. Err.	P>t
water*	-0.01	0.01	0.06
toilet*	-0.02	0.01	0.1
sewerage	-0.67	0.02	0.24
drain*	-0.08	0.02	0.05
_cons	0.83	0.03	0

Observations   7,118
Adjusted R²   0.11
*10% Significance

Plainly, a literal interpretation of the coefficients in this case does not make sense (one cannot imagine 0.01 of an illness, for example) instead these results have been included as they support the intuition of the findings in the first regression. From the results one can see that access to water, toilet facilities, sewerage and drainage all decrease the number of illnesses households experience – the magnitudes being relatively unimportant here. The Adjusted R-Squared is 0.11 which suggests that while some of the movement in illnesses is explained here, there are also other factors influencing the dependent variable.

Equation 2
This second regression tries to find out which variables might influence how much a family spends on upgrading their house and installing basic amenities. In this equation the amount which families invested is the dependant variable and the independent variables are; if the family owns the land or not, if they own the house or not, and their per capita monthly income.

Inv. on House = C + β1(own-land) + β2(rent-house) + β3(pc income) +

Regression Output 3

invonhouse	Coef.	Std. Err.	P>t
ownland**	683.22	200.7	0.09
renthouse*	-11537.32	975.16	0.02
pcinc*	22.71	3.5	0
_cons	32863.76	3151.67	0

Observations   2,410
Adjusted R²   0.32
*5% Significance
**10% Significance

These results reveal an important link which was alluded to earlier. Firstly, they show that owning land is linked to larger investment (Rs.683) on upgrading and acquiring infrastructure relative to households who do not own their land. Secondly, if the family rents their house they are likely to spend considerably less on investment (Rs.11, 537) compared to those who owned their house. Thirdly, as expected, higher per capita income is related to increased investment, this simply suggests that those with more money invest more. The Adjusted R² value is 0.32, and again the variables are statistically significant. These results support the claim that tenure and ownership matter; when the land and house are owned this increases security and generally leads to greater investment, which ultimately has positive effects for the household.

Equation 3
This final equation examines the relationship between income and infrastructure.

Monthly Income = C + β1(sewerage) + β2(toilet) + β3(water) + β4(drain) +

The regression is used to summarise what has been reported in some of the data tables above; that poorer families generally have fewer amenities available to them.

Regression Output 4

Monthly Income	Coef.	Std. Error	P-Value
sewerage*	44.83	15.17	0.00
toilet*	99.11	23.27	0.00
water*	28.67	10.16	0.01
drain**	25.32	13.76	0.07
_cons	675.37	26.11	0.00

Observations   8,792
Adjusted R²   0.14
*1% Significance
**10% Significance

Examining the output reveals that, on average:

o   Households with a facility to deal with sewerage earn Rs.44 more than those who do not have this facility.
o   Households with access to a toilet earn Rs.99 more than those without a toilet.
o   Households with their own tap earn Rs.28 more than those with no tap.
o   Households with storm water drainage earn Rs.25 more than households with no drainage.
o   The regression explains 14% of the variation in monthly income according to the Adjusted R^2.

vi.   Summary and Conclusion

Overall the data shows that about one-third of families are poor, many live in inadequate housing and have insufficient access to basic infrastructure such as water, toilets, and drainage. When asked to rate which resources were most urgently needed the first three were water, toilets and drainage, respectively. Regarding savings there are few households that save and those who are saving are almost exclusively households with higher incomes. Nearly two-thirds of households are taking loans, the majority of whom use informal sources. The regression analysis suggests, in agreement with other studies, that the basic amenities are related to the health of households and therefore also to the monthly amount spent on healthcare. Furthermore, it appears that ownership of land and housing both play a role in the amount of investment that households make into their estate. Finally it is clear that in general households who are poorer (earning less) are also those who do not have access to basic facilities.

2.1.2 Nadiad

Nadiad is a smaller city in Gujarat and is the administrative centre of the Kheda district. It has a population of about 196,000 and the information presented here was gathered from 6,566 households in 97 different slums (Census, 2001).

i.   General Household Information

The average household size in these selected slums is 4.59 and most of the residents are from the Scheduled Tribe (ST), as shown in figure 9, below. Nearly all families have at least 3 children and there are equal numbers of ladies and men living in these communities.

Figure 9
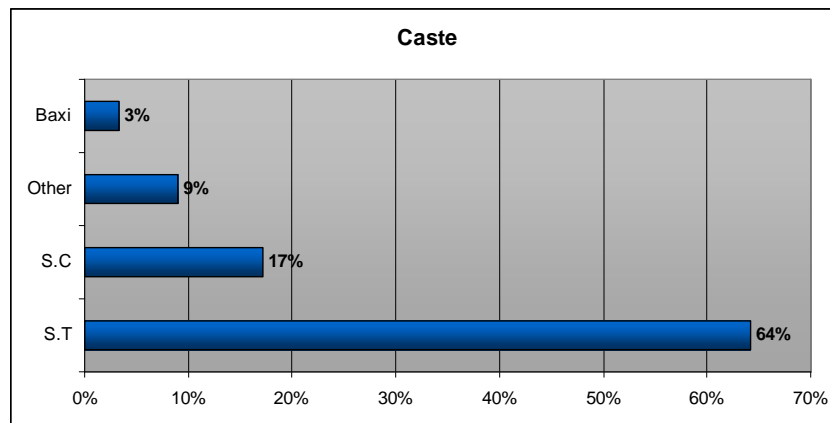
The split between types of housing is shown in Figure 10; it is fairly equal with a slight majority living in Kuccha houses relative to Pucca and Semi-Pucca. However, as we shall see most families are extremely poor both in terms of income and their access to basic services.
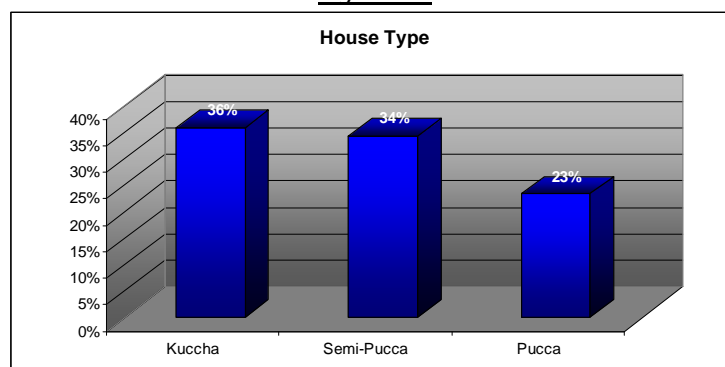
Figure 10

Table 12 compares income to 'house type' and reveals that most of the families living in Kuccha houses are those in the bottom 2 income quartiles, so again we see that there is a connection between income and the type of house with the poorer members of the community living in worse houses.

Table 12

Income Quartiles	Type of House		
	Kuccha	*Semi-Pucca*	*Pucca*
1	34%	27%	16%
2	43%	39%	30%
3	15%	21%	22%
4	7%	13%	31%
Total	100%	100%	100%

Regarding ownership, 85% of families own their houses while 15% rent. Thirty-eight percent of residents own the land upon which they live, the rest of the land is owned by the government and the municipality. Concerning taxes 66% of households are supposed pay tax to the municipality. Of those who get taxed, 6% admitted to not paying, 30% did not answer, and 63% said they did pay their tax. Eighty-two percent of respondents say they do not have a ration card.

ii.   Income

Mean monthly per capita income is Rs. 373.51 for these households; which shows clearly that this is a poor community in terms of income. The Income CDF, figure 11, shows that approximately 85% of the population would be considered poor under the national poverty line, and 90% under the international line.

Figure 11

Nadiad Income CDF
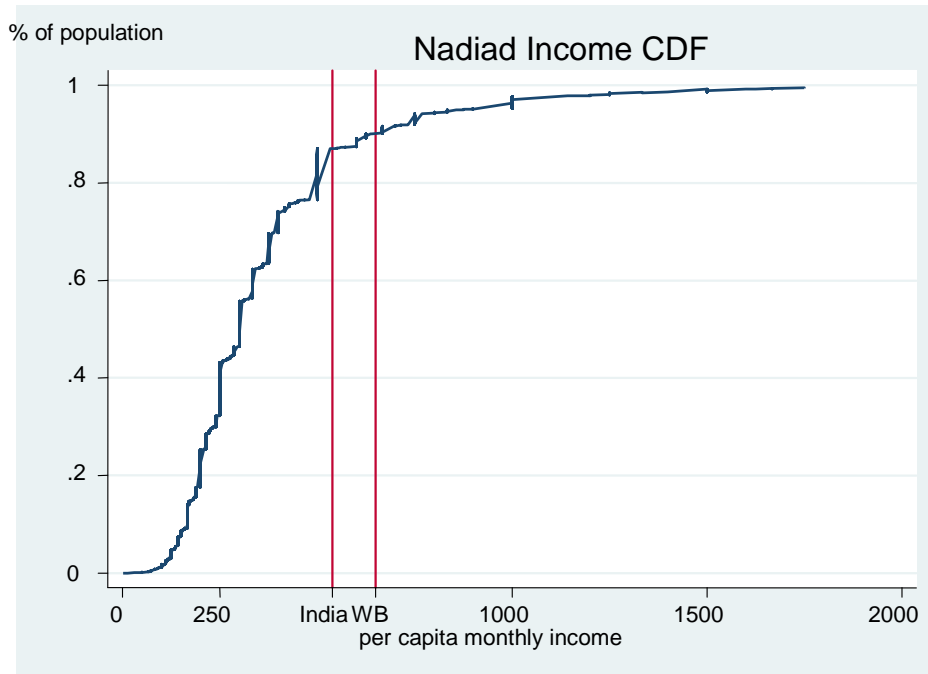
The FGT measures, presented in the table 13, have been calculated on the Indian poverty line of Rs.538.60 per month and reveal that approximately 87% of families are earning less than this. The poverty gap (a=1) which gives a sense of the depth of poverty tells us that, out of the population who is below the poverty line (i.e. poor) on average they are 40% below the line.

Table 13

| Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.87019	0.40359	0.2255
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

No data on savings or loans is available

iii.   Infrastructure
- *Water*

Seventy-one percent of households have access to some kind of water facility, while the rest state that they have no regular access to water. Of those who have access to water, the various sources are illustrated below in figure 12.

Figure 12

Water Source
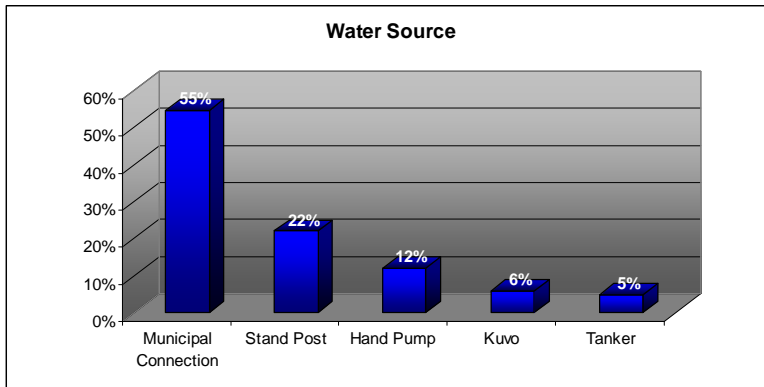
The division between those who have access to water and those who do not is related to income levels, as the regression analysis in section 5 will also show. Table 14 presents data on income and access to water, and indicates that the majority of households who have access are from the top two income groups while most of those who do not have access to a water facility are from the bottom two groups.
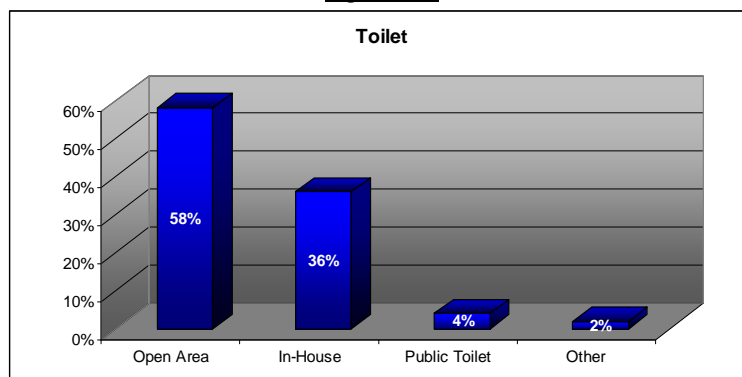
Table 14

Income Quantiles	Water Facility	
	Yes	*No*
1	24%	35%
2	18%	41%
3	20%	17%
4	38%	7%
Total	100%	100%

- *Toilet*

Forty-three percent of families have a toilet facility and the rest do not. For the families without a toilet 58% have to use an open area and a small percentage make use of a public toilet.

