



# UNIVERSITA' DEGLI STUDI DI PADOVA

Sede Amministrativa: Università degli Studi di Padova

Dipartimento di Scienze Economiche “Marco Fanno”

SCUOLA DI DOTTORATO DI RICERCA IN : ECONOMIA E MANAGEMENT  
CICLO XXII

## ESSAYS ON SOCIAL PROTECTION AND POVERTY TRANSMISSION IN SUB-SAHARAN AFRICA

**Direttore della Scuola** : Ch.mo Prof. Guglielmo Weber

**Supervisore** : Ch.mo Prof. Guglielmo Weber

**Dottorando** : Francesco Strobbe

31 gennaio 2010



*To Michele,  
whose dreams and strength  
are the real source of these pages.*

*“Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.”*

**The Universal Declaration of Human Rights (Article 22)**



## Acknowledgements

This thesis has been made possible by the contribution of many people who supported me in various ways and different contexts throughout this journey.

Foremost, I wish to express my deepest gratitude to my two advisors: Prof. Claudia Olivetti in Boston and Prof. Guglielmo Weber in Padua. The enthusiasm and the continuing encouragement of Prof. Olivetti have been fundamental in the choice of the research topic and throughout all the stages of this thesis: working with her has been an extraordinary experience. The expertise and suggestions of Prof. Weber represented a unique value added not only to this work but also to my personal growth.

A special word of gratitude goes to Prof. Benedetto Gui: he supervised my work as an undergraduate allowing me to discover the “human side” of economics. He kept on supporting me even in the years after my graduation, being for me a reference for all my choices, including the one of enrolling in a Ph.D. in Economics.

I am grateful to Prof. Alice Amsden, who “adopted” me during my visiting period at MIT and showed me the importance of “free” thinking in economics and to my friend Prof. Jerome Maryon for his example of dedication and his sincere interest in my ideas and projects.

The first chapter of this thesis would have not been possible without the fundamental support of Elisabetta Garuti, Sauro Monnechi and all the friends of the Rainbow Project (Street Children Services) and the Cisetekelo Youth Project in Ndola (Zambia). They have been my family during my longer stay in Zambia back in 2002-2003 and they have been again my most precious shelter when, in November 2008, I went back to Ndola in order to collect data on street children and their families of origin. In particular, Ethel Kwibisa Sitwala, Maxwell Mwila Lungu and Moses Mumba provided excellent assistance during extensive working hours spent in the slums and on the streets interviewing children and households. I also wish to thank Prof. Mireille Jacobson (my co-

author in the first chapter together with Claudia Olivetti) for her research insights on the preparation of the questionnaires and on the econometric issues of the analysis.

The second chapter of the thesis benefited a lot from the help of my friend Giacomo Sbrana, who granted me access to the latest DHS data available at the United Nations and hosted me several times in New York City, always open to constructive suggestions and endless discussions. Prof. Jane Fortson provided an invaluable support with comments and guidance on how to improve the analysis.

Prof. Candace Miller, from the Boston University School of Public Health, allowed me to access the exclusive Malawian dataset used in the third chapter: her expertise and patience in answering my questions on the data have been admirable.

Prof. Joseph Stiglitz, Prof. David Hulme, Prof. Michael Lipton and Prof. Tony Addison contributed enormously with their suggestions and expertise to my research ideas and to my personal knowledge of development economics during the time spent together in Manchester in June and July 2009. Moreover, Gian Maria Milesi Ferretti and Natalia Tamirisa have been two incredible supervisors (and co-authors) during my internship in the Research Department of the International Monetary Fund in the Summer 2009.

It is difficult to describe the importance of the support received from my classmates of the PhD in Economics and Management at the University of Padua. Sharing with them the burden of the exams as well as the doubts and the satisfactions of the academic research has contributed in making my PhD a wonderful experience. I am also grateful to all the professors and colleagues in the Economics Department of the University of Padua for providing a stimulating environment in which to learn, grow, and enjoy academic research.

I am indebted to my management at the European Central Bank for granting me a 3-year leave in order to pursue my research interests in development and I am thankful to my colleagues for their continuing presence throughout these 3 years of distance.

I wish to express a special thanks to my parents, my siblings and my five nephews: their unconditional love and encouragement represented the real strength of all my choices.

My warmest gratitude goes to my fiancée Marta, for her patience and her love: she has accepted the distance and the isolation that a Ph.D. requires and, more than anyone else, she has been able to interpret my silences, to understand my words and to support my dreams.

Finally, a special note of praise goes to the children, the women and the men I met in the slums of Ndola: their stories, their dignity, their lives go well beyond any pure data analysis and will remain forever in my heart and in my thoughts.

# Contents

<b>List of Figures</b>	<b>iii</b>
<b>List of Tables</b>	<b>v</b>
<b>Introduction</b>	<b>1</b>
<b>Introduzione (in Italian)</b>	<b>5</b>
<b>1 Breaking the Net: Family Structure and Street Children in Zambia</b>	<b>9</b>
1.1 Introduction.....	9
1.2 Literature Review.....	12
1.3 The Setting.....	14
1.3.1 Institutional Environment.....	14
1.3.2 Background.....	15
1.3.3 Data Collection.....	17
1.4 Results.....	20
1.4.1 Descriptive Analysis.....	20
1.4.2 Multivariate Analysis.....	28
1.5 Conclusions.....	34
<b>Bibliography</b>	<b>35</b>
Appendix 1.....	39
Appendix 2.....	49

<b>2</b>	<b>HIV/AIDS in Sub-Saharan Africa: Gender Disparities and Socio-Economic Status</b>	<b>55</b>
2.1	Introduction.....	55
2.2	Socio-Economic Determinants of HIV/AIDS: what do we know?.....	57
2.3	Data.....	60
2.4	Econometric Specification and Methodology.....	63
2.5	Results.....	66
2.6	Risk Factors.....	76
2.7	Conclusions.....	79
	<b>Bibliography</b>	<b>80</b>
<b>3</b>	<b>Social Protection in an Epidemic Context: the Interaction of Formal and Informal Support in Rural Malawi</b>	<b>85</b>
3.1	Introduction.....	85
3.2	Theoretical Framework.....	88
3.3	Institutional Framework.....	91
	3.3.1 The Context of Malawi.....	92
	3.3.2 The Mchinji Cash Transfer Program .....	93
3.4	The Data.....	95
3.5	Econometric Analysis.....	97
	3.5.1 Risk Sharing and Cash Transfers.....	98
	3.5.2 Crowding out of Private Arrangements.....	104
3.6	Conclusions.....	111
	<b>Bibliography</b>	<b>112</b>



## List of Figures

<b>1.1</b>	Map of Zambia (Copperbelt region in red).....	15
<b>1.2</b>	Map of Ndola. Arrows indicate the selected slums .....	17
<b>1.3</b>	Household selection criterion .....	19
<b>2.1</b>	Lowess Regressions of HIV on Education/Wealth by gender for each country.....	62



# List of Tables

<b>1.1</b>	Descriptive Statistics: Street Children Survey.....	22
<b>1.2</b>	Descriptive Statistics: Household Level.....	24
<b>1.3</b>	Descriptive Statistics: Children Level.....	27
<b>1.4</b>	Household Level Regressions: OLS Estimates.....	29
<b>1.5</b>	Household Level Regressions: Average Marginal Effects Based on Probit Estimates.....	30
<b>1.6</b>	Children Level Regressions: OLS Estimates.....	32
<b>1.7</b>	Children Level Regressions: Average Marginal Effects Based on Probit Estimates.....	32
<b>2.1</b>	HIV prevalence by gender.....	60
<b>2.2</b>	Sample Means (Women).....	64
<b>2.3</b>	Sample Means (Men).....	64
<b>2.4</b>	Education and Wealth: Quadratic Specifications.....	67
<b>2.5</b>	Education Gradient in HIV with controls.....	70
<b>2.6</b>	Wealth Gradient in HIVwith controls.....	72
<b>2.7</b>	Education Gradient in HIV with alternate measure.....	73

<b>2.8</b>	Wealth Gradient in HIV with alternate measure.....	75
<b>2.9</b>	Modelling Risk Factor with controls.....	78
<b>3.1</b>	Descriptive Statistics at Baseline and at the Final Round .....	96
<b>3.2</b>	Quantile Regressions: Total Consumption Expenditures.....	100
<b>3.3</b>	Quantile Regressions: Food Consumption Expenditures.....	103
<b>3.4</b>	Marginal effects after Probit – Any private net transfer received.....	105
<b>3.5</b>	Marginal effects after Probit – Remittances.....	107
<b>3.6</b>	Marginal effects after Probit – Gifts.....	108
<b>3.7</b>	Marginal effects after Probit – Loans.....	110

# Introduction

The present Ph.D. dissertation deals with the analysis of micro data from developing countries. In particular, the underlying theme is the analysis of social protection and poverty transmission in Sub-Saharan Africa studied in different contexts (i.e. urban slums and rural villages) and at different levels (i.e. local and national samples). The thesis consists of three papers, each corresponding to a chapter. The first one focuses on the risk factors leading children to street life in Zambia; the second one analyses gender differences in the education-health and wealth-health gradients across nine sub-Saharan African countries affected by the HIV/AIDS epidemic; and the final one studies the interaction between formal and informal insurance mechanisms in providing social protection to poor families in Malawi.

More precisely, the first chapter<sup>1</sup> is based on a unique dataset that I personally collected through fieldwork on the streets and in the slums of the city of Ndola, in Northern Zambia. The main objective was to investigate the determinants of the phenomenon of street children analyzing the role of family structure in caring for vulnerable children. In fact, street children can be seen as the extreme outcome of the collapse of the informal safety net traditionally based on the extended family. Important motivations that justify research in this field are given by the fact that, today, poverty, malaria and HIV/AIDS have put the extended family safety-net at risk as well as by the fact that the spillover effect of HIV/AIDS, consisting in an increased number of orphans and vulnerable children, can amplify any initial negative effect of the pandemic because vulnerable children are more likely to be associated with lower accumulation of human capital also in the next generations. Moreover, by looking at numbers, it is striking to note that the number of street children in Zambia almost doubled over the 1990s. The phenomenon of street children has been

---

<sup>1</sup> The chapter is co-authored with Claudia Olivetti (Boston University & NBER) and Mireille Jacobson (RAND Corporation & NBER).

rarely studied in the economic literature: the lack of quantitative studies in this area stems in large part from the difficulty of collecting micro-level data with appropriate information on street children and their families of origin. The data used in this chapter helps to fill this gap in the literature as the fieldwork was conducted in the usually off-limit areas where street children and their families live. We present a quantitative analysis of data collected from 220 households, capturing the experience of 1455 nuclear family members, 1685 extended family members, and 102 current and former street children. The methodology used in the data collection and the subsequent analysis aimed at isolating those features of a child's nuclear and extended family that put him most at risk of ending up on the streets. We find that older, male children and particularly orphaned children are more likely to wind up on the street. Families with a male household head who is in poor health are more likely to originate street children. The educational level, age and employment status of the male head of household has little impact on the likelihood the family is associated with a child who has taken to the street. In contrast, households with surviving maternal grandparents or with a male head who has many sisters are significantly less likely to originate street children. These findings support the critical role that women play in poor countries, highlighting the importance of policies aimed at empowering women. At the same time, our findings show that policies aimed at improving the health of the male head of household can also yield important benefits. A back-of-the-envelope calculation suggests that moving male heads from poor to good self-rated health status can increase the rate of GDP growth by as much as 0.20 to 0.33 of a percentage point per year.

The second chapter takes a closer look at the issue of health and focuses on the relationship between socioeconomic status and HIV/AIDS using the most recent Demographic and Health Surveys (DHS) for 9 Sub-Saharan African countries with both high and low/moderate HIV prevalence rates. The starting point of the analysis is the fact that the relationship between health and socio-economic status has been generally considered to be positive but evidence on the link between HIV/AIDS and socioeconomic status is mixed. The chapter also enters an academic debate raised in the literature about the fact that more educated people in certain areas of Africa are more (according to Fortson (2008)) or less (according to De Walque (2007)) likely to be HIV positive and this has a relevance in terms of policy design. The first and most important contribution of this chapter is that it adds the gender dimension to the discussion of the education gradient of HIV/AIDS. The second contribution is the use of some of the most recent batch of data from the DHS to study this phenomenon. I perform both a non-parametric and a parametric analysis in order to assess the existence of a gradient in HIV/AIDS for education and wealth. In particular, it was

chosen to carry out a gender-based analysis in order to test for the presence of gender disparities in education and wealth with reference to HIV infection. I find that better-educated women are more likely to be HIV-positive in the majority of countries while the same does not hold for men. The robustness of a positive education gradient in HIV is tested using different specifications and controls including the marital status. Moreover, even using an alternate measure of education based on completed educational levels, the positive relation for women holds leading to the conclusion that a positive and concave gradient in education for women exists regardless of the measure of education employed. Conducting this analysis at aggregate national level with the two sexes combined shows how the aggregate level result is basically driven by the female component of the population, thus confirming that a gender-based analysis of the relationship between education and HIV infection is able to provide more meaningful insights than an aggregate level analysis. Further empirical analysis on the relation between sexual behaviours and education shows that more educated individuals tend to have more lifetime sexual partners and premarital sex. This seems to be a plausible explanation for the presence of a positive education gradient in HIV for females, considering their higher exposure and vulnerability to HIV infection compared to men. On the other hand, evidence of the presence of a wealth gradient in HIV is mixed and depends on the measure of wealth taken into consideration. These results suggest that the links between socioeconomic status and health may be more heterogeneous and less obvious than previously thought.

The third and final chapter aims at assessing whether, in an HIV-epidemic context characterized by imperfect enforceability of private insurance contracts and limited commitment, social protection policies based on unconditional cash transfers can fix the failures of the informal system by reinforcing the social fabric or, on the contrary, they may run the risk of crowding out pre-existing private arrangements. The chapter moves from the fact that the traditional informal systems of social protection (e.g. family aid, communal living) are being eroded in many Sub-Saharan African countries and consequently poor families face a social protection vacuum when both formal interventions and informal arrangements fail to provide the necessary safety nets. At the same time, nowadays many governments in Sub-Saharan Africa are starting to implement social protection programs and, consequently, the impact evaluation of such programs becomes a fundamental tool for policy formulation at the national level as well as for funding decisions from bilateral and multilateral donors. The analysis focuses on a social protection intervention based on unconditional cash transfers started by the Government of Malawi and expected to become a major tool of poverty reduction in the coming years. I use data from a pilot program of social cash

transfers implemented by the Government in the rural district of Mchinji (central Malawi) and representing one of the first social protection experiments in Sub-Saharan Africa. The program has a randomized component which provides a unique source of exogenous variation that allows a direct evaluation of the effects of the public transfer program on consumption and private transfers. The project is targeted to the ultra-poor and labor constrained, meaning those people who are excluded even from the so-called “food for work” programs, and who are normally left behind by most of the policies and public interventions that target the poor. I investigate whether a public intervention is justified on the basis of the type of risk sharing arrangements existing at village level and examine how these public interventions interact with pre-existing private arrangements. This chapter contributes to the academic literature by providing empirical evidence on two “classical” issues tested by economists in several different contexts (i.e. the perfect risk-sharing hypothesis and the crowding-out of informal insurance by public insurance) but it also contributes to the policy debate because these types of interventions are new to Africa and no serious impact evaluation has been undertaken thus far. Moreover, it relies on a unique dataset based on a randomized experiment that offers robustness to the results of the analysis. To my knowledge, it is the first time that this dataset is used in economics. The data allow distinguishing the different effect of cash transfers on gifts, informal loans and remittances. In addition, I exploit information on households’ consumption expenditures in order to test for the type of risk sharing arrangements at village level in rural areas. In terms of findings, I reject the hypothesis of the full insurance model in favor of partial risk sharing practices, a result which justifies the role of a public intervention. Moreover, I find strong evidence of crowding out of private transfers when considering gifts from family and friends and (to a lesser extent) remittances from family members living abroad. On the contrary, informal loans are not crowded out by the introduction of a public cash transfer but they seem to depend on previous credit transactions, thus highlighting an interesting feature of informal rural credit markets.



## Introduzione

La presente tesi di dottorato si concentra sull'analisi di micro dati provenienti da paesi in via di sviluppo. In particolare, il tema di fondo riguarda l'analisi di meccanismi di protezione sociale e di trasmissione della povertá in Africa Sub-Sahariana in diversi contesti (baraccopoli urbane e villaggi rurali) e a diversi livelli (locali e nazionali). La tesi é composta da tre articoli, ognuno corrispondente ad un capitolo. Il primo esamina i fattori di rischio che conducono i bambini alla vita di strada in Zambia; il secondo analizza la presenza di disparitá sessuali nelle relazioni educazione-salute e ricchezza-salute in nove paesi dell'Africa sub-Sahariana colpiti dall'epidemia di HIV/AIDS; il terzo capitolo studia l'interazione tra meccanismi formali ed informali di assicurazione nel fornire forme di protezione sociale a famiglie povere in Malawi.

Piú precisamente, il primo capitolo si basa su un campione di dati esclusivo che ho personalmente raccolto nelle strade e nelle baraccopoli della cittá di Ndola, nel nord dello Zambia. La raccolta dati aveva come principale obiettivo quello di approfondire le cause del fenomeno dei bambini di strada analizzando in particolare il ruolo della struttura familiare di origine. Infatti, i bambini di strada possono essere considerati come il risultato estremo della rottura della rete informale di protezione tradizionalmente basata sulla famiglia estesa. Il fatto che oggi l'azione congiunta di povertá, malaria ed HIV stia mettendo a rischio la tenuta della rete di protezione basata sulla famiglia estesa, cosí come il fatto che l'effetto indiretto dell'epidemia di HIV/AIDS (rappresentato da un numero sempre maggiore di bambini orfani e resi vulnerabili) possa amplificarne l'effetto diretto dal momento che questi bambini sono piú facilmente esposti ad una minore accumulazione di capitale umano che si ripercuote anche nelle generazioni future, sono di per sé motivazioni sufficienti a giustificare una ricerca accademica in questo campo. Inoltre, guardando alle cifre, colpisce notare come il numero dei bambini di strada in Zambia sia quasi raddoppiato nel corso degli anni '90. Tale fenomeno é stato raramente affrontato nella letteratura economica: la mancanza di studi quantitativi in quest'area é dovuta in larga parte alla difficoltá di

raccogliere micro dati che contengano un'informazione appropriata su questi bambini e sulle loro famiglie di origine. I dati utilizzati in questo capitolo aiutano quindi a riempire un vuoto nella letteratura, dal momento che sono stati raccolti in aree normalmente di difficile accesso nelle quali i bambini di strada e le loro famiglie vivono. Il capitolo presenta dunque un'analisi quantitativa dei dati raccolti riguardanti 220 famiglie, 1455 membri dei nuclei familiari, 1685 membri delle famiglie estese e 102 tra attuali ed ex bambini di strada. La metodologia utilizzata nella raccolta dei dati e nell'analisi degli stessi si propone di isolare quei fattori della famiglia nucleare e della famiglia estesa che contribuiscono ad accrescere il rischio che il bambino finisca a vivere in strada. A livello di risultati, l'analisi indica che i bambini di sesso maschile e di età piú elevata (ed in particolare quelli orfani) presentano una maggiore probabilità di vivere in strada. Le famiglie, il cui capofamiglia presenti precarie condizioni di salute, hanno maggiore probabilità di dare origine a bambini di strada. Il grado di istruzione, l'età e lo stato occupazionale del capo famiglia hanno invece un impatto poco rilevante sulla probabilità che la famiglia sia associata ad un bambino che vive in strada. Al contrario, famiglie che possono contare sulla presenza di nonni materni o in cui il capofamiglia abbia delle sorelle hanno una probabilità molto significativa dal punto di vista statistico di non dare origine a bambini di strada. Questi risultati supportano quindi il ruolo fondamentale che la donna svolge in ambito familiare nei paesi poveri. Al tempo stesso, i risultati dimostrano che politiche volte a migliorare le condizioni di salute del capo della famiglia possono portare importanti benefici: da un calcolo approssimativo emerge infatti che un miglioramento dello stato di salute da "precario" a "buono" può comportare un aumento annuo del tasso di crescita del PIL tra gli 0.20 e gli 0.33 punti percentuali.

Il secondo capitolo analizza la questione della salute e in particolare si concentra sulla relazione esistente tra condizione socio-economica ed HIV/AIDS utilizzando i piú recenti dati DHS<sup>1</sup> a disposizione per 9 paesi dell'Africa sub-Sahariana con diversi tassi di prevalenza di HIV. L'analisi muove dalla considerazione che, mentre generalmente la relazione tra condizioni di salute e condizioni socio-economiche é considerata positiva, i risultati sui legami tra HIV/AIDS e condizione socio-economica non sono univoci. Il capitolo si inserisce quindi in un dibattito esistente in letteratura riguardo al fatto che, in certe zone dell'Africa, le persone piú istruite sembrano avere maggiori (Fortson, 2008) o minori (De Walque, 2007) probabilità di contrarre il virus dell'HIV e questo ovviamente ha una rilevanza dal punto di vista della formulazione di politiche sociali. Il primo e principale contributo di questo capitolo é dunque quello di inserire la dimensione delle

---

<sup>1</sup> Demographic and Health Surveys.

disparità sessuali nel dibattito sopra citato. Il secondo contributo è dato dall'utilizzo di alcuni dei dati più recenti (DHS) per studiare questo fenomeno. Al fine di valutare l'esistenza o meno di una relazione positiva per educazione e ricchezza rispetto all'HIV, viene svolta un'analisi sia di tipo parametrico che non-parametrico. Tale analisi indica che le donne meglio istruite presentano una maggiore probabilità di contrarre il virus dell'HIV nella maggioranza dei paesi esaminati, mentre lo stesso non avviene per gli uomini. La solidità del risultato è stata testata utilizzando diversi modelli e variabili di controllo, compreso lo stato coniugale. In aggiunta, anche utilizzando misure alternative di educazione basate sui livelli di istruzione completati, la relazione positiva per le donne sembra tenere, portando quindi alla conclusione che tale relazione esista indipendentemente dal tipo di misura utilizzato. Questo stesso tipo di analisi condotta a livello nazionale aggregato, quindi per uomini e donne assieme, dimostra che il risultato a livello aggregato sembra essere dovuto principalmente alla componente femminile della popolazione, confermando quindi l'importanza di un'analisi basata sulle differenze di genere rispetto ad una condotta esclusivamente a livello aggregato. Ulteriori analisi empiriche riguardanti la relazione tra comportamenti sessuali ed istruzione rivelano che individui più istruiti tendono ad avere un maggior numero di partners nell'arco della vita ed una maggiore frequenza di relazioni pre-matrimoniali. Questi elementi rappresentano quindi una plausibile (se pur parziale) spiegazione per la presenza di una relazione positