

Wageningen University - Department of Social Sciences
MSc. Thesis Chair Group: Development Economics (DEC)

Depth of Poverty Outreach in Ecuador

*An Application of the CGAP Poverty Assessment Tool on a
Microcredit Program in Santo Domingo de los Colorados*

May, 2010

MSc programme: International Development Studies (MID)

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Thesis code: DEC 80439

“The measurement of poverty must be seen as an exercise of description assessing the predicament of people in terms of the prevailing standards of necessities. It is primarily a factual rather than an ethical exercise, and the facts relate to what is regarded as deprivation, and not directly to what policies are recommended”

Amartya K. Sen (1979)

Abstract

This study applied the CGAP Poverty Assessment tool to assess the poverty level of client households and depth of poverty outreach of the microcredit program of INSOTEC - agency of Santo Domingo de los Colorados respectively, on the basis of a local, a national, an urban and a rural poverty context. Only if the poverty level of urban client households is held against the poverty level of urban non client households in Ecuador, that is on the basis of an urban poverty context, it was found that a considerable number of poor households is reached. In all other poverty contexts in turn, the larger share of client households that is reached by the institute is found in the category of relatively best of households. The CGAP tool is progressive in incorporating various aspects of household's well-being in a relatively practical and non-sensitive way, and reveals insight in the poverty characteristics of the areas considered and in what way the household' relative poverty level is subject to change, dependent on the poverty context. However, regarding the methodological approach, aswell as the practical relevance of the tool, it is also argued that the tool involves many disadvantages; the claim to identify a multidimensional poverty is flawed in several ways and judgments on findings on depth of poverty outreach remain arbitrary, with respect to the difficulty of interpreting a relative definition of poverty of client households in practice. The more complex the conceptualization of poverty, the more difficult it becomes to make the identification of poverty operational, and it is argued that the CGAP tool suffers from this identification problem.

List of Abbreviations

BRAC:	Bangladesh Rural Advance Committee
CGAP:	Consultative Group to Assist the Poor
CAN:	Nations of Andean Communities - Comunidad de Naciones Andinas
ECV:	Living Standards Questionnaire- Encuesta de Condiciones de Vida
EFA:	Exploratory Factor Analysis
IBN:	Insatisfaction of Basic Needs - Insatisfacción de Necesidades Básicas
IFPRI:	International Food Policy Research Institute
INEC:	National Institute of Statistics - Instituto Nacional de Estadísticas y Censo
INSOTEC:	Socio-Economic and Technological Institute - Instituto de Investigaciones Socio-Económicas y Tecnológicas
MFI:	Microfinance Institute
NGO:	Non Governmental Organization
PCA:	Principle Component Analysis
PPI:	Progress out of Poverty Index
RFR:	Rural Finance Network – Red Financiera Rural
SIISE:	Integrated System of Social Indicators of Ecuador - Sistema Integrado de Indicadores Sociales de Ecuador

Index

Chapter 1. Introduction.....	16
1.1 Background.....	16
1.2 Problem Statement	17
1.3 Objective of study.....	18
1.4 Research Question and research objectives	18
1.5 Approach and Methodology	19
1.6 Scope of study	19
1.7 Overview of study.....	19
Chapter 2. Conceptual Framework.....	20
2.1 Introduction.....	20
2.2 Measuring poverty at the household level.....	20
2.3 Depth of poverty outreach.....	23
2.4 Factors on depth of poverty outreach	23
2.5 Relations between poverty outreach and poverty reduction	25
2.6 The CGAP poverty assessment tool.....	26
2.7 Other poverty assessment tools.....	26
2.7.1 <i>Index of Insatisfaction of Basic Needs (IBN)</i>	27
2.7.2 <i>Progress out of Poverty Index (PPI)</i>	27
2.7.3 <i>Productive Asset Index</i>	28
2.8 Using the CGAP poverty assessment tool.....	28
Chapter 3. Predicting depth of poverty outreach	30
3.1 Introduction.....	30
3.2 Experiences in depth of poverty outreach.....	30
3.3 Difficulties in comparison of studies	31
3.4 Predicting depth of poverty outreach.....	31
3.4.1 <i>Microfinance in Ecuador</i>	31
3.4.2 <i>Institutional features</i>	32
3.4.3 <i>National and local poverty characteristics</i>	34

Chapter 4. Methodological framework	38
4.1 Introduction.....	38
4.2 Application of the CGAP poverty assessment tool.....	38
4.2.1 <i>The CGAP poverty assessment indicators</i>	38
4.2.2 <i>Using a national database</i>	39
4.2.3 <i>Measuring depth of poverty outreach</i>	40
4.3 Relative poverty measurement in a broader context	41
4.3.1 <i>CGAP tool recommendations on regional poverty analysis</i>	41
4.3.2 <i>Another approach</i>	42
4.4 Principle Component Analysis	44
4.4.1 <i>PCA and household poverty assessment</i>	44
4.4.2 <i>Mathematical model of PCA</i>	44
4.4.3 <i>Extraction of components</i>	45
4.4.4 <i>Pre-selection of poverty indicators</i>	46
4.4.5 <i>Output information of principle component analysis</i>	46
4.4.6 <i>Procedures for adjustment of the model</i>	46
4.4.7 <i>Calculation of the composite poverty index</i>	48
4.5 Adaptations.....	49
4.5.1 <i>Human resources</i>	49
4.5.2 <i>Housing conditions</i>	50
4.5.3 <i>Food security and vulnerability</i>	50
4.5.4 <i>Assets</i>	51
4.5.5 <i>The use of dummy variables</i>	51
4.5.6 <i>Variables with price values</i>	53
4.6 Sampling client households	53
4.6.1 <i>Selection of new client households</i>	54
4.6.2 <i>Reflections on the client sampling design</i>	57
4.6.3 <i>Field work procedures</i>	57
4.7 Sampling non client households.....	58
4.7.1 <i>Sampling non-client households at the local level</i>	58
4.7.2 <i>Sampling non client households at the national level</i>	58
4.7.3 <i>Sampling non client households in the urban and rural area</i>	59

Chapter 5. Principle demographic, socioeconomic and geographic characteristics of client and non-client households.....	60
5.1 Introduction.....	60
5.2 Distribution of demographic variables on the household head among client and non client households.....	60
5.2.1 <i>Gender of the household head.....</i>	<i>60</i>
5.2.2 <i>Age of the household head.....</i>	<i>60</i>
5.2.3 <i>Principle economic position of the household head.....</i>	<i>61</i>
5.2.4 <i>Level of education of the household head</i>	<i>62</i>
5.3. Distribution of geographical and socio-economic variables among client and non client households	64
5.3.1 <i>Residential area of the household</i>	<i>64</i>
5.3.2 <i>Housing characteristics; Type of roof material</i>	<i>65</i>
5.3.3 <i>Housing characteristics; type of toilet facility</i>	<i>65</i>
5.3.4 <i>Housing characteristics; Type of source of water provision.....</i>	<i>66</i>
5.3.5 <i>Other household characteristics.....</i>	<i>67</i>
5.4 Additional information on client- and credit characteristics	70
5.4.1 <i>Client characteristics</i>	<i>70</i>
5.4.2 <i>Distribution of the first loan amount by residential area of the client.....</i>	<i>71</i>
5.4.3 <i>Economic sector of the client's principle activity</i>	<i>71</i>
5.4.4 <i>Specific sector of client's principle activity</i>	<i>72</i>
5.5 Concluding remarks	73
Chapter 6. Determination of the relative poverty level of client households on the basis of different poverty contexts.	74
6.1 Introduction.....	74
6.2 Construction of the local poverty index.....	74
6.2.1 <i>Internal validity of the poverty index.....</i>	<i>76</i>
6.2.2 <i>Practical validity of the poverty index.....</i>	<i>76</i>
6.2.3 <i>Differences in the relative poverty level between client and non client households, regarding the overall distribution of the local poverty index.....</i>	<i>78</i>
6.2.4 <i>Differences in the relative poverty level between client and non client households by residential area</i>	<i>78</i>
6.3 Construction of the national poverty index.....	79
6.3.1 <i>Differences in the relative poverty level between client and non client households, regarding the overall distribution of the national poverty index</i>	<i>80</i>
6.3.2 <i>Differences in the relative poverty level between client and non client households by residential area.....</i>	<i>80</i>
6.4 Construction of the urban poverty index.....	80
6.4.1 <i>Differences in the relative poverty level between urban client households and urban non client households, regarding the overall distribution of the urban poverty index</i>	<i>81</i>

6.5 Construction of the rural poverty index.....	81
6.5.1 <i>Differences in the relative poverty level between rural client households and rural non client households, regarding the overall distribution of the rural poverty index.....</i>	82
6.6 Concluding remarks.....	83
Chapter 7. Depth of poverty outreach	84
7.1 Introduction.....	84
7.2 Categorization on the basis of the household poverty score	84
7.3 Internal coherence	85
7.4 Depth of poverty outreach in the local area	87
7.5 Depth of poverty outreach on the basis of different poverty contexts	88
7.5.1 <i>Depth of poverty outreach on the basis of a national poverty context</i>	88
7.5.2 <i>Depth of poverty outreach on the basis of an urban and a rural poverty context.....</i>	89
7.6 Concluding remarks.....	91
Chapter 8. Reconsidering the CGAP poverty assessment tool.....	92
8.1 Introduction.....	92
8.2 Weighing poverty indicators.....	92
8.2.1 <i>Application of exploratory factor analysis</i>	93
8.3 Overall robustness of the poverty index	94
8.3.1 <i>Testing overall robustness</i>	95
8.4 Multi-dimensionality of the poverty index.....	95
8.4.1 <i>Testing the importance of multi-dimensionality</i>	96
8.5 Triangulation of methods; applying the Progress out of Poverty Index	98
8.5.1 <i>Identification of poor households on the basis of PPI.....</i>	98
8.5.2 <i>Limitations of PPI results.....</i>	99
8.5.3 <i>Poverty rate of client households on the basis of the national poverty line</i>	99
8.5.4 <i>Comparison of outcomes</i>	99
Chapter 9. Principle findings, reflections and recommendations.....	101
9.1 Introduction.....	101
9.2 Principle findings	101
9.3 Reflections on the research	103
9.4 Reflections on the CGAP poverty assessment tool.....	105
9.4.1 <i>The relative measurement of poverty</i>	105
9.4.2 <i>Multidimensionality and the use of a benchmark indicator</i>	105
9.4.3 <i>Construction of a poverty index</i>	106
9.4.4 <i>Sustainability of findings.....</i>	107
9.5 Recommendations for further research.....	108

Literature.....	110
Appendix 1. Overview on CGAP Poverty assessment tool' studies.....	116
Appendix 2. Original set of recommended variables by CGAP Tool.....	121
Appendix 3. Overview of all other tested poverty variables in PCA.....	122
Appendix 4. Features of the variables of the poverty index	123
Appendix 5. Output information of PCA (1).....	125
Appendix 6. Construction of other poverty indices	127
Appendix 7. Pearson correlations with the benchmark indicator	130
Appendix 8. Principle results of alternative procedures in chapter 8.....	131
Appendix 9. Map of the considered local area	136
Appendix 10. Questionnaire.....	137

Chapter 1. Introduction

1.1 Background

Since the time that Muhammed Yunus, an economist from the Vanderbilt University in Nashville, Tennessee, started in 1976 with a series of experiments to provide small loans to poor households in the rural areas of Bangladesh, microfinance has been addressed as a tool to alleviate poverty among the lowest income groups in developing countries. Microfinance nowadays refers to the broader set of financial services (including credit, saving and insurance products) to those households who lack access to traditional banking services or financial resources in general (Armendáriz de Aghion & Morduch, 2005). Despite the increasing emphasis on the necessity of improved access to financial services for poor households (Littlefield, Morduch & Hashemi, 2003), microfinance still fails to reach a large amount of low income households in developing countries. Many regulated financial institutions face difficulties in revealing trustworthy socio-economic characteristics of this category of households and are unable to provide the appropriate financial products at manageable costs. (Revolledo-Wright, 2004), (Navajas, 2000), (Montgomery, 2004). In the absence of collateral, the risks involved in providing loans are high. As a consequence, the high interest rates set by banks and other formal financial institutions, create incentive problems for poor households to get involved with formal lending. (Armendáriz de Aghion & Morduch, 2005). In regard to the country that is focused on in this study, Claessens (2003) reported that a share of 49 percent of the small firm sector of Ecuador complaint about a lack of access to external financing. As a response to the limited access to low income households in developing countries into regulated financial markets, a variety of Microfinance Institutions (MFI's) such as NGO's, village banks, credit unions, non profit organizations but also commercial banks got involved in microfinance services. Though the specific features of microfinance services differ, common characteristics are the provision of relatively small loans, often offered in the absence of collateral and provided at reasonable interest rates. It is argued that improved access to microfinance could help households in three ways; (i) by generating an income that allows households to engage in more profitable economic activities, (ii) by allowing to obtain more cost-efficient assets and liabilities, or (iii) as a direct use for immediate consumption needs (Matin, Hulme & Rutherford 2002, pp. 286-287).

Donor agencies and MFI's are becoming more and more aware of the desirability to evaluate to what extent microfinance programs actually succeed in reaching poor households. Many different factors, some within and some beyond the influence of the MFI, impact on this targeting process (Gulli & Berger, 1999).

A range of tools have been developed to identify the poverty level of (client) households, such as the Cashpor Housing Index, the Small Enterprise Foundation's Participatory Wealth Ranking, the Progress out of Poverty Index and the CGAP¹ poverty assessment tool (Zeller, 2006), (Simanowitz, Nkuna & Kasim, 2000). In this study, the CGAP poverty assessment tool will be applied; this method gives insights in to what extent poor households are reached by a credit program , by analyzing the poverty level of client households in relation to the poverty level of non client households respectively. More specifically, the study will evaluate a credit program of the microfinance institute INSOTEC in Ecuador that is directed by the agency in Santo Domingo de los Colorados. This city is located 200 Kilometers to the Westside of Quito, and is the capital city of the province of Santo Domingo de los Tsáchilas. Evaluating the client's poverty profile by taking the client household as the unit of analysis, follows the tradition of the school of beneficiaries in this research field (Hulme, 1999).

1.2 Problem Statement

Many MFI's claim to contribute to overall poverty reduction, by creating financial incentives for the lowest income groups. However, whether, in order to reduce poverty and promote local economic development, prioritizing the poorest households in getting improved access to micro finance, is the most desirable, is subject to debate. The foregoing brings along the important condition to find objective measures that identify the poverty status of client households in the first place; if one does not gain knowledge on the (initial) poverty level of clients as a start, not so much can be said about the impact of microfinance on the status of well being of the client household or the wider population respectively. An evaluation on what kind of households are reached is therefore an important starting point to enrich the debate on poverty impact of microfinance. Public support for micro credit is largely based on it's premise to reach poor households and improve their living conditions by means of access to small loans. If donor organizations and recipient agencies claim to fulfill this social role, it is in their interest that socio-economic characteristics of their clients are revealed in order to monitor whether poor households are sufficiently reached.

¹ NB. The Consultative Group to Assist the Poor (CGAP) is an independent policy and research centre that is committed to extend and improve financial access for the world's poor. It is supported by over thirty development agencies and private foundations who share a common mission to alleviate poverty. Source: NB. <http://www.cgap.org/p/site/c/aboutus/> (10/07/2009)

1.3 Objective of study

The general objective of this thesis is to evaluate the depth of poverty outreach of a microcredit program of INSOTEC, in order to obtain information on the socio-economic background of clients at the household level. In addition, by applying the CGAP poverty assessment tool, this study reveals insights on the tool's benefits and disadvantages to assess poverty of clients at the household level.

1.4 Research Question and research objectives

The following research question is identified;

To what extent does the microcredit program of INSOTEC- Agency Santo Domingo de los Colorados, succeed in reaching poor households?

In order to answer the research question in a constructive way, the following research objectives were identified;

- Predict outcomes on depth of poverty outreach, on the basis of an evaluation in regard to experiences of depth of poverty outreach in Latin America, institutional features of INSOTEC and national and regional poverty characteristics of Ecuador respectively
- Describe and compare principle demographic, socio-economic and geographical characteristics of the client households with respect to non-client household in the local area²
- Estimate the relative poverty level of client households by means of the CGAP poverty assessment tool, on the basis of different samples of non-client households derived from the local, national, urban and rural population
- Determine depth of poverty outreach from a local, national, urban and rural perspective
- Identify some of the methodological flaws of the CGAP poverty assessment tool and address them by means of a set of alternative procedures in order to evaluate the validity of the tool.

² NB. The CGAP tool is originally developed to evaluate depth of poverty outreach in the local area. In Chapter 4, section 4.7.3 respectively, the identification of the local area that is referred to in this study is discussed in detail.

1.5 Approach and Methodology

The CGAP poverty assessment tool identifies a relative measure of poverty on the basis of poverty information from non client households in the local area, by means of the construction of an index that consists of a range of quantitative and (quantified) qualitative poverty indicators. The poverty index is constructed by means of principle component analysis (PCA), a statistical method that tries to find the best linear combination of a set of variables, that together describe the same underlying construct or so called component. In this study the component of interest identifies the poverty level of the household.

1.6 Scope of study

It is difficult to generalize the findings of this study to the client populations of other agencies of the institute, since the relative poverty level of client households from the agency of Santo Domingo is identified on the basis of poverty information of non client households in the local area. Second, the choice of the institute to focus on a certain part of their operational area, as well as their specific interest in the poverty profile of rural clients respectively, undermined the representativeness of the final sample of client households with respect to the total client population of the agency of Santo Domingo de los Colorados. Consequences for the sampling design are further discussed in Chapter 4.

1.7 Overview of study

In chapter 2 the conceptual framework for this study is outlined, while in chapter 3 an attempt is made to analyze what results may be expected on depth of outreach for this particular study. Then, in chapter 4 the methodology of the CGAP poverty assessment tool is explained, as well as in which ways this method was adopted for this study. A preliminary analysis on differences in demographic, socio-economic and geographical features between client households and non client households at the local level is discussed in chapter 5. Then, the construction of the poverty indices at the local, national, urban and rural level as well as differences in overall poverty levels between client and non client households respectively, are addressed in chapter 6. Depth of poverty outreach on the basis of poverty indices at the local, national, urban and rural level respectively, is determined. In chapter 8, some methodological flaws of the CGAP tool are discussed and alternative procedures to address some of these flaws are proposed, of which the results are discussed in the same chapter. Chapter 9 finally, concludes with a reflection on the research and it's overall findings and recommendations in regard to further research and the application of the CGAP tool.

Chapter 2. Conceptual Framework

2.1 Introduction

The following chapter builds the conceptual framework in which the relevance of the CGAP poverty assessment tool can be understood. Different patterns on the measurement of poverty at the household level, as well as a description on what is meant by depth of poverty outreach and which factors may have an impact on its results respectively, are reviewed. In addition, issues in the current debate on the relation between reaching poor households and overall poverty reduction are shortly addressed. Last, the CGAP poverty assessment is introduced and held against comparable poverty assessment tools, in order to argue why the CGAP tool was applied in this study.

2.2 Measuring poverty at the household level

Poverty, conceptually could be described as “a state of deprivation or an unacceptably low standard of living, either relative to others in society or on the basis of some absolute minimum” (Meyer, Nagarajan, and Parker, 1999, p:3). Pinpointing at the poorest households of a population, various descriptions such as ‘the poorest of the poor’, the ‘chronic poor’ or the ‘destitute poor’ are commonly used in the literature. But in order to identify this group of households, different variables may have been applied that aim to tackle the severity of poverty, the duration of poverty or the different dimensions of poverty respectively. (Matin, 2003) (Falkingham & Namazie, 2002) (Van der Ruit & May, 2003). Though a consensus could be found on the nature and the different aspects of poverty, the measurement of poverty however, is far more complex. This relates to what precise definition is used to identify poverty in a research context, on which scale poverty is investigated, which dimensions of poverty are addressed, and what methodologies are chosen to assess poverty respectively. Neither in the academic world, nor in practice, a common sense exists on how to identify and measure poverty at the household level in the best way (Hatch & Frederick, 1998, p. 20) (Hulme, 1997) (Morduch and Haley, 2002).

However, four different approaches could be identified (Zeller, 2001) (Perry, 2002). First, one could identify poverty in terms of the ‘economic means’ of the household, usually defined by a minimum income or expenditure level to attain a minimum standard of living. Applying an indirect measure to identify a household’s poverty level has been a standard practice in poverty analysis.

By means of the construction of a poverty line and the use of a poverty measure that describes how household expenditures fall short of this poverty line, poverty at the household level can be evaluated (Aho, Larivière & Martin, 1998; Lipton & Ravallion, 1995 as cited in Zeller, 2001, p.5). Total income or expenditure of the household is usually derived from national household surveys and because of the money-metric approach, the method allows for comparison between different populations. However, from the eighties onwards, measuring poverty in terms of household' income or expenditure data became highly criticized for it's uni-dimensional approach (Sen, 1976) (Sen, 1979) (Atkinson, 1987). The traditional approach was also criticized on the basis of methodological flaws; questions were raised in regard to the reliability of income and expenditure data, the arbitrary choice of the minimum basket of goods and the inaccuracy of estimations of purchase power parity exchange rates to allow for international comparisons of poverty rates (Howe et al, 2008, p.2) (Falkingham & Namazie, 2002, pp.22-24) (Sillers, 2005, p.7). New approaches on the measurement of poverty at the household level emerged, of which one is referred to as the 'end results' poverty measurement. Here, the aim is to identify the multi-dimensional face of poverty, by means of direct measures of material aspects of the household (such as assets and housing characteristics) and non-material aspects (such as food security and the level of education) respectively (Meyer, Nagarajan, and Parker, 1999, p.5). Using direct measures that aim to reflect the quality of life of the household, research that supported this approach is often labeled as 'human' poverty analysis rather than 'income' poverty analysis (Qizilbash, 2003a, p.8).

A third approach to identify poverty at the household level is known as the 'participatory' method. Here, the measurement of poverty at the household level is derived from personal perceptions on the own poverty status, for example by means of personal wealth ranking, participatory mapping and seasonal calendars (Laderchi, 2001, p.7). The value of this approach lies with the construction of a definition of poverty where external perceptions on poverty are removed and it is argued that the most vulnerable groups in a community are more efficiently identified. (Hatch and Frederick, 1998, p.17).

However, the approach is also criticized for the impact of power relations within communities, the limitations in the generalization of findings for larger client population, the difficulty in regard to comparison with other poverty studies and the extensive work and trained personal that is required to provide qualitative data (Laderchi, 2001, pp. 13-14) (Zeller, 2001, p.8).

Last, poverty assessments can also be based on an integrated approach, which combines quantitative expenditure or income data with 'end results' poverty variables. The poverty index of the CGAP poverty assessment tool is based on such an integrated approach.

Development organizations are often constraint in regard to detailed information on income or expenditure data of their clients. The relatively easy practice of collecting a set of qualitative and quantitative data that could proxy poverty at the household level, contributed to the development of more practical poverty assessments such as the CGAP poverty assessment tool (Filmer & Pritchett, 2001, p.116). To what extent results on the measurement of poverty at the household level on the basis of a wealth index is comparable to measurement on the basis of income or expenditure data is subject to debate. Some studies find a strong association between the money metric identification of poverty and approaches on the basis of a composite index respectively (May & van der Ruit, 2003, p.30) (Filmer and Pritchett, 2001, p.120) (Sahn and Stifel, 2003, p.484). Others in turn, criticize the simple replacement of an index based on a range of proxy variables to express household economic welfare; classifications of poor and non poor households may differ considerably when these are ranked on the basis of some type of welfare index or instead other types of poverty measurements are applied (Qizilbach, M., 2003a, p.11) (Montgomery, 2000, pp. 161-165) (Hentschel et al. 2000 as cited in Falkingham & Namazie, 2002, p. 38) (Perry, 2002). However, one maybe should not try to justify the validity of the measurement of poverty by comparing a wealth index with explanations on welfare in terms of income or expenditure data at the household level, but instead acknowledge that both measures have their own theoretical backgrounds, as well as their own methodological problems respectively. In this respect, (Filmer and Pritchett, 2001, p.2) claim that the construction of their productive asset index³ instead of having the pretention to replace an income measure on poverty, it is better described as a proxy for the household's long run economic status.

³ NB. The Productive Asset Index is discussed later on in this chapter.

2.3 Depth of poverty outreach

In order to evaluate to what extent poor households are reached by a microfinance program, in the literature two relevant concepts are introduced; Breadth of outreach and depth of outreach respectively. Breadth of outreach refers to the scale of microfinance operations of the MFI or the total number of clients that are being served. Depth of outreach can be associated with the value that society attaches to the net gain from the use of micro credit by a given borrower (Schreiner, 2002, pp.7-9). Among the poorest households, many lack the resources to enter the financial formal system. Therefore, evaluating the absolute number of poor clients (e.g. breadth) or the degree of poverty of clients (e.g. depth) in the client portfolio could be assessed in order to evaluate on poverty outreach. The CGAP poverty assessment tool is concerned with depth of outreach, since it classifies client households in different poverty groups on the basis of their relative poverty level and subsequently evaluates the relative presence of client households that are classified in the category that identifies the relatively poorest households respectively.

Breadth and depth of (poverty) outreach are often perceived as interrelated concepts. The general idea is that reaching poorer households compensates for serving a relatively small number of clients while in turn, reaching a large number of clients, justifies the focus on relatively non-poor clients. However, it is important to mention here that there is not necessarily a trade-off, as large self-sufficient MFIs that generally serve the better off households can, by means of their scale, reach large numbers of poor clients in absolute terms. (Wollni, 2001, p.7) (Paxton, 2003, p.5). In a study commissioned by Micro-Credit Ratings International Limited no evidence was found that greater financial sustainability of an MFI would impact negatively on poverty outreach (Sinha & Brar, 2005, p.6) .

2.4 Factors on depth of poverty outreach

Depending on the context, a number of factors are influential in regard to what extent a MFI is able to reach poor households with microfinance services. In the first place, (potential) client-related factors have an impact on outcomes on depth of poverty outreach, in regard to the constraints and needs of the enterprises and households in the area of study. (Gulli & Berger, 1999, p.17). Hereby, one could think of the possible presence of the self-selection bias of less poor clients; the poorest households may not want to get involved, as a result of their fear to get further indebted, due to cultural constraints to respond to formal credit systems or their specific needs of non-financial support respectively (Rosenberg, 2006) (Banerjee & Duflo, 2003) (Hentschel & Waters, 2002).

A study from Dufhues and Buchenrieder (2006) on poverty outreach in Northern Vietnam, concludes that the outcome that the poorest households are rarely reached by the formal microfinance institutions in Vietnam does not result from access constraints as a results from their overall poverty level, but instead because of the low demand on (formal) credit of this group of households.

In the second place, institutional features, such as the institution's mission, strategy or policy objectives, can have a considerable impact on depth of poverty outreach (Henry et al., 2003, p.164) (Montgomery, 2004). There exists great diversity among the nature of MFI's and therefore to what extend targeting poor clients is a priority within institution's policies. This relates to the specifications of social objectives of the organizations and the content, terms and conditions of the credit programs that are offered. Patterns of policy may either include or exclude the poorest households, and may therefore promote or inhibit depth of poverty outreach respectively. If depth of outreach turns out not to be considerable, but the MFI is also not aiming to reach the poorest households with their financial services, this should be acknowledged when reflecting on the results (Wollni, 2001). A study from Zeller and Johansson (2006) for example, investigated the question whether the legal status and lending technology of microfinance institutions were related to their poverty outreach performance. The study made use of data derived from a household survey of client households from a range of MFI's in Bangladesh and Peru respectively. The overall conclusion was that member-based organizations, such as cooperatives in Peru and solidarity group lending by NGO's in Bangladesh, performed best with respect to depth of poverty outreach, irrespective whether the national poverty line was taken as a reference point or either a relative poverty measure was used.

Last, contextual factors, such as the local infrastructure, the regulatory framework, the presence of other providers of financial services and the poverty characteristics in the area, impact on the overall wellbeing of households and therefore on outreach (Gulli & Berger, 1999, p.17). When starting up a new branch, MFI's often evaluate on the basis of these external circumstances, whereby economic opportunities, population density and growth, the expected demand on services, the cost of supplying services and the perceived riskiness are usually important criteria (Sharma and Zeller, 1999, p.7). Dependent on the mission and objectives of the respective microfinance organization and the related criteria of program placement, contextual factors may cause a bias against reaching the poorest households with microfinance services.

In the aforementioned study of Wollni (2001) , where depth of poverty outreach was evaluated at the national level for a MFI in Mexico, it was found that although the institute was operating in the poorer states of Mexico, a majority of it's clients resided in the relatively better off municipalities within these states. The foregoing indicates that even if the MFI may have chosen to locate it's branches in poorer states with the aim to reach the poorer household, on a higher disaggregated level, the poorest households may still not be reached.

2.5 Relations between poverty outreach and poverty reduction

Organizations that spend donor resources on development activities such as microfinance, are increasingly confronted with international poverty eradication targets such as those defined in the Millennium Development Goals⁴. Therefore, many MFI's are under continuous pressure to put institutional effort to improve access to new economic opportunities for the poor or the economically excluded segment of society (Littlefield, Morduch & Hashemi, 2003). Though how valuable from an ethical perspective the reasoning behind reaching poor households may be, whether attending specifically the poorest segment of the population with credit opportunities contributes to a sustainable impact on overall poverty reduction, is subject to debate. In regard to the role of credit as a direct measure to poverty reduction, some studies conclude positively, addressing it's potential in regard to consumption smoothing and reduction of vulnerability of the household (Zaman, 1999) (Khandker, 2005) (Morduch, 1998) (Pitt & Khandker, 1998) (Tilakaratna & Wickramasinghe, 2005) (Matin, Hulme & Rutherford, 2003). Nonetheless, others conclude that the poorest households are not served by improved access to micro-credit, due to the lack of entrepreneurial skills, the insufficient sustainable economic resources of these families and the risk of *increasing* vulnerability caused by repayment obligations. Many of these authors claim that to help out the poorest households, protectional measures such as social programs on health, education and food security should be prioritized to create a basis for economic activity. (Robinson, 2001) (Banerjee & Duflo, 2007) (Rosenberg, 2006). In addition, non-poor households that run a micro enterprises and participate in microfinance programs, may indirectly reduce poverty through the expansion of their economic activities and the creation of new employment for the poorer segments of society (Gulli & Berger, 1999). Thus, if MFI's would focus on non-poor households, it is not necessarily conflicting the purpose of overall poverty reduction.

⁴ NB. Ref. One can consult the following website: <http://www.un.org/millenniumgoals>

In sum, provided that poverty reduction is taken as an important development goal of microcredit services, there is no agreement whether this goal is best fulfilled by targeting the poorest households or by providing credit on a broader basis to low income households.

In addition, the relation between the initial poverty level of client applicants and the provision of credit differs per microfinance institution; With some MFI's the probability to get a loan increases with initial low living standards of the household, while with other MFI's the opposite is the case (Hulme & Mosley (1996).

2.6 The CGAP poverty assessment tool

The CGAP poverty assessment tool is developed by the International Food Policy and Research Institute (IFPRI) of the United Nations, and further developed for the microfinance sector by the CGAP. The principle aim was to develop a tool that could be used by development practitioners to assess the poverty level of beneficiaries of development projects, on the basis of a comparison with the poverty level of the general population in the local area. The tool was developed with the help of principle component analysis, a statistical method that selects and weights a range of poverty indicators that are measures of multiple dimensions of poverty, which together construct a composite index of relative poverty at the household level. The indicators that are recommended by the CGAP method either express the means of the household to achieve welfare, which reflects the earning potential of the household such as family size, education level, economic occupation and assets, or either relate to the fulfillment of basic needs, referring to indicators on health status, access to social services, food, shelter and clothing respectively (Henry et al. 2003, p. 3). The final set of recommended poverty indicators⁵ covered the following dimensions; 'demographic features', 'housing conditions', 'food security and vulnerability', and 'assets' of the household respectively (Zeller et al., 2001, pp.12-16).

2.7 Other poverty assessment tools

Though more poverty assessment tools are comparable to the CGAP poverty assessment tool⁶, in the following section three related poverty assessment tools are discussed, in order to explain why the application of the CGAP poverty assessment tool in this study is considered as valid.

⁵ NB. In chapter 3, the identification of this final set of recommended indicators is further outlined.

⁶ NB. Clear overviews of a range of poverty assessment tools are discussed in USAID-AMAP, 2004 & McGee, R. & Brock, K. , pp: 9-29.

2.7.1 Index of Insatisfaction of Basic Needs (IBN)

The index on insatisfaction of basic fulfillment of needs is commonly used to identify household poverty rates in Latin America. A particular version of this index was developed within the Nations of Andean Communities (CAN), for which in each of the respective national household surveys information is requested on the basis of four variables that proxy housing conditions, access to public services, access to health services and the level of education respectively. The outcome of the index is determined by the average of the ratios of all the included indicators to their set norms, which are defined in advance by means of information derive from national assessment survey data and a consultative process with poverty experts and policy analysts (SIISE, 2008). The IBN index differs from the CGAP methods with respect to the process of the selection of indicators and the weighting system of the poverty indicators that are involved in the index.

2.7.2 Progress out of Poverty Index (PPI)

The Progress out of Poverty Index was developed by a joint initiative of the Ford Foundation, the Grameen Foundation and the CGAP respectively. Likewise the CGAP poverty assessment tool, the PPI method was designed with the aim to construct a relatively practical tool to identify household poverty levels, in the absence of detailed information on income or expenditure data of the household. The purpose was to design a simple questionnaire that could produce poverty score cards of households, based on a small number of globally comparable indicators of poverty at the household level. This scorecard was developed on the basis of statistical analysis and data information of national household expenditure surveys. Differences with the CGAP poverty assessment tool is that the Progress out of Poverty Index estimates the probability that a client household lives below the national poverty line, which results in a absolute definition on the measurement of poverty, whereas the CGAP tool uses a relative poverty definition instead that is identified in the first place on the basis of the overall poverty level of non client households in the local area⁷ (Schreiner, 2008)⁸.

⁷ NB. Countries for which the CGAP , The Grameen and Ford Foundation have created a national PPI are; Bangladesh, Bolivia, Haiti, India, Malawi, Mexico, Nepal, Nigeria, Pakistan, Philippines, South Africa, Ecuador and Vietnam

⁸ NB. More information on the design, the methodology and experiences with the progress out of poverty index can be consulted at: <http://progressoutofpoverty.org/>

2.7.3 Productive Asset Index

The asset index, as how it is developed by Filmer and Pritchett (2001), consists of an evaluation of twenty-one asset indicators that refer to three categories; ‘consumer durables’ (such as bicycle and refrigerator); ‘dwelling characteristics’ (such as type of toilet facility and source of drinking water) and ‘household landownership’ respectively. Selected assets were aggregated by means of Principle Component Analysis to produce a single asset index . Due to the broad interpretation of the range of assets of the household, the dimensions ‘assets’ and ‘housing conditions’ which are applied in the CGAP tool are addressed in the productive asset index as well. However, the asset index does not provide indicators on food security and demographic features of the household respectively. In addition, a difference with the CGAP tool is that the asset index focuses on the *ownership* of assets only. This approach can be criticized for the absence of knowledge on the quality, the quantity and the working condition of these assets (Falkingham & Namazie, 2002, p:30) Also, overall variance in the data is reduced, since only dummy variables are used to construct the asset index⁹.

2.8 Using the CGAP poverty assessment tool

On the basis of the foregoing comparison of different poverty assessments, applying the CGAP poverty assessment tool is considered as valid on the basis of the following reasons. First, using a relative poverty definition whereby client household’s poverty is held against the overall poverty level of non client households, is an interesting approach since in this way poverty characteristics of the non client population are revealed as well. Second, The CGAP tool doesn’t rely on a fixed number of poverty variables but instead allows that the set of poverty indicators that finally constructs the poverty index may vary, dependent on the context of study; apart from a recommended list of universally applicable poverty variables, additional indicators can be added and tested with PCA for their validity as well. Third, as long as the relation with poverty for each selected variable is theoretically grounded on the basis of the specific poverty context of the area, principle component analysis allows to account for the relative strengths of the different indicators and identifies poverty in a rigorous and objective way. Fourth, a multi-dimensional approach was preferred over an approach where only dimension of household poverty (such as is the case with the productive asset index or household poverty on the basis of income) is considered. Finally, due to a focus on non sensitive data, which are often easily observable for the researcher, the trustworthiness of the data increases (Henry et al., 2003, pp. 2-15).

⁹ NB. The use of dummy variables in a poverty index is further discussed in chapter 3.

Chapter 3. Predicting depth of poverty outreach

3.1 Introduction

This chapter explores experiences on depth of poverty outreach in Latin America, the microfinance sector and poverty characteristics of Ecuador and gives a short review on the institutional features of INSOTEC respectively. Hereafter, on the basis of these aspects, an effort is made to define what results can be expected in regard to depth of poverty outreach for this particular study.

3.2 Experiences in depth of poverty outreach

Practice has shown that MFI's often fail to reach the poorest households (Hulme & Mosley, 1996), (Gulli & Berger, 1999), (Coleman, 2006), (Khandker, 2001) (Morduch and Haley, 2002) (Tilakaratna & Wickramasinghe, 2005). However, success stories exist like for example ASA and the Bangladesh Rural Advancement Committee (BRAC) in Bangladesh, institutions that both have high percentages of clients who live on less than a dollar per day (Littlefield, Morduch and Hashemi, 2003). In Latin America, there is a tendency towards what is called the commercialization of microfinance institutions. This trend shows a decrease in the relative presence of poor clients in client portfolios. As a consequence, the service of microfinance diverts from being a direct means to alleviate credit constraints to the poorer segment of the population (Montgomery, 2005) (Armendáriz de Aghion & Morduch, 2005) (Copestake, 2007). A study from Navajas et al. (2000) evaluated poverty outreach at the household level of the five greatest MFI's in Bolivia on the basis of the Index on Insatisfaction of Basic Needs¹⁰. Four categories of poverty groups were created, on the basis of the aggregate household poverty scores derived from the index. Compared to distribution estimates of poverty from a national perspective, on average it was found that the poorest of the poor were not attended by the credit programs. Interestingly, those MFI's lending to rural borrowers reached a greater depth of outreach, while urban lenders reached more of the relatively poorer households in absolute terms. Regarding the studies that were undertaken in Latin America and applied the CGAP poverty assessment tool, results showed that only Banco Solidario (Ecuador) and Promuch (Peru) had an overrepresented share of client households classified in the category that identified the relatively poorest households, in comparison to the share of non client households that were present in that same category¹¹.

¹⁰ NB. Features of this tool were outlined previously in chapter 2 in section 2.7.1 respectively

¹¹ NB. For an overview of the results on depth of poverty outreach derived from studies that used the CGAP tool, one can consult appendix 1.

3.3 Difficulties in comparison of studies

Problems of interpretation arise when reviewing studies on poverty outreach to predict outcomes on depth of poverty outreach for the credit program of INSOTEC. As was pointed out in the foregoing chapter, different definitions on what one understands as ‘poor households’, as well as different methodologies to measure poverty at the household level respectively, are at stake. Evaluations on the outcomes on depth of poverty outreach of other MFI’s are therefore particularly relevant if the same methodology is applied or either an attempt has been made, to compare outcomes of the CGAP tool with other poverty assessments on the basis of some kind of ranking procedure, such as is done in May & van der Ruit (2003). But relying on the results of other studies on the basis of the CGAP tool is also complex in another way; Since the CGAP tool works with a relative measurement of poverty, a comparison of studies does not give much insight if the available studies took place in another region or country. To the knowledge of the researcher; the CGAP poverty assessment tool has not been implemented on a broad scale and no previous studies were undertaken with MFI’s that were comparable to INSOTEC in the same local area.

3.4 Predicting depth of poverty outreach

Arguments that support a prediction on the outcomes of depth of poverty outreach of the credit program of the agency of Santo Domingo of INSOTEC, are related to the current patterns of microfinance practices in Ecuador, the institutional policies of the microfinance institute and the poverty characteristics of the area of study. These topics are discussed in the following sections, in order to predict depth of poverty outreach for this study specifically.

3.4.1 Microfinance in Ecuador

While the regulated microfinance sector in Ecuador experienced high growth rates in previous years, in the first three trimesters of the year 2009 the sector grew with only 2,7 percent to a total amount of 1.555,2 million \$¹². The internal and external economic instability resulted in a growing scarcity of external finance, decreasing liquidity of the (micro)finance sector and increasing taxes on interest payments to loan disbursements.

¹² NB. Superintendencia de Bancos y Seguros, Compendio de Micro-finanzas, September 2009 as cited in INSOTEC (2009)

Due to an overall decreasing demand on goods and services, microfinance clients experienced increasing difficulties in payment of interests and pay offs. As a result, Ecuadorian microfinance institutes were confronted with increasing portfolios at risk. The microfinance sector responded with prioritizing the disbursement of individual loans, as well as the disposal of higher loans.

This trend caused a decrease in the number of operations with 23,4 percent in the first three trimesters of 2009 in comparison to the same period in 2008. In addition, the average loan size increased from \$ \$1,665 to \$1,896 respectively¹³. It may be expected that these circumstances did not favor the small scale lenders in the microfinance sector. However, though an increasing loan size is often positively related to the well being of the client, the opposite, that a decreasing loan size would result in an increase of poorer client households, is less evident (Sinha & Brar, 2005, pp.4- 6).

3.4.2 Institutional features

In contrast to the aforementioned 2,7 percent growth of the regulated microfinance sector in the first three trimesters of 2009, in that same period the active portfolio of INSOTEC grew by 12,9 percent to a total amount of \$4.554.449,29¹⁴. By the start of the fieldwork in September 2009, the credit programs of INSOTEC consisted of a total volume of outstanding loans of \$6.767.047,63 on the basis of 6,136 credit operations. The growth of the total volume of outstanding loans and the number of operations in the first three trimesters of 2009 declined from 57,7 percent to 17,1 percent and from 43,5 percent to 18,6 percent respectively in comparison to that same period in 2008. Nonetheless, in contrast to the overall regulated microfinance sector, the institute was able to realize a *decrease* in the average loan size of \$ 1,117 in the first three trimesters of 2008 to \$ 1,103 in the same period in 2009¹⁵. However, at the same time the institute also experienced a decline in the share of credits equal or less than \$ 600 in the first nine months of 2009 from 25,0 percent to 22,6 percent. With respect to the agency of Santo Domingo, this share declined from 22,9 percent to 16,0 percent in this period¹⁶.

¹³ NB. Superintendencia de Bancos y Seguros, Volúmen de Microcrédito, Agosto 2009 as cited in INSOTEC (2009).

¹⁴ NB. INSOTEC, Programa de Microfinanzas, Evaluación de Resultados , Enero – Septiembre 2009, p: 8

¹⁵ NB. INSOTEC, Programa de Microfinanzas, Evaluación de Resultados , Enero – Septiembre 2009, pp:10-11

¹⁶ Id.

Regarding INSOTEC's potential to reach poor households, it is important to notify that the institute does not aim to provide their credit services to poor households in particular; the institute believes that the risk of indebtedness of these households and the possibility of economic losses for the organization are too high¹⁷. This is also the main reason why no systematic classification of client households exists on the basis of poverty characteristics of the client or the client household respectively.

The absence of this specific interest is also shown in the definition of the type of clients the institute is focusing on, which doesn't make any reference to the poverty profile of their potential clients:

'The potential clients of INSOTEC are all those micro-entrepreneurs who's activities are generated on the basis of production, commerce or services, which are considered as legitimate, and do not go against practices of good behavior or the environment respectively'.¹⁸

Second, INSOTEC only provides individual loans which, in comparison to group lending generally attracts less poor households. In addition, to be in the position to get a loan, INSOTEC requires that one has to be economically active as an entrepreneur and in addition should have been running the business for at least twelve months. The foregoing conditions are common for many MFI's in Latin America and possibly exclude the share of the poorer segment of the population that do not have the resources to build up and sustain a self-owned economic activity.

Though the foregoing features on INSOTEC's institutional policy may hamper considerable depth of outreach, some features on the side of the practices of the institute may in turn promote depth of poverty outreach. A majority of the outstanding loans of the agency of Santo Domingo are identified as 'crédito minorista', which refers to loans below the amount of \$ 3000, provided to micro-entrepreneurs who have annual sales inferior to \$ 100.000¹⁹. This group of clients is generally characterized by a low working capital, income that is largely spent on household consumption, very low levels of investment and savings, low levels of inventories, and purchase and selling activities are generally taking place on the spot.

¹⁷ NB. Personal communication with Luis Felipe Guevara, Head Officer Department 'Risk and Analysis' (08/08/2009)

¹⁸ NB. This definition was taken from the document 'Reglamento de Crédito y Cartera de INSOTEC', which was last updated on June 26th, 2009

¹⁹ NB. Banco Central de Ecuador, Regulación N° 184-2009, p.5

Then, in regard to the selection of new clients, implicitly there lies an emphasis with attending individuals from the lower socio-economic segment of the population; the executives who evaluate the loan applications are trained to prioritize credit applications that are requested by credit applicants from the lower socio-economic classes in Ecuador²⁰. This practice was also recognized within the results of a Social qualification report, that was independently elaborated by the Rural Finance Network (RFR), from which INSOTEC became a member in 2008. Last, INSOTEC provides the alternative of formal credit to about sixty percent of their clients.

This means that these clients do not have access to the regulated formal financial institutions that are registered with the governmental Supervising body of Bancs and Assurances²¹. Taking into account that people who are characterized by low living standards often experience greater difficulties of access to credit to finance their activities, it is expected that many clients origin from the lower socio-economic segments of Ecuadorian society.

3.4.3 National and local poverty characteristics

For this study, the poverty level of client household is evaluated on the basis of the relative poverty level of non client households that is derived from a local, a national, an urban and a rural sample respectively²². Therefore, it is expected that outcomes on depth of poverty outreach will differ, depending the context that is considered. The following poverty indicators give an insight on the distribution of poverty in Ecuador at different geographical levels. For comparison, information of the same poverty indicators but then from the year 1999 are also given, as well as the percentage of change in poverty rates between the two time periods. In 2006, the national poverty line in Ecuador was determined at \$ 1,89 per person per day, while the extreme poverty line was estimated to be \$ 1,06 respectively (INEC, 2006). The features of the Index of Insatisfaction of Basis Needs were previously discussed in chapter 2.

²⁰ NB. Personal communication with personnel of INSOTEC (11/08/2009)

²¹ NB. Red Financiera Rural (Rural Finance Network), Informe de Desempeño Financiero y de Mercado – ONG INSOTEC, junio 2009

²² NB. In the next chapter, the approach in this study of the CGAP tool is more profoundly discussed

Table 1 Poverty indicators of Ecuador at different geographical levels in 1999 and 2006

Year	Population living in poverty (%)			Population living in extreme poverty (%)			Population experiencing Insatisfaction of Basic Needs (%)		
	1999	2006	Growth (%)	1999	2006	Growth (%)	1999	2006	Growth (%)
National	52,2	38,3	-26,6	20,1	12,8	-36,3	50,6	45,8	-9,5
Urban	36,4	24,9	-31,6	8	4,8	-40,0	26,3	24,8	-5,7
Rural	75,1	61,5	-18,1	37,3	26,9	-27,9	85,8	82,2	-4,2
Coastal Area	52,8	40,3	-23,7	16	10,8	-32,5	54,5	51,4	-5,7
Sierra Area	51,4	33,7	-34,4	24,4	12,2	-50,0	46,2	36,9	-20,1
Amazon Area	50	59,7	19,4	22,2	39,6	78,0	72,1	71,0	-1,5

Source: (SIISE 2008) ECV 1999 and ECV 2006

The most remarkable of these data is that though on a national level, poverty incidence has decreased considerably, the trend of an improvement of living standards of the population is unevenly distributed over the country; the sierra region was most successful in the alleviation of poverty, followed by the coastal region. The Amazon region clearly stays behind in this pattern. Also, irrespective of the poverty indicator that is concerned, large differences can be found in the percentage share of people living in poverty between the urban and rural population; the urban population of Ecuador is more wealthy than the rural population. In addition, between 1999 and 2006, poverty levels have decreased more in the urban area than in the rural area.

In the following table, results on poverty rates on the basis of the three poverty indicators are also given for a set of provinces of Ecuador. This set included those provinces from which one or more cantons were identified as the local (operational) area of the agency of Santo Domingo of INSOTEC. For comparison, the results of poverty rates are also given for the canton of Santo Domingo de los Colorados²³, as well as for the whole population of Ecuador, as was given in the previous table²⁴.

²³ NB. In 2006, Santo Domingo de los Colorados was still a canton of the province of Pichincha. In 2007 this canton changed into a province.

²⁴ NB. While all other poverty data in this table are based on the year 2006, instead the poverty data from the canton of Santo Domingo de los Colorados are based on a population census from 2001, and should therefore be taken with more scrutiny.

Table 2 Poverty indicators of Ecuador by province

Provinces	Population living in poverty (%)	Population living in extreme poverty (%)	Population experiencing Insatisfaction of Basic Needs (%)
Manabí	55,3	19,9	74,8
Esmeraldas	49,1	19,4	76
Los Ríos	44,6	12,5	77,3
Pichincha	25	7,7	40,6
Santo Domingo de los Colorados	48,9	19	69,6
National	38,3	12,8	45,8

Source: SIISE, 2008

The most interesting for this study is the information that, except for the province of Pichincha, of which the results are highly influenced by the relatively high standards of living in the capital city of Quito, all surrounding provinces of the local area have higher shares of populations living in poverty on the basis of all three poverty indicators in comparison to the results that are found at the national level. In addition, the results that are indicated for the canton of Santo Domingo de los Colorados are more or less similar to the outcomes of the local populations in poverty of the provinces Manabí, Esmeraldas and also but to a lesser degree of the province of Los Ríos respectively. These results suggest that local poverty, that is with respect to the surrounding provinces (of which a set of cantons are together considered as the local area in this study), is more severe in comparison to national poverty characteristics of Ecuador.

3.5 Expectations on depth of poverty outreach

Generally, the commercialization of microfinance in Latin-America, as well as the current trends of an increase in the average loan size and an increase in portfolios at risk in Ecuador respectively, do not stimulate considerable depth of poverty outreach of microfinance institutions in Ecuador. In regard to the institutional features of INSOTEC, depth of poverty outreach may further be hampered due to the absence of a targeting strategy on poor households and the requirements to receive a loan that may exclude the poorest households. In turn, though perhaps less convicting, depth of poverty outreach may be promoted through the attendance of a large share of clients of INSOTEC that can not enter the regulated financial banking system, and the effort of the institute to focus on potential clients that come from for the lower socio-economic segments of the Ecuadorian population respectively. Dependent on the sample of non client households that is taken as a reference to assess client household's relative poverty level, differences in outcomes on depth of poverty outreach are expected.

Since poverty characteristics at the national level were found to be less severe in comparison to the local level, a greater depth of poverty outreach at the national level is therefore likely to be the result, since client households may be evaluated as relatively poorer if the overall poverty level of the population of reference is lower. Outcomes on urban and rural depth of poverty outreach are difficult to predict beforehand, since no prior information was available on differences in poverty rates of households by residential area of the household respectively, between the local level and the national level. However, dependent on whether the local, the national, the urban or the rural poverty context is considered, it is expected that results may vary considerably.

Chapter 4. Methodological framework

4.1 Introduction

The following chapter discusses the methodological framework of this study. In the first part, more detailed information is provided on the CGAP poverty assessment tool and its particularities for this study in particular. Then an overview is given on the conceptual and mathematical background of principle component analysis and subsequently the requirements of this type of analysis with respect to the poverty assessment of households is discussed. The chapter concludes with an explanation on the sampling design of client and non client households respectively.

4.2 Application of the CGAP poverty assessment tool

4.2.1 The CGAP poverty assessment indicators

In order to determine a final set of recommended poverty indicators that could construct a poverty index in different local contexts, the designers of the CGAP tool selected about 300 poverty indicators on the basis of a range of criteria²⁵ by means of a close review on the results of in-depth-interviews on household economics, famine early warning systems, national monitoring systems of food security, nutrition and vulnerability, as well as a study on the poverty indicators that are currently used by MFI's (Zeller, 200, p.12). Then, a subset of poverty indicators was identified, that were found to be most suitable to build up a generic questionnaire, which could assess poverty at the household level. The selection of these (final) indicators was based in the first place on the ease and accuracy with which information on the indicators could be taken from household surveys and secondly, on the basis of a significant correlation with the so called 'benchmark indicator', which is the per member expenditure on clothing and footwear in the last three months (Zeller, 2001, p. 16). This questionnaire was field-tested in four different countries with different socioeconomic and cultural contexts and applied to MFI's that either worked in urban areas, in rural areas or in both. The MFI's also differed with respect to the characteristics of their client portfolios and the range of financial products they offered.

²⁵ NB. The first evaluation to select poverty indicators was based on the following criteria; suitability for rural and urban contexts, sensitivity of question, time and cost requirements to obtain response, quality of the indicator in discriminating between different poverty levels, reliability (including the possibility to verify the answer in a re-check), simplicity, and universality in an international context (Zeller et al, 2001)

The selected indicators were adopted to the national context of each country. Principle Component Analysis was done with about 40 to 50 remaining poverty indicators for each country²⁶, and on the basis of these results, a set of 25 poverty indicators were finally recommended by the CGAP poverty assessment tool. These indicators are considered to be universally applicable in varying local contexts²⁷. As mentioned before, the CGAP poverty assessment tool allows to construct a poverty index, in which the relative contribution of the included indicators is not set by some arbitrary choice of the researcher, but instead by means of statistical analysis that adjusts the weights of the indicators, taking into account the specific poverty context existing therein. Though the recommended CGAP poverty indicators were taken as a starting point, apart from the fact that the final set of indicators is dependent on the local context of study, it is also dependent on the availability of data. The final list of poverty indicators that builds the poverty index can therefore differ considerably in practice.

4.2.2 Using a national database

An important feature of the CGAP poverty assessment tool is that the status of relative poverty of a client household is defined, in comparison to the state of well being of the overall population in the local area. However, different from the procedure in the CGAP poverty assessment tool, where data for the non-client household sample are obtained by means of the EPI Cluster Survey Design Method (Henry et al., 2003, pp. 42-44), the sampling of non client households in this study is based on data from the national household survey ‘Encuesta de Condiciones de Vida’ that was commissioned by INEC²⁸ and the World Bank and held between November 2005 and October 2006 respectively. Using an existent national database, that was developed on the basis of a multi-stage random sampling of household was found to be more applicable in this study, most importantly for the difficulty to guarantee the randomization of the sampling of (non client) households if the EPI-method would have been applied (Copestake et al., 2005, p. 711) and the practical reason of time availability. While using a national database as the source of information on the non client households, it was only possible to incorporate those recommended CGAP poverty indicators in the analysis, that were also present in the database.

²⁶ NB. For an explanation on the explicit criteria that were used in Principal Component Analysis for these pilot studies, I refer to Zeller et al, 2001, p:20.

²⁷ NB. In appendix 2 one can consult the list of the recommended poverty indicators of the CGAP tool

²⁸ NB. Instituto Nacional de Estadísticas y Censos (National Institute of Statistics)

Since not all recommended poverty variables were present, other available variables that either resembled the missing recommended CGAP variables or either were also used as poverty indicators in other poverty studies in Ecuador, were also taken into account²⁹. An explanation on the changes in the selection of poverty indicators is further discussed in the section 4.5 of this chapter.

4.2.3 Measuring depth of poverty outreach

Depth of poverty outreach, as was mentioned before, is concerned with an evaluation on the degree of poverty of (client) households. The application of the CGAP poverty assessment tool in this respect, allows to verify to what extent a microcredit program succeeds to reach the poorest households. Here to, one needs some kind of classification of the non-client households, that distinguishes them on the basis of their relative poverty level. The non client households are ranked into five equal groups on the basis of their poverty score that is obtained from the constructed poverty index. The found poverty scores at the cut off points that divide these five groups of non client households then become a reference point for the grouping of client households; based on their poverty scores they are classified within one of these groups. Since the non-client households are divided equally, any deviation from these equal proportions amongst the client households signals a skew either to or against greater poverty outreach (Zeller, 2001). Eventually the degree of poverty outreach can then be analyzed by means of an evaluation on the percentage shares of client households in each relative poverty group, in comparison to the fixed 20 percent of non client households that is categorized by default in each of these groups (Henry et al., 2003, pp. 9-15). Ratio's of relative presence of client households for each poverty group can then be calculated by dividing the percentage share of client households by the 20 percent of non client households that are present in each category, which are a measure of relative presence of client households in each category. Though the designers of the CGAP tool leave it to freedom of the researcher how to interpret found percentages and ratio's, it is clear that a low percentage of client households and subsequently a ratio that approximates zero, in the group that identifies households with the (relatively) highest poverty levels, refers to a very low depth of outreach.

²⁹ NB. An overview of a list of all the variables that were tested with PCA for their descriptive power on poverty at the household level, can be consulted in appendix 3.

In turn; if in the highest (or the second highest) poverty group, instead high percentage shares of client households are found, one could speak of a considerable depth of outreach³⁰.

4.3 Relative poverty measurement in a broader context

Identifying the relative poverty level of client households at the local level, which refers to the area where the agency is operative³¹, brings along some considerations with respect to a valid interpretation of the results on depth of poverty outreach. One should notify that in a relatively poor local area, relatively better off client households may on average still be poorer than households outside the identified local area. In turn, when the local area is characterized as a relatively wealthy part of the country, relatively poorer clients may on average still be better off than households living outside the operational area. It is also argued that in a relatively poor area, it may be more easier to reach the poorer client than in a relatively rich area. On the basis of the latter, it is therefore argued that insights on the poverty characteristics of the local area in comparison to other areas enables the researcher to reflect whether the branch location contributes or in turn impedes to reach poor households. The foregoing addresses the notion of program placement bias (Idem, pp. 155-165). Program placement bias refers to the occurrence that the type of clients that is reached by a credit program is influenced by the choice of placement of the credit program. To give an example; if depth of poverty outreach at the local level is not very considerable, one could use the counterargument that the agency may operate in a relatively wealthy area, which makes it also more difficult to reach the poorer client.

4.3.1 CGAP tool recommendations on regional poverty analysis

In order to deal with the limitations of findings on local depth of poverty outreach, the CGAP tool suggests to collect poverty measures (such as the poverty head count ratio, the poverty gap, the gini-coefficient and the human development index) from secondary data resources at a sufficiently disaggregated level, in order to compare the poverty context of the local area with other areas of the country respectively (Id). Two critical remarks are made here in regard to this approach. Hereafter another approach is introduced to cope with the limitations of the results of depth of poverty outreach at the local level.

³⁰ NB. It is worth mentioning that the CGAP tool explains the procedure on the basis of three poverty groups, but also emphasizes that a different number of groups can be opted for. (Henry, et al., 2003, p: 144). Since most socio-economic and poverty studies in Ecuador refer to quintiles when analyzing the Ecuadorian population at the household level, it is argued that a division in quintiles is a more appropriate segmentation for this study.

³¹ NB. The identification of the local or 'operational' area of the agency of Santo Domingo of INSOTEC, is further elaborated in the section on sampling design in this chapter.

In the first place it is argued that when data are compiled from more than one source, differences often appear regarding the division of geographic areas, units of measure, definitions of terms on poverty and the year in which data were collected³². A choice has to be made in regard to what poverty measures are considered to get an idea on the overall poverty level in the area. Reviewing the available poverty measures, as these were evaluated in chapter 3, it becomes clear that depending the poverty measure considered, the incidence of poverty varies across the different regions and provinces of Ecuador. It also turns out to be difficult to distinguish information on poverty measures within and outside the local area, since the identified local area consists of different political entities and aggregates of poverty data may not reflect reality sufficiently. Last, available poverty data at different disaggregated levels are based on the year 2001 and 2006; by that time Santo Domingo de los Colorados was still a canton within the province of Pichincha. By August 2007, it turned into a province but the original borders of the canton are not completely equivalent to the new province.

Second, to what extent the found differences in outcomes on poverty measures between the intervention area and its surrounding areas are contributive to an impact on the institution's ability to reach poor households is difficult to say. This is particularly so, when these differences are not very remarkable³³. To give an example, when the local area has a slightly higher percentage of people living below the national poverty line of \$ 1,89 per capita per day compared to surrounding areas, one could argue that there is a higher probability that poorer clients are reached. However, if these poor households mostly live in the remote areas of the respective area far away from the agency, it is at least doubtful whether a higher percentage of poor households in the area could lead to greater depth of poverty outreach.

4.3.2 Another approach

Since the information of non-client households is derived from a national database, it allows to select different samples of non-client households as a changing reference against which the relative poverty status of client households can be determined. Therefore, in order to evaluate depth of poverty of client households beyond the local level, depth of outreach will also be evaluated from a national, an urban and a rural perspective respectively.

³² NB. This argument was also addressed by the CGAP tool

³³ NB. Reviewing the poverty data that were consulted in Chapter 2 to develop predictions on depth of poverty outreach for this study, it became clear that the poverty characteristics in the intervention area are not found extremely different from data from its surrounding areas, in regard to poverty data that were evaluated by province respectively.

Findings on differences in outcomes on depth of poverty outreach, dependent on the area that is considered, complements the limited information on the relative poverty level of client households on the basis of a local poverty context only. While conducting PCA with the same poverty indicators that were identified at the local level but instead including in the analysis non client households from all over Ecuador, depth of poverty outreach will be reviewed from a national perspective, on the basis of the construction of a national poverty index. In addition, depth of poverty outreach is also evaluated from a geographical perspective. This is done by evaluating depth of poverty outreach of urban and rural client households separately by constructing an urban and a rural poverty index on the basis a sample of urban and rural non client households respectively. Hereto, it was found to be most appropriate to derive an urban and rural sample of non client household from the national sample, since at the local level the number of respondents by residential area of the household, would have been critically low to conduct PCA.

Since the purpose of the construction of these variants of the local poverty index is to evaluate outcomes on depth of poverty outreach of client households regarding different poverty contexts, it is argued that maintaining the same set of variables sustains a consistent conceptual approach on how poverty at the household level can be described. However, this approach may result in that the poverty indices at the national, urban and rural level do not comply fully with all the requirements of an appropriate model in PCA³⁴.

Apart from the fact that this approach (re)considers depth of poverty outreach at the local level on the basis of different poverty contexts, it also provides the means to evaluate the consistency of the constructed poverty index at different disaggregated levels. Changes in the relative importance of indicators give insights in the strengths and weaknesses of the applicability of the poverty indicator in different poverty contexts. Applying rural and urban depth of poverty outreach for example, may give information whether the poverty index is applicable to geographical sub-samples or in turn indicates a rural or urban bias with respect to some of the retained poverty indicators.

³⁴ If the aim of this study would have been to find the best selection of poverty variables that could distinguish household poverty levels regarding the national, the urban and the rural context respectively, it is obvious that in each case some of the included poverty variables would have been replaced by more appropriate variables. To give an example, in previous analyses that were conducted with samples of non client households, a dummy variable on 'whether or not the household head was an agricultural laborer as his principle economic position' turned out to be a good explanatory variable on poverty in the rural area.

4.4 Principle Component Analysis

4.4.1 PCA and household poverty assessment

Principle component analysis is a statistical technique that analyses the interdependence of a set of variables and searches for a linear combination of variables that together describe a 'latent' variable, the so called component. The method is based on the assumption that the interrelation between the variables describes one underlying construct. The procedure identifies a few orthogonal linear combinations of the variables which best portray the common information. The specific application of PCA to this study is that the method isolates and measures the poverty component that is embedded in the set of poverty indicators and subsequently creates a household- specific poverty index. The aim therefore is, to search for a certain set of variables that together describe poverty at the household level in a meaningful way.

To be appropriate for their applicability in Principle Component Analysis, the poverty indicators are interval scaled and have an ordinal character, which means that the variable responses or categories of variable responses of the indicator distinguish different poverty levels at the household level. An example could be given by introducing 'the type of toilet facility', which is one of the recommended poverty indicators in the CGAP poverty assessment tool. Considering the context of living standards in Ecuador, five categories were identified; flush toilet and sewerage system (1), pit toilet and septic hole (2), pit toilet (3), latrine(4) and no toilet facility(5) respectively. The ordinal character of the variable implies that an Ecuadorian household with flush toilet and sewerage system is generally less poor than an Ecuadorian household with a pit toilet and a septic hole. But then again an average household with these facilities is considered to be less poor than a household with only a pit toilet, and so on and so forth.

4.4.2 Mathematical model of PCA

The principal component technique slices the information that is contained in a set of variables into several components. Each component expresses an underlying common variable as a linear combination of the original indicators such that it accounts for the maximum of the total variance in these original indicators.

The formula that expresses the construction of the first component can be notated as followed: (Filmer and Pritchett, 2001, p. 117);

$$A_{1j} = f_{11} \times a_{1j} + f_{12} \times a_{2j} + \dots + f_{1N} \times a_{Nj} \quad (j = 1, \dots, J) \quad (1)$$

Whereby:

A_{1j} = The first common variable (poverty component) for each household j

f_{11} = The loading of the first variable on the first component

a_{1j} = The (standardized) value of the first variable for each household j

f_{12} = The loading of the second variable on the first component

a_{2j} = The (standardized) value of the second variable for each household j

f_{1N} = The loadings of the included N variables on the first component

a_{Nj} = The (standardized) values of the N variables for each household j

The poverty index that is expressed by the first component in principle component analysis A_{1j} is a standardized and normally distributed variable with a mean of zero and a standard deviation equal to one that gives the poverty scores for each household j.

4.4.3 Extraction of components

Outcomes of Principle Component Analysis usually results in the extraction of several components (for example a poverty component and a demographic component), this because the variance in the data are interrelated in different ways and therefore may describe several common characteristics. However, the first principal component always accounts for the largest proportion of the total variability in the set of indicators used, the second component accounts for the second largest amount of variability not accounted by the first component, and so on for the higher order components. In regard to this study, the first component is expected to capture poverty and is supposed to account for most of the movements in the indicators. The extraction of second and higher order components, apart from their irrelevance to describe poverty that was explored, have been left out from the analysis.

4.4.4 Pre-selection of poverty indicators

In order to satisfy the relation of the potential poverty variables with a variable that proxies household total expenditures, CGAP tool recommends to consider only those variables in PCA that have a statistically significant correlation with the benchmark poverty indicator; which is the per member expenditure on clothing and footwear in the last three months (Henry et al., 2003, p.7)³⁵. To guarantee the strength of this benchmark indicator, Zeller et al (2001, p. 19) refers to several studies, which conclude that the proportion of clothing and footwear expenditures in the household budget remains stable, irrespective of the income level of households. Second, as was discussed in chapter 2, CGAP recommends to include indicators that capture different dimensions of poverty, in order to account for the multi-dimensionality of household poverty. Third, in regard to the number of poverty indicators to be included in PCA, CGAP tool recommends to involve 10 to 20 indicators (Henry et al., 2003, p.21).

4.4.5 Output information of principle component analysis

A range of statistical output information results from PCA, of which the analysis is necessary in order to adjust the set of indicators that construct the final model. A summary of this output information can be consulted in appendix 5. In this table a set of concepts are outlined, and if necessary an explanation on their particularities is given; the component loadings, the percentage of explained variance, the determinant, the KMO-test and the Bartlett's test of sphericity respectively, are of major importance in regard to the process of selection of the poverty indicators that are finally retained in the model.

4.4.6 Procedures for adjustment of the model

After pre-selecting potential poverty indicators by means of a statically significant bivariate correlation with the benchmark indicator and taking into account the conditions on the number and the multidimensionality of the poverty indicators respectively, principle component analysis is conducted, whereby other considerations are taken into account. In the following section the procedure to adjust the model to a final set of poverty indicators is outlined. In the first place the absolute value of the component loadings of all the variables should be considered;

³⁵ NB. Though CGAP tool recommends to use 'total expenditure on clothing and footwear of all household member in the last year', this study used the variable '*Per member expenditure on clothing and footwear in the last three months*'; the ECV database only provided data on this variable over a time period of three months, which is why the benchmark indicator changed accordingly.

On the basis of a minimum of 300 respondents, the loadings should have a minimum value of 0,198 to be statistically significant in the model. However, it is recommended to include only variables with loadings equal or greater than 0,300 (Henry et al, 2003, p. 135).

Second, the sign of the component loading is reviewed, in order to assure that the relationship between the indicator and poverty is meaningful. To give an example of a ratio-scaled variable; regarding the variable 'Current price value of the car(s) of the household (if available)', one expects a negative sign on it's component loading on poverty, since it is assumed that a higher price value of the car is related to a decrease in poverty at the household level.

Then, to also give an example with respect to variables based on categories, recalling the variable 'type of toilet facility' where a value of '1' corresponded with 'flushtoilet connected to the sewerage system' and the value of '5' corresponded to 'no toilet facility' respectively, it should be assured that the sign of the component loading of this variable is positive, since higher values of the variables correspond with a decreasing quality of the toilet facility of the household and thus it is assumed, an increase in poverty at the household level (Id.)

Third, a review on the percentage of explained variance of the original variables in the first (poverty) component is needed. This is a measure of representativeness of the original data in the extracted component. The designers of the CGAP tool do not suggest a minimum percentage that should be found, though it is clear that this percentage should be as high as possible (Idem p.137).

Fourth, output information in PCA also produces the KMO test and the Bartlett's test of sphericity. The KMO test compares the magnitudes of the observed correlations between the variables to the partial correlations between the variables respectively. A result of a KMO test of $> 0,60$ is acceptable, a ratio $> 0,70$ is good, while a ratio of $> 0,80$ is very good. The Bartlett's test of sphericity evaluates whether the observed correlation matrix of the variables is not similar to an identity matrix, which would indicate insufficient correlation between the data to conduct PCA in an appropriate way. The test needs to produce statistically significant difference at a confidence level of 0,05. (Idem, p.139).

Fifth, the value of the determinant should be reviewed, which is a measure of degree of intercorrelation between the variables. A determinant of less than 0.00001 requires to reconsider the selected set of variables, because it indicates that partial correlations between one set or more sets of variables are too high in comparison to the overall correlation between the variables. (Field, 2005, p.641).

Last, one can consult the communalities, that reflects the power of association between the variables and alle extracted components. CGAP tool suggests that comunalities should at least holds a minimum value of 0,198. (Henry et al., 2003, p.137). However, since communalities refer to the explained variance of each variable with respect to all extracted components³⁶, it is worth mentioning that communalities give not much insight on the specific explained variance of each variable in the first (poverty) component. A high level of communalities could be the result of a high explanatory power of the variable with respect to another extracted component. In the next table, a schedule is outlined that gives a clear overview of all the steps that were considered to verify the validity of different combinations of (sub)sets of variables. The final selection of poverty indicators that constructed the poverty index complied with all the aforementioned requirements and conditions.

Table 3. Procedures in the adjustment of the model and the selection of indicators

Pre-selection of indicators	Condition
Benchmark indicator	All poverty indicators should have a statistically significant correlation with the benchmark indicator
Multi-dimensional indicators	The poverty index should have a balanced set of multi-dimensional poverty indicators ³⁷
Number of indicators	Between 10 and 20 indicators
Adjustment of the model	Condition
Significant component loadings	Component loadings have a minimum absolute value of 0,300 and their signs indicate an expected relationship with poverty at the household level.
Percentage of explained variance	Percentage of explained variance of the first (poverty) component should be as high as possible.
KMO-test	Ratio: > 0,70
Bartlett's test of sphericity	Statistically significant result at (p < 0,05)
Determinant	Determinant > 0,00001
Communalities	Communalities preferably have a minimum value of > 0,198

4.4.7 Calculation of the composite poverty index

The first component that is derived from PCA and captures poverty at the household level and constructs a household specific poverty index. The values of the poverty index denominated as 'component scores' express the poverty score for each household.

³⁶ NB. To determine the value of the communalities, CGAP tool follows the common rule of extracting all components with eigenvalues larger than 1, which is based on the so called 'Kaiser criterion'. (Kaiser, 1960) However, much literature can be found that criticizes this criterion to decide how many components should be maintained, see for example; Hayton et al. (2004), Fabrigar et al., (1999) and Keeling (2000).

³⁷ NB. As mentioned before the following dimensions of poverty are considered in the CGAP tool; demographic characteristics, Food security and vulnerability, housing conditions and assets of the households respectively.

Poverty scores are calculated by means of the insertion in (1) of the found component loadings of the poverty component and the standardized indicator values for each household respectively; high values of scores refer to relatively poorer households whereas low value of scores refer to the relatively better off household respectively.

4.5 Adaptations

A number of variables were tested by means of principle component analysis. A specific description on the selection of the finally retained poverty variables is discussed in Chapter 6. However, in the next section, in order to get an idea to what extent the finally retained set of poverty indicators differed from the CGAP recommended poverty indicators list, rigorous changes are discussed for each dimension of poverty in the next section. In addition, the use of dummy variables and the adjustment of inflation on price valued variables is addressed.

4.5.1 Human resources

On the basis of the condition to retain a minimum of two variables in each dimension to comply with the multi-dimensionality of poverty, the ratio-variable of the number of household members earning an income divided by the total number of household members (hereafter the ‘working dependency ratio’) was retained as a ‘human resources/demographic features’ variable, since this variable proxies human capital of the household on the basis of labor capacity. It is expected that the higher this ratio, the less poor this household is likely to be, since risks on shortfalls of income is spread over different household members and wealth of the household usually increases with increasing stability of employment possibilities of the household (World Bank, 2004)³⁸. Those recommended CGAP poverty indicators that were also present in the ECV 2005/2006 database³⁹ did not result in sufficiently high component loadings on the poverty component.

³⁸ NB. Those recommended CGAP poverty indicators that were also present in the ECV 2005/2006 database (e.g. the education level of the household head, the literacy ratio of the household adult members and the ratio of the number of children below the age of 16 to the total number of household members) did not result in sufficiently high component loadings on the poverty component

³⁹ NB. Those variables were: 1) the education level of the household head, 2) the literacy ratio of the household adult members and 3) the ratio of the number of children below the age of 16 to the total number of household members

4.5.2 Housing conditions

Additional poverty indicators that were added to the dimension on ‘housing conditions’ were the ‘Location of toilet facility’ and the ‘Location of the primary water source’ of the household respectively. The first variable was also taken up in the progress out of poverty index⁴⁰ for which the poverty indicators in the Ecuadorian context were identified in Schreiner (2008). Both variables have the same structure in regard to the categories of responses; (i) inside the house, (ii) outside the house but on personal territory or (iii) outside the house and also outside the personal territory respectively. The premise of these variables with respect to poverty is that households that have the provision of their water source and toilet facility inside the house are likely to be the best off and those households that have these facilities located outside the house are expected to be poorer. Finally, households for which these facilities are located outside their personal territory are likely to be found among the poorest households respectively.

4.5.3 Food security and vulnerability

A problem with the dimension on ‘food security and vulnerability’ is that none of the recommended CGAP poverty indicators were requested in the ECV 2005/2006. Therefore, many alternative indicators that were present in the database were evaluated in PCA, to review their explanatory power to capture poverty at the household level⁴¹. The variables ‘Difficulties of payment of food in the last two weeks’ and ‘Frequency of purchase of whole chicken’ were finally retained in the poverty index, on the basis of the result of higher component loadings in PCA, in comparison to other food security variables that were tested. The first variable may refer to food (in)security in the short term, whereas the second variable could be seen as a proxy for the household’s purchasing power in regard to luxury food. The inclusion of the variable ‘Frequency of purchase of whole chicken’ is based on the assumption that the more frequently the household usually buys ‘whole chicken’ at once, the less poor the household is likely to be. This latter variable is similar to a recommended poverty variable in CGAP tool, indicated by the question ‘how many days a week (frequency) the household consumes a luxury food; the choice for ‘whole chicken’ is meaningful, since buying a whole chicken at once still is a luxury to many households in Ecuador. In a study that was held in Ecuador and Bolivia by HIVOS and the Free University of Amsterdam and in which the CGAP tool was applied, ‘whole chicken’ was taken up as a luxury food in the questionnaire they applied (HIVOS, 2002, p. 4).

⁴⁰ NB. This variable in PPI however was integrated with the type of toilet facility in one variable

⁴¹ NB. As was mentioned before, a list of all poverty indicators that were evaluated in PCA, indicated per dimension can be consulted in [appendix 3](#)

4.5.4 Assets

In contrast to the case of scarcely available variables on the food security dimension, the majority of the variables that were recommended by the CGAP tool in regard to ‘assets of the households’ were present in the ECV 2005/2006 database. However, most of these variables did not produce sufficiently high component loadings on the poverty component, which questioned their explanatory power on poverty at the household level. Finally, only the ‘Current price value of the car (if available)of the household’ was maintained in the final set of indicators, together with the dummy variable ‘Possession of shower’. The latter is not a recommended variable by the CGAP tool and therefore an additional indicator in the poverty dimension of ‘assets of the household’. However, the indicator is also applied in the Progress out of Poverty Index of Ecuador (Schreiner, 2008) and resulted in a very high component loading when PCA was conducted.

4.5.5 The use of dummy variables

Despite high component loadings that were the results of PCA, some of the available poverty indicators in the ECV 2005/2006 database, were questioned on their required ordinal character. To give an example in this respect, in the following table, the available categories of the variable ‘Type of roof material’ and the corresponding values of these different response categories is given.

Table 4 Characteristics of the variable 'Type of roof material'

<i>“What is the dominant construction material of the roof of your house?”</i>	
Response categories	Value
Concrete/ paving stone	1
Eternit	2
Zinc	3
Roof tile	4
Canes/Leaves	5

The values of the different categories in PCA result in the assumption that the higher the value, the higher the poverty among the household. However, this assumption should be meaningful in regard to the fact that PCA expects that each identified category distinguishes different groups of households on the basis of their poverty level; one can not simply assume that an average household with a roof made of zinc is less poor than an average household that has a roof of roof tile.

To know whether all categories are sufficiently explanatory to distinguish between different poverty levels, while holding other variables constant, dummy variables for all different categories were introduced in PCA. This strategy was applied to all (potential) poverty indicators that were questioned for their ordinal structure. Sometimes, only one category was most strongly related to the poverty level of the household. In other cases, all categories turned out to be sufficiently relevant. In the previous example, the first category (concrete/pavingstone) was most explanatory on poverty. Therefore, this variable was changed into a dummy variable, of which the characteristics are shown in table 5.

Table 5 Characteristics of dummy variable 'Type of roof material'

<i>“What is the dominant construction material of the roof of your house?”</i>	
Response categories	Value
Concrete/tile/paving stone	1
All other roof material	0

The example variable produced a component loading of -0,550 in the final (local) poverty index, which indicates that the household poverty level is likely to decrease (negative sign) if the roof material is concrete or paving stone respectively; the statistical power of this variable in the model to describe poverty at the household level is $(0,550)^2$.

The dummy variables in this study that were constructed on the basis of this procedure maintain an ordinal character; a value of '1' and a value of '0' reflect two different categories of household responses, and between these categories, a different poverty level of the average household is assumed. It is important to mention here that variables with more categories or values, increase the variability in the data, a characteristic that is more suitable to PCA. It is therefore recommended to limit the number of dummy variables as much as possible because if not, the overall variability in the data is reduced. Also if only binary variables would construct the poverty index, the knowledge of the researcher on how different values of a variable relate to relative household poverty levels would be lost (Kolenikov & Angels, 2004). In the final set of poverty indicators, only three dummy variables were applied to construct the poverty index⁴².

⁴² NB. A list of the variables that were questioned for their ordinal character and for which dummy variables were introduced can be consulted in [appendix 3](#)

4.5.6 Variables with price values

Regarding the fact that the data from the sample of non client households were collected between November 2005 and October 2006 respectively, while the field work for data collection on the sample of client household took place in September 2009, the study considered an adjustment for inflation to those poverty indicators that were measured on the basis of a price value. Price variables that were taken up in the final poverty index were; Per member expenditure on clothing and footwear in the last three months and the ‘Current price value of the car(s) of the household. Taking 2004 as the base year, the average price index between November 2005 and October 2006 (period 1) was found to be 104,92, whereas this price index increased to 132,41 in the month September 2009 (period 2). To be able to express the variables with price values in US dollars of period 1, data on price variables from period 2 were adjusted to prices in period 1. In the next table one can consult the price devaluator and how it was calculated; the price devaluator was determined at 0,7923.

Table 6 Calculation of price devaluator

Price Index Nov. 2005- Oct. 2006	Price Index September 2009	Price devaluator
104,92	132,41	$104,92/132,41= 0,7923$

Source: www.inec.gov.ec

Although neither a statistical significant difference was found in the poverty index variable with or without the adjustment of inflation on price variables, nor a difference was found in the percentage of explained variance on the poverty component respectively, the adjustment of prices was nonetheless maintained, to make the collected information of client households compatible with the consulted information of non client households to respectively.

4.6 Sampling client households

The CGAP poverty assessment tool recommends to select a sample of 200 client households and also to guarantee a minimum ratio of 2:3 of client households to non-client households respectively. The larger number of non client households was recommended to account for the expected larger variance in the collected data of this latter group (Henry et al., 2003, p. 37). In addition, in order to conduct a proper PCA, the required sample size is also related to the number of variables that are included in the analysis. In this study, the rule of thumb of 15 respondents (households) for each variable, was taken as a reference with respect to the total number of households in the analysis (Field, 2005, p.639).

A random sample of client households whereby the relative presence of clients in the different parishes is taken into account, would have guaranteed the representativeness of the client sample to reflect the total client portfolio of the agency of Santo Domingo in a meaningful way. However, several causes have impeded a random sampling of client households. In the first place, INSOTEC had an interest to expand their financial services to the rural areas, more specifically to the Westside of Santo Domingo de los Colorados, into the Province of Manabi and the canton El Carmen respectively⁴³. Therefore, the institute desired to focus on clients in the western (expanding) part of their operational area, and additionally they preferred to consider a (part of the) client population that included relatively more clients from the rural area than they actually had in their client portfolio by the time the fieldwork took place. As a result, the final sample did not consider the clients in the three urban parishes on the eastside of Santo Domingo de los Colorados⁴⁴. Second, in order to include more rural clients in the final sample, only 50 percent of the total number of urban client in each (retained) urban parish was considered in the (remaining) client population.

Starting with the original total client portfolio of the agency of Santo Domingo, that consisted of 1085 active clients, as registered by the 31st of July in 2009, a total number of 463 urban client households, which accounted for 42,7 percent of the total client portfolio, was not considered in the new 'total client population'; 28,6 percent of these eliminated urban client households represented those clients that were registered in the urban parishes on the eastern side of Santo Domingo de los Colorados, while the remaining 72,4 percent was eliminated due to the 50 percent reduction of urban clients in the remaining urban parishes where INSOTEC is operational⁴⁵. Finally, a total of 622 client households remained eligible for sampling for being within the finally considered client population.

4.6.1 Selection of new client households

The CGAP tool, in line with other literature on sample selection with respect to measuring poverty outreach (Copestake, 2005, p.711) (Karlán, & Goldberg, 2006, p.18) , emphasizes that the sample preferably consists of new clients only. Since poverty outreach focuses on the (initial) poverty status of the household of the client that they *reach* and not the household that they already *attend*, the aim is to reduce the impact of the program on poverty as much as possible;

⁴³ NB. Personal correspondence with Luis Felipe Guevara Head Officer Risk and Analysis (June 2009)

⁴⁴ NB. Excluded parishes are: Rio Toachi, Chiguilpe and Zaracay.

⁴⁵ NB. These urban parishes are: Bombolí, Calzacón, Río Verde and Santo Domingo de los Colorados (urban)

The status of poverty among borrowers may be subject to change due to the impact of the credit program itself. In this study, ‘new’ clients were identified as those individuals that received no more than just one loan from INSOTEC⁴⁶. Therefore, as far as the subsamples by parish allowed this, either a random selection of the registered new clients was applied or all new clients in the parish were selected for the client sample. If the required number of client households for a specific parish was not reached, old client households were then (randomly) selected to reach the minimum amount of 200 respondents in total. In the final client household sample, a majority of 167 (83,5 percent) of the clients were ‘new’ clients, whereas the rest (16,5 percent) were old clients respectively. It was chosen to consider only the new clients in the analysis, this to reduce the poverty impact of credit as much as possible. In the table on the next page, one can consult the considered ‘total’ client population and the considered sample of client households by parish and by geographical area respectively⁴⁷. In addition, the fieldwork sample of client households as well as the (new) client household sample* that was used in further analysis, are given.

⁴⁶ NB. For practical reasons unfortunately, it was not possible to select only newly registered clients who did not receive any loan yet. Identifying new clients as clients that received their first loan no longer than three months ago, as recommended by the CGAP tool (Henry et al.,C. 2003, p:33), was not possible either, due to the limited number of new clients in some of the considered parishes.

⁴⁷ NB. The parishes colored in pink are urban, while those colored in green are identified as rural.

Table 7 Overview of sampling design of client households

Total Population considered		
	Total	%
El Carmen	94	
4 de Diciembre	27	4,3%
El Carmen	66	10,6%
San Pedro de Suma	1	0,2%
Santo Domingo de los Tsáchilas	528	
Abraham Calazacón	70	11,3%
Bombolí	105	16,9%
Río Verde	86	13,8%
Sto. Domingo d/l Colorados (U)	79	12,7%
Sto. Domingo d/l Colorados (R)	32	11,4%
Alluriquín	17	2,7%
Puerto Limón	74	11,9%
Luz de America	12	1,9%
San Jacinto del Búa	50	8,0%
El Esfuerzo	3	0,5%
Total	622	

Total' Population considered	#	%
Urban clients	406	65,3%
Rural clients	216	34,7%
Total	622	

Sample considered						
	# New	% New	Old	% Old	# Total	% total
El Carmen					30	
4 de Diciembre	6	66,7%	3	33,3%	9	4,5%
El Carmen	20	95,2%	1	4,8%	21	10,5%
San Pedro de Suma	0		0		0	
Santo Domingo de los Tsachilas					170	
Abraham Calazacón	22	95,7%	1	4,3%	23	11,5%
Bombolí	29	85,3%	5	14,7%	34	17,0%
Río Verde	28	100,0%	0	0,0%	28	14,0%
Sto. Domingo d/l Colorados (U)	23	92,0%	2	8,0%	25	12,5%
Sto. Domingo d/l Colorados (R)	6	60,0%	4	40,0%	10	11,4%
Alluriquín	5	100,0%	0	0,0%	5	2,5%
Puerto Limón	16	66,7%	8	33,3%	24	12,0%
Luz de America	4	100,0%	0	0,0%	4	2,0%
San Jacinto del Búa	7	43,8%	9	56,3%	16	8,0%
El Esfuerzo	1	100,0%	0	0,0%	1	0,5%
Total	167	83,5%	33	16,5%	200	

Field work sample	#	%
Urban clients	131	65,5%
Rural clients	69	34,5%
Total	200	
New client sample*	#	%
Urban clients	122	73,1%
Rural clients	45	26,9%
Total	167	

4.6.2 Reflections on the client sampling design

The institutional focus on rural client households has affected the distribution of original client portfolio in regard to the residential area of the households, while, as can be derived from the table, the final choice to consider only new client households in the analysis has affected the balanced weighting of relative shares of client households for each (retained) parish respectively. In the original client portfolio only 7,5 percent of the client households resides in the rural area, while in turn 26,9 percent of the final sample of (new) client households is rural based⁴⁸. However, by also evaluating depth of outreach for urban and rural client households separately, by means of an urban and a rural poverty index respectively, the geographical bias in the overall client household sample can then be neglected. The choice to select only new client households requires the notion that on balance these client households may have different characteristics than the present client portfolio, due to changed product technologies of the credit program, external factors in the socio-economic environment or changes in the self selection bias of clients over time. Evaluating the impact of these factors however, goes beyond the scope of this study

4.6.3 Field work procedures

The field work for data collection on the client household sample took place between the 24th of August 2009 and the 31th of September 2009 respectively. When the final questionnaire was discussed and some improvements on text interpretation were made in cooperation with INSOTEC, 4 pilots were done to test the validity of the questionnaire. Apart from a change in the range of response categories of one variable, no other adaptations were found to be necessary⁴⁹. A total of three persons were involved in the data collection, being the researcher and two students from one a local university respectively. Sixty-five percent of the questionnaires was conducted by the researcher, whereas the two students were responsible for the remaining thirty-five percent of client household visits.

⁴⁸ NB. If not would have been chosen consider only new client households in the final client household sample, even more rural client households (34,5%) would have been retained.

⁴⁹ NB. In appendix 10, one can consult the applied questionnaire

4.7 Sampling non client households

4.7.1 Sampling non-client households at the local level

As explained before, data from the non client household sample were obtained from a national database, elaborated by means of the ECV 2005/2006. The local sample of non client households consisted of 504 valid respondents in the 'local area'⁵⁰. This area covers the area where the agency of Santo Domingo de los Colorados is operational, which is the Province of Santo Domingo de los Tsáchilas and the canton of El Carmen respectively, as well as the surrounding cantons and parishes that have the same geographical characteristics⁵¹. In appendix 9 one can consult a map of the 'local area' (indicated with green).

4.7.2 Sampling non client households at the national level

In order to determine depth of poverty outreach from a national perspective, the whole sample of households that was approached to elaborate the ECV 2005/2006 database was used in the analysis. The sample included a total number of 13535 of households⁵², and according to INEC standards this sample is considered as reliable to reflect the national population of Ecuador⁵³. The three stage sampling design was derived from a balanced weighting between estimations on sampling errors of measurement, which relates to the decrease of representativeness when the sample gets smaller and estimations on non sampling measurement errors, which relates to the increasing probability of inaccuracy of the data information when the sample size gets larger.

⁵⁰ NB. The sample of non client households included $\approx 91\%$ of the total sample of non client households that resided in the specified intervention area (that originally consisted of 552 non client households). However, those households that didn't provide data for one or more of the finally included variables were left out in the analysis. It was preferred to rely on original data than to create new data from missing data by means of replacements with the mean of the variables; The total sample is small, and most variables are not normally distributed, such that replacement with the mean may not reflect reality sufficiently.

⁵¹ NB. These surrounding areas are the following; (Province of Los Ríos) Cantons San Jacinto de Buena Fé y Valencia, (Provincia of Esmeraldas) the cantón Quinindé, (Province de Manabí) the cantón El Carmen, (Province of Pichincha),the cantón de Santo Domingo de los Colorados, Pedro Vicente Maldonado y Puerto Quito. This political division is based on the year 2006. In this period, Santo Domingo de los Colorados was still a canton within the province of Pichincha.

⁵² NB. For the national as well as the national bases urban and rural sample respectively, it was decided to replace missing values on the poverty variables with the mean of the variable, this in order to retain the full number of households in the sample.

⁵³ NB. Source: http://www.inec.gov.ec/web/guest/rep_inf 'Explicación de la muestra de la Encuesta de Condiciones de Vida 2005-2006' (11/08/2009)

4.7.3 Sampling non client households in the urban and rural area

Then, in order to address depth of urban and rural poverty outreach respectively, on the basis of the national total sample of households, the urban sample and the rural sample was distinguished. In the ECV database, households are referred to as 'urban' in case the households resides in 'those settlements with more than 5000 inhabitants' and 'rural' in the case the household resides in 'those settlements with less than 5000 inhabitants' respectively. The urban (sub) sample included a total number of 7500 valid cases of households, whereas the rural sample consisted of a total number of 6033 household respondents.

Chapter 5. Principle demographic, socioeconomic and geographic characteristics of client and non-client households

5.1 Introduction

The information in this chapter reviews a set of demographic socio-economic and geographic characteristics of client households and non client households in the local area.

Differences in the distribution of these variables reveal specific features of client households in comparison to non client households of the local population. In the last section, some independent client household characteristics are discussed.

5.2 Distribution of demographic variables on the household head among client and non client households

5.2.1 Gender of the household head

The household head was defined as the member of the household that felt most responsible for the other household members on the basis of the ability to secure the principle economic resources for the household. A first remarkable difference between client households and non client households is that client households are more often headed by women in comparison to non client households. 34,7 percent of the client households is female headed, whereas only 16,3 percent of the non client households have a woman as the household head. This difference in distribution was found to be significant at a p-level of $< 0,05$ ⁵⁴.

5.2.2 Age of the household head

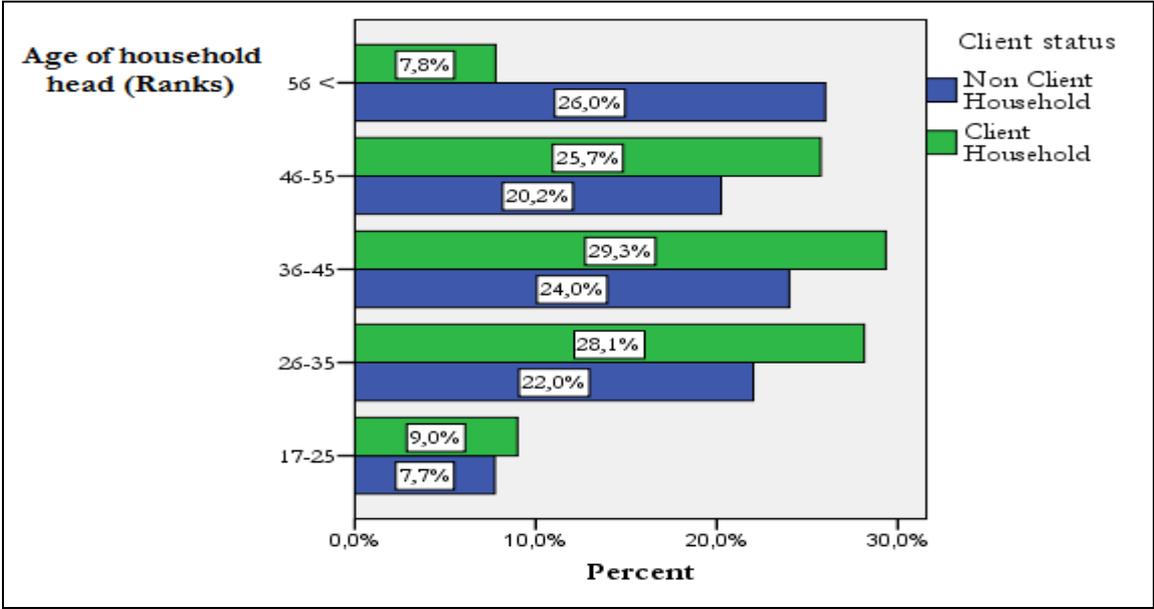
To get an insight in the distribution of the age of the household head, a categorization was made in five different ranks, as can be noticed in figure 1. A significant difference was found in the distribution of these ranks between client and non client households respectively⁵⁵. Most remarkably, reviewing the four ranks that cover the age of 17 to the age of 55 respectively, the percentage share of client households in these categories is every time higher than that of non client households, whereas in turn, non client households are overrepresented in the category of household heads equal or over the age of 56.

⁵⁴ NB. Pearson Chi-square test; value: 25,891, Df:1, Sig(two-tailed): 0,000

⁵⁵ NB. Pearson Chi-square test; value: 24,784, Df: 4, Sig(two-tailed): 0,000

In addition, a statistical significant difference was found between the average age of the client and the average non client household head respectively⁵⁶. This indicates that overall, the household heads of client households are significantly younger in comparison to their counterpart of non client households respectively.

Figure 1 Distribution of age of household head (in ranks) by client status



5.2.3 Principle economic position of the household head

With respect to the principle economic position of the household head, a significant difference was found in the distribution of the different categories between client and non client households respectively⁵⁷. The percentages that reflect the distribution of both groups of household over the categories are indicated in table 8.

⁵⁶ NB. Independent Samples t-test; (equal variances not assumed); t-value: -4,950, Df: 371,804, Sig(two-tailed):0,000

⁵⁷ NB. Pearson Chi-square test; value: 152,680, Df:12, Sig (two-tailed): 0,000

Table 8 Distribution of the principle economic position of the household head (%) for client and non client households

Principle Economic Position Household Head	Client Household (%)	Non Client Household (%)	Total (%)
Pensioner	0,6	0,0	0,2
Employee in public organisation	1,2	5,8	4,6
Employee in private organisation	7,2	18,7	15,7
Day-laborer	0,0	4,2	3,1
Business owner	21,6	7,9	11,4
Working for own account	56,3	18,1	27,9
Domestic worker without payment	1,8	1,2	1,4
Agricultural laborer on salary	0,0	9,6	7,1
Agricultural day-laborer	2,4	15,0	11,7
Farm owner	4,8	8,7	7,7
Agricultural worker on salary	3,6	9,8	8,2
Non-domestic agricultural worker without payment	0,0	0,2	0,2
Domestic employee	0,6	0,8	0,8

The most remarkable differences were found in the categories ‘business owner’ and ‘working for own account’. Client household heads are largely overrepresented in both categories in comparison to the respective shares of household heads that origin from the local population. A percentage of 66,5 percent of the clients considered themselves as the head of the household, which is reflected in these figures; INSOTEC requires that one runs it’s own business to be in the position to receive a loan. Furthermore, the smaller shares of client household heads that have a principle economic position in the agricultural sector, results probably from the fact that the client household sample is highly urban biased.

5.2.4 Level of education of the household head

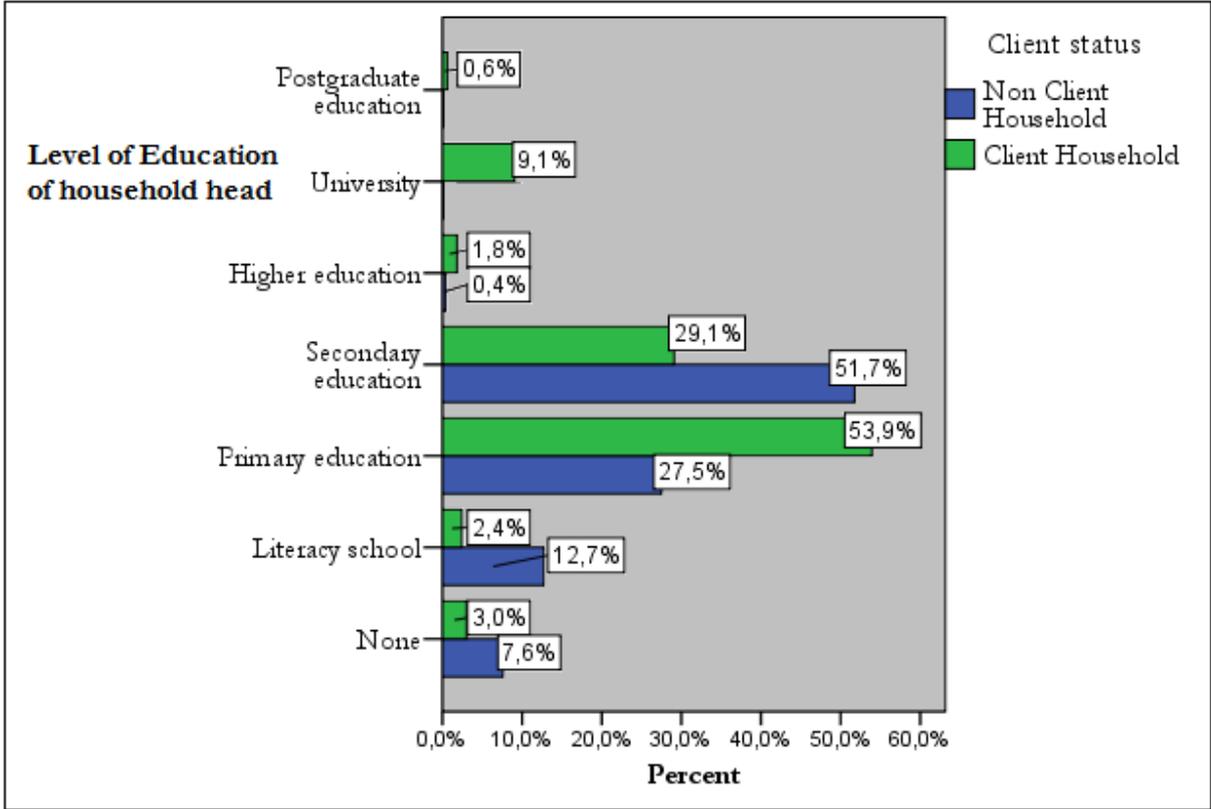
Regarding the level of education⁵⁸, on the following page in figure 2, the percentage shares of household heads which were found in each specified category is given by client status. A significant difference was found in the distribution over the different categories between client and non client households respectively⁵⁹. Most remarkable are the differences in results with respect to primary and secondary education of the household head respectively.

⁵⁸ NB. The level of education refers to the highest obtained degree or diploma of education that the household head has achieved.

⁵⁹ NB. Pearson Chi-square test; value:106,239, Df: 6, Sig(two-tailed): 0,000

In the category of primary education the relative share of client household heads is very much overrepresented in comparison to non client household heads (53,9 percent vs. 27,5 percent) where as more or less the opposite is true for the category of secondary education respectively (29,1 percent vs. 51,7 percent). Though the majority of the client household heads only obtained a primary education diploma, the education level of the average client household head was found to be significantly higher than the average household head of the local population (3,54 vs. 3,25)⁶⁰. This is mostly due to the remarkable high share of client household heads with a university degree; 9,1 percent of the client household head holds a university degree, in comparison to none of the household heads from the local population respectively.

Figure 2 Distribution of level of education of household head by client status



⁶⁰ NB. Independent samples t-test (equal variances assumed); t-value: 3,311 df:650, Sig (two-tailed): 0,001

5.3. Distribution of geographical and socio-economic variables among client and non client households

5.3.1 Residential area of the household

Regarding the distribution of households on the basis of residential area, a statistical significant difference was found between client and non client households respectively⁶¹. This is not surprising, as the subsample of client households is (as discussed in the section on sampling design) highly urbanized; while 73,1 percent of the client households resides in the urban area, this is only true for 54,0 percent of the non client households. It may be that the urban bias of the sample impacts negatively on overall depth of poverty outreach, but to a lesser degree if urban depth of poverty outreach is evaluated. In the following table an overview is given of the geographical distribution of client and non client households respectively.

Table 9 Distribution of household by residential area and by client status

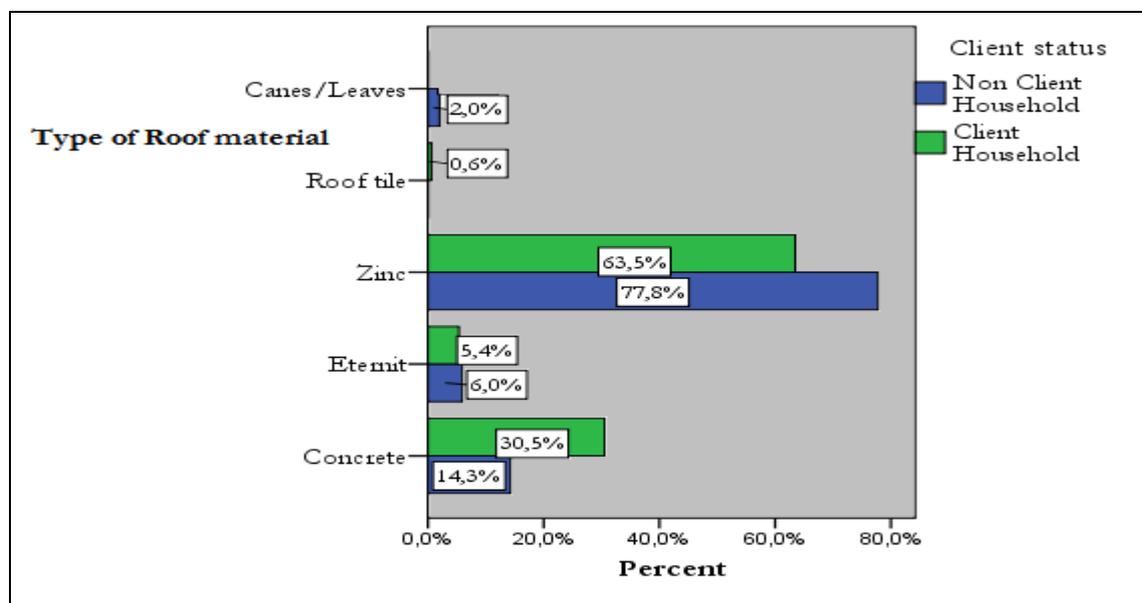
Residential area	Non Client Households (%)	Client Households (%)	Total (%)
Rural Area	46,0	26,9	41,3
Urban Area	54,0	73,1	58,7

⁶¹ NB. Pearson Chi-square test: value: 18,850, Df: 1, Sig(two-tailed): 0,000

5.3.2 Housing characteristics; Type of roof material

In order to get an insight on the distribution of the type of roof of the dwelling among client and non client households respectively, one may consult the differences in percentage shares of households for each category in figure 3. A statistical significant difference was found in regard to the distribution of the type of roof material between client and non client households⁶². Most remarkably is the far higher percentage share of client households that have a roof made of concrete/paving stone, in comparison to that share of the households of the local population (30,5 percent vs. 14,3 percent). However, this is likely to be related to the urban bias of the client household sample, as the share of urban households that have a roof of concrete is far larger than that of rural households respectively.

Figure 3 Distribution of type of roof material of the dwelling by client status



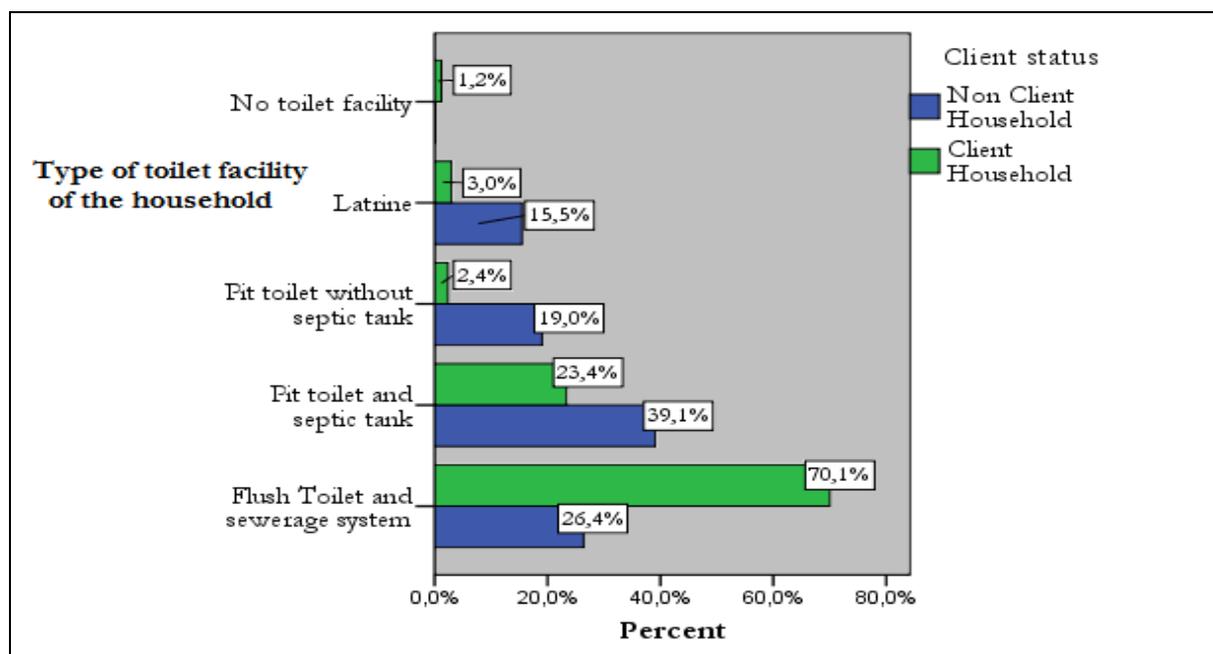
5.3.3 Housing characteristics; type of toilet facility

Figure 4 illustrates the distribution of the type of toilet facility among both groups of households. A statistical significant difference was found in regard to the distribution of this variable between client and non client households respectively⁶³. Most remarkably is the very high share of client households that have a flush toilet connected to the public sewerage system in comparison to this respective share for non client households of the local population (70,1 percent vs. 26,4 percent). However again, it is expected that the highly urban biased sample of the client households has an impact, since in the rural areas usually only the main street was connected to the sewerage system.

⁶² NB. Pearson Chi-square test: value: 27,935, Df: 4, Sig(two tailed) : 0,000

⁶³ NB. Pearson Chi-square test: value: 118, 213 , Df: 4, Sig (two tailed) : 0,000

Figure 4 Distribution of type of toilet facility of the household by client status



The variable, which has an ordinal structure, has been taken up in the poverty index⁶⁴. On the basis of the results in the distribution of this variable, it is expected that client households are relatively better off than non client households, since a higher share of client households was found in the category of households with a flush toilet and a sewerage system, which is the highest valued category. This means that a household with this characteristic has the lowest probability to be identified as a poor household on the basis of principle component analysis.

5.3.4 Housing characteristics; Type of source of water provision

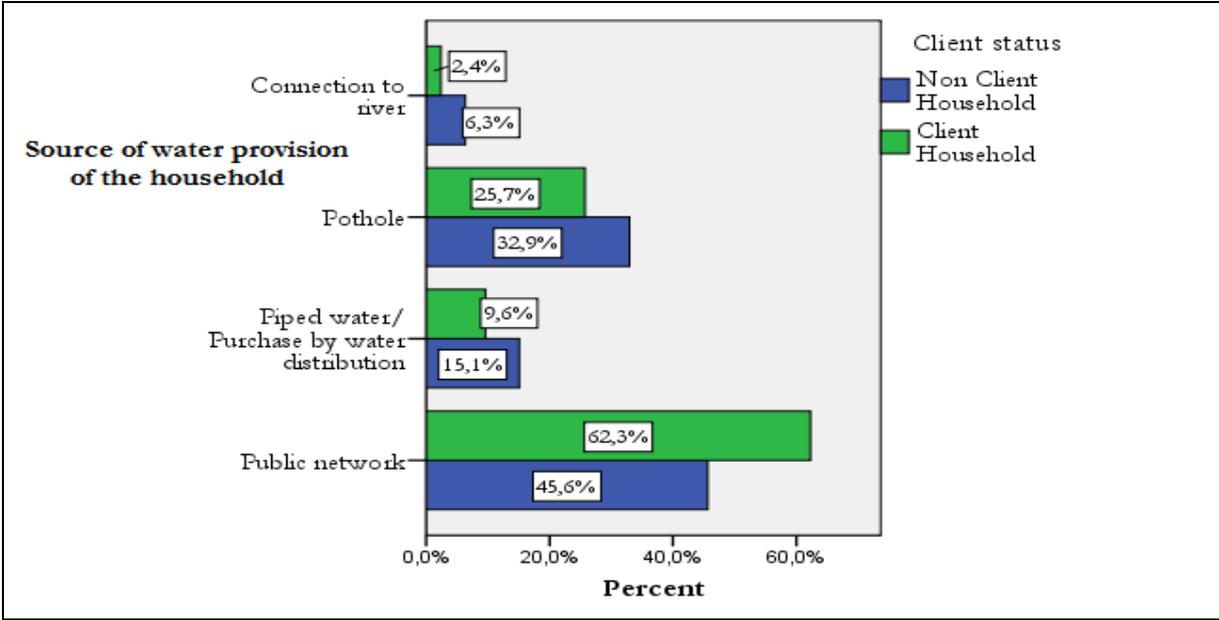
The variable on type of source of water provision was also retained to construct the poverty index⁶⁵. The ordinal structure of the variable assumes that households that buy their water or either receive it directly via a pipe or tube system, are expected to be on average poorer than households that receive water from the public network. Households that only have a pothole are on their turn expected to be on average poorer than households that have to buy their water or either receive it directly via a pipe or tube system.

⁶⁴ NB. In appendix 4 one can consult a list of the poverty variables that were used to construct the final poverty index; ‘No toilet facility’ had a corresponding value of ‘1’, while in turn ‘Flush toilet connected to the sewerage system’ corresponded to the value ‘5’. Higher values on this variable therefore, corresponds with an expected decrease of the poverty level of the respective household.

⁶⁵ NB. Here, the category ‘connection to the river’ corresponds to a value of ‘0’, while in turn the category ‘public network’ corresponds to a value of ‘4’. Therefore; higher values on this variables are associated with decreasing levels of poverty.

Figure 5 illustrates the distribution of the type of source of water provision of the household for client households and non client households respectively.

Figure 5 Distribution of type of source of water provision by client status



A statistically significant difference was found between client and non client households in regard to the distribution of this variable⁶⁶. A higher percentage share of the client households was found to be connected to the public network system in comparison to non client households respectively (62,3 percent vs. 45,6 percent), In turn, for the second lowest and lowest valued categories, that is those categories where it is expected that the shares of households identified as poor become larger, the percentage share of non client households was larger than that of client households respectively (figure 5).

5.3.5 Other household characteristics

In table 10, descriptive information on a set of demographic and socio-economic variables are given, categorized by client households and non client households respectively. Three of these five variables were incorporated in the poverty index; a higher working dependency ratio, as well as a higher per member expenditure on food and clothing wear and a higher current price value of the car (if available) respectively, is assumed to correspond to households that are relatively better off. No statistical significant difference was found in regard to the total number of household members between the average client – and non client household respectively.

⁶⁶ NB. Pearson Chi-square: Value: 15,480, Df: 3, Sig (two-tailed):0,000

However in turn, the other four remaining variables produced statistical significant differences between the two groups⁶⁷. In the first place it was found that the average client household has significantly fewer household members per room. The average number of household members per room was 1,40 for client households vs. 1,63 for non client households respectively. Also, a higher ratio of the number of households that had a paid job divided by the total number of the household members (hereafter ‘the working dependency ratio’) was found with respect to the average client household in comparison to the average non client household respectively (0,52 vs. 0,41). The average client household also had a higher per member expenditure on clothing and footwear in the last three months than his counterpart in the local population (\$ 24,12 vs. \$ 15,91). Last, the current price value of the car of the average client household is significantly higher than it is for the average non client household of the local population (\$ 2731,54 vs. \$ 521,23). For an overview of the aforementioned differences in regard to these household characteristics, table 10 can be consulted⁶⁸.

⁶⁷ NB. Independent samples t-tests were conducted on the following variables 1) Total number of household members per number of rooms; (equal variances not assumed), t-value: -3.013 Df.: 502,879 Sig(two-tailed): 0,003, 2) Working dependency ratio(equal variances assumed), t-value: 4,659 Df.: 669 Sig(two-tailed): 0,000 3) Per member expenditure on clothing and footwear in last three months (equal variances not assumed) t-value: 2,486, Df: 269,391, Sig(two-tailed): 0,014. 4) Current price value of car (USD)if available; equal variances not assumed; t-value: 4,812, Df: 182,599, Sig (two-tailed), 0,000

⁶⁸ NB. All tests of differences of variable averages between client and non client households that provided the corresponding t-values in table 10, were found to be significant at a p-level of < 0,05.

Table 10 Descriptive information on demographic and socio-economic variables by client status

Non Client Households (N=504)					
Variable	t-value	Mean	Standard Deviation	Min. Value	Max. Value
Total number of household members		4,21	2,190	1	19
Total number of household members divided by number of rooms	-3.013	1,63	1,322	0,17	11
Working dependency ratio	4,659	0,41	0,268	0	1
Per member expenditure on clothing and footwear in last three months	2,486	15,25	34,052	0	500
Current price value of car (\$) if available	4,812	521,23	2233,650	0	20.000,00
Client Households (N=167)					
Variable	t-value	Mean	Standard Deviation	Min. Value	Max. Value
Total number of household members		4,41	1,760	1	12
Total number of household members divided by the number of rooms	-3.013	1,40	0,695	0,25	4
Working dependency ratio	4,659	0,52	0,231	0,11	1
Per member expenditure on clothing and footwear in last three months	2,486	24,12	37,577	0	237,71
Current price value of car (\$)	4,812	2731,54	5795,07	0	43.576,50

The standard deviations of all variables are larger for the non client household sample, which indicates the greater variance in the data of this group. The standard deviation of the price value indicators is very large for both types of households, which indicates high inequality among the two households samples in regard to these variables; The percentage of households that did not spend any money on clothing and footwear in the last three months was comparable for client and non client households (28,7 percent vs. 26,6 percent). In turn, the percentage of non client households that did not have a car was 92,1 percent whereas for client households this percentage was far less; 60,5 percent .

5.4 Additional information on client- and credit characteristics

In the following section, a set of specific client characteristics is discussed, whereby a distinction has been made between client households from the urban and from the rural area respectively. In the first place, some general features on client and credit characteristics are given. Then special attention will be given to the amount of the first loan and the economic and specific sector of the client activity respectively.

5.4.1 Client characteristics

It was found that with respect to the whole client sample, a share of 54,5 percent consisted of female clients. It was also found that in the urban area, the share of female clients was a little higher than in the rural area (57,4 percent vs. 46,7 percent). Second, for a share of 48,5 percent of the clients, INSOTEC is the only credit provider. Unsurprisingly, in the urban area this percentage was smaller than in the rural area (45,9 percent vs. 55,6 percent); the finding of a higher percentage of rural clients is very much related to the greater dependency on INSOTEC with respect to access to finance in these more remote areas. Third, in regard to the percentage of clients currently involved with (informal) financial transactions with money lenders, it was found that the difference between clients in the urban and in the rural area is not very big (11,1 percent vs. 9,8 percent). Fourth, it was also found that the average number of total loans that a client obtained from (formal) financial institutions was a little higher for clients that resided in the urban area in comparison to those in the rural area; In the urban area the average number of loans of a client was determined at 1,82 whereas for the rural area this was only 1,6. A summary of the foregoing is given in table 11.

Table 11 Overview on client- and loan characteristics by residential area

Client Characteristics	Urban area	Rural area	Total
percentage of female clients	57,4	46,7	54,5
percentage of clients that only receives credit from INSOTEC	45,9	55,6	48,5
percentage of clients that is currently involved in transaction(s) with moneylenders	11,1	9,8	10,2
Average number of loans obtained from formal financial institutions of the client	1,82	1,60	1,76

Interestingly, no statistical significant differences in the percentage shares of the first three category variables, neither in the average of the variable on the number of loans was found between urban and rural clients respectively.

5.4.2 Distribution of the first loan amount by residential area of the client

The average (first) loan amount for the whole client sample was found to be \$ 848,56. The clients in the urban area had an average loan of \$ 870,98, whereas this amount was estimated to be \$ 787,78 for the clients in the rural area respectively. The minimum loan that was provided in the urban area was \$ 350 whereas in the rural area this was only \$ 100. The highest first loan provided in the urban area was \$ 1500 whereas this was a little less for the rural area; \$ 1300.

If one reviews the first loan amount of the client on the basis of ranks⁶⁹ by residential area of the household, the following distribution is obtained (table 12).

Table 12 Distribution of amount of loan (ranks) by residential area of client

Amount of first loan (\$) obtained from INSOTEC (ranks)	Urban area	Rural area	Total
Less than \$ 600	16,4	28,9	19,8
Between \$ 601 and \$ 900	34,4	28,9	32,9
Between \$ 901 and \$ 1000	39,3	40,0	39,5
More than \$ 1001	9,8	2,2	7,8

It is interesting to remark that in the rural area a higher share of clients is present in the category with the lowest loan amounts in comparison to that share in the urban area, while urban clients have higher percentage shares in the categories of \$ 601 < \$ 900 and > \$ 1001; The shares of urban and rural clients that are found in the category of \$ 901 < \$1000 are very similar. Overall, no statistical significant difference was found in the distribution of urban and rural clients with respect to the loan amount on the basis of these categories, neither a statistical significant difference was found in regard to the average first loan amount respectively.

5.4.3 Economic sector of the client's principle activity

Large differences were found between urban and rural clients with respect to the sector in which clients are economically active. In the following table, one can consult the distribution of clients on the basis of their economic working sector, by residential area of the client household respectively.

⁶⁹ NB. INSOTEC holds a similar type of categorization in their client database.

While in the urban area only 8,2 percent of the clients is active in the agricultural sector (most economic activities focus on the commercialization of agricultural products), in turn 44,4 percent of the rural clients are active in this sector. It is obvious that these rural clients take the greatest share in this sector regarding the overall client sample, which resulted to be 18,0 percent. However, clients in both the urban and the rural area are mostly active in the commerce sector (63,1 percent and 48,9 percent). As a consequence, the largest share of clients is economically active in the commerce sector (59,3 percent). In turn, the total share of clients in the manufacture sector is only 5,4 percent; in the urban area, a share of 6,6 percent of the clients is found in this category and an even smaller share in the rural area was found; 2,2 percent. Last, the share of urban clients that is economically active in the service sector is far greater than those in the rural area respectively (22,1 percent vs. 4,4 percent). The percentage share of clients in the overall sample that works in this sector is estimated to be 17,4 percent (table 13).

Table 13 Distribution of economic sector of client activity by residential area of client

Economic sector of client activity	Urban area	Rural area	Total
Agriculture (%)	8,2	44,4	18,0
Commerce (%)	63,1	48,9	59,3
Manufacture (%)	6,6	2,2	5,4
Services (%)	22,1	4,4	17,4

5.4.4 Specific sector of client’s principle activity

Clients were also reviewed on the basis of the specific activity of the client, whereby again the residential area of the household was taken into account. Though the categorization distinguished thirty-three types of specific activities, in table 14 only those three activities that involved the highest share of clients for each residential area, are given, as well as the three activities that were mostly practiced in regard to the overall client sample respectively.

Table 14 Most executed specific activities of the client (%) by residential area

Specific activity of the client	Urban area	Specific activity of the client	Rural area	Specific activity of the client	Local area
Commerce of Clothing	13,8	Agricultural production	26,7	Agricultural production	11,8
Small commerce of food- and other basic living products	9,5	Commercialization of agricultural products	24,4	Commercialization of agricultural products	10,6
Commerce of beauty and care products	7,8	Farming production	11,1	Commerce of Clothing	10,6

The table indicates that the activities mostly undertaken vary completely, dependent on the geographical area that is considered. The highest share of urban clients is involved in the commerce of clothing (13,8 percent), followed by running a small commerce store of basic products (9,5 percent) and the commerce of beauty and care products (7,8 percent) respectively.

In the rural area, the total range of activities of the clients is smaller in comparison to the urban area, which explains the larger percentage shares of the rural clients involved in the three most popular activities, being agricultural production (26,7 percent), commercialization of agricultural products (24,4 percent) and farming production (11,1 percent) respectively.

5.5 Concluding remarks

The foregoing evaluation showed that client households often differ significantly from non client households with respect to most of the discussed demographic and socio-economic variables respectively. Overall, the household head of an average client household is more often female, younger, higher educated and more often runs it's own business than the household head of an average non client household respectively. Second, the findings in this chapter suggest that in regard to socio-economic features of the household, it is expected that client households more often have a roof of concrete, a flush toilet connected to the sewerage system and water provision from the public network than households from the local population. In addition, the average client household has fewer household members per room, a higher working dependency ratio, a higher expenditure on foot and clothing wear and a higher current price value of the car than the average non client household respectively. The foregoing differences reflect that the client household sample does not resemble the local population sample. Instead, INSOTEC attends a more homogeneous group, of which it's specific characteristics may well be related to the self-selection bias of clients, the terms and conditions of the loan, the specific location of the organization, the social network of the client household and so on and so forth. Moreover, regarding the differences that were found between client and non client households with respect to those variables which are also used in the poverty index, it is expected that at the local level, the average client household is relatively better of than the average non client household respectively. Last, interestingly, no statistical significant differences were found between urban and rural clients in regard to the following client characteristics; the distribution of loan amount in categories, the average loan amount, the average number of outstanding loans, the percentage of female clients, the percentage of clients that only receive credit from INSOTEC and the percentage of clients that is involved with moneylenders respectively.

Chapter 6. Determination of the relative poverty level of client households on the basis of different poverty contexts.

6.1 Introduction

This chapter focuses on the construction of the local poverty index. The set of retained poverty variables is based on the requirements and tests that sustain the final model that resulted from PCA. The construction of three additional poverty indices, namely the national poverty index, the urban poverty index and the rural poverty index respectively, is then outlined. The chapter evaluates the differences in poverty levels between client and non client households on the basis of different poverty contexts and by residential area respectively, as a way of introduction to the evaluation on depth of outreach in the next chapter.

6.2 Construction of the local poverty index

Following the procedures of adjustment of the model as was described in chapter 4, the final poverty index was constructed on the basis of eleven poverty variables, which is given in table 15. In the same table, the poverty component loadings and found communalities respectively, are indicated for each variable. The different dimensions of poverty that were taken into account are indicated with different colors⁷⁰. Then, in table 16 the results of the principle tests and requirements to conduct principle component analysis in a proper way, are given⁷¹.

⁷⁰ NB. Grey colored are the poverty variables that reflect demographic features of the household, blue colored are the poverty variables that reflect housing characteristics of the household, in green are the poverty variables that reflect the food security and vulnerability dimension of poverty at the household level and last, the pink color refers to poverty variables that reflect assets of the households.

⁷¹ NB. A complete list of the variables and their specific features can be consulted in appendix 4 .

Table 15 Results of PCA for the construction of the local poverty index

Variables of the poverty index	Poverty component loading	Communalities
Per member expenditure on foot and clothing wear in last three months	-0,377	0,438
Working dependency ratio	-0,313	0,587
Type of roof material	-0,550	0,337
Type of source of water provision	0,685	0,731
Location of source of water provision	0,769	0,769
Type of toilet facility	0,759	0,584
Location of toilet facility	0,732	0,542
Difficulties in payment of food in last two weeks	0,321	0,343
Frequency of purchase of whole chicken	-0,415	0,575
Possession of shower	-0,743	0,554
Current price value of car (if available)	-0,395	0,508

Table 16 Additional information of PCA

Tests and Requirements of PCA (Local)	
KMO-Test	0,829
Bartlett's Test	Significant
Explained Variance (%)	33,62
Determinant	0,068

In the first place, all poverty variables had a significant Pearson correlation with the benchmark indicator, at a p-level of $< 0,01$ ⁷². Second, the multi-dimensionality of poverty was satisfied by including at least two variables for each dimension of poverty. Third, all poverty variables produced component loadings above 0,300 and had the expected signs that indicate the relationship of the variable with poverty at the household level. Fourth, the model produced a significant Bartlett's test, a high KMO-test value and an appropriate determinant value respectively. Last the communalities of the variables were all higher than the minimum required value of 0,198.

⁷² NB. Only one variable, the current price value of the car of the household, had a significant correlation coefficient at a p-level of < 0.05 . The results of Pearson correlations coefficients of the poverty variables with the benchmark indicator can be consulted in appendix 7.

6.2.1 Internal validity of the poverty index

In order to check the internal validity of the poverty index, the non client household sample was randomly splitted where after with both remaining subsamples, PCA was again conducted on the basis of the same set of poverty indicators. For both subsamples of non client households, the component loadings of the poverty indicators were slightly lower, as well as the KMO value and the explained variance on the poverty component. However overall, the results didn't differ a lot and all requirements of a valid principle component analysis were met. Moreover, Pearson correlation tests were conducted between the household poverty scores that resulted from PCA after the random splitting and the original poverty scores respectively. For both subsamples of non client households an almost perfect correlation was found. This result indicates that no significant difference was found between the poverty scores of the randomly splitted groups of non client households in comparison to the original poverty scores for these households that were estimated.

6.2.2 Practical validity of the poverty index

Since in this study, one starts with the assumption that the first component that is extracted describes poverty at the household level, it is interesting to review whether the poverty index provides a realistic picture, when differences in the poverty level of households in the local area are used as a reference. By consulting available data on poverty at the parish level, an evaluation on agreements in outcomes was done between the average CGAP poverty score by parish with outcomes of the NBI poverty measure for that same parish respectively, of which the results can be consulted in table 17. These average poverty scores were based on information of non client households only, since this is the most unbiased sample to identify poverty in the local area.

Table 17. Practical validity of the poverty index on the basis of a comparison with NBI poverty measures at the parish level

Geographical unit/ Poverty Measure	Pichincha					Manabí		Los Rios		Esmeraldas			
	Sto. Dom. de los Colorados	Alluriquín	Puerto Limón	Pedro V. Maldonado	Puerto Quito	El Carmen	Wilfrido L. Moreira	Valencia	Buena Fè	Quininde	Malimpia	Viche	Union
Index of Insatisfaction of Basic Needs (% total pop)	69,6	84,5	92,8	80,2	88,4	78,7	95,7	83	81	86,4	97	97	80,1
Index of extreme insatisfaction of Basic Needs (% total pop.)	31	41,7	52,1	38	47,2	43,8	61,1	46,4	44,6	47,8	60,4	57	40,5
Average poverty score	-0,46158	0,03804	0,53690	-0,43085	-0,27690	0,29962	1,27721	0,26153	-0,11139	-,06433	0,75145	0,66171	0,32453
Number of households	157	9	9	12	12	54	11	56	46	75	11	18	34

Source: SIISE (2008) and own calculations

The coloring of the data, going from light to dark orange distinguishes the areas in regard to a lower incidence of poverty to a higher incidence of poverty respectively. From the table it can be notified, that the poverty index shows differences in poverty levels of households by parish, more or less in the same pattern as these are indicated by the NBI measure. This suggests that the poverty index is interpretable as a reliable poverty measure. However, the comparison suffers from the fact that the NBI index provides a per capita poverty measure, with data based on the year 2001, whereas the CGAP poverty score in turn is a relative poverty measure at the household level on the basis of information from the year 2005/2006 respectively.

6.2.3 Differences in the relative poverty level between client and non client households, regarding the overall distribution of the local poverty index

The local poverty index was finally constructed on the basis of data from 669 households that consisted of 504 non client households and 165 client households respectively. The poverty index is standardized and normally distributed and provides a poverty score for each household. Regarding the overall distribution, a statistical significant difference was found between the average poverty score of the client household and the average poverty score of the non client household respectively⁷³. It turns out that the average client household is less poor than the average non client household in the local area. The difference between the average poverty scores of the two (sub)samples of households is $\approx 0,974$ (absolute terms).

6.2.4 Differences in the relative poverty level between client and non client households by residential area

When the average poverty scores of the client households and non client households at the local level are compared separately for the urban and for the rural area respectively, it was found that in both areas the average client household is significantly less poor than the average non client household respectively⁷⁴; urban client households in the local area were on average less poor than urban households from the local population and the same was found with respect to rural households. In the urban area, the differences in average poverty scores between urban client and urban non client households was found to be $\approx 0,730$ (in absolute terms), whereas with respect to rural households, this difference was even larger; $\approx 0,956$.

⁷³ NB. Independent samples t-test(equal variances assumed); t-value: -11,964, Df: 667, Sig(two-tailed): 0,00

⁷⁴ NB. Independent samples t-test; For the urban area: (equal variances assumed); t-value: -8,302, Df: 392 Sig(2-tailed): 0,000. For the rural area: (equal variances not assumed): t-value: -5,796, Df: 50,250 Sig(2-tailed): 0,000.

6.3 Construction of the national poverty index.

In the national context, again significant Pearson correlations were found between the benchmark indicator and the other poverty variables in the index⁷⁵. Comparing the outcomes with the output results of PCA at the local level, most remarkable is that in the national case two poverty indicators, namely the 'Frequency of purchase of whole chicken' (-0,123) and the 'Working dependency ratio' (-0,127) respectively, produced far smaller component loadings and therefore suggest a weaker relationship of these variables with poverty, than was found at the local level⁷⁶. However in turn, most other indicators produced component loadings that were slightly higher compared to the local situation. In addition, no rigorous differences were found in the results of the additional statistical tests and requirements; the results of principle component analysis produced a total explained variance of 33,58%, a significant Bartlett's test, a high KMO value, and the required values for the determinant and the communalities respectively. In short, only the CGAP requirement to include those variables with component loadings equal or above 0,300 was not satisfied in the case of two variables. On the basis of the foregoing, the set of poverty indicators is found to be sufficiently reliable (though far from perfect) to determine national depth of poverty outreach in the next chapter. An overview on the results of PCA that produced the model for the national poverty index, can be consulted in appendix 6.

⁷⁵ NB. For the results on the Pearson correlations with the benchmark indicator, one can consult appendix 7

⁷⁶ NB. In the local poverty index, the variable 'Frequency of purchase of whole chicken' produced a component loading of -0,415 and the variable 'Working dependency ratio' produced a component loading of -0,313 respectively.

6.3.1 Differences in the relative poverty level between client and non client households, regarding the overall distribution of the national poverty index

The national poverty index was finally constructed on the basis of data from 13700 households that consisted of 167 client households and 13533 non client households respectively. Regarding the overall distribution of the national poverty index, a significant difference was found between the average poverty score of the client household and the non client household respectively⁷⁷. The average client household was found to be less poor than the average non client household of the sample that reflects the total population of Ecuador. Though the average poverty scores of client and non client households still differ considerably, differences between the average poverty scores of the two groups have become smaller; now, this difference was $\approx 0,507$, while in the local case this difference was almost twice as large; $\approx 0,974$.

6.3.2 Differences in the relative poverty level between client and non-client households by residential area

When considering the urban and the rural households within the total sample of households separately, significant differences were found in both areas between the average poverty score of the client household and the non client households by residential area respectively⁷⁸; On the basis of the CGAP poverty score, urban client households are on average less poor than urban households from the national population, and likewise, rural client household are found to be on average less poor than rural based households in Ecuador respectively. However remarkably, the difference in the average poverty score between the client household and the non client household in the urban area of Ecuador is only $\approx 0,187$, whereas for the rural area this difference is far larger; $\approx 0,620$. Overall, these differences were found to be smaller than those that were found at the local level⁷⁹.

6.4 Construction of the urban poverty index

Regarding the urban sample of client and non client households that constructed the urban poverty index, again significant Pearson correlations were found between the benchmark indicator and the set of retained poverty variables⁸⁰.

⁷⁷ NB. Independent samples t-test (Equal variances not assumed): t-value: -7,078, Df: 170,881, Sig(two-tailed): 0,000

⁷⁸ NB. Independent samples t-test; Urban area; (equal variances assumed); t-value: -2,481, Df: 7620, Sig (two-tailed) 0,013, Rural area (equal variances not assumed); t-value: -4,055, Df: 44,411, Sig (two-tailed): 0,000

⁷⁹ NB. At the local level, the difference of the average poverty level between client and non client households, was found to be $\approx 0,730$ for the urban area and $\approx 0,956$ for the rural area respectively

⁸⁰ NB. The only exception in this case was the variable 'Frequency of purchase of whole chicken'

The same as this was found at the national level, the urban poverty index produced low component loadings for the variables ‘Frequency of purchase of whole chicken’ and the ‘Working dependency ratio’ respectively⁸¹, which indicates that these indicators also do not distinguish households sufficiently on the basis of their poverty level in the urban (national) context. Nonetheless, a significant Bartlett’s test, a lower but still valid KMO value, as well as accountable values for the communalities and the determinant were found. The total explained variance of the data on the poverty component however, decreased considerably with $\approx 12,0$ percent from 33,6 percent to 29,6 percent respectively. The CGAP tool doesn’t provide any threshold for the minimum percentage of explained variance to be found on the poverty component and irrespective of the low component loadings on the two aforementioned variables, it is argued that the poverty component is still interpretable on the basis of the other variables. Therefore, though the weaker results on which the construction of the urban poverty index is based should be taken with caution, urban depth of poverty outreach is evaluated in the next chapter. An overview on the results of PCA that produced the model for the urban poverty index, can be consulted in appendix 6.

6.4.1 Differences in the relative poverty level between urban client households and urban non client households, regarding the overall distribution of the urban poverty index

The urban poverty index was finally constructed on the basis of data from a total number of 7622 households that consisted of 7500 urban non client households and 122 urban client households respectively. On the basis of this urban sample, no significant difference was found between the average poverty score of the urban client household and the urban non client household respectively. This is a contrary finding in comparison to the results on the basis of the national poverty index where the average urban client household was significantly less poor than the average urban non client household respectively.

6.5 Construction of the rural poverty index

The construction of the rural poverty index was based on a (national) rural sample that consisted of rural client households and rural non client households respectively. Again significant Pearson correlations were found⁸². Overall, the results of PCA can be considered as slightly weaker than the results that lied at the basis of the construction of the urban poverty index.

⁸¹ NB. In the urban poverty index, the variable ‘Frequency of purchase of whole chicken’ produced a component loading of -0,114 and the variable ‘Working dependency ratio’ produced a component loading of -0,114 respectively.

⁸² NB. The only exception in this case was the variable ‘Frequency of purchase of whole chicken’

Though the majority of the poverty variables still produced sufficiently high loadings, as well as the expected signs in regard to their relationship with poverty, now three poverty variables did not produce component loadings equal to or above 0,30083. Though the KMO value declined even more than in the urban case, it was still considered as valid. The same counts for the significant Bartlett's test and the determinant value, which both contributed to a reliable principle component analysis. In turn, the total explained variance of the data on the poverty component decreased even more than in the urban case, that is with $\approx 15,9$ percent, from 33,6 percent to 28,3 percent respectively. However, despite the weaker statistical results of principle component analysis that constructs the rural poverty index, in order to evaluate and reconsider outcomes on depth of poverty outreach beyond the local context, rural depth of poverty outreach is evaluated for the rural client households in the next chapter. An overview on the results of PCA that produced the model for the rural poverty index, can be consulted in appendix 6.

6.5.1 Differences in the relative poverty level between rural client households and rural non client households, regarding the overall distribution of the rural poverty index

The rural poverty index was finally constructed on the basis of data of a total number of 6078 households, consisting of 6033 rural non client households and 45 rural client households respectively. Regarding the overall distribution of the rural sample in regard to the household poverty level, a statistical significant difference was found in the average poverty score between the rural client household and the rural non client household respectively. As was also found on the basis of the national poverty index, but then disaggregated by area; the average rural client household was found to be significantly less poor than the average rural non client household respectively⁸⁴. Moreover, the difference between the average poverty scores was 0,824 (in absolute terms) and therefore slightly larger than the difference that was found, if the national poverty index was considered, which was estimated to be 0,620.

⁸³ NB. These poverty variables included the (expected) variables 'working dependency ratio', (which had a loading of -0,125) and 'frequency of purchase of whole chicken'(which had a loading of -0,115), and in addition the variable 'difficulties in payment of food in last two weeks' (which had a low component loading of 0,202)

⁸⁴ NB. Independent samples t-test; (Equal variances not assumed), t-value: -4,385, Df: 44,412, Sig(two-tailed):0,000

6.6 Concluding remarks

Overall it was found that, irrespective of the poverty context that was concerned, the average client household was found to be significantly better of than the average non client household. The only exception in this respect was the average household poverty score of urban client households that didn't differ significantly from the average poverty score of urban non client households from the urban population of Ecuador.

The fact that the results in differences in average poverty scores between client and non client households at the national level were found to be smaller than those that were found at the local level⁸⁵, may indicate that client and non client households are more closely related to each other in a national context with respect to their average poverty level than in the local context respectively. The findings also suggest that the local sample of non client households identified a higher overall poverty level in comparison to the national sample of non client households, which resulted in a determination of the average poverty level of the client household that was relatively lower than when these same client households were evaluated at the national level respectively.

The fact that on the basis of the urban poverty index, no significant difference was found between the average poverty scores of urban client households and urban households from the national population while in turn, on the basis of the national poverty index a significant difference was found, gives weight to the expectation that the urban poverty index identifies client urban households as relatively poorer in comparison to an evaluation from a national perspective. Since both poverty indices (national and urban) are based on the same set of poverty variables, the differences in the results must be related to the fact that (the poverty characteristics of) rural households were left out from the analysis, which resulted in some influential changes in the component loadings of some of the poverty variables.

⁸⁵ NB. At the local level, the difference of the average poverty level between client and non client households, was found to be $\approx 0,974$, while on the basis of the national poverty index this difference was found to be 0,507 (absolute terms)

Chapter 7. Depth of poverty outreach

7.1 Introduction

In the following chapter, depth of poverty outreach from a local perspective is determined. Beforehand, the internal coherence of the poverty variables across the different poverty groups is evaluated. Then, national depth of poverty outreach is evaluated, and last, the classification of urban and rural client households is assessed separately on the basis of the constructed urban and rural poverty index respectively.

7.2 Categorization on the basis of the household poverty score

In order to examine to what extent client households identified as poor in the local area by the CGAP tool, are reached with the micro credit program of the agency of Santo Domingo of INSOTEC, a categorization of the non client households derived from the local population was made on the basis of their relative poverty level. As was explained in chapter 4, it was chosen to divide the non client households into five equally sized categories on the basis of their poverty scores. It followed that each group consisted of 20 percent of the non client households. For purpose of clearness, this time the intervals of the poverty scores of each poverty group are given in table 18. The higher the poverty score, the higher the poverty level of the household is expected to be; Poverty group 1 therefore represents the relatively best off households while poverty group 5 identifies the relatively poorest households respectively.

Table 18 Interval values of relative poverty groups at the local level

Relative Poverty Groups	Poverty Index Score	
	Min. Value	Max. Value
1	-3,30806	-0,6335
2	-0,63349	0,03352
3	0,03353	0,60148
4	0,60149	1,09225
5	1,09226	2,27672

Relatively better off households





Relatively poorer households

7.3 Internal coherence

The reliability of the poverty index to describe poverty at the household level can be evaluated in different ways ⁸⁶(Filmer and Pritchett, 2001, pp. 117-119). In regard to this study specifically, it is important to evaluate the internal coherence of the variables, by ensuring that the individual behavior of the variables differs across the different relative poverty groups that were identified. In the following overview table, one can consult the means of each poverty variable in each relative poverty group as well as its standard deviations ⁸⁷. Here, only non client households were considered in the analysis, this in order to test internal coherence with an unbiased sample.

The ordinal character of the variable is shown in the results, since the pattern of the means of the variables behaves as expected regarding the association with poverty at the household level. To give a few examples; going from group 1 to group 5, that is from the category that identifies households which are relatively best off, to the category that identifies the relatively poorest households, the average 'Per member expenditure on clothing and footwear in last three months' and the average 'Current price value of the car' declines with each group. Second, the average 'Working dependency ratio' decreases from group 1 to 5 which indicates that the poorer the group that is identified, the lower the ratio of the number of members earning an income compared to the total number of households respectively. Third, while for example in the relatively best off category almost 50 percent of the households had a roof of concrete, none of the households had in group 5 respectively. Likewise, where 90 percent of the households in group 1 had a shower at their disposal, again none of them had one in the poorest group. In between these two extremes, the proportion of the households who have a roof of concrete, or possess a shower is decreasing as expected (table 19).

⁸⁶ NB. In chapter 8, more ways to evaluate the robustness of the index are addressed

⁸⁷ NB. As was already mentioned in chapter 6, in appendix 4 one can consult a complete list of the poverty variables that were used to construct the index, as well as their characteristics in terms of units of measurement or identified categories respectively. Consultation of this appendix gives a better insight in the outcomes of the averages of the variables in table 19 on the next page.

Table 19 Means and standard deviations of poverty variables across poverty groups

Poverty indicator		Per member expenditure on footwear and clothing in last three months (\$)		Working dependency ratio		Type of roof material		Type of source of water provision		Location of source of water provision		Type of toilet facility	
Poverty groups	N	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	100	36,47	60,556	0,53	0,288	0,49	0,502	1,20	0,449	1,07	0,256	1,35	0,479
2	101	18,84	39,867	0,45	0,286	0,18	0,385	1,45	0,700	1,35	0,478	1,69	0,579
3	101	11,61	14,757	0,41	0,270	0,03	0,171	1,68	0,859	1,82	0,385	1,94	0,676
4	101	7,09	10,462	0,36	0,217	0,02	0,140	2,40	0,813	1,98	0,244	2,70	0,807
5	101	5,73	8,483	0,32	0,155	0,00	0,000	3,27	0,564	2,46	0,500	3,49	0,702

Poverty indicator		Location of toilet facility		Difficulties in payment of food in last two weeks		Frequency of purchase of whole chicken		Possession of shower		Current price value of car (\$)	
Poverty groups	N	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	100	1,05	0,219	0,10	0,302	0,012	0,023	0,90	0,302	1745,00	4165,451
2	101	1,47	0,501	0,19	0,393	0,008	0,020	0,42	0,495	475,25	1742,665
3	101	1,82	0,385	0,24	0,428	0,005	0,019	0,14	0,347	242,57	1422,346
4	101	1,98	0,199	0,37	0,484	0,005	0,015	0,01	0,100	125,74	888,218
5	101	2,04	0,242	0,50	0,502	0,001	0,006	0,00	0,000	29,70	298,511

7.4 Depth of poverty outreach in the local area

Client households were classified in one of the identified groups on the basis of their poverty scores. In table 20, the percentage share of client households, as well as the corresponding ratio's that reflect how much bigger or smaller this client household share is in comparison to the 20 percent of non client households that are categorized in that same group, is given.

Table 20 Results of depth of poverty outreach at the local level

Relative Poverty Groups	Local level		
	Percentage share of client households	Percentage share of non client households	Ratio
1	61,8	20	3,1
2	14,5	20	0,7
3	15,8	20	0,8
4	3,6	20	0,2
5	4,2	20	0,2

As one can observe from the table, it was found that by far the largest share of client households was classified in the group that represents the relatively best off households in the local area (group 1); a share of 61,8 percent of the total of client households is present in this category in comparison to only 20 percent of the non client households of the local population respectively. In turn, in the second poorest and the poorest group respectively (group 4 and group 5), only 3,6 percent and 4,2 percent of the client households are present. As a result, the ratio of group 1 indicates that in this group the relative share of client households is about three times larger than that of the local (non client) households, while in the other groups the ratios indicate a lower relative presence of client households. It follows that depth of poverty outreach, that is when measured at the local level is found to be low. The findings suggest that the agency of Santo Domingo of INSOTEC fails to reach a considerable numbers of poor households in regard to the presence of this group in the local area.

7.5 Depth of poverty outreach on the basis of different poverty contexts

7.5.1 Depth of poverty outreach on the basis of a national poverty context

In the same way as this was done in the local case, a categorization of non client households was elaborated, but this time on the basis of the national poverty index that was constructed with the help of a representative sample of households from the national population. In the following table, outcomes on the measurement of depth of poverty outreach from a national perspective are given.

Table 21 Results of depth of poverty outreach at the national level

Relative Poverty Groups	National Level		
	Percentage share of Client Households	Percentage share of Non Client households	Ratio
1	34,1	20	1,7
2	25,7	20	1,3
3	22,2	20	1,1
4	10,8	20	0,5
5	7,2	20	0,4

In the first place, it was found that the distribution of client households over the different poverty categories, was much more balanced compared to the findings at the local level. However, though the percentage share of client households in the category that identifies the relatively best off households (group 1) decreased considerably from 61,8 percent to 34,1 percent, the major share of the client households is still classified in this category. In the two relatively poorest categories a share of 10,8 percent (group 4) and 7,2 percent (group 5) of client households was found in comparison to 20 percent of the national population sample in each category respectively. Though the relative shares of client households in the two relatively poorest categories grew with 200 percent in group 4 and with 71,4 percent in group 5, compared to the percentage shares that were found in the local poverty context, the shares of client households are still much lower than the respective share of non client households in these two groups. One can conclude that depth of poverty outreach from a national perspective is still not very convincing; the largest shares of their clients are still found in the categories which identify the relatively best off households.

It is interesting to add here that from those client household that were classified in the relatively poorest category, a share of 24,4 percent of the total of rural client households was classified, while this was only true for 0,8 percent of the total of urban client households respectively. This

indicates that the welfare gap that is present between the average urban and average rural household respectively, is also relevant in the microfinance context; relatively more rural client households were classified in the category that identified the relatively poorest households. This is further supported by the significant difference that was found between urban and rural client households⁸⁸. A significant difference between urban and rural client households was also found at the local level⁸⁹.

7.5.2 Depth of poverty outreach on the basis of an urban and a rural poverty context

The following table gives the results of depth of poverty outreach from an urban and rural perspective. This time, the classification of urban and rural client households in regard to their poverty level was evaluated separately on the basis of an urban poverty context and a rural poverty context respectively⁹⁰.

Table 22 Results of depth of poverty outreach at the urban and rural level

Relative Poverty Groups	Urban level		Rural level	
	Percentage share of Urban Client Households	Ratio	Percentage share of Rural Client Households	Ratio
1	31,1	1,6	53,3	2,7
2	12,3	0,6	17,8	0,9
3	14,8	0,7	4,4	0,2
4	22,1	1,1	13,3	0,7
5	19,7	1,0	11,1	0,6

Regarding the results on urban depth of poverty outreach, it was found that in group 1, which reflects the category with the relatively best off households, urban client households are again overrepresented with a percentage share of 31,1 in comparison to the share of 20 percent of urban non client households that is present in this category. However most remarkably, in group 4 and group 5, in which the relatively poorest households are classified, the presence of urban client households is also considerable; in the second poorest group of households a percentage share of 22,1 percent of the client households is present and in the poorest category a percentage share of 19,7 percent respectively.

⁸⁸ NB. Independent Samples t-test (eq. var. not assumed); t-value; -4,254, Df; 64,771, Sig(two-tailed): 0,000

⁸⁹ NB. Independent Samples t-test (eq. var. not assumed); t-value; -4,036, Df; 61,661, Sig(two-tailed): 0,000

⁹⁰ NB. Though the shares of urban and rural non client households are not shown in the table, it is clear that again 20 percent of the total of the urban and rural population was categorized in each poverty group

In sum, if urban client household poverty levels are held against poverty levels of urban (non client) households in the whole country, it is found that a considerable number of poor urban client households are reached by the institute; a share of 41,8 percent of urban client households, which is a little higher than the presence of the 40 percent share of urban non client households, are found in the two groups of households that capture the relatively poorest urban households. An evaluation on rural depth of poverty outreach also generated interesting results. The percentage share of rural client households that was classified in the group that identified the relatively best off households (group 1), was very high; a majority of the rural client households, that is 53,3 percent, was classified in this group. A particularity in the outcomes is the very low share of rural client households in the middle category. Last, the found percentage shares of rural client households in the two poorest groups of households are not very pronounced but neither irrelevant; in the second poorest group of households, a percentage share of 13,3 was found while in the poorest category a share of 11,1 percent of the rural client households was classified. It is argued that depth of poverty outreach with respect to rural client households on the basis of a rural national poverty context, is not very convicting; relatively low percentage shares of rural client households were found in the two poorest categories.

7.6 Concluding remarks

Depth of poverty outreach from a local perspective was found to be very low. The more balanced distribution of the classification of client households on the basis of a national poverty context, suggests that the local poverty index identified a local poverty context that is more severe in comparison to the national context respectively, which may have resulted in the classification of more client households identified as relatively well off in the local area.

Differences in the overall poverty level between the local area and the country as a whole is further underscribed by the differences in outcomes on poverty measures at the local and the country level, as discussed in chapter 3. It resulted that in turn, quite a large share of poor urban client households are reached, that is if their poverty level is held against the poverty level of all urban client households in the country. This could indicate that overall households in the urban local area are relatively poorer than urban client households in the whole country. Rural depth of poverty outreach was found to be very low, since the majority of the rural client households was identified as relatively well of. This in contrast to the urban case, could indicate that overall the living standard of households that reside in the rural local area is less severe in comparison to the overall living standard of rural households in the whole country respectively.

Chapter 8. Reconsidering the CGAP poverty assessment tool

8.1 Introduction

The validity of using the CGAP tool to assess the poverty level of client households and depth of poverty outreach of a microcredit program respectively, can be questioned in several ways. In order to obtain a better insight in the robustness of the method, this chapter explores some of the tools methodological flaws and proposes a set of procedures to deal with these, where after the results of these alternative approaches are discussed. Due to time limitations, it was decided that in some of the alternative methodological procedures, only changes in poverty component loadings and household poverty scores respectively are addressed. However, dependent on the importance of an evaluation on the classification of client households, differences in outcomes on depth of poverty outreach were also considered.

8.2 Weighing poverty indicators

Although the CGAP tool does not discuss in detail why Principle Component Analysis was applied in favor to other methods, it is valid to question whether comparable statistical methods, could have been considered to construct a similar poverty index. In Sahn and Stifel (2003) for example, Exploratory Factor Analysis (EFA) is used to construct a household asset index, which was found to be a good predictor of poverty in terms of nutrition and child health respectively. EFA and PCA are often applied to the same research purposes in behavioral and social sciences, though however they differ from a conceptual and a methodological perspective. EFA generally aims to identify a set of latent constructs that should give a parsimonious representation of the association between the measured variables. In turn, the principle idea of PCA is data reduction; the aim is to come to a smaller set of composite variables that retains as much of the original information as possible. The main methodological difference between EFA and PCA is that the first one assumes that each variable is a linear function of one or more (unobservable) common factors and of one unique factor respectively. The common factors are reflected in the correlations among the measured variables, whereas the unique factor expresses the latent variable that only impacts on one measured variable and doesn't account for the correlations between the variables. This unique factor again, is assumed to consist of a systematic unique factor component and of a measurement error component respectively (Fabrigar et al., 1999, pp:274-275). Factor analysis derives a mathematical model from which the factors are estimated, while instead principle component analysis decomposes the original data into a set of linear variates. Therefore, PCA has a more simpler mathematical structure.

The structure of the model is not based on a distinction between common variance and unique variance of the observed variables. Instead, it assumes that all variance in the data is common variance, which explains why the total variance in the data is equal to the number of included variables in the analysis⁹¹. Regarding the aim of this study to identify poverty at the household level on the basis of a meaningful association between a set of measured variables, it may be more desirable to conduct EFA, since its approach allows for a more realistic model on the structure of correlations between variables.

EFA is but one of the many statistical methods which could have replaced principle component analysis to assess poverty at the household level. In Howe (2007) an asset based index was constructed by means of the application of regular PCA and four other measures⁹² respectively, in order to measure the socio-economic position of households. The robustness of the index for each measure was assessed, based on differences in agreement with estimations on household's consumption expenditure. The study concluded that PCA using categorical variables or either dichotomized versions of these variables produced the most robust index, whereas indices derived from equal weights or multiple correspondence analysis (MCA) respectively, resulted in lower agreements with total consumption expenditure data. However, in Booyson et al. (2005), it is claimed that MCA deals in a better way with categorical variables than principle component analysis. These authors consider PCA to be most appropriate for continuous variables because the analysis requires that all variables are measured in the same units, which means that the set of variables usually has to be standardized. Last, Kolenikov and Angels (2004) introduced a new technique called polychoric principle component analysis that improves the inclusion of (unclear) ordinal categorical variables respectively. They argue that this technique improves regular principle component analysis, because the coefficients of the variables on the components are more accurately estimated.

8.2.1 Application of exploratory factor analysis

Filmer and Pritchett (2001, p: 119) claim that the robustness of the weights derived from PCA can be evaluated by using a comparable statistical analysis, whereby they suggest that EFA would be an appropriate one.

⁹¹ NB. since all measured variables are standardized before PCA is conducted, the variance of each measured variable equals one. If all variance in the model is taken as common variance, then total variance equals the number of included variables.

⁹² NB. In this study, regular PCA is compared to PCA using dichotomized versions of categorical variables, equal weights, weights equal to the inverse of the proportion of households owning the item, and Multiple Correspondence Analysis respectively.

Therefore, on the basis of the local sample of client and non client households, exploratory factor analysis was conducted to explore possible differences in the results of the model and the obtained household poverty scores in comparison to the results with PCA. It resulted that all factor loadings were interpretable in regard to their expected relation with poverty. However, all were found to be slightly lower than in the case of principle component analysis, but the majority of the variables produced sufficiently high loadings. Interestingly; one of the two variables that produced low component loadings in the national and urban poverty index, and two of the three variables that produced low component loadings⁹³ in the rural poverty index respectively, also produced insufficiently high loadings in the results on the basis of EFA. In addition, total explained variance was reduced with $\approx 16,05$ percent (from 33,62 percent to 28,23 percent respectively). The estimated variance of 28,23 percent, gives a more realistic picture of the real contribution of the set of variables to describe poverty at the household level, since EFA accounts for the unique variance and the error of measurement in the variables. In addition, the low factor loadings on two of the variables if EFA is applied, weakens the choice to have included these variables within the final local poverty index. Nonetheless, a very high Pearson correlation was found between the original poverty scores as these were identified by means of PCA and the newly found poverty scores on the basis of EFA respectively⁹⁴. In appendix 8, one can consult the principle results of exploratory factor analysis.

8.3 Overall robustness of the poverty index

The overall robustness of the poverty index can be evaluated by excluding each of the different indicators once at the time and evaluate the consistency between the original household poverty scores and the newly found poverty scores respectively, by applying a Pearson correlation coefficient. The exclusion of one of the variables should not result in a complete different ranking of the households regarding their relative poverty level. It was chosen to apply this procedure with respect to the inclusion and exclusion of the poverty benchmark indicator, as well as the two weakest poverty variables that were identified at the local level, being the 'Working dependency ratio' and the 'Frequency of purchase of whole chicken' of the household respectively. This procedure was applied on the subsample of client and non client households, and results are discussed below.

⁹³ NB. These variables were 'Working dependency ratio', 'Difficulties of payment of food in last two weeks' 'Frequency of purchase of whole chicken' respectively. EFA produced insufficiently high component loadings for the first two variables mentioned.

⁹⁴ NB. Pearson correlation: (N=669); 0,990**

8.3.1 Testing overall robustness

As expected if variables are removed from PCA, the KMO tests on the basis of the alternative models were all slightly lower, which is the result of an increasing influence of partial correlations between sets of variables in comparison to the presence of multiple correlations between the variables, since the total number of variables is reduced in the analysis. However, for all alternative models in turn, total explained variance was at least 2 percent higher, compared to the original model in PCA. This indicates that although in the original poverty index more information of the household is considered (since more variables are retained), the overall strength of the model decreases if relatively weaker variables are retained in the analysis, that is variables that have a lower explanatory power to describe poverty at the household level. Nonetheless, overall the results of the new PCA's resulted in a positive judgment on the robustness of the poverty index, since the behavior of the component loadings didn't change with respect to their signs and no rigorous changes were found in the values of the loadings. In addition very high correlation coefficients were found between the original poverty scores and the newly found scores on the basis of the alternative models⁹⁵. In appendix 8, one can consult the results of principle component analysis, where each time one of the three selected variables is eliminated.

8.4 Multi-dimensionality of the poverty index

The design of the CGAP tool that ambitiously conditions the inclusion of a determinate set of dimensions on poverty, directly brings along its limitations; the tool only considers a limited number of dimensions. In addition, the quality of the included variables within each dimension may be questioned in regard to what extent they are able to reflect different dimensions of poverty at the household level. A critique of the multi-dimensional approach of poverty is that the selection of dimensions and the choice of poverty variables to reflect them, is often based on an ad-hoc selection procedure, which is usually related to data constraints in the research. (Qizilbash, 2003a, p.6)⁹⁶.

⁹⁵ NB. Pearson correlation coefficient between local poverty index and (i) Local poverty index without the 'benchmark indicator' (N=504) : 0,991**, (ii) Local poverty index without 'working dependency ratio' (N=504) : 0,993** and (iii) Local poverty index without 'Frequency of purchase of whole chicken' (N=504) : 0,999**.

⁹⁶ NB. The arbitrariness of the selection of dimensions is referred to as 'horizontal vagueness', whereas the quality of the measurement of poverty within each dimension (usually on the basis of some threshold to identify poor households or the derivation of weights on the basis of statistical procedures such as PCA), is referred to as vertical vagueness respectively (Qizilbash, 2003b).

Likewise, the CGAP tool experienced the exclusion of a range of dimensions, due to practical and methodological reasons; poverty indicators on social capital of the household were excluded for the relative complexity of measurement, as well as health related indicators; these variables usually need large recall periods and specialized training of research personnel. Self-assessment poverty indicators were excluded for being highly subjective and difficult in their comparison between households (Henry et al., 2003, p.7)

It is interesting to verify whether outcomes on depth of poverty outreach change if one of the included dimensions of the CGAP tool are left out. The dimension ‘food security and vulnerability of the household’ was previously identified as the weakest dimension, on the basis of the relatively low explanatory power of the two variables that covered this dimension⁹⁷. As an alternative procedure, results on the classification of client households on the basis of the original poverty index were compared to the same results on the basis of a poverty index whereby the weakest dimension was left out from the analysis. This approach is interesting with respect to the CGAP tool’s claim on the importance of accounting for the multi-dimensionality of poverty at the household level; if the results on depth of poverty outreach turn out to be similar, this could either pinpoint at the irrelevance of the specific dimension, or to the irrelevance (or low quality) of the used poverty variables within that dimension respectively. The results of the alternative procedure are discussed in the next section.

8.4.1 Testing the importance of multi-dimensionality

In the first place, the results of PCA on the basis of a model that did not include the dimension on ‘food security and vulnerability of the household’, resulted in that about half of the remaining variables produced slightly higher component loadings, while the other half in turn decreased slightly respectively in comparison to the original component loadings. However, none of them produced insufficiently high component loadings and all of them maintained the expected sign in regard to their relation with poverty. Second, while the KMO-value only decreased with 0,7 percent (from 0,829 to 0,823), the percentage of total explained variance of the data on the poverty component increased with 15,3 percent (from 33,6 percent to 38,8 percent).

⁹⁷ NB. The two variables that cover the dimension of ‘Food security and vulnerability of the household’ are ‘Difficulties in payment of food in last two weeks’ and ‘Frequency of purchase of whole chicken’ respectively.

Thus, by removing this weakest dimension , in statistical terms, the overall model improved considerably. Nonetheless, a high Pearson correlation was found between the original household poverty score and these scores on the basis of a poverty index without the food security dimension⁹⁸. Principle output results of PCA in the case that the variables of the food security dimension are eliminated from the analysis, can be consulted in appendix 8.

In the following table, one can consult the outcomes on depth of poverty outreach if the variables of the food security dimension of poverty would have been eliminated. By means of comparison, the percentage shares of client households that were identified in each category on the basis of the original poverty index, are also given.

Table 23 Outcomes on local depth of poverty outreach with and without the food security dimension of poverty

Relative Poverty Groups	Local Depth of Poverty Outreach	Local Depth of Poverty Outreach without food security dimension
	Percentage share of Client Households	Percentage share of Client Households
1	61,8	49,7
2	14,5	23,0
3	15,8	17,0
4	3,6	7,3
5	4,2	3,0

Most interestingly, the percentage share of client households in the category that identifies the relatively best off households decreased considerably, though in this group still the largest share of client households is found. Secondly in the categories 2, 3 and 4 all shares of client households increased, while in the relatively poorest group, the share of client households in turn, however only slightly, decreased. In sum, irrespective of the fact that a high correlation was found between the new poverty scores and the original poverty scores respectively, removing the food security dimension from the index does have a considerable impact on the distribution of client households over the different categories. Most remarkably in this respect, are the fewer client households that are categorized as ‘relatively best off household’ .

⁹⁸ NB. Pearson correlation coefficient:(n=669); 0,990**

In this case, the extreme result of a very low depth of poverty outreach is softened, which could indicate that the nature of the variables within the food security dimension overestimated the relative welfare level of the client households considered. The foregoing could be the result of limitations in the structure of the variable, or of misinterpretations in regard to the question that was concerned. It can be concluded that once having decided to describe poverty at the household level in a multiple way, apart from the difficulty to decide which dimensions to include, in the next phase it becomes most important to think over how each individual variable impacts on results on depth of outreach; the foregoing example illustrate that results on the distribution of client households may differ considerably from the original outcome.

8.5 Triangulation of methods; applying the Progress out of Poverty Index

Triangulation for this study was done with respect to a comparison between outcomes on client household poverty levels on the basis of the CGAP tool and the PPI method respectively. On the client household sample, additional data were collected to apply the Progress out of Poverty Index method⁹⁹. Since the PPI scorecard was developed at the country level, a comparison between the outcomes of the two poverty assessments is discussed with respect to the national poverty index of the CGAP tool.

8.5.1 Identification of poor households on the basis of PPI

Amongst other applications¹⁰⁰, the PPI method allows to estimate the probability that a household lives below the the national poverty line. In addition, the PPI method allows to estimate the percentage of a certain group of households that is expected to live below the national povertyline. This rate is identified by taking the average of all the individual household probabilities (Schreiner, 2008, pp.37-38). The PPI index is constructed on the basis of a simple poverty score card that is derived from ten questions about the household. Zero points on the scorecard indicate that the household is most likely to live below the national poverty line, while instead 100 points indicate that the household is least likely to live below the national poverty line respectively.

⁹⁹ NB. The Progress out of Poverty Index was already discussed in Chapter 2 in section 2.8.2. For more details on the design and features of the PPI method, I refer to Schreiner (2008).

¹⁰⁰ NB. The PPI method allows to evaluate a household's probability to be poor on the basis of 7 different poverty lines. However in this study, only findings on the basis of the national poverty line are discussed.

8.5.2 Limitations of PPI results

Before the poverty status of client households on the basis of PPI is determined, a few important methodological flaws should be taken into consideration. In the first place, in order to construct and test the PPI scorecard and calculate corresponding probabilities, three different subsamples (a construction, a calibration and a validation sample respectively) from a national household database were used. Found differences between estimated rates of poverty and true rates of poverty respectively, are therefore influenced by sampling variation. Second, the reliability of the confidence intervals on the prediction of poverty among a group of households is flawed, if this group of households does not reflect a representative sample of the population from which the PPI scorecard was constructed, or either if the sample is taken in a later period than the year of the PPI design; over time and across subgroups within the population of Ecuador, the relationship between the PPI indicators and poverty is likely to change (Schreiner, 2008, pp.37-41). Both flaws with respect to the sampling design are at stake regarding the assessment of client households of INSOTEC. Last, it is worth noticing that the real costs to pay the minimal basket of goods, on which the construction of the national poverty line is elaborated, changes over time. Since the calculation of the national poverty line is based on prices of 2006 and real consumer prices have only increased, client households may be poorer than how the results of the PPI poverty scorecards will identify them.

8.5.3 Poverty rate of client households on the basis of the national poverty line

On the basis of an evaluation of the client household's PPI scores and the corresponding probabilities of the individual households to live below the national poverty line, it resulted that the average probability was determined at $\approx 0,14$. This means that among the group of 176 client households that were evaluated, about 14 percent of them is expected to live below the national poverty line¹⁰¹.

8.5.4 Comparison of outcomes

Since PPI identifies poverty at the household level in absolute terms, while the CGAP does the same in relative terms respectively, it is difficult to verify whether client households are likely to live below or above the national poverty line on the basis of the poverty scores identified by the CGAP tool.

¹⁰¹ NB. One can find the categories of scorecard scores and corresponding probabilities in figure 5 of the 'national poverty line tables in Schreiner (2008) p: 73.

However, it is still interesting to analyse how strong the association is between the ranking of client households on the basis of the CGAP tool poverty scores and the PPI scores or the related probabilities respectively. Since normality of data with respect to the considered variables was violated, a spearman’s rho correlation test was conducted between the three poverty measures. The results are given in the following table.

Table 24 Spearman's Rho correlation coefficients between different poverty measures

	CGAP score	PPI score	PPI probability
CGAP score	1	-0,646**	0,613**
PPI score	-0,646**	1	-0,971**
PPI probability	0,613**	-0,971**	1

Found correlations of the CGAP household poverty score with the two PPI measures on household poverty (scores and probabilities respectively) are similar, which is something that one would expect regarding the direct relationship between PPI scores and the estimated probabilities, which is also indicated by the high correlation coefficient between the two PPI variables. The (negative) correlation of 0,646 between the client household’s CGAP poverty scores and their PPI scores respectively, which was found to be significant at the 0,01 level, indicates that similarities were found in the ordering of client households on the basis of the CGAP tool and the PPI method. This finding strengthens the idea that the measurement of poverty at the household level on the basis of the CGAP tool is meaningful. However, some methodological factors could have played a role in this respect; both methods constructed a household specific poverty measure on the basis of data that were derived from the same database¹⁰². Secondly, overlap is also found in regard to the poverty variables that were applied, since four of the PPI poverty indicators were also used (though not in the same structure) in the application of the CGAP tool in this study. On the other hand side, an correlation of 0,646 is also not extremely high. In case this study would have prioritized the construction of a national poverty index as a starting point in the analysis¹⁰³, the found correlation coefficient between CGAP and PPI scores might have been larger. It can be concluded that the found association is not high enough to assume that, on the basis of the findings in this study, both methods identify (client) households poverty levels in a similar way.

¹⁰² NB. ‘ECV 2005/2006’

¹⁰³ NB. In chapter 6, section 6.6 respectively (page 73). the arguments to construct other poverty indices on the basis of those indicators that were found to be most explanatory at the local level, are discussed.

Chapter 9. Principle findings, reflections and recommendations

9.1 Introduction

This study realized an application of the CGAP poverty assessment tool with respect to client households of the credit program of the microfinance institute INSOTEC - agency of Santo Domingo de los Colorados. The original approach of this tool is to measure a client household's relative poverty, that is in comparison to the poverty level of non client household in the local area, and subsequently provides a means to evaluate to what extent relatively poorer client households are reached by the credit program. However, this study made an attempt to place the CGAP tool in a greater context by also evaluating outcomes on depth of poverty outreach using different poverty contexts as a reference. In this chapter principle findings are summarized. Hereafter a critical reflection is given on the research and the merits of the CGAP tool respectively. Finally, recommendations for further research are proposed.

9.2 Principle findings

Irrespective of the poverty context that was concerned, the average client household was found to be significantly less poor than the average non client household. The only exception to this rule was the average poverty level of the urban client household, which didn't differ from that of an average non client household from the urban population of Ecuador. The foregoing was also reflected in the outcomes on the classification of client households to evaluate depth of poverty outreach. Although the relative poverty level of client households changed across the different poverty contexts, from a local, a national and a rural perspective respectively, it can be concluded that the agency of Santo Domingo de los Colorados, currently doesn't succeed in reaching poor households with the micro credit program. In all contexts, the largest share of client households was each time found in the category of households that identified the relatively best of households. Considerable depth of poverty outreach was only found with respect to urban client households. Provided that their poverty level was held against an urban sample of (non client) households from the national population, the findings in this study indicated that the agency does succeed in reaching a considerable amount of poor urban households with their micro credit program.

In regard to many demographic and socio-economic household characteristics, it was found that client households differed significantly from non client households in the local area; the household head of an average client household is younger, more often female, higher educated and more often runs it's own business than the household head of an average non client household respectively. It is also more likely that client households have a roof of concrete, a flush toilet connected to the sewerage system and water provision from the public network than that non client households would have these characteristics. Last, the average client household also has more rooms per household member, a higher working dependency ratio, and higher per member expenditures on food and clothing wear respectively, than the average non client household respectively.

The local sample of non client households identified a relatively higher poverty level in the local area in comparison to the national poverty context, which resulted in a determination of the average poverty level of the client household that was relatively lower than when these same client households were evaluated at the national level respectively. Also, on the basis of the national, as well as the local poverty index, overall urban client households were identified as significantly less poor than their urban counterpart in the wider population, while on the basis of the urban poverty index instead, no significant difference was found between urban client households and urban non client households respectively. The foregoing makes clear that while the same set of variables was used to construct the different poverty indices, changes in the poverty component loadings impact considerably on the relative status of poverty of client households, depending the poverty context that is considered.

Last, it was found that on the basis of the local, as well as the national poverty index, the average urban client household was significantly less poor than the average rural client household. Therefore, regarding the fact that a larger share of rural client households was considered in the final client household sample in comparison to the real distribution of client households by residential area, one could expect the results on depth of poverty outreach from a local and national perspective in real life to be even lower than what was found on the basis of this study.

9.3 Reflections on the research

The greatest flaw in the research, was the difficulty to design a representative client household sample. This hampers a generalization of the findings for the whole client population of the agency of Santo Domingo¹⁰⁴. Second, in regard to the approach in this study to address household poverty in a multi-dimensional way, it is argued that selecting a minimum of two variables for each dimension and assuming that these variables are sufficiently meaningful to capture the identified dimension of poverty, is at least doubtful. In Moser and Felton (2007) it is stated that no paper so far has conducted PCA initially on a variable set of poverty variables for each dimension specifically, where after PCA could be applied again to create a multi-dimensional poverty index, by using the (for each dimension) pre-selected poverty variables. Though this approach would have been worthwhile for this study, due to the lack of data on some of the identified dimensions of poverty by the CGAP tool, it was considered as beyond the scope of possibilities in this study.

Extreme low depth of poverty outreach was particularly found at the local level. On the one hand side this may not be surprising; INSOTEC is not focused on poor client households in particular and it is expected that the prerequisite to run a self-owned registered business for at least 12 months in order to be eligible for a loan, results in that many poor households are excluded from access to the services of INSOTEC. On the other hand side, it is argued that the extreme results can not be explained fully by the features of current policy and working procedures of the institute. In practice the institute does aim to attend individuals from the lower socio-economic segments of the population¹⁰⁵.

It may therefore be likely that methodological causes have had a certain impact on the extreme outcomes of depth of poverty outreach at the local level. First, since it was found that the average rural client household is significantly poorer than the average urban client household, the low depth of poverty outreach could partially be the result of the urban biased client household sample. Second, client household information was collected in September 2009, while data information of non client households dated from the year 2005/2006 respectively.

¹⁰⁴ NB. A profound explanation on the construction and related biases of the client household sample was given in chapter 4 in section 4.6.

¹⁰⁵ NB. In chapter 3 in section 3.4.2 respectively, the institute policy guidelines and current activities in this respect were addressed more profoundly.

Though price-valued poverty indicators of the index were adjusted for inflation, responses of client households on the remaining poverty variables may not only be related to their client status, but also to changes in welfare patterns over time which impacted on the overall welfare level of households in the area. Third, the possible welfare impact of the disposal of the first loan was not accounted for in the analysis. Fourth, although an evaluation on a set of demographic features in chapter 5 distinguished client households from non client households respectively, unobservable characteristics of client households such as ‘entrepreneurial skills’ or ‘social networking skills’ that make it more likely that the respective person applies for a loan, may also have an impact on their initial welfare level. Last, the branch was located at one of the main streets of the inner-city of Santo Domingo de los Colorados. Poorer households generally lived more in the suburbs of the city center or in the surrounding rural areas respectively, which is why it is expected that these households experience more obstacles to reach or even take notice from the institute.

Low depth of poverty outreach of the microcredit program of Santo Domingo however could improve in the future; the agency of Santo Domingo aims to expand its credit services into the rural areas of Ecuador in order to reach more potential clients engaged in agricultural production or farming activities respectively. This policy could stimulate depth of poverty outreach, since the severity of poverty among rural households is still higher than among urban households (World Bank, 2004). More specifically, the agency is planning to expand its services to the province of Manabí, where as was discussed in chapter 3, the incidence of poverty is higher than in the province of Santo Domingo de los Tsáchilas. On the one hand side therefore, one may expect that reaching poor households may be promoted, since overall poverty in this province is more severe. However, program placement bias, self-selection bias and institutional requirements could counteract against this. Moreover, if the local poverty context in Manabí and surroundings (that is on the basis of a local sample of non client households in this area) is identified by the CGAP tool as even poorer than the poverty context of Santo Domingo de los Tsáchilas, depth of poverty outreach in turn may be found again very low¹⁰⁶. The foregoing reflects the practical limitations of a sound judgment on the measurement of poverty of client households in the local area; findings on a low depth of poverty outreach on the basis of a relative measurement of poverty in a relatively poor area doesn’t necessarily mean that client households are exempted from a poor living standard.

¹⁰⁶ NB. In chapter 4, section 4.3.1 this study already pinpointed at the limitations of regional poverty analysis in regard to expectations on outcomes of depth of poverty outreach

The choice to evaluate depth of poverty outreach beyond the local area on the basis of other poverty contexts, provided a means to overcome the limited knowledge of client household poverty at the local level. Maintaining the same set of variables in all poverty indices however, undermines the approach of the CGAP tool that allows the set of variables to change according to a changing poverty context. The rigorous changes that were found in the component loadings of some of the poverty variables, are informative in this respect. To give an example; the variable 'Frequency of purchase of whole chicken' that produced a loading of 0,415 (in absolute terms) in the local context, was reduced to 0,115 in the rural context respectively. The weak explanatory power of this variable in the rural context, may be related to the fact that many rural families hold poultry themselves, which makes the need to buy 'whole chicken' irrelevant. In a rural context therefore, the relation of this variable to the poverty status of the household becomes less relevant.

9.4 Reflections on the CGAP poverty assessment tool

9.4.1 The relative measurement of poverty

However interesting the concept of a relative measurement of poverty may be from a methodological perspective, various obstacles are at stake regarding the practical implementation of the tool and the obtained insights respectively. Where relative deprivation of households is the starting point of the analysis, poverty is judged in comparison with the experience of others in society. But this cannot be the only basis to judge on poverty. In this respect, one could question to what extent the relative definition of poverty at the household level is valuable in a country where one explicitly deals with absolute deprivation of people. A relative measurement of poverty could result in perceiving the problem of poverty only as an inequality problem (Sen, 1976) In this respect, the notion that on the basis of a local poverty context, the majority of the client households was identified as 'relatively non poor', may tell the institute more about the poverty context in the local area than about the real poverty status of their clients. The limited knowledge that is derived from an estimation of the relative poverty status of client households, lies in the fact that microfinance clients identified as 'relatively rich' in the local area can still be worse off than the poorest households in a relatively rich area.

9.4.2 Multidimensionality and the use of a benchmark indicator

The use of a benchmark indicator to pre-select other poverty variables and the inclusion of the benchmark indicator in the poverty index respectively, intends to build a bridge between the 'multi-dimensional approach' and the traditional 'money metric approach' to measure poverty at the household level.

However, regarding the difficulty to understand to what extent these approaches of identification of poverty are comparable¹⁰⁷, one could question the desirability to include a money metric benchmark indicator in the poverty index. In addition, to what extent the importance of multi-dimensionality of poverty should be claimed if all retained poverty variables conditionally should assure a significant correlation with the benchmark indicator, may be questioned as well. It may occur that poverty variables which are on a theoretical basis highly relevant to identify certain dimensions of poverty, are nonetheless excluded because of a non significant correlation with the benchmark indicator¹⁰⁸. Moreover, found correlations between the benchmark indicator and other poverty variables may be subject to non systematic variation of the benchmark indicator itself¹⁰⁹. In this study, another limitation in regard to the condition on multi-dimensionality was also experienced; a slightly different (sub)set of variables created a poverty component that was explained by a higher percentage of explained variance in the original data. However, this set did not comply with the ‘multi-dimensionality condition’¹¹⁰, and was therefore neglected. In addition, the alternative procedures in chapter 8, where a few poverty indicators, as well as the variables of the weakest dimension were excluded from the analysis, resulted in all cases in a higher explained variance on the poverty component than what was found originally; this illustrates the gap between the condition of multi-dimensionality on the one hand side and a parsimonious model of PCA on the other respectively. In this respect, it is argued that if the inclusion of a certain variable reduces the total explained variance of the model and the internal coherence of that variable is violated across the relative poverty groups, the additional value of the inclusion of the respective variable in the analysis should be reconsidered and reliable theory to retain the respective variable becomes ever more important.

9.4.3 Construction of a poverty index

Once the final set of retained variables is determined on the basis of the non client household sample, the final poverty index in turn, is constructed on the basis of client households and non client households respectively.

¹⁰⁷ NB. This was previously discussed in chapter 2, section 2.9

¹⁰⁸ NB. For example in regard to this study, many demographic indicators that generally identify a clear relationship with household poverty levels, such as the education level or literacy rate of the household head, did not produce a significant correlation with the benchmark indicator, and were therefore excluded from the analysis.

¹⁰⁹ NB. The robustness of the benchmark indicator that is assumed to reflect total expenditure patterns of the household, could be tested as this was done in Van der Ruit, May and Roberts (2001, p. 51) where bivariate correlations between the benchmark indicator and monthly household expenditure per adult equivalent were conducted.

¹¹⁰ NB. The condition on multi-dimensionality has been discussed in chapter 2.

In particular at the local level, where the share of client households in the total sample is considerable, the impact of the inclusion of this biased sample of client households is ignored, but in a strict sense can not be neglected¹¹¹. In this respect, the national, urban and rural poverty indices that were constructed on the basis of larger samples of non client households, produced less biased results in regard to poverty component loadings and scores, since the relative share of client households in the total sample was much more reduced.

9.4.4 Sustainability of findings

It is important to acknowledge that CGAP tool evaluates current poverty information on participants of a credit program and their households respectively. By using cross-section data, the method is not very useful to analyze poverty dynamics or changes in poverty over time; the method does not allow to analyze the causal chain of poverty, where many feedback loops exist among the endogenous variables that impact on the poverty status of households. Moreover, the socio-economic conditions of households in a country are changing over time, as well as the norm to identify a minimal living standard. Therefore, earlier collected poverty indicators, may become less representative. The set of poverty indicators that at best captures the poverty status of households, will vary over time.

The CGAP tool is progressive in providing a means to evaluate depth of poverty outreach that incorporates various aspects of well-being at the household level and in addition reveals insights in the client households poverty level and how it is subject to change, depending the poverty context that is considered. In comparison to a poverty assessment on the basis of income or expenditure data, or either a self-assessment of the household on their living standard, the data that are used in the CGAP tool are generally non-subjective, trustworthy and relatively easy to collect. On the basis of the application of the CGAP tool in this study however, it is also argued that the tool involves many disadvantages. The claim to identify a multidimensional poverty is flawed in several ways and judgments on findings on depth of poverty outreach remain arbitrary, with respect to the difficulty of interpreting a relative definition of poverty of client households in practice. Moreover, in regard to the identification of poverty by means of statistical analysis that is based on the association between variables, a difficulty is that once a set of variables is found that according to the researcher describes sufficiently the underlying common characteristic of poverty, one can always find arguments for a different set of variables that would have produced the same or even better statistical results.

¹¹¹ NB. Unbiased poverty component loadings as well as unbiased poverty scores of client and non client households respectively, could be realized if client households' poverty scores are calculated after the original poverty component loadings have been identified.

Moreover; combining short term poverty variables such as those on food insecurity with long term welfare indicators such as household's assets, blurs a clear definition of what kind of poverty is actually measured; the more complex the conceptualization of poverty, the more difficult it becomes to make the identification of poverty operational, and it is argued that the CGAP tool suffers mostly from this identification problem.

9.5 Recommendations for further research

From a practical point of view, the CGAP tool could be applied to several credit programs from different agencies, while using a broader poverty context as a reference, for example on the basis of the national poverty index. In this way, changing relative poverty levels of client households, as well as outcomes on depth of outreach, can then be compared across different agencies. Secondly, one could explore the patterns of associations between client characteristics (e.g. loan repayment behavior of the client, residential area of the household, gender of the client, economic sector of the client's activity) and the client household's relative poverty level (e.g. client household poverty score) respectively. On the basis of new insights in the relation between the poverty status of the household and other client characteristics, financial products, for example with respect to terms and conditions of the loan, could be adopted to attend the poorer client in a better way.

From a methodological point of view, further research could focus on the coherence of the identification of poverty by the CGAP tool with other poverty assessments at the household level. Overlap analysis could be useful with respect to comparison between methods with respect to classification results. It is also argued that information on household income of client households, in order to identify associations in the ordering of poor and non poor client households on the basis of CGAP total and income poverty measurement is particularly relevant in the context of microfinance; if the institute does not have additional knowledge about in what way the outcomes on poverty of client households is related to expectations on the consequences for their disposable income, the merits of the CGAP tool remain within the scope of a descriptive analysis.

Last, it may also be interesting to apply the same research on another MFI of comparable size that operates in the same local area, but instead differs with respect to their mission, institutional procedures or in regard to the characteristics of the loan; Since the relative poverty level of client households is identified on the basis of the same local poverty context, interesting differences in depth of poverty outreach may be revealed between the two respective institutes.

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Appendix 1. Overview on CGAP Poverty assessment tool' studies

Authors	Year	Organisation & Location	Objectives of study	Principle findings	Special features
Zeller, M., Sharma, M., Henry, C., Lapenu, C.	2005	ACODEP, Nicaragua	Study presents empirical results of a new operational method (the CGAP poverty assessment tool) for assessing the poverty outreach of microfinance programs	Organisation serves clientele that is equally distributed over the different poverty levels in the operational area, which is consistent with it's aim to reach micro, small and medium enterprises and maintain diversity in financial products	
"	"	Kenyan Women Finance Trust (KWFT), Kenia	"	The poorest tercile of the households are underrepresented among the clients of KWFT but half of the clientele is present in the two poorest catagories.	
"	"	SHARE, India	"	The clients in poorest tercile are overrepresented, whereas clients in least poorest tercile are under represented	
"	"	Societe Desjardins, Madagascar	"	The least poorest clients are overrepresented compared to their share in the general population	
Van der Ruit, C., May, J., Roberts, P.	2001	Small Entreprise Foundation (SEF), South Africa	Explore depth of poverty outreach of SEF clients in relation to non SEF clients by comparing the poverty profiles accros two different programs of SEF, being the targeting micro-credit programme (TCP) and the non-targeted micro-credit programme (MCP)	The TCP programm showed greatest depth of outreach: Majority of TCP clients are located in the lowest poverty catagory, whereas the majority of the MCp clients fell in the least poor category/ Most of the operational area of SEF ranks considerably below the national average of poverty level in South Africa	Comparison with Participatory Wealth Ranking (PWR) method; three quarters of those defined as poor by the CGAP tool were also defined as poor by PWR tool

Authors	Year	Organisation & Location	Objectives of study	Principle findings	Special features
Shaban, A. A.	2001	Social Safety Net (SSN) Programs, Indonesia	Assess effectiveness of SSN programs to reach poor households and compare findings with targeting effectiveness of SSN programs in other regions of the country	Four of the five programs reach relatively more clients belonging to the poorest category in the operational area. The targeting effectiveness differs widely across different regions. Poverty outreach in central Sulawesi is compared to other regions quite successful	
Wollni, M.	2001	Compartamos, Mexico	Evaluation of poverty outreach among client households of Compartamos at the state, municipality and operational area level	Results on a state level indicate that Compartamos operates mainly in poorer states while on a municipality level it was found that the institute is mainly operating in better-off municipalities within these poorer states; wealthier households are disproportionately reached with respect to the general population in the operational area.	Study also addresses breadth of outreach: Compartamos does reach a large amount of poor households in absolute terms
Barua, P. Sulaiman, M	2006	Bangladesh Rural Advancement Committee, Bangladesh (BRAC)	Assessing the targeting effectiveness of the BDP Ultra poor programme by measuring relative poverty of BDP ultra poor households in relation to non BDP-BRAC clients.	Almost half of the 'BDP ultra poor' belongs to the poorest quartile; BDP ultra poor are overrepresented in comparison with control group in poorest quartile/ deterioration of welfare status is largely concentrated in the poorest quartile/ No. Of selection criteria fulfilled has significant inverse relationship with poverty scores,	Study allows for the inclusion of variable that addresses self assessment on trajectory of change of the household's welfare status/ inclusion of study on quality of participation of BDP clients and its relation to poverty scores.

Authors	Year	Organisation & Location	Objectives of study	Principle findings	Special features
Matin, I., Cortijo, M.A., Hossain, M.Z.	2003	Pali Daridro Bimochon Foundation (PDBF), Bangladesh	Assessing the relative depth of outreach by describing the poverty profiles of PDBF client households in relation to a representative sample of non-client households and explore levels of well being in these areas to higher aggregate poverty data	In relative terms, PDBF is not serving the poorest households. For a given percentage of the population, the average score of clients is higher initially and then becomes lower than that of the non-client groups. Given the standard of living of the country, in some branches the institute is dealing with poor households in absolute terms. PDBF land-based targeting procedure fails to be pro-poor in discriminating between the various poverty groups	Study reviews on land based selection criteria and on microfinance participation of the whole sample
Central Bank of West Africa and CGAP	2004	PAMECAS, ACEP, CMS, FENAGIE, FDEA, PAME, Senegal	Determine the poverty level of client households compared to non-client households	FENAGIE has largest share of poorest households among it's clients, while PAMECAS has the smallest share of poorest clients. Other institutions show shifting patterns depending on whether dwelling characteristics are included or not within the poverty index. Clients were on average worse off in terms of material capital, compared to the national average but better off for indicators related to human capital such as literacy and family size.	Study reviews differences in poverty levels including and excluding dwelling characteristics within the poverty index to account for influences of community characteristics. Study addresses importance of breadth of outreach
European Savings Banks Groups (ESBG), World Savings Banks Institute (WSBI)	2008	National Saving Institute of India, Tanzania Postal Bank, Banco Nacional de Ahorro y Servicios Financieros (Mexico) and Government Savings Bank (Thailand)	Determine the poverty level of client households compared to non-client households	The study concludes that the four savings banks are large providers of financial services in their countries; each has significant outreach among the poorest households. They actually have a larger outreach among the poorest households than most other pro-poor institutions in their countries.	

Authors	Year	Organisation & Location	Objectives of study	Principle findings	Special features
Milan, F.M. & Zeller, M.	2005	AMK Co. Ltd, Cambodia	Using cross-sectional data and panel data, depth of outreach and poverty transition is evaluated over time. Differences in household features per poverty group is analyzed	Transiently poor seem to be more successful in asset building. Many significant differences in changes in means of poverty indicators are revealed (in particular among transiently poor)	Use of panel data to reveal patterns of change in poverty status and poverty impact, addresses attrition bias and drop out problem
Copestake, D.	2005	Promuc, Peru	Comparing two assessments of poverty of microfinance households	Considerable depth of outreach	Impact analysis is also addressed and suggestions are made on how to combine different poverty assessment methods.
Awusabo-Asare, K. et al.	2009	Rural and Community Banks, Non governmental Organizations, Savings and Loans companies, Credit unions, Ghana	Identify which market is targeted by the different categories of institutions with respect to the socio-economic characteristics of the client household.	The rural and community banks and the financial NGOs respectively reached out to all categories of clients ranging from the extremely poor in the lowest wealth quintile to the poor in the highest quintile. On the other side, savings and loans companies and susu collectors reached clients within the above average and highest quintile. Last, credit unions reached out to clients from the average to the highest quintile.	Chosen proxy indicators differ highly from original recommended CGAP poverty indicators and it remains unclear which set of final indicators is eventually used

Authors	Year	Organisation & Location	Objectives of study	Principle findings	Special features
Kimos Adjei, J., Arun, T.	2009	SINAPI ABA TRUST, Ghana	Evaluate depth of poverty outreach of the client households of SINAPI ABA TRUST	The study concluded that clients of SAT are under-represented in the very poor category, but over-represented in both the moderately poor and less poor categories of the population within the survey areas.	The study notes that programme placement plays a key role in determining the type of clients reached by SAT, since almost all its branches are located in urban centres
Bhadra, C., Singh Karky, B	2001	Nirdhan Uttan Bank Ltd. (NUBL), Nepal	Examine the social mission of the bank to reach the poorest households in all of their three operative areas	A larger proportion (44%) of clients are found to cluster in the lowest (poorest) tercile. In the higher tercile only 15% of clients is found. Depth of outreach of NUBL is considerably since poorer communities are reached as well as the poorest households within these communities NUBL has reached to the poorest households.	The sample of non client households was not randomly designed by the EPI-method but instead non client households from only the respective rural areas were selected, this to evaluate relative poverty level of client households on the basis of a 'poor community reference'

Appendix 2. Original set of recommended variables by CGAP Tool

Human resources

1. Age of adult household members
2. Sex of adult household members
3. Level of education of adult household members
4. Economic occupation of adult household members
5. Number of children below 15 years of age in the household
6. Annual Clothing/Footwear expenditure for all household members

Dwelling characteristics

1. Ownership status
2. Number of rooms
3. Quality of roof material
4. Quality of exterior walls
5. Type of flooring
6. Observed structural condition of dwelling
7. Type of electricity connection
8. Type of cooking fuel used
9. Source of drinking water
10. Type of toilet facility

Food security and vulnerability

1. Number of meals served in the last two days
2. Serving frequency (weekly) of three luxury foods
3. Serving frequency (weekly) of three inferior foods
4. Hunger episodes in last one month
5. Hunger episodes in last 12 months
6. Frequency of purchase of staple goods
7. Size of stock of local staple in dwelling

Assets

1. Area and value of land owned
2. Number and value of selected livestock resources
3. Ownership and value of transportation related assets
4. Ownership and value of electric appliances

Others

1. Urban/rural indicator
2. Non-client assessment of poverty outreach of MFI

Appendix 3. Overview of all other tested poverty variables in PCA

Human resources

1. The education level of the household head
2. The literacy ratio of the household adult members
3. The ratio of the number of children below the age of 16 to the total number of household members

Dwelling characteristics

1. Type of material of exterior walls
2. Type of lightning
3. Type of cooking fuel
4. Location of kitchen in the dwelling
5. Type of housing
6. Number of bathrooms per householdmember

Foodsecurity and vulnerability

1. Frequency of purchase and expenditure on beef (luxery food)
2. Expenditure on whole chicken (luxery food)
3. Frequency of purchase and expenditure on fish (luxery food)
4. Frequency of purchase and expenditure on potatoes (basic food)
5. Frequency of purchase and expenditure on rice (basic food)
6. Frequency of purchase and expenditure on noodles (basic food)
7. Evaluation whether the household had or not sufficient to eat in the last two weeks

Assets

1. Possession of fridge
2. Possession of mixer
3. Possession of color television
4. Possession of sound equipement system
5. Possession of washing machine
6. Possession of terrain
7. Sum of current value of all transport assets

Variables tested as dummy variables

1. Type of material of exterior walls; concrete/cement/adobe/wood/bahareque/cane
2. Type of cooking fuel; gas/electricity/coal
3. Principle economic position of the household head; whether or not the household head is an agricultural laborer
4. Location of toilet facility; inside the dwelling/outside the dwelling on private terrain/outside the dwelling and private terrain
5. Location water source; inside the dwelling/outside the dwelling on private terrain/outside the dwelling and private terrain

Appendix 4. Features of the variables of the poverty index

1. Per member expenditure on food and clothing wear in last three months in US Dollars
2. 'Working dependency ratio'; Number of members with paid jobs divided by the total number of household members
3. Type of roof material of the dwelling

Categories	Value
Concrete/paving stone	1
Other materials	0

4. Type of water source provision

Categories	Value
Public network	1
Piped water/Purchase by water distribution	2
Pothole	3
Connection to river	4

5. Location of water source

Categories	Value
Inside the dwelling	1
Outside the dwelling on private terrain	2
Outside the dwelling and on non-private terrain	3

6. Type of toilet facility

Categories	Value
Flush toilet connected to the sewerage system	1
Pit toilet with septic tank	2
Pit toilet without septic tank	3
Latrine	4
No toilet facility	5

7. Location of toilet facility

Categories	Value
Inside the dwelling	1
Outside the dwelling on private terrain	2
Outside the dwelling and on non-private terrain	3

8. Difficulties of payment of food in last two weeks

Categories	Value
Yes, household experienced difficulties	1
No, household didn't experience difficulties	0

9. Frequency of purchase of whole chicken

Categories	Value
Daily	1,000
Weekly	0,500
Once in two weeks	0,250
Once in a month	0,125
Once in three months	0,040
Once in a half year	0,020
Once in a year	0,010
Never	0,000

10. Possession of shower

Categories	Value
Yes, household has a shower	1
No, household doesn't have a shower	0

11. Current price value of car(s) of the household, (if available) in US Dollars

Appendix 5. Output information of PCA (1)

Concept	Definition	Particularities
<i>Correlation Matrix</i>	Matrix of the observed correlations between the variables (Pearson)	
<i>Level of significance Matrix</i>	Matrix of the level of significance of the observed correlations between the variables	Preferably the correlations between the variables are found significant at ($p < 0,05$)
<i>Determinant</i>	Determinant of the Correlation matrix; overall measure of degree of interrelation between the variables. The determinant of the variance/covariance matrix is the product of the diagonal entities minus the product of the off diagonal entities.	The smaller the determinant, the higher the interrelation between variables.
<i>The KMO test (Kaiser-Meyer-Olkin)</i>	Measure of sampling adequacy; compares the magnitudes of the observed correlations between the variables to the partial correlations between the variables respectively.	The larger the ratio of the KMO test, the more successful is the application of PCA; this indicates that multiple correlation is more prevalent than the partial correlation between individual sets of variables.
<i>Bartlett's test of sphericity</i>	A chi-square test which compares the correlation matrix with an identity matrix. Test to satisfy the condition that the variances and covariances in the data are not equal to one and zero respectively	To assure that the correlation matrix does not resemble an identity matrix, one needs a statistical significant found difference at ($p < 0,05$)
<i>Inverse Matrix</i>	Inverse of the correlation matrix between the variables	
<i>Matrix of reproduced correlations</i>	Demonstrates the correlations between the variables, on the basis of the variance that the component(s) account(s) for. The reproduced correlations are calculated by the sum of the component loadings of each set of variables.	
<i>Matrix of correlation residuals</i>	Represents the variance between the variables that is not explained by the model. The residuals are calculated by subtracting the reproduced correlations from the observed correlations	Preferably the residual correlations between the variables are low, since the aim of PCA is to explain the highest variance in the data possible by the model.
<i>Matriz Anti-Imagen</i>	Demonstrates the partial correlations between the variables, whereby the influence of other variables has been eliminated.	The smaller the partial correlations, the more prevalent becomes multiple correlation in the analysis; this suggests the presence of latent variables.

Output information of PCA (2)

Concept	Definition	Particularities
<i>Component matrix</i>	Demonstrates the unique correlation between the variable and the constructed component, whereby the relation between the variables has been eliminated. Component loadings are calculated by multiplying the observed correlation matrix with the inverse correlation matrix respectively	
<i>Eigenvalue of the component</i>	Sum of the squared component loadings for each component, of all variables in the analysis.	
<i>Percentage of explained variance</i>	Eigenvalue of the component (explained variance)divided by the total variance (which equals the number of variables included in the analysis).	Since PCA assumes that all variance in the data is common variance and data are usually standardized (each variable has a variance of '1'), total variance equals the number of variables in the analysis
<i>Communalities</i>	Expresses the variance in each variable that is explained by the extracted components; communalities are calculated by the sum of the squared component loadings of each extracted component.	In this study, one only focuses on the first component. This is why the definition of communalities as such doesn't say much about the explained variance of the variable on the first component only.

Source; Vidal Diaz de Rada, 2002¹¹²

¹¹² NB. Vidal Diaz de Rada. I. *Técnicas de análisis multivariante para investigación social y comercial*, RA-MA editorial, pp: 97-127, 2002

Appendix 6. Construction of other poverty indices

Results of PCA for the construction of the national poverty index

Variables of the poverty index (national)	Poverty component loading	Communalities
Per member expenditure on foot and clothing wear in last three months	-0,369	0,516
Working dependency ratio	-0,127	0,590
Type of roof material	-0,536	0,314
Type of source of water provision	0,700	0,615
Location of source of water provision	0,854	0,774
Type of toilet facility	0,789	0,673
Location of toilet facility	0,681	0,480
Difficulties in payment of food in last two weeks	0,321	0,294
Frequency of purchase of whole chicken	-0,123	0,522
Possession of shower	-0,818	0,681
Current price value of car (if available)	-0,402	0,475

Additional information of PCA

Tests and Requirements of PCA (National)	
KMO-Test	0,846
Bartlett's Test	significant
Explained Variance (%)	33,58
Determinant	0,059

Results of PCA for the construction of the urban poverty index

Variables of the poverty index (urban)	Poverty component loading	Communalities
Per member expenditure on foot and clothing wear in last three months	-0,319	0,523
Working dependency ratio	-0,114	0,553
Type of roof material	-0,507	0,289
Type of source of water provision	0,505	0,494
Location of source of water provision	0,841	0,756
Type of toilet facility	0,710	0,537
Location of toilet facility	0,712	0,529
Difficulties in payment of food in last two weeks	0,328	0,281
Frequency of purchase of whole chicken	-0,114	0,564
Possession of shower	-0,804	0,658
Current price value of car (if available)	-0,380	0,411

Additional information of PCA

Tests and Requirements of PCA (Urban)	
KMO-Test	0,814
Bartlett's Test	significant
Explained Variance (%)	29,60
Determinant	0,115

Results of PCA for the construction of the rural poverty index

Variables of the poverty index (rural)	Poverty component loading	Communalities
Per member expenditure on foot and clothing wear in last three months	-0,328	0,465
Working dependency ratio	-0,125	0,568
Type of roof material	-0,374	0,184
Type of source of water provision	0,669	0,604
Location of source of water provision	0,819	0,721
Type of toilet facility	0,753	0,599
Location of toilet facility	0,597	0,391
Difficulties in payment of food in last two weeks	0,202	0,377
Frequency of purchase of whole chicken	-0,115	0,319
Possession of shower	-0,780	0,615
Current price value of car (if available)	-0,377	0,488

Additional Information of PCA

Tests and Requirements of PCA (Rural)	
KMO-Test	0,796
Bartlett's Test	significant
Explained Variance	28,27%
Determinant	0,145

Appendix 7. Pearson correlations with the benchmark indicator

Poverty Indicators	Correlations with benchmark indicator at the local level		Correlations with benchmark indicator at the national level		Correlations with benchmark indicator at the urban level		Correlations with benchmark indicator at the rural level	
	Pearson Corr.		Pearson Corr.		Pearson Corr.		Pearson Corr.	
Working dependency ratio	Pearson Corr.	0,234**	Pearson Corr.	0,165**	Pearson Corr.	0,189**	Pearson Corr.	0,119**
	N	671	N	13700	N	6722	N	6078
Type of roof material	Pearson Corr.	0,223**	Pearson Corr.	0,165**	Pearson Corr.	0,129**	Pearson Corr.	0,079**
	N	671	N	13547	N	7499	N	6048
Type of source of water provision	Pearson Corr.	-0,159**	Pearson Corr.	-0,133**	Pearson Corr.	-0,050**	Pearson Corr.	-0,083**
	N	671	N	13213	N	7622	N	5823
Location of source water provision	Pearson Corr.	-0,178**	Pearson Corr.	-0,198**	Pearson Corr.	-0,150**	Pearson Corr.	-0,152**
	N	671	N	13700	N	7622	N	6078
Type of toilet facility	Pearson Corr.	-0,213**	Pearson Corr.	-0,190**	Pearson Corr.	-0,124**	Pearson Corr.	-0,161**
	N	671	N	13700	N	7622	N	6078
Location of toilet facility	Pearson Corr.	-0,188**	Pearson Corr.	-0,200**	Pearson Corr.	-0,154**	Pearson Corr.	-0,166**
	N	671	N	11909	N	7405	N	4504
Difficulties in payment of food in last two weeks	Pearson Corr.	-0,132**	Pearson Corr.	-0,151**	Pearson Corr.	-0,146**	Pearson Corr.	-0,126**
	N	671	N	13700	N	7622	N	6078
Frequency of purchase of whole chicken	Pearson Corr.	0,124**	Pearson Corr.	0,036**	Pearson Corr.	0,032**	Pearson Corr.	0,024
	N	671	N	13700	N	7622	N	6078
Possession of shower	Pearson Corr.	0,200*	Pearson Corr.	0,215**	Pearson Corr.	0,166**	Pearson Corr.	0,189**
	N	671	N	13700	N	7622	N	6078
Current price value of car	Pearson Corr.	0,092*	Pearson Corr.	0,274**	Pearson Corr.	0,261**	Pearson Corr.	0,205**
	N	671	N	13700	N	7622	N	6078
**: Correlation is significant at the 0.01 level (two-tailed).								
* ; Correlation is significant at the 0.05 level (two-tailed).								

Appendix 8. Principle results of alternative procedures in chapter 8

Results of EFA for the construction of the local poverty index

Variables of the poverty index (local)	Factor loading	Communalities
Per member expenditure on foot and clothingwear in last three months	-0,307	0,094
Working dependency ratio	-0,252	0,064
Type of roof material	-0,473	0,224
Type of source of water provision	0,635	0,403
Location of source of water provision	0,744	0,554
Type of toilet facility	0,72	0,519
Location of toilet facility	0,686	0,47
Difficulties in payment of food in last two weeks	0,260	0,067
Frequency of purchase of whole chicken	-0,342	0,117
Possession of shower	-0,698	0,488
Current price value of car (if available)	-0,325	0,106

Additional information of EFA

Tests and Requirements of EFA	
KMO-Test	0,829
BARTLETT's Test	significant
Explained Variance	28,23%
Determinant	0,068

Results of PCA of a local poverty index without the benchmark indicator

Variables of the poverty index (local without benchmark indicator)	Poverty component loading	Communalities
Working dependency ratio	-0,294	0,596
Type of roof material	-0,545	0,359
Type of source of water provision	0,694	0,732
Location of source of water provision	0,779	0,767
Type of toilet facility	0,763	0,586
Location of toilet facility	0,738	0,545
Difficulties in payment of food in last two weeks	0,316	0,558
Frequency of purchase of whole chicken	-0,416	0,585
Possession of shower	-0,748	0,563
Current price value of car (if available)	-0,400	0,488

Additional information of PCA

Tests and Requirements of PCA	
KMO-Test	0,826
BARTLETT's Test	significant
Explained Variance	35,91%
Determinant	0,077

Results of PCA of a local poverty index without the variable 'working dependency ratio'

Variables of the poverty index (local without 'working dependency ratio')	Poverty component loading	Communalities
Per member expenditure on foot and clothingwear in last three months	-0,361	0,183
Type of roof material	-0,557	0,344
Type of source of water provision	0,692	0,736
Location of source of water provision	0,776	0,772
Type of toilet facility	0,762	0,583
Location of toilet facility	0,735	0,541
Difficulties in payment of food in last two weeks	0,310	0,217
Frequency of purchase of whole chicken	-0,414	0,476
Possession of shower	-0,744	0,555
Current price value of car (if available)	-0,400	0,364

Additional information of PCA

Tests and Requirements of PCA	
KMO-Test	0,829
BARTLETT's Test	significant
Explained Variance	36,25%
Determinant	0,076

Results of PCA of a local poverty index without the variable 'Frequency of purchase of whole chicken'

Variables of the poverty index (local without 'Frequency of purchase of whole chicken')	Poverty component loading	Communalities
Per member expenditure on foot and clothingwear in last three months	-0,378	0,412
Working dependency ratio	-0,311	0,492
Type of roof material	-0,548	0,301
Type of source of water provision	0,705	0,627
Location of source of water provision	0,789	0,707
Type of toilet facility	0,753	0,576
Location of toilet facility	0,736	0,544
Difficulties in payment of food in last two weeks	0,324	0,384
Possession of shower	-0,742	0,550
Current price value of car (if available)	-0,378	0,144

Additional information of PCA

Tests and Requirements of PCA	
KMO-Test	0,827
BARTLETT's Test	Significant
Explained Variance	35,67%
Determinant	0,082

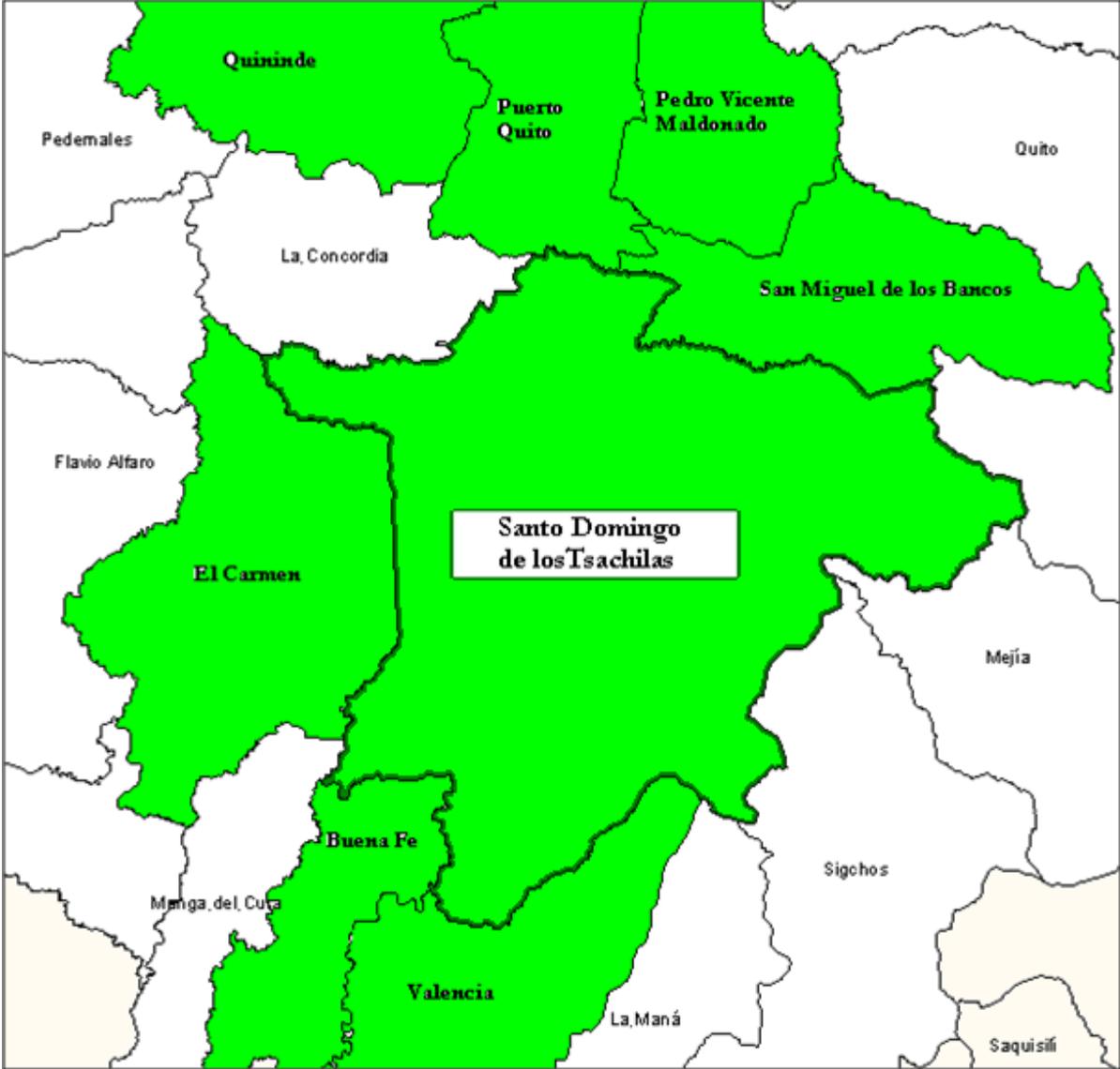
Results of PCA of a local poverty index without variables on the ‘Food security dimension’

Variables of the poverty index (local without food security dimension)	Poverty component loading	Communalities
Per member expenditure on foot and clothingwear in last three months	-0,373	0,593
Working dependency ratio	-0,299	0,593
Type of roof material	-0,551	0,31
Type of source of water provision	0,720	0,585
Location of source of water provision	0,798	0,693
Type of toilet facility	0,756	0,576
Location of toilet facility	0,737	0,547
Possession of shower	-0,739	0,547
Current price value of car (if available)	-0,375	0,143

Additional information of PCA

Tests and Requirements of PCA	
KMO-Test	0,823
BARTLETT's Test	significant
Explained Variance	38,78%
Determinant	0,090

Appendix 9. Map of the considered local area



 = Local area of study

Source: SIISE (2008)

Appendix 10. Questionnaire

Research topic: Level of wellbeing of client households of the microcredit program of INSOTEC – Agency of Santo Domingo de los Colorados

Aim: Assess in a quantitative way the level of well being of client households of the agency of Santo Domingo de los Colorados in comparison to the overall level of well being of non client households in the area.

Confidentiality: The information that is consulted in this questionnaire will be treated confidentially and by no means will influence the contract that the client has with INSOTEC.

Section A: Codification of questionnaire

A1. Date:

A2. Number of questionnaire:

A3. Code of interviewer:
1 = Tonja Van Gorp
2 = Mauricio Lugo Ruiz

A4. Questionnaire digitalized

Section B: Location of the household

B1. Province:

B2. Canton:

B3. Parish:

B4. Residential area:
Urban = 1
Rural = 2

B5. Household Code (HHID)

Section C: Client Information

C1. Name:

C2. Passport Number:

C3. Are you a new or an old client of INSOTEC?

- 1 = Client only received a first loan from the institute
- 2 = Client has received more than one loan

C4. ¿What was the amount of the (first) loan with INSOTEC

USD:

C5. Do you currently receive loan(s) from other formal financial institutions?

- 1 = Yes
- 2 = No

→ **C5.1.** From how many other institutes? (additional to INSOTEC)

C6. Does any other household member currently hold a loan in a financial institute?

- 1= Yes
- 2= No

C7. Are you or either another household member currently involved in financial transactions with a Moneylender?

- 1= yes
- 2= No

C8. What was the principle reason to apply for a loan with INSOTEC?

- 1 = Working capital
- 2 = Consumption
- 3 = Purchase of asset
- 4 = Improvement of dwelling
- 5 = Other

C8. C8.5.

C9. What is your principle economic activity?

- 1 = Agriculture
- 2 = Commerce
- 3 = Manufacture
- 4 = Services
- 5 = Other

Section D: Characteristics of the household

D1. What is the total number of members of the household?

D2. What is the number of household members That is aged under 16?

- 21 = one
- 17 = two
- 10 = three
- 0 = four or more
- 29 = none → continue with question **D4**

D3. Were all household members aged between 5 and 16 years enrolled in an educational institute This present year?

0 = No

2 = There are no household members aged between 5 and 16 years

5 = Si

D4. How many household members contribute economically to the household (by means of a paid Job?)

D5. During the last three months, what is the amount of money spent by the household on foot and clothing wear?

USD

Section E: Demographic characteristics of the household head/ client

E1. ¿Is the client of INSOTEC also the head of the household (HH head)?

1= Yes

2= No

E2. The HHhead/ client considers oneself to be;

1 = Indiginous

2 = Mestizo

3 = White

4 = Black

5 = Mulato

6 = Other

E2 HH head

E2a Client

E3. What is the gender of the HHhead/client?

E3 HH head

E3a Client

1 = masculine

0 = femenine

E4. What is the age of the HHhead/ client?

E4 HH head

E4a Client

E5. What is the civil state of the HH head/client?

E5 HH head

E5a Client

1 = Engaged

2 = Married

3 = Single

4 = Seperated

5 = Divorced

6 = Widow

E6. The HH head/client is able to:

E6 HH head

E6a Client

1 = read

2 = read and write

0 = none of those stated above

E7. What was the highest course/grade in which the HH head /client is graduated?

- 1 = None
- 2 = Centre of alfabetism
- 3 = Basic education
- 4 = Primary school
- 5 = Bachelor
- 6 = Secondary school
- 7 = Post Bachelor
- 8 = Superior
- 9 = Postgraduate

E7 HH head **E7a** Client

--	--

E8. What is the principle labor activity of the HH head/client?

Non agricultural:

Agricultural

- | | |
|--------------------------------|--|
| 0 = retired | |
| 1 = Public employee | 8 = Agricultural worker on salary |
| 2 = Private employee | 9 = Agricultural day-labourer |
| 3 = Day-labourer | 10 = Farm owner |
| 4 = Chief/manager | 11 = Agricultural worker for own account |
| 5 = Own account | 12 = Unpaid agricultural domestic worker |
| 6 = Unpaid domestic worker | 13 = Unpaid non-domestic agricultural worker |
| 7 = Unpaid non-domestic worker | 14 = Domestic worker |

E8 HH head **E8a** Client

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Section F: Housing conditions

F1. How many rooms does your house dispose? (*without kitchen, garages and rooms exclusively used for business occasions*)

F2. What is the principle material of the roof of the dwelling?

- 1 = Concrete/ paving stone
- 2 = Asbest/Eternit
- 3 = Zinc
- 4 = Roof tile
- 5 = Cane
- 6 = Leaves
- 7 = Other

F3. What is the principle material of the exterior walls of the dwelling?

- 1 = Concrete/construction blocks
- 2 = Asbest/cement
- 3 = Adobe
- 4 = Wood
- 5 = Bahareque
- 6 = Cane
- 7 = Other

F4. ¿What is the principle source of the water

Provision of the household?

- 1 = Public network
- 2 = Public well
- 3 = Other source by tube
- 4 = Purchase by distribution(transport)
- 5 = Pothole
- 6 = River

F5. The supply of water is located:

- 1 = Inside the dwelling
- 2 = Outside the dwelling but on private terrain
- 3 = Outside the dwelling and on non-private terrain

F6. The principle lightning of the household:

- 1 = Public network
- 2 = Electric plant
- 3 = Sun panels
- 4 = Candle, gaslamps
- 5 = None

F7. In this households one usually cooks with:

- 1 = Gas
- 2 = Collected or buyed coal
- 3 = Electricity
- 4 = Othet
- 5 = We don't cook ourselves

F8. What is the type of toilet facility that

The dwelling disposes?

- 1 = Flush toilet connected to the Sewerage system
- 2 = Pit toilet and septic tanc
- 3 = Pit toilet
- 4 = Letrine
- 5 = No toilet facility

F9. The toilet facility is located:

- 1 = Inside the dwelling
- 2 = Outside the dwelling but on private terrain
- 3 = Outside the dwelling and on non-private terrain

F10. How many private bathrooms disposes the household?

F11. The place where the household usually cooks is:

- 1 = An exclusive room that is used only foor cooking
- 2 = A room that is also used as a sleeping room
- 3 = In the dining room
- 4 = At a central open space (patio) or corridor
- 5 = We don't cook ourselves

Section G: Food security and vulnerability

G1. In the last two weeks; did the household face difficulties or problems in the payment of food?

- 1= Yes
- 2= No

G2. How frequently is the purchase of 'Whole chicken' of this household?

- 1 = Daily
- 0,5 = Weekly
- 0,25 = Every two weeks
- 0,08 = Monthly
- 0,04 = Once in three months
- 0,02 = Once in a half year
- 0,01 = Annually
- 0 = Never

Section H: Assets

H1. Does the household possess (a) motor(s)?

- 1= Yes
- 0= No

→ **H1.1.** What is the current total selling value of this asset?

H2. Does the household possess (a) bicycle(s)?

- 1= Yes
- 0= No

→ **H2.1.** What is the current total selling value of this asset?

H3. Does the household possess (a) car(s)?

- 1= Yes
- 0= No

→ **H3.1.** What is the current total selling value of this asset?

H4. Does the household provide in a shower?

- 1= Yes
- 0= No

H5. Does the household have a fridge?

- 6= Yes
- 0= No

H6. How many televisions has the household ?

- 4 = One
- 9 = Two
- 14 = Three or more
- 0 = The household doesn't have a television

H7. Does the household have a blender?

- 4 = Yes
- 0 = No

Sección I: Evaluation of own living standard

I1. Regarding the household's current income:

- 1 = One can secure a good living
- 2 = One can secure a more or less good living
- 3 = One can not secure a good living

I2. During the last 12 months, the living standard of this household:

- 1 = improved
- 2 = remained the same
- 3 = deteriorated