Figure 13

Toilet

- *Waste*

Fifty-eight percent of households have drainage in their homes to deal with waste while the other 42% have no such facility. To deal with garbage and solid waste 65% of households do not have a dustbin nearby but report that in most cases there is a facility for a community dustbin.

- *Roads*

Sixty-three percent of the roads in these slums are Kuccha, while the rest are Pucca.

- *Electricity*

Seventy-percent of houses have an electricity meter and the average monthly bill is Rs.306. Three quarters of the community have street lights.

- *Drainage*

Ninety percent of houses have no storm water drainage.

iv.   Health

Unfortunately no data on health expenditure or frequency of illnesses was available for Nadiad. Looking at other indicators, most households report that there is a hospital nearby to where they live, and an equal number of families choose to use the public facilities as the private facilities.

v.   Regression Analysis

Given the lack of data on health and other variables of interest the only regression presented here is one which investigates the link between per capita monthly income and having access to basic infrastructure. It is found that there is an inverse relationship between infrastructure and income, this summarises some of the earlier findings. The equation used to examine this link is:

$$Per\ Capita\ Monthly\ Income = C + \beta1(rent) + \beta2(water) + \beta3(drainage) + \beta4(sewerage) + \beta5(toilet) +$$

Regression Output 5

pcminc	Coef.	Std. Err.	P-Value
water*	43.32561	8.036331	0
drainage	-9.713703	9.674141	0.3
sewerage*	33.79729	6.649395	0
toilet*	87.58142	6.491663	0
_cons	289.0916	7.465252	0

Observations	6,086
Adjusted R²	0.11

*1% Significance

The output shows that monthly income is higher for households who have the given amenities. One exception is 'drainage' which reports a negative sign, suggesting that if a household has drainage then their income is lower, however the variable is not statistically significantly different from zero. The output for the other three variables water, sewerage, and toilet tells us that a household which has access to these facilities earns Rs.43, Rs.33 and Rs.87 more than households who do not, respectively. Intuitively this is what we would expect to see, it is predominantly the poorer households who do not have adequate access to basic amenities.

vi.   Summary

The general access to basic services in these slums is bad, one-third of respondents do not have adequate access to water and over half must defecate in an open area for lack of toilet facilities. Regarding housing the situation is not as severe with only 36% of the population living in Kuccha houses. However, using income as the measure of poverty it is clear that a large proportion of families are earning below the poverty line.

2.1.3 Godhra

Godhra, meaning 'land of the cow', is a municipal town in Gujarat which has a population of around 130 000 according to the 2001 census, and is also the administrative capital of the Panchmahal district. Males constitute 52% of the population and females 48%; the literacy rate is 73% (Census, 2001). A total of 4,249 households were surveyed in Godhra for this study, across 47 different urban slums. The report is presented below.

i. General Household Information

The average household size in these Godhra slums is 4.95 and most residents are from the Bhakshi caste as shown in figure 15. A large proportion of the women in this community are married (85%) and in terms of occupation most are housewives.

Figure 15
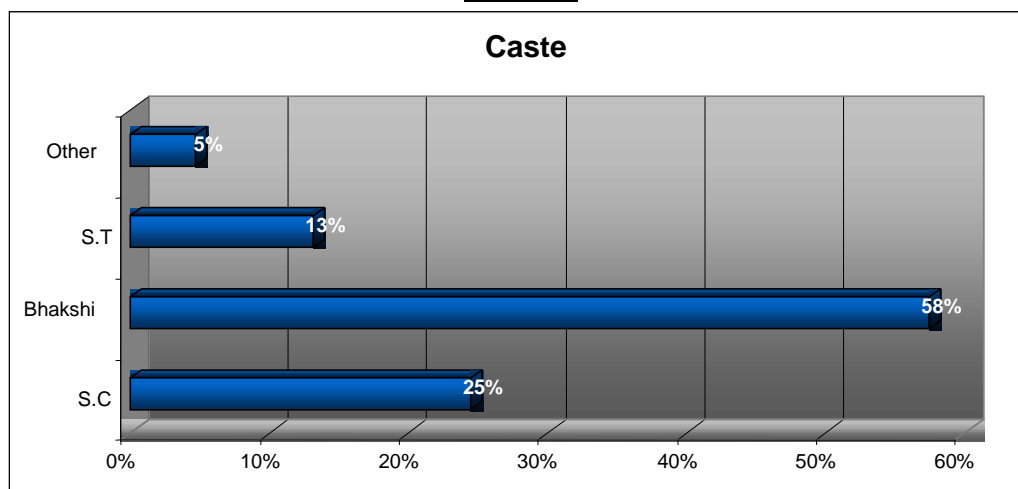
Regarding housing, figure 16 shows that the type of house that is most common is Kuccha, but many families live in mixed houses and a few in full Pucca houses.

Figure 16
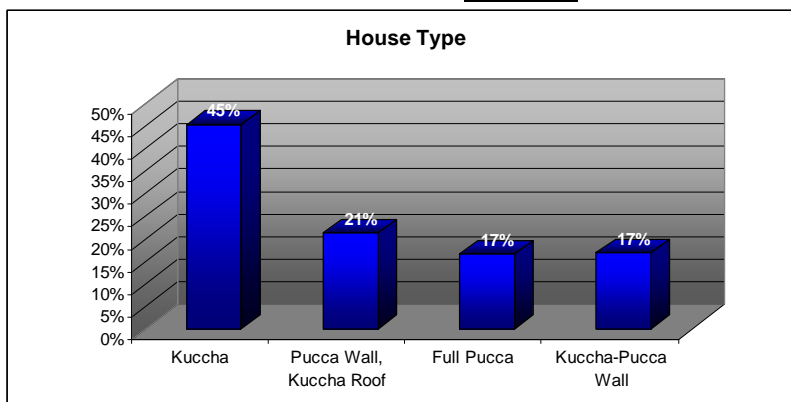
Analysing the type of house by income it can be seen that those residing in Kuccha houses are predominantly from the lower income groups and in general the higher income households live in better houses.

34

Table 15

Quartiles of Income	Pucca	Pucca Wall, Kuccha Roof	Kuccha-Pucca Roof	Kuccha
1	11%	14%	21%	35%
2	34%	32%	33%	41%
3	16%	29%	25%	15%
4	38%	24%	20%	9%
Total	100%	100%	100%	100%

Regarding ownership and tenure, 76% of all households possess some kind of property, the majority of which are houses.

Figure 17
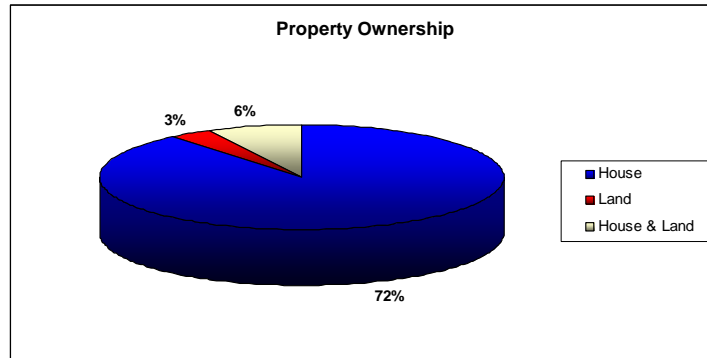
Almost all families live on land which they do not own and this land is mostly owned either by the Nagar Palika or private owners. Of those who own property only 22% have legal papers supporting their claims. The households who do not own their dwellings pay an average of Rs 320 per month for rent. Concerning ration cards, 82% of these households do not possess a card.

ii.   Income

The average per capita monthly income in the Godhra slums is very low, at only Rs 366.48. Average expenditure is Rs. 354 per month. From the CDF below one can see that a large group of households are thus earning incomes that place them below both the national and international poverty lines.

Figure 18

Godhra Income CDF
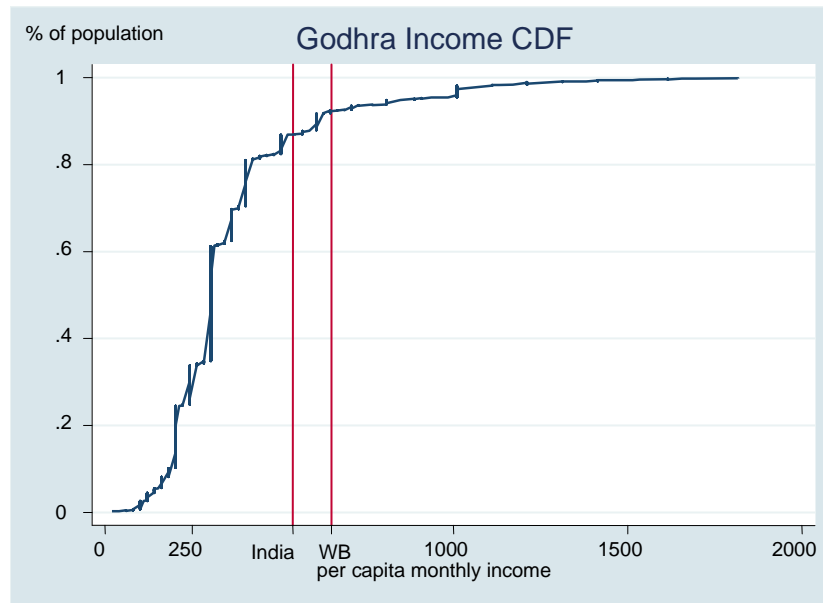
Looking at the FGT measures will give an accurate estimation of the extent of this poverty.

Table 16

Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.86886	0.39807	0.21019
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

Table 16 reports that the Headcount Index (a=0) is 0.868, which means that approximately 87% of the population could be considered poor under the National poverty line. The World Bank poverty line gives an even higher estimate of 93%, this is measured at Rs.650 and illustrated as the 2nd red line on the CDF in figure 18.

- *Saving*

Concerning savings there are almost no households who report to be saving – 97% do not save. The handful of families who are saving, save a mean amount of Rs. 452 per month. Only 20% of households state that they make use of loans and the data on the sources of these loans is unreliable as most households did not answer the questions.

iii.   Infrastructure

- *Water*

The sources of water for families in these slums are quite diverse, and from the figure below one can see that the number of households with their own tap is smaller than in other cities. It is not clear from the survey where those who use 'other' sources get their water from. For households who rely on conventional water sources approximately 81% state that they only have water for 1-2hrs per day, and

half of the residents say that the water pressure is inadequate to meet their needs during this time.
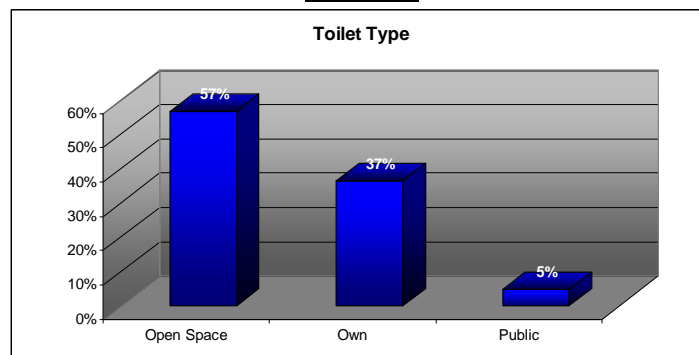
Figure 19

Water Source
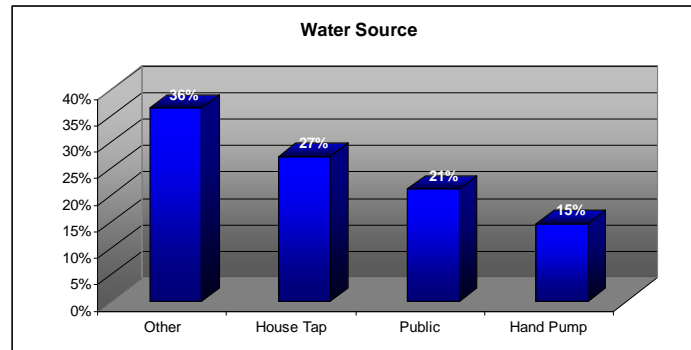
- *Toilet*

These communities face a serious lack of toilet facilities with more than half of the families having to defecate in an open area, figure 20. The health risks and other problems associated with this have already been mentioned.

Figure 20

Toilet Type

For bathroom's 44% of households have a facility in their house, 26% of population use a public bathroom to wash and 30% use other facilities.

Figure 21

Bathroom Facility
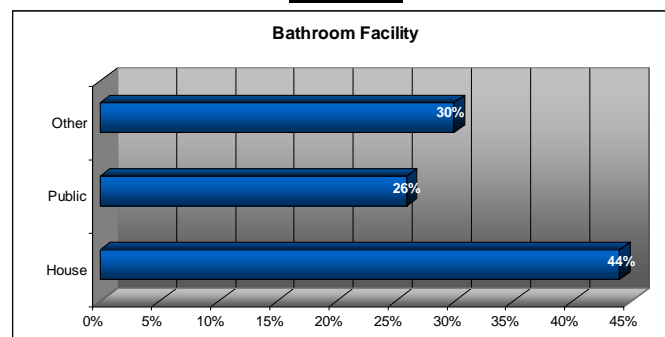
- *Waste*

Regarding waste services 40% of residents have no form of garbage disposal which is likely to lead to the accumulation of waste in the slums.

- *Drainage*

Almost all households have no drainage facility, with only 7% having drainage in their home.

- *Electricity*

Seventy-one percent of families have electricity and all of them use an in house meter.

iv.   Health

Despite the extent of poverty in these slums and the clear lack of infrastructure there are not many illnesses reported; 93% of residents say that there are no frequent illnesses in their families. However, there may have been problems getting a response for this question as many households did not answer. Fifty-six percent of residents prefer to make use of government medical facilities, the rest frequent private sources. The average expenditure on healthcare is Rs. 190 per month.

v.   Regression Analysis

Initial analysis into the relationship between health (expenditure on health) and infrastructure for Godhra revealed no significant correlations or insight into the relation between these variables. This may be due to the fact that not many illnesses are reported to have occurred in this community according to the data. Another reason for the lack of correlation could be that these households are extremely poor and simply cannot afford to spend money on healthcare (calling the use of health expenditure into question). People may be getting sick from bad sanitation due to lack of infrastructure but they are simply too poor spend money on healthcare, thus no relationship between health expenditure and infrastructure shows up.

It can, however, be shown again that income is correlated with insufficient access to water, toilet, drainage, garbage, and the household not saving. The equation and output are presented below.

Per capita monthly income = C + β1(water) + β2(toilet) + β3(drainage) + β4(save) +

Regression Output 6

pcminc	Coef.	Std. Err.	P-Value
water*	30.159	7.644	0.000
toilet*	90.663	7.736	0.000
drainage*	57.834	15.891	0.000
save*	210.359	25.098	0.000
_cons	305.026	6.643	0.000

Observations   4,215
Adjusted R²   0.26
*1% Significance

Here we can see that some of the independent variables have a strong relationship with income. Particularly it is obvious from the output that the group of households who save money are earning far more than those who don't save, on average Rs.210

per month more. The other independent variables also show a strong link with income, especially access to a toilet, and all are significant at the 1% level. Again this is intuitively what one would expect; those who do not have access to the services in the table are also most likely to be those who are earning lower incomes. Overall the regression has relatively good explanatory power and standard errors for the regressors are low.

vi.   Summary

The data on these slums in Godhra reveal a fairly bleak picture of the situation facing most families here. For the most part they are below the poverty line, have little access to basic amenities (over half do not have the use of proper toilet), and not many have adequate housing. The regression analysis failed to pick up any link between health and access to basic infrastructure but did show that there is a correlation between being poor and having inadequate access to basic infrastructure.

2.1.4 Ankleshwar

Ankleshwar is a city and a municipality in the Baruch district of Gujarat, and has a population of 112 643 (Census, 2001). Well known for its industrial township the city has a literacy rate of 76%. For this study 293 households were surveyed from 40 urban slums in Ankleshwar.

i.   General Household Information

The average household size of families in this area is 5.32 people per house, and the majority of the people work for a daily wage. Table 17 shows that among the women 81% are daily wagers but there are also a number of house-wives and a small percentage who work in a business job.

Table 17

Daily Job	Women	Others
Business Job	3%	9%
Daily Wager	81%	91%
House Wife	16%	0%

Investigating the type of house it is clear that the housing conditions are not very good with three quarters of the families living in Kuccha houses.
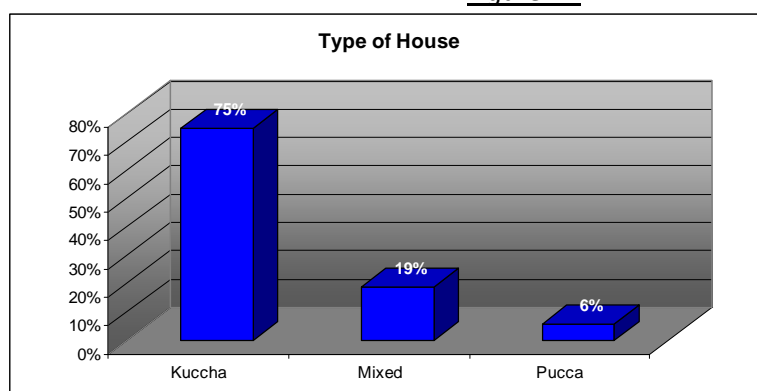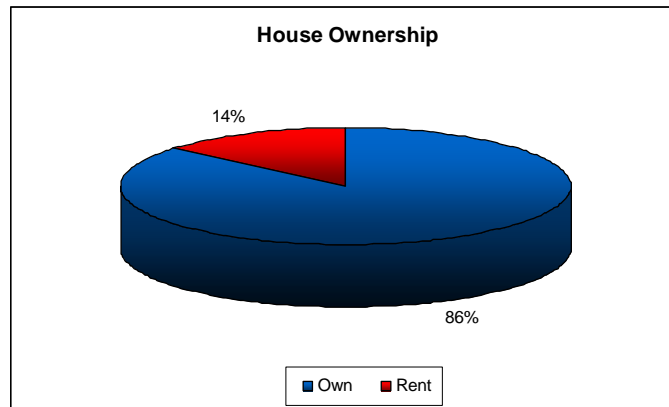
Figure 22

Table 18 tabulates the earnings of households against the houses they live in. This is somewhat helpful in describing the community. The majority of poor families live in Kuccha dwellings, while most of the families living in Pucca or Semi-Pucca (Mixed) houses are in the upper three income quantiles. Noticeably there are no families in the poorest quantile who own a Pucca house.

Table 18

Income Quantile	Type of House		
	Kuccha	Mixed	Pucca
1	30%	13%	0%
2	29%	15%	15%
3	22%	24%	31%
4	7%	9%	31%
5	13%	39%	23%
	100%	100%	100%

Regarding tenure it was found that the majority of households owned the houses in which they live (86%) and a comparatively small number were renting.

Figure 23

House Ownership

14%

86%

■ Own ■ Rent

ii.   Income

The monthly mean per capita income among these households is Rs. 364.25, while their average per capita expenditure is Rs. 359.10. The CDF in figure 24 illustrates how income is spread across the population. One can see that over 80% of households are earning below the national poverty line and around 90% are below the international line. This is again a very poor group of households.

Figure 24

% of population

Ankleshwar Income CDF

per capita monthly income
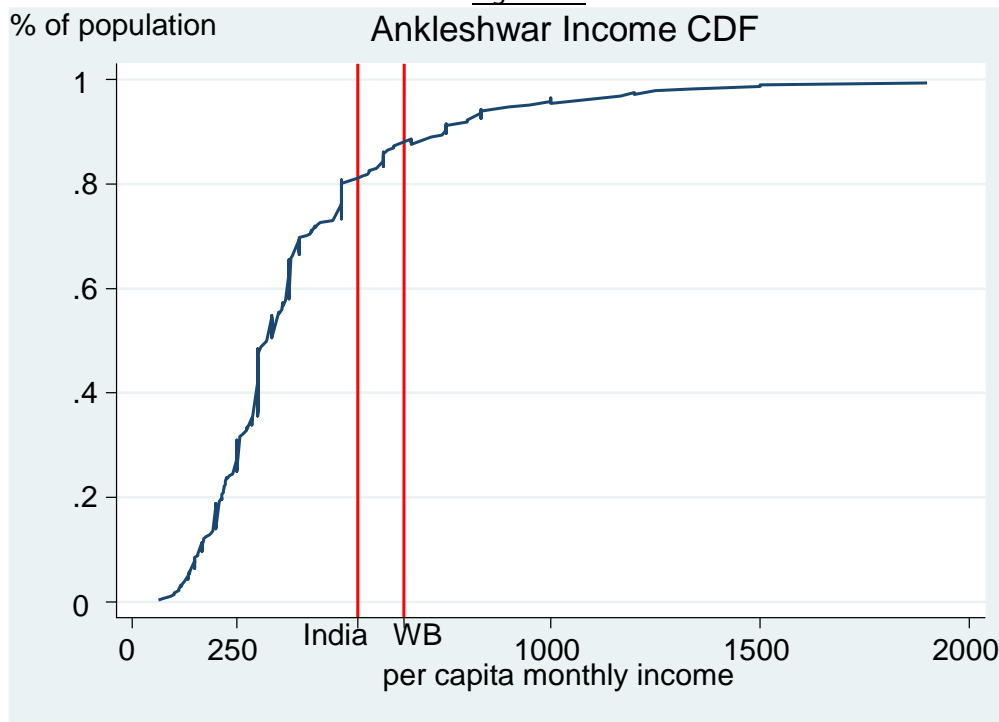
The FGT measures tell us that 80.7% of the population are living below the Indian poverty line. Looking at the poverty gap it is clear that the depth of poverty is considerable with the poor being 36% below the line of Rs. 538, on average.

Table 19

Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.80783	0.36151	0.19399
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

- *Savings*

Regarding savings only 10% of families are saving while the remaining 90% are not. The few who do save are managing to put away Rs 460 per month and most respondents save with a bank. The table below illustrates that the majority of those who do save come from the upper three income quantiles, while most of those not saving are in the bottom two quantiles.

Table 20

| Income Quantiles	Saving	
	No	Yes
1	26%	11%
2	28%	11%
3	22%	22%
4	6%	22%
5	18%	33%
Total	100%	100%

- *Loans*

Concerning loans, 33% of families are taking out loans and the average loan is for Rs. 11,500, with a median value of Rs. 10,000 being borrowed. In contrast to the income profile of those households who are saving, households from all income groups are taking loans without any clear pattern emerging. No data on the sources of loans was recorded.

iii.   Infrastructure

- *Water*

Sixty-five percent of families have an individual water connection while the remaining 35% do not, this is illustrated below.

Figure 25

42
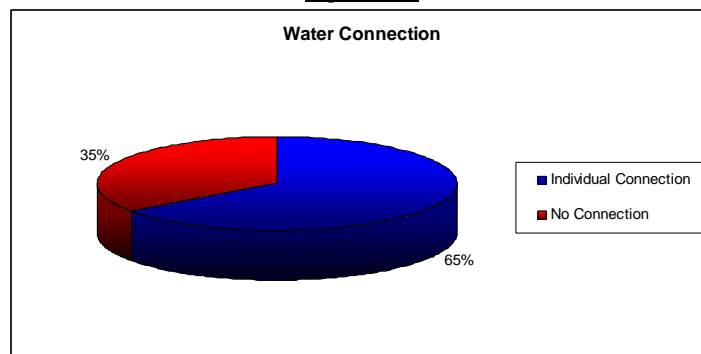
Concerning spending on water facilities, on average households report that they have spent Rs.1, 010 to install a water connection for their house, and those families who do not have water connections at present are willing to pay Rs.420 to set up a connection. Table 21, below, illustrates that it is predominantly the households with lower earnings that do not have access to an individual water connection – 41% of those who have no connection are from the poorest quantile.

Table 21

Income Quantile	Individual Water Connection	
	No	*Yes*
1	41%	16%
2	25%	10%
3	20%	23%
4	6%	26%
5	7%	24%
Total	100%	100%

- *Toilet*

The majority of residents do not have access to their own toilet (76%), as table 22 shows. Those who have their own toilet paid an average of Rs.3526 for the facility and those without are willing to pay approximately Rs.604 (the maximum offer was Rs. 2000). Again, the bulk of those who do not have a toilet are from the poorest two quantiles of earners. This is what one would expect because poorer households generally do not have the financial capacity to afford their own toilet.

Table 22

Toilet		
	Percentage	Paid/Willing to Pay
Own Toilet	76%	Rs. 3526
No Toilet	24%	Rs. 604

- *Waste*

Seventy-seven percent of families have some kind of sewerage connection, in or nearby their house, while 23% do not. Rs. 1222 is the average amount spent on obtaining this connection, per family, and those who do not have a connection are willing to pay a mean amount of Rs. 444. In this case also the majority of those without sewerage disposal are the households with the lowest income.

- *Drainage*

Eighty-nine percent of houses do not have adequate drainage to deal with rain, thus 80% complain that they have blockage problems when it rains.

- *Roads*

Sixty-four percent of households have no roads in their area, 73% state that when it rains the lack of roads causes water to get trapped and no one comes to clear this problem up when it occurs.

- *Electricity*

Sixty-five percent of houses have an electricity meter and on average families spend Rs. 1227 per month on electricity. Those who have no meter are willing to spend Rs. 954 to get one. Concerning streetlights 74% of houses are on streets that have street-lighting, but 20% of these are not working.

iv.   Health
No Data

v.   Regression analysis
There is not much need to use regression analysis in this case as the story is adequately told by the tables already presented. However, use of another regression on income and infrastructure helps as an overview and is thus presented here.

Per capita monthly income = C + β1(save) + β2(toilet) + β3(water) + β4(sewerage) + β5(electricity) +

Regression Output 7

pcminc	Coef.	Std. Err.	P-Value
save*	176.372	42.406	0.000
toilet**	64.924	37.930	0.088
water*	82.869	30.143	0.006
sewerage	43.051	38.209	0.261
elec	3.720	13.649	0.785
_cons	266.796	21.537	0.000

Observations   254
Adjusted R²   0.16
*1% Significance
**10% Significance

The results of this regression indicate that families who have access to basic amenities and are saving have comparatively higher incomes than those without amenities and those who are not saving. Households that save earn Rs.176 per month more than households who don't, on average. Having a toilet, access to water, and a sewerage connection is also linked with having higher income; the magnitudes can be seen by the coefficients. This result is similar to what was found in the analysis above as well. The standard errors are relatively high which may be due to the small sample size.

vi.   Summary
The story told by the data from the slums in Ankleshwar is that the greater number of households in these slums are very poor, most of them do not have access to basic infrastructure and services, and those who are most in need are also those who earn the least. Few families save money and housing conditions are such that most live in Kuccha dwellings. Regression analysis shows that it is those households with higher income who are saving, have access to water, toilets, and have a sewerage connection.

2.2   Rajasthan

2.2.1. Jaipur

Jaipur, commonly known as the 'pink city', is the capital of Rajasthan and has a population of around 2.3 million (Census, 2001). The annual economic growth rate of Jaipur is 4.5% and the city has a large handicrafts industry which employs 22% of the workforce (CDP, 2006). Regarding city infrastructure: the city's water supply covers about 86% of the population but is under pressure due to increasing population pressure and many surface water sources are heavily polluted, the sewerage network covers only 56% of the population and in particular the slums are not serviced, only half of the solid waste in the city is collected, and there are concerns over much unplanned growth and development. The city has 183 slums in total and these areas contain 31% of the population (CDP, 2006). In this survey data was collected from 3,706 households in 15 different urban slums.

### i.   General Household Information

The average household size in these slums was much lower than the others at just 3.72 members per house. One-third of the women in this community work at home and those that do work elsewhere live within a 4km radius of their workplaces. As the data will show, the general state of these slums in Jaipur is superior, and families better-off, than in most of the other cities. This community is largely comprised of Hindu's, and among castes the General Caste is in the majority, this is illustrated below in figure 26. There is no identifiable link in the data between household income and caste so it seems that caste is not a large determinant of earnings.

Figure 26
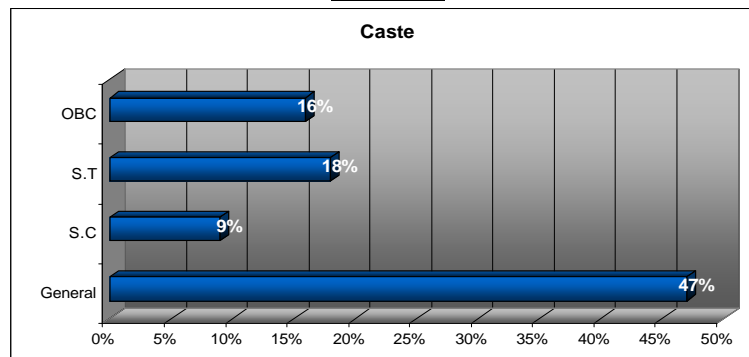
Over half of the residents live in Kuccha houses; figure 27. Closer analysis of the data shows that the type of housing is not as closely linked to income as in other slums. This suggests that in addition to income there may be other factors influencing the type of house which a family lives in, such as length of residency.

Figure 27
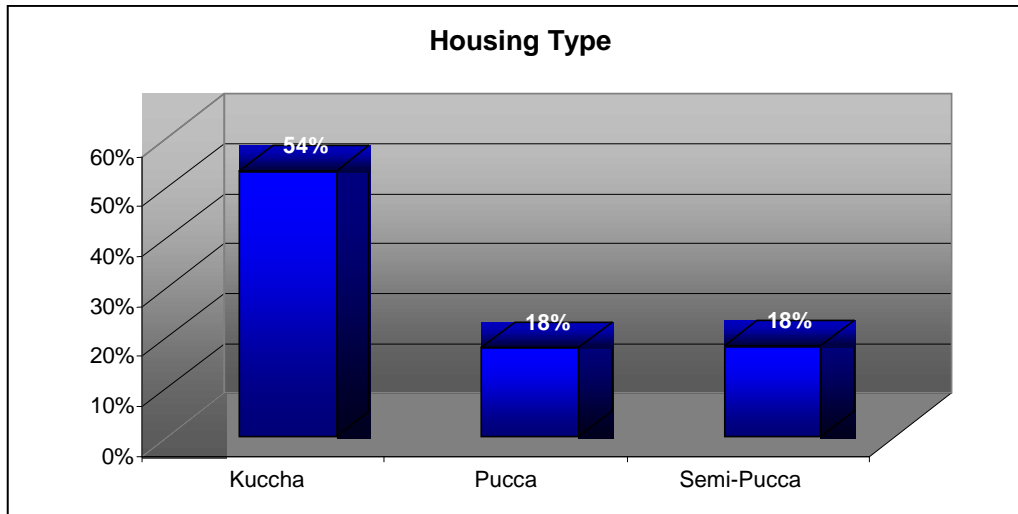
The histogram below shows the number of years residents have lived in the community, where the average length of stay is about 19 years.

Figure 28
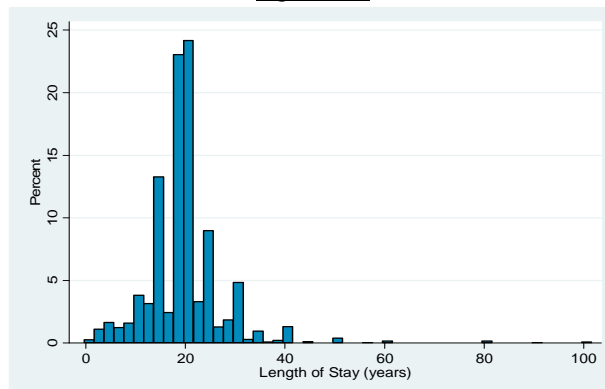
Linking the type of house with the length of stay (table 23) it becomes clear that on average those who have lived in the area for longer are more likely to live in a better house.
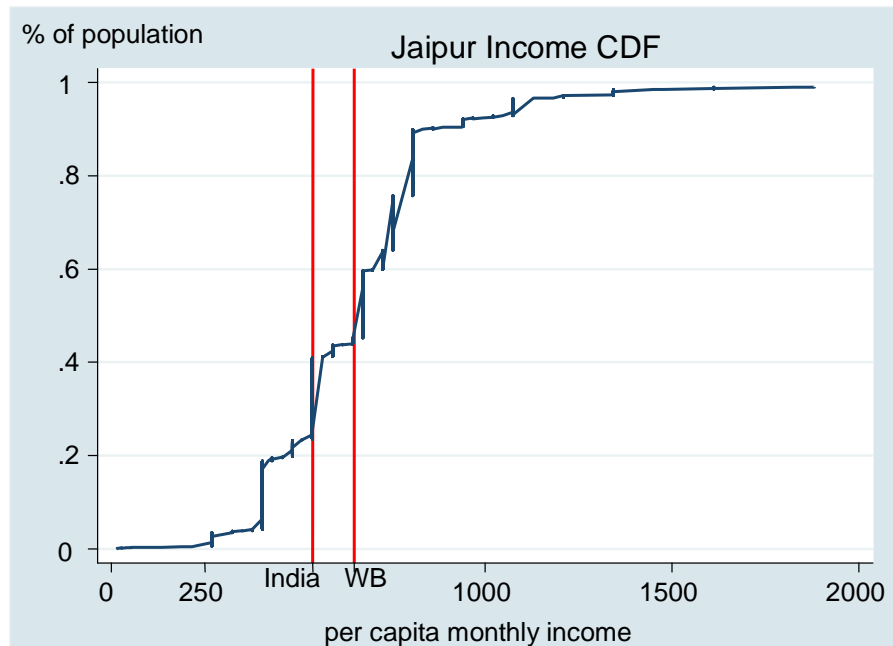
Table 23

House Type	Length of Stay
Kuccha	13.71
Semi-Pucca	18.96
Pucca	22.44

Land and house ownership are also a factors which might be expected to influence a family's investment in their home. In these slums 65% of land is owned by the Jaipur Nagar Nigam, 23% by the J.D.A, so only a fraction of households own their land. One quarter of households own their houses, but 70% of these households do not have any legal documents to prove their ownership. Overall the data suggests that current housing conditions are relatively insecure and while this may influence the housing conditions of residents this is not clear in the data.

ii.   Income

The average monthly per capita income is Rs. 671.80 for each household, which is much higher than most of the other areas which have been examined. The CDF below illustrates that around 40% of people in these slums are earning below the national poverty line and around 45% below the international line. While income is not a complete welfare measure this does suggest that the families are better off relative to most of the other slums in this study.

Figure 29

Examining the FGT measures one can see that the headcount index is 40.9% and the poverty gap is only 6% which tells us that the depth of poverty is not severe.

Table 24

| Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.40974	0.06419	0.02201
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

- *Savings*

Eighty-one percent of households do not save; of the remainder that do save the average monthly amount saved per household is Rs. 608. Again this is substantially more than the average savings of households in other areas.

iii.   Infrastructure

- *Water*

The members of this community use a variety of water sources, only 26% of households have a municipal water supply, 37% use a public supply, 17% obtain water from a neighbour, 8% are using water from a nearby river and 2% use a hand-pump.
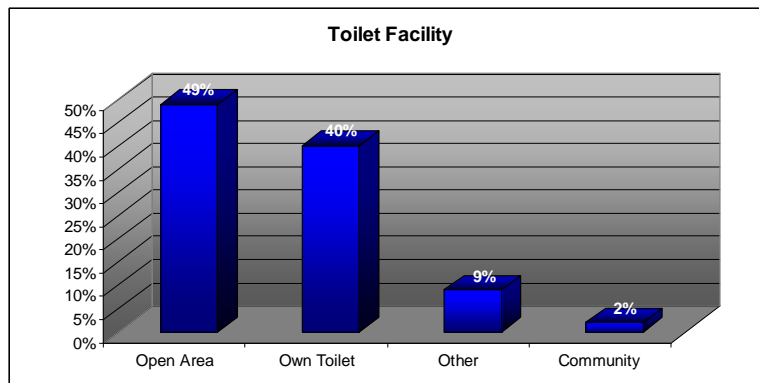
Figure 30
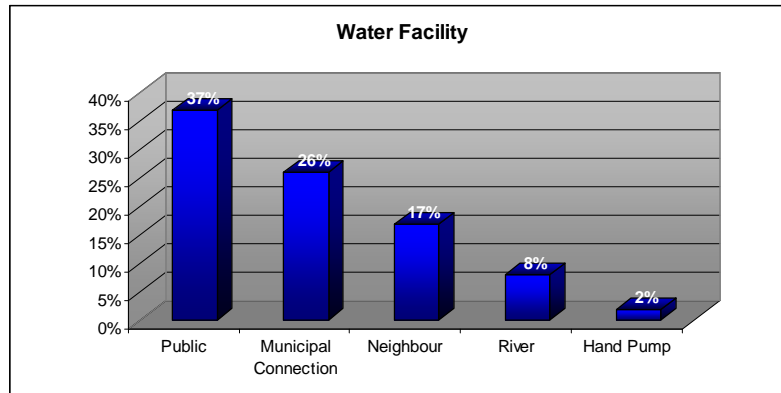
- *Toilet*

Approximately 40% of households have their own toilet and almost half of the population in these slums uses an open area for their ablutions.

Figure 31

- *Drainage*

Sixty percent of households do not have a gutter or sewerage tank, while the rest do. As will be shown later, the lack of sewerage facility is correlated to higher expenditure on healthcare.

- *Roads*

Fifty percent of the roads in this area are Pucca, while the other 50% is Kuccha.

- *Electricity*

Eighty-two percent of households have electricity, while the remaining houses are without. Regarding streetlights, 55% of houses report that there are no street lights near their houses.

iv. Health

The average household spends Rs. 237 per month on healthcare; this is within a range of Rs.20 to Rs.1500, with the median being Rs.200. Fifty-five percent of households use private hospitals, and on average the distance to the private hospital (4km) is double the distance to the public facility (2km). Analysis of the links between healthcare expenditure and infrastructure are presented in section 5.

v. Regression Analysis

Data for 'expenditure on healthcare' was available for the Jaipur slums and thus some analysis of the relationships between expenditure and infrastructure was possible, this is presented first and the usual regression on income and infrastructure follows.

Equation 1

The first equation is similar to the equation used in the Ahmedabad analysis, it is of the form:

$$Health\ Expenditure = C + \beta1(toilet) + \beta2(sewerage) + \beta3(per\ capita\ monthly\ income) + \beta4(water) +$$

Regression Output 8

Health exp	Co-eff.	Std. Err.	P-Value
toilet	6.157	8.418	0.465
sewerage**	-17.47	8.843	0.048
pcminc*	0.069	0.01	0
water*	-34.642	7.521	0.003
_cons	240.777	13.675	0

Observations 3,382
Adjusted R² 0.14
**5% Significance
*1% Significance

The results reveal that there is a relatively strong correlation between 'water' and health expenditure, as well as a smaller link between 'sewerage' and health expenditure, controlling for the other independent variables. More precisely, having a sewerage connection decreases the average monthly expenditure on health by Rs.17, and having an in-house tap reduces it by Rs.34. These two variables are significant at the 5% level. Having access to a toilet is related to higher spending on health, which is not what one would expect, but the variable is insignificant and the standard error is high. Per capita income is positively related to expenditure on healthcare but is very small. Overall the equation is significant and the Adjusted R² is 0.14.

Equation 2

The second equation analyses the relationship between per capita monthly income, infrastructure, and savings.

$$Per\ capita\ monthly\ income = C + \beta1(save) + \beta2(sewerage) + \beta3(toilet) + \beta4(water) +$$

Regression Output 9

pcminc	Coef.	Std. Err.	P-Value
save*	507.867	23.393	0.000
sewerage*	122.173	14.961	0.000
toilet**	32.172	14.097	0.023
water	34.628	19.512	0.076
_cons	664.842	20.455	0.000

Observations   3,143
Adjusted R²   0.15
*1% Significance
**5% Significance

The story told by the output in the case of Jaipur is similar to that of previous cities. Two variables which appear to correlate with large changes in income are 'save' and 'sewerage'. Families who save are likely to earn Rs.507 per month more than those who don't, while families with a sewerage connection earn Rs.122 per month more than those who have no connection. These variables are both significant at the 1% level. The other two variables (toilet and water) also are related to higher income but have relatively high standard errors. Overall these four variables explain 15% of the variation in income.

vi.   Summary
These urban slums in Jaipur have some interesting characteristics. The per capita average income is relatively high and the family size small. While these are positive indicators most families live in Kuccha houses, half of them have no access to any toilet facilities, sewerage facilities are poor and access to water is varied. The analysis in section 5 highlights the correlation between some of these basic amenities and the money spent monthly on healthcare, indicating that families who have frequent access to water and have sewerage facilities generally spend less on monthly healthcare, the equation controls for income. Additionally we find that poorer households are less likely to be saving and are also less likely to have a sewerage connection, a toilet and adequate access to water.

2.2.2 Bikaner

Bikaner has a fairly large population of around 724,000 and is situated in the North-West of Rajasthan in the district of Bikaner (Census, 2001). It is the fourth largest city in the state. The data presented here is taken from a survey of 266 households across 12 urban slums in Bikaner.

i.   General Household Information

The average household size in these Bikaner slums is 6.25 and all of the respondents in the survey are married. Three quarters of the families are Hindu and the split of the population by caste is shown below in figure 32.

Figure 32
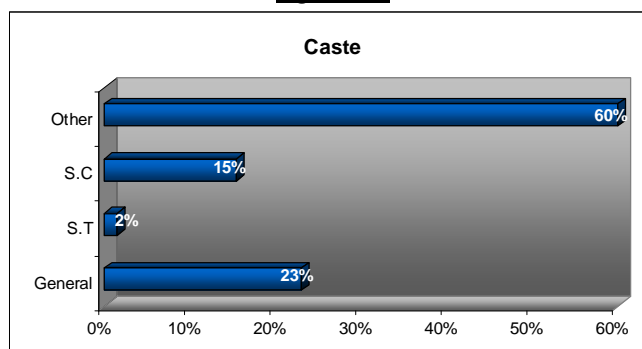
The type of house varies in this community and is shown in figure 33; 46% of families live in a house with mixed walls, 36% in a Kuccha house and 18% have Pucca walls and a Kuccha roof - notably only 1% of families live in a full Pucca house. House type appears to be related to income, as was the case is other areas, with most families living in Kuccha houses coming from the lowest two income brackets, the families living in a mixed-wall dwelling also mainly come from the lower half of the income distribution, and those with Pucca walls predominantly from the higher income brackets.

Figure 33
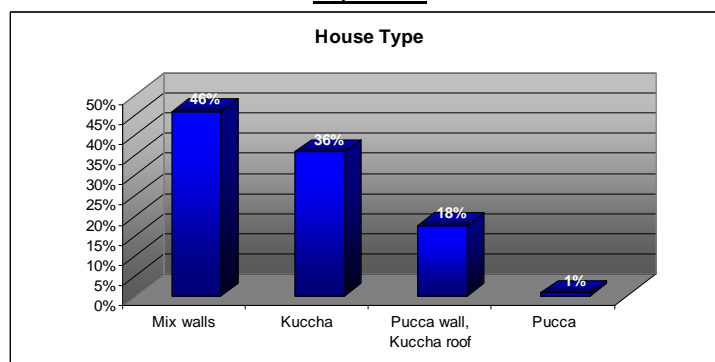
Concerning tenure, 90% of families in these slums own their houses but only 7% own the land on which they live. Most of the land is owned by the Bikaner Municipal Corporation (BMC) and other private owners, while a small portion is government owned. Table 25 presents the ownership data.

51

Table 25

Who owns the land?	
Private	38%
Gov	9%
BMC	53%

On average, families have been living in the area for 23 years, with some even living in the area for 100 years already.

Figure 34
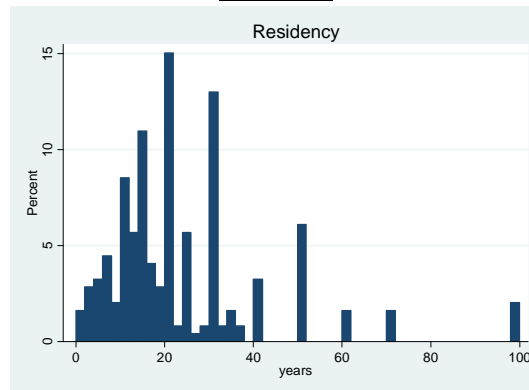
It is surprising that after living in the same area for so long still hardly any residents have built themselves a Pucca house. Furthermore, over half of the residents do not have any legal papers to prove ownership of their houses or land.

ii.   Income

Per capita monthly income is Rs.381.63, on average, which is relatively low, while per capita expenditure is Rs.362 per month. One can see from the CDF below that over 90% of the population are earning incomes below the national poverty line, and if one uses the international line then almost the entire population would be classified as poor.

Figure 35

Bikaner Income CDF
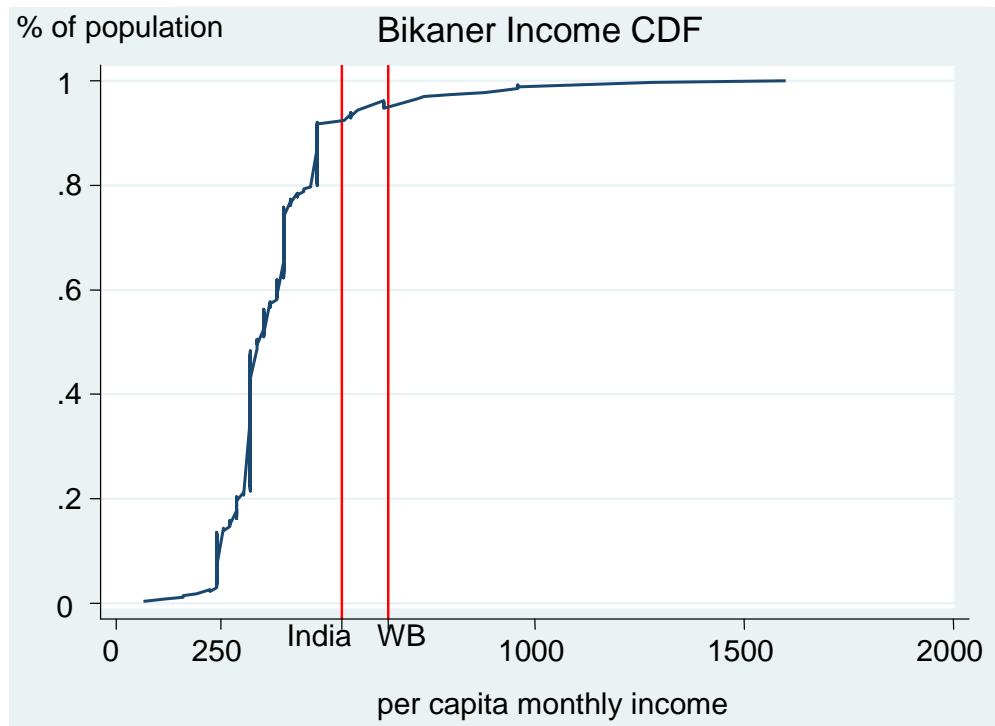
Looking at the FGT measures in table 26 one can accurately say that 92% of the population earns less than Rs.538.60 per month. The poverty gap tells us that on average those below the poverty line are earning 32% less than the poverty benchmark.

Table 26

Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2
0.92	0.32	0.13
FGT(0): headcount ratio (proportion poor)		
FGT(1): average normalised poverty gap		
FGT(2): average squared normalised poverty gap		

Regarding savings, only 2% of households are saving money. However, 67% of families take out loans and the various sources are shown in figure 36, clearly most families borrow from private money lenders (PML).

Figure 36

Loan sources

iii. **Infrastructure**

- *Water*

Water Sources
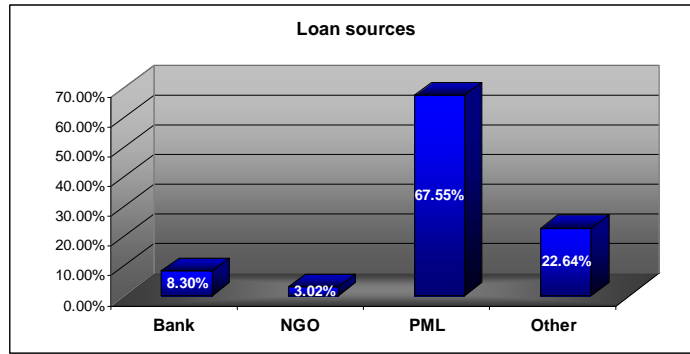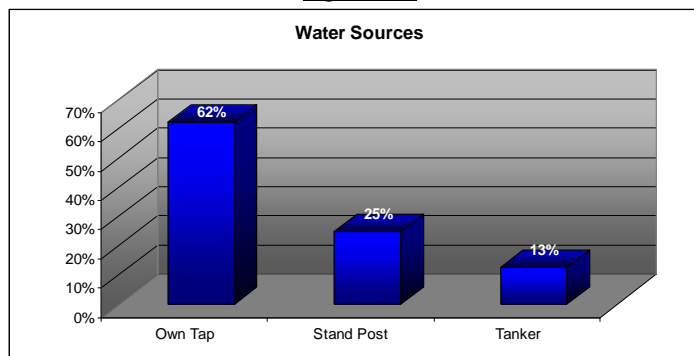
Sixty-six percent of households have piped water supply while the remainder do not, on average water is available for 1.5hrs per day. Those who do not have piped water use a public stand post, a hand pump, or a water tanker.

- *Toilet*

Many of the residents in this community do not have adequate access to toilet facilities, while 43% have their own toilet over half of the population is using an open area. Regarding bathroom facilities, 56% of households have a bathroom inside their house.

Toilet
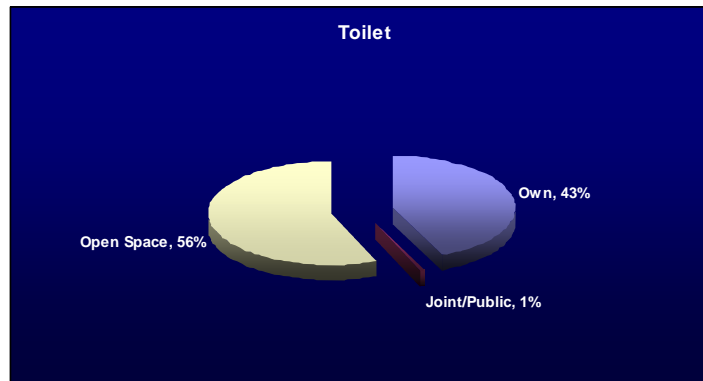
- *Roads*

Sixty-five percent of the roads are Kuccha, the rest are Pucca, and 42% of the roads do not have any drainage.

- *Waste Collection*

Ninety-six percent of the residents have no waste disposal or collection facility.

- *Electricity*

Sixty-five percent of households these slums have an electricity meter. On average households are paying Rs 465 per month for electricity, and more than half of residents state that they have legal usage. Concerning street lights, 55% of residents have street lights in their neighbourhood.

iv.   Health

The average monthly expenditure is Rs. 228 in these slums and the vast majority of households (85%) make use of the public medical facility. Most households are within a 3km radius of the nearest hospital but over half of residents have no childcare facility in their area. The data on health also included some information on whether households reported having frequent illnesses in the family or not, the data shows that 16% of households experience frequent illnesses**.**

v.   Regression Analysis

The first analysis again uses health expenditure as the dependent variable in order to see whether families who spend more on healthcare are generally also those families who have poor access to basic services. To reiterate, the reasoning is that those without the basic services are more likely to get sick from living in less hygienic conditions with poorer water quality and worse sanitation. The second equation is the usual regression where income is regressed against a number of infrastructural variables.

The specified equation is:

Health Expenditure = C + β1(per capita monthly income) + β2(piped-water)
+β3(waste) + β4(toilet) + ε

Regression Output 10

healthexp	Coef.	Std. Err.	P-Value
pcminc	0.066	0.078	0.394
Piped-water	-30.306	5.234	0.131
waste*	-20.924	6.771	0.071
toilet*	-43.011	14.265	0.078
_constant	161.297	34.172	0
Observations	236		
Adjusted R²	0.18		
10% Significance			

The results reveal some of the expected relationships. Higher levels of income are associated with a very small increase in health expenditure. Looking at the infrastructure variables the results show that on average households with access to

piped water, waste (sewerage) disposal, and a toilet spend less on healthcare by Rs.30, Rs.21, Rs.43, respectively. This is a fairly large impact on expenditure, and both 'toilet' and 'waste' are significant at the 10% level.

Equation 2
This equation analysis the link between household monthly income, savings and infrastructure, the formula is similar to previous analyses.

$$Per\ capita\ monthly\ income = C+ \beta 1(save)+ \beta 2(piped\text{-}water) + \beta 3(sewerage)+ \beta 4(toilet)+ \beta 5(drain) +$$

Regression Output 11

pcminc	Coef.	Std. Err.	P-Value
save	20.906	66.792	0.755
pipedwater*	68.887	23.156	0.003
waste**	79.595	62.248	0.102
toilet	-9.597	22.547	0.671
drain	-44.406	114.287	0.698
_cons	345.116	17.906	0.000

Observations   245
Adjusted R²   0.09
*1% Significance
**10% Significance

Despite the same equation being used in this case as for the other cities the output for Bikaner does not present data that gives much insight. One can see that if a household has access to piped water they are generally earning Rs.68 per month more than those who do not have this access, and that those who have a waste disposal service are also earning higher incomes than those who don't (Rs.79). However, the standard errors for 'waste' are very high. None of the other variables are significant, while 'toilet' and 'drain' report signs which are opposite to what we would expect. We can thus only conclude that in this case poorer households are less likely to have access to piped water. Furthermore, the adjusted R² value is relatively small, so the model does not have a great deal of explanatory power. A small sample size could be affecting the results.

vi. Summary
Households in the slums surveyed here are very poor by income standards, and have limited access to basic amenities such as water, a toilet and sewerage disposal. There is no real saving occuring, which can be expected in such a low-income setting, and most of the loaning takes place from private money lenders. This is typically not the best loan source for poor households as interest rates are high, but presumably other more conventional sources are inaccessible due to lack of collateral. Closer analysis of some relationships within the data reveals that having piped-water, waste disposal and a toilet are strongly linked to how much families spend on healthcare. There is also a link between households having access to piped water and earning higher monthly income.

2.2.3 Jodhpur

Jodhpur has a population of about 2,860,000 and is the second largest city in Rajasthan (Census, 2001). It is sometimes called the 'blue city' due to the colour of many houses which attracts many tourists, and it also has a big handiworks industry. The city has a score of 0.56 on the Human Development Index (HDI), thus ranking 13 in Rajasthan based on the HDI and the literacy rate is 57% (www.jodhpur.nic.in, 2009). The data in this report comes from a survey of 120 households in the city from the Jagademba Colony, it must be noted that this is a relatively small sample.

i.   General Household Information

The average household size in this area is 6.3, which is higher than any of the other slums in this study. Most residents belong to the General Caste (78%). Figure 39 illustrates the type of house, clearly the majority of families live in Pucca houses (74%), which is considerably more than in other cities. On average the houses have two rooms.

Figure 39
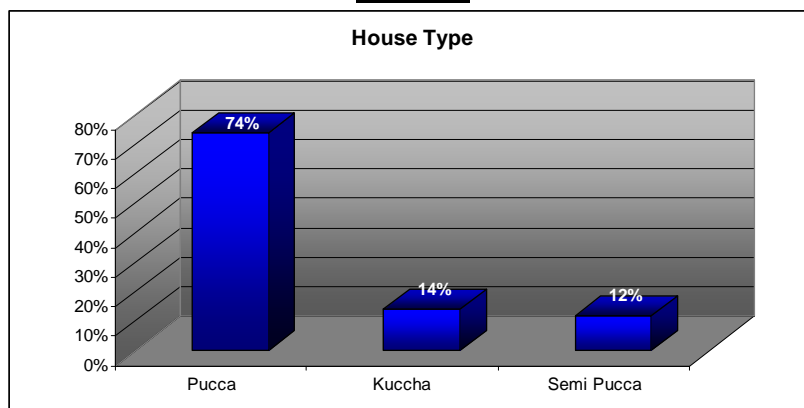
Again it is useful to illustrate how income is linked to the type of houses which families live in, and intuitively the link makes sense in that those with more money can afford better housing. One can see from table 27, below, that out of the families living in Kuccha houses there are none from the top two income groups while the majority of those living in Pucca housing are from the two highest income groups.

Table 27

Income Quartiles	Type of House		
	Kuccha	Semi-Pucca	Pucca
1	38%	56%	16%
2	63%	33%	18%
3	0%	0%	24%
4	0%	11%	43%

Concerning house ownership 83% of families own their houses while the rest rent, but in terms of land ownership almost all land is owned by private owners or the Municipality. Seventy-seven percent of families do not have a ration card. Figure 40 illustrates the length of residency among households and the average length of residency is twenty years.

Figure 40
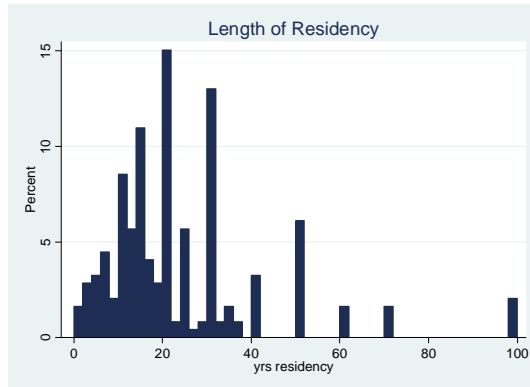
ii. Income

Average per capita monthly income in this community is Rs.512.50 for the 120 households and the CDF, figure 41, illustrates the spread of income across this population. It appears that about 70% of the population earns less than the national poverty line and about 85% would be considered poor using the World Bank measure as an international standard.

Figure 41
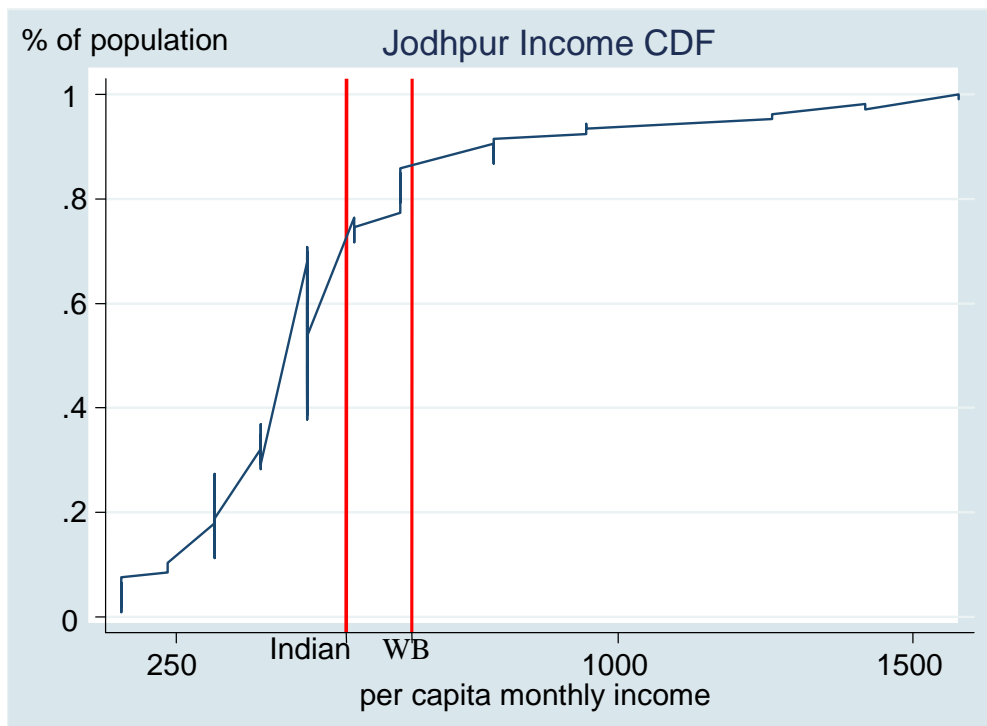
To gain a clearer sense of poverty the FGT measures in table 28 reveal that about 71% of households are earning incomes which are below the national poverty line and the poverty gap is 20%.

Table 28

Foster-Greer-Thorbecke poverty indices, FGT(a)		
a=0	a=1	a=2

```
        0.70755    0.20624    0.08763
FGT(0): headcount ratio (proportion poor)
FGT(1): average normalised poverty gap
FGT(2): average squared normalised poverty gap
```

iii.   Infrastructure

- *Water*

Forty-two percent of households have an individual Municipal water connection, while 6% use a public stand-post; the remaining households had missing data.

- *Toilet*

As shown in figure 42, seventy-five percent of respondents have a toilet facility; unfortunately it is unclear from data what type of toilet facilities these are or what the other 25% of households use.

Figure 42
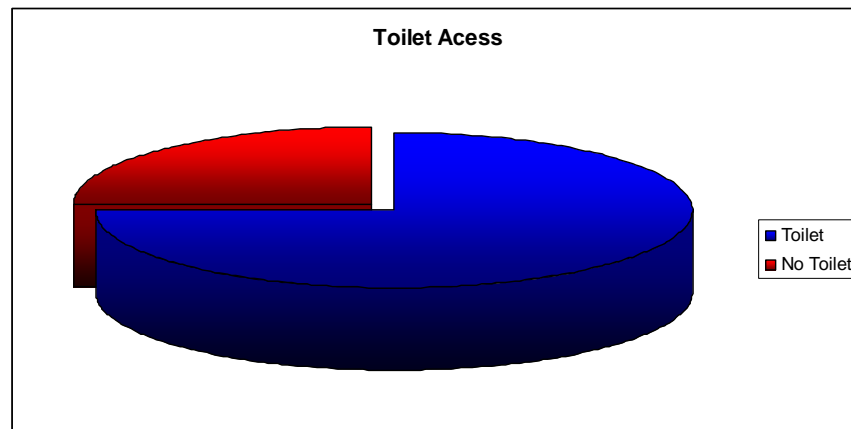
- *Waste/Drainage*

A large percentage (68%) of residents has no sewerage facility in their home, while 83% have no storm-water drainage for their homes.

- *Roads*

All roads in this community are Kuccha.

- *Electricity*

Sixty-eight percent of households have electricity, the rest do not and on average households are paying Rs. 910 per month for lights. Three quarters of households have streetlights in their neighbourhood.

iv.   Health

No data

v.   Regression Analysis

The lack of data for Jodhpur, as well as the small sample size makes any statistical analysis difficult, but the regression here attempts to show the links between income and infrastructure as in the other cities; where a household with higher income

generally has access to the basic amenities such as water, toilet, sewerage, and storm water drainage.

Per capita monthly income = C+ ß1(water)+ ß2(sewerage) + ß3(drainage)+ ß4(toilet)
+

Regression Output 12

pcminc	Coef.	Std. Err.	P-Value
water	142.782	70.426	0.046
sewerage	12.787	74.777	0.865
drainage	65.120	135.231	0.631
toilet	48.171	85.668	0.575
_cons	376.599	63.520	0.000

Observations	97
Adjusted R²	0.1

From the output it is clear that water has a very strong relationship with earnings, i.e. if a household has access to water their income is Rs.142 more that those households who have no access to water. But this is the only significant variable and does have a high standard error. All the other variables are insignificant and have very high standard errors, which calls their accuracy into question. The main reason for this is the small sample size of only 97 observations. Thus, from looking at this data one can only conclude that there is a relationship between income and 'water'.

vi.   Summary
Most respondents in this Jodhpur slum live in Pucca houses relative to the other cities, and the majority have access to water, toilets and sewerage facilities. Given these indicators the community is relatively well-off compared slums in some of the other cities. However, looking at monthly per capita earnings approximately 70% of households are earning below the national poverty line. The regression analysis shows that the households who lack access to water are poorer than those who have access. That is, there is a correlation between being poor and having a lack of access to water, but the small sample size affects the accuracy of this result.

SECTION 3
Inter-City Comparison

This section presents the data on general household information, income, infrastructure and health, in a comparison for all seven cities. The comparison is helpful in giving the reader an overview of the data. An initial summary of the cities and the survey data collected is shown in the table below.

Table 29

City Name	No. of Slums	No. of Households Surveyed
Ahmedabad	39	12,773
Nadiad	97	6,566
Godhra	47	4,249
Ankleshwar	40	293
Jaipur	15	3,706
Bikaner	12	266
Jodhpur	1	120

1. General Household Information

❖ *Household size*

Table 30

	Ave. Household Size
Bikaner	6.3
Jodhpur	6.3
Ankleshwar	5.3
Godhra	5.0
Ahmedabad	4.6
Nadiad	4.6
Jaipur	3.7

The average number of people per household for each city is presented in this table and it ranges from 3.7 to 6.3 with Bikaner and Jodhpur having the largest household size and Jaipur the smallest.

❖ *Residency*

Figure 43

Average Years Residency
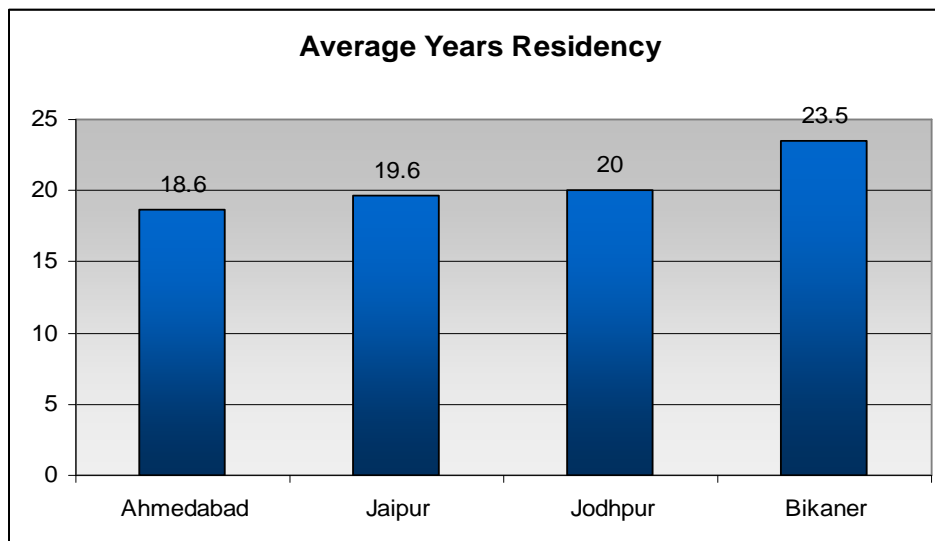
The number of years a household has lived in their current neighbourhood is shown in the graph above for four of the cities (it was not available for the other three); clearly most families have been residents for quite a number of years.

❖ *House Type*

Table 31

	Kuccha	Semi-Pucca	Pucca
Ahmedabad	73%	12%	15%
Nadiad	37%	35%	23%
Godhra	45%	38%	17%
Ankleshwar	75%	19%	6%
Jaipur	54%	19%	18%
Bikaner	36%	63%	1%
Jodhpur	7%	8%	74%

There are quite large differences in 'house type' across the seven cities. For example 73% of residents in the Ahmedabad slums live in Kuccha houses while in Jodhpur only 7% do. It was not clear from the data which factors account for these differences, in some cities 'house type' was linked to income which may explain part of the story.

❖ *House Ownership*

Table 32

House Ownership		
	Own	*Rent*
Ahmedabad	63%	37%
Nadiad	85%	15%
Godhra	72%	28%

Ankleshwar	86%	14%
Jaipur	25%	75%
Bikaner	99%	1%
Jodhpur	83%	17%

In all the cities, except Jaipur, the majority of residents own their houses.

❖ *Land Ownership*

Table 33

Land Ownership		
	Own	*Don't Own*
Ahmedabad	33%	67%
Nadiad	38%	62%
Godhra	6%	94%
Ankleshwar	N/A	N/A
Jaipur	10%	88%
Bikaner	38%	62%
Jodhpur	3%	97%

In contrast to house ownership most of the residents in these urban slums do not own the land on which their house is built, although they may own their house. Figure 44, below, highlights this difference.

❖ *Comparison of House and Land Ownership*

Figure 44
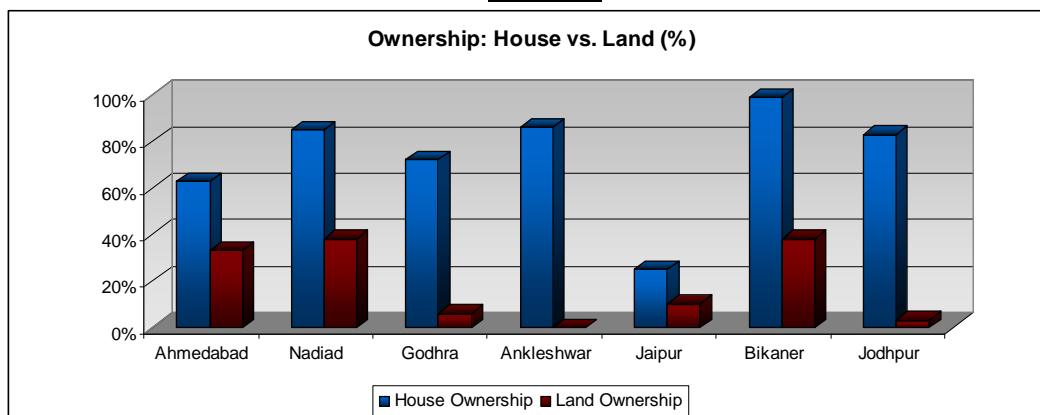
❖ *Legal Land Ownership*

Table 34

% Households with legal proof of their Land Ownership*		
	Yes	No
Ahmedabad	25%	75%
Nadiad	N/A	N/A
Godhra	22%	78%

Ankleshwar	N/A	N/A
Jaipur	30%	70%
Bikaner	47%	53%
Jodhpur	N/A	N/A

*Percentage of households with legal documents of land ownership within the percentage who said that they own land (refer to above table)

Concerning land ownership the majority of household who do own land do not have any proof of their legal ownership.

2.   Income

Table 35

Cities	Per Capita Monthly Income*	% Poor**
Ahmedabad	Rs.702	32%
Nadiad	Rs.374	85%
Godhra	Rs.366	87%
Ankleshwar	Rs.364	82%
Jaipur	Rs.672	41%
Bikaner	Rs.382	92%
Jodhpur	Rs.513	71%

*The average monthly income earned, per person
**The percentage of the population below the National Poverty line (Rs.538.60/person/ month)

Table 35 presents data on per capita monthly income and also the percentage of the population in each city that is earning below the national poverty line. It is clear from this data that according to this measure Bikaner has the largest number of poor households while Ahmedabad has the smallest number of poor households. The level of poverty is illustrated in figure 45.

Figure 45

64
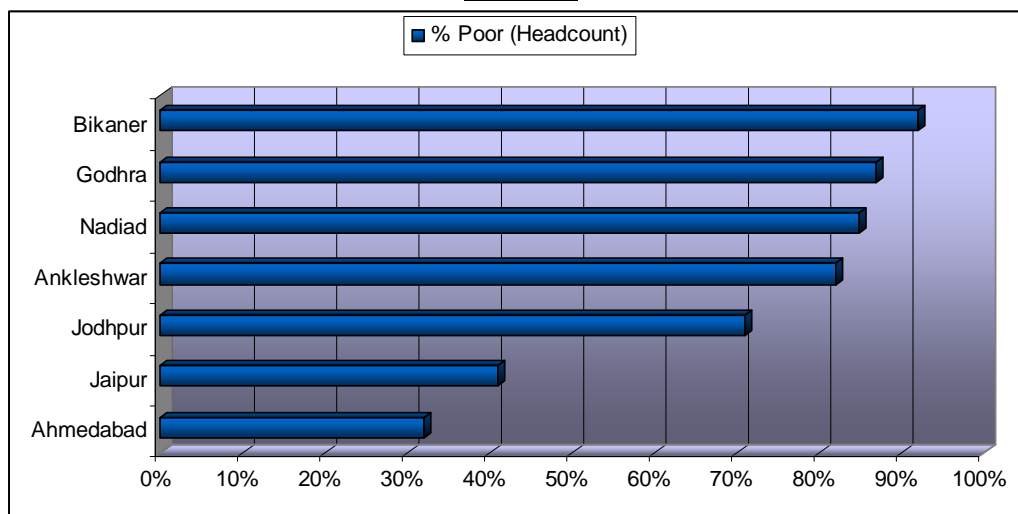
❖ *Savings*

Table 36

Savings			
	Yes	*No*	*Rs.*
Ahmedabad	**23%**	**77%**	**451**
Ankleshwar	**10%**	**90%**	**460**
Godhra	**3%**	**97%**	**452**
Nadiad	**-**	**-**	**-**
Jaipur	**19%**	**81%**	**608**
Jodhpur	**-**	**-**	**-**
Bikaner	**2%**	**98%**	**-**

Not all the surveys provided data on savings but that which was available is presented here, it is clear that not many households are saving money, with the highest saving rates being seen in Ahmedabad (which has the least number of poor households).

❖ *Loans*

Table 37

Taking Loans?		
	Yes	No
Ahmedabad	74%	26%
Ankleshwar*	33%	67%
Godhra	20%	80%

*In Ankleshwar the average loan amount was Rs.11500

Data on loans was quite scarce but the comparison between three of the cities is shown here, again Ahmedabad has the highest percentage of households taking loans.

3.   Infrastructure

❖ *Water*

Table 38

Water Facility	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
In-House Tap	**66%**	**40%**	**27%**	**65%**	**26%**	**66%**	**57%**
Public Tap	**14%**	**17%**	**21%**		**37%**		
Neighbour	**8%**	**43%**	**36%**	**35%**	**17%**	**34%**	**43%**
Private Seller	**4%**	**0%**	**0%**		**8%**		
Hand Pump	**0%**	**0%**	**15%**		**0%**		

Access to water is varied across cities; Ahmedabad, Ankleshwar and Bikaner have over 60% of households with access to their own tap. However, Godhra and Jaipur have a relatively small percentage of households with similar access.

❖ Toilet

Table 39

Toilet Facility	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
In-House	72%	43%	37%	76%	40%	43%	75%
Neighbour	3%	0%	0%	24%	0%	0%	
Public	11%	4%	5%	0%	2%	1%	25%
Open Area	14%	51%	57%	0%	49%	56%	

The problem of toilet access is quite bad in certain cities, the table shows four out of the seven cities have around half of the population using an open area.

❖ Drainage

Table 40

Sewerage/ Drainage	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
Yes	85%	31%	7%	77%	40%	2%	32%
No	15%	42%	93%	23%	60%	98%	68%

Concerning drainage the facilities are mixed and in particular the households in Bikaner and Jodhpur have extremely poor drainage infrastructure.

❖ Electricity

Table 41

Electricity	Ahmedabad	Nadiad	Godhra	Ankleshwar	Jaipur	Bikaner	Jodhpur
Yes	92%	70%	71%	65%	82%	65%	68%
No	8%	25%	29%	35%	10%	35%	32%

When compared to the other facilities the access that households have to electricity in all the cities is good, particularly Ahmedabad where almost all households have electricity.

4.   Health

❖ Preferred Medical Facility

Table 42

Medical Facility	Ahmedabad	Ankleshwar	Godhra	Nadiad	Jaipur	Jodhpur	Bikaner
Public	28%	-	56%	50%	45%	-	85%
Private	72%	-	42%	50%	30%	-	15%

The data on medical facilities is again mixed with no clear majority preferring private care over public care across all the cities; one would expect that the poorer populations would use public health care.

❖ *Average Monthly Health Expenditure*

<div align="center">

Table 43

Health Expenditure (Rs.)	
Ahmedabad	220
Ankleshwar	-
Godhra	190
Nadiad	-
Jaipur	270
Jodhpur	-
Bikaner	228

</div>

3.2   Conclusion

This report has analysed data from the seven urban slums in Gujarat and Rajasthan providing a detailed description and analysis of the situation facing households in these slums. To begin with the range of problems facing slum dwellers were explained and some examples from the study were given. A profile for each city was then presented where the important data was investigated and explained. Additionally, within these profiles some regression analysis was used to explore links in the data – for the cities with more data this helped to provide deeper insights while for others it served as a summary of the relationships within the data.

When looking at the general trends in the data there are some broad conclusions one can draw for all of the cities. Most of the households are poor, there is a lack of access to basic services which is extreme in certain slums, and the general housing conditions for the most part are not very good. Despite living in an area for many years most families do not own their land and the majority of those who do own land are without legal proof. Savings rates in the slums are very low and with the exception of Ahmedabad loan rates are also low. Beyond this broad assessment, which was the first objective of the report, there are a few specific findings that must be mentioned – these are related to the second objective of analysing some underlying relationships in the data.

Firstly, investigation of the 'health-infrastructure' link found that household health is correlated with the access to basic amenities; those households who did not have access to water, a toilet, and drainage (sewerage and storm water) were spending more money on monthly healthcare than those with these services, and they also reported more frequent illnesses. Secondly, it was clear that a relationship exists between income and access to infrastructure, that is, the poorer households are also those who lack access to water, toilets, drainage and so on. Thirdly, in Ahmedabad specifically, the data revealed that spending on household upgrading and acquiring basic amenities was much higher if the house and the land were owned by the family. Spending was also positively correlated with income. Fourthly, the data showed that 'house type' generally differed by income, with the families earning higher income living in better housing. Finally, analysis also revealed that saving was much higher among richer households.

The findings provide helpful insights into the situation facing many families living in these urban slums and while many of the findings are intuitive and perhaps even expected, the value of empirical evidence should not be underestimated. They provide strong support for the claim that interventions which can provide or improve basic infrastructure, upgrade housing, or afford increased tenure security, will have many direct and indirect positive effects.

Appendix

This generic formula describes the FGT (also called the Pα class) of poverty measures:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{q} \left[\frac{z - y_i}{z} \right]^\alpha \qquad \text{for } \alpha \geq 0$$

where :

- *z* is the poverty line
- *yi* is the standard of living indicator (e.g. PCI) of the *i*th household
- α is the "aversion to poverty" parameter. The higher the value of α, the more sensitive the measure is to the well-being of the poorest person. As α approaches infinity, the measure reflects only the poverty of the poorest person
- *n* is the population

- P0 (α=0) is the head count
- P1 (α =1) is the poverty gap ratio
- P2 (α=2) is the squared poverty gap

References

Amis, P (2001), *Rethinking UK aid in urban India: reflections on an impact study of slum improvement projects*, The Journal of Environment and Urbanization Vol. 13, No 1, April 2001

Ahmedabad Municipal Corporation website: www.egovamc.com

Chen, Martha (2000). *Women in the informal sector: a global picture, the global movement*. Washington DC: World Bank, http://info.worldbank.org/etools/docs/ library/76309/dc2002/proceedings/pdfpaper/module6mc.pdf

Chen S, Ravallion M, (2008), *The Developing World Is Poorer Than We Thought, But No Less Successful in the Fight against Poverty*, Policy Research Working Paper 4703, The World Bank Development Research Group, August 2008, http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2009/08/05/000158349_20090805 133945/Rendered/PDF/WPS4703.pdf

Census of India (2001), Retrieved on 30th June 2009, As viewed in www.sangamindia.org "Slums in India" (2009)

City Development Plan (CDP), (2006), Jaipur Municipality, available at www.jnnurm.nic.in/nurmudweb/cdp_apprep/CDP/CDP-Jaipur.pdf

Devas, N (2004), *Urban Governance and Poverty: Lessons from a Study of Ten Cities* University of Birmingham School of Public Policy

Dutta, S & Batley, R (1999), *Ahmedabad, Urban Governance, Partnership and Poverty Working Paper 16,* International Development Department, University of Birmingham, Birmingham

Hancock T (2000), *Urban Ecosystems and Human Health* Institute of Development Studies Research , www.idrc.ca/ecohealth

Karn, S.K., Shikura, S, Harada, H. (2003), *Living Environment and Health of Urban Poor: a Study in Mumbai* Economic and Political Weekly: August 2003
Meenakshi J.V, Ray R (2000), *Impact of Household Size and Family Composition on Poverty in Rural India*, Centre for Development Economics, Delhi School of Economics, www.ecite.utas.edu.au/25467

MHT (2009), *Endline Report on the Sahbhagi Yojana 2 Support Programme (SY2SP)*

Ray, R (2000), *Poverty, Household Size and Child Welfare in India*, Economic and Political Weekly, Vol. 35, No. 39 (Sep. 23-29, 2000), pp. 3511-3520 Published by: Economic and Political Weekly, http://www.jstor.org/stable/4409778

Rakodi C with Loughhead S (2002), *Reducing Urban Poverty in India – Lessons from Projects Supported by DFID in Urban Livelihoods: A People-Centred Approach to Reducing Poverty*, C Rakodi with T Lloyd-Jones (Eds). London: Earthscan, p. 225-36

SEWA Academy (2002), *Parivartan and its Impact: A Partnership Programme of Infrastructure Development in Slums of Ahmedabad City*, SEWA Academy: 2002

-- UPRS Report – Urban Poverty Reduction Strategy, Ahmedabad

UNDP, (2009), *India: Urban Poverty Report*, Factsheet, http://www.undp.org.in/content/factsheets/PovertyReduction/INDIA-URBAN-POVERTY-REPORT-2009.pdf

UN-Habitat (2003), *Global Report on Human Settlements, The Challenge of Slums*, Earthscan, London; Part IV: "Summary of City Case Studies", pp 195-228, As viewed in Bhatt, R (2003) "Understanding Slums: Case studies for the Global Report" UN Habitat

UN-HABITAT (2007), Twenty-first session of the governing council, Nairabi, Kenya, April 2007, www.unhabitat.org

UN-Habitat, (2008), *The UN-HABITAT Water and Sanitation Trust Fund ANNUAL REPORT*, 2008
UK Department for International Development Reducing Urban Poverty in India http://www.dfidindia.org/pub/pdfs/urban1.pdf

UN-Habitat, *State of the World's Cities 2004/5,* www.unhabitat.org

WHO/UNICEF/WSSCC (2000), *Global Water Supply and Sanitation Assessment 2000 Report*. WHO, Geneva, Switzerland

WHO with the Stockholm International Water Institute (2003), *Driving Development by Investing in Water and Sanitation* WHO/SIWI: 2003. See www.siwi.org

Younes. M, Bartram. J (2001), *Waterborne Health Risks and the WHO perspective*, Department of Protection of the Human Environment, World Health Organization, Geneva, Switzerland, International Journal of Hygiene and Environmental Health, 204, 255 ± 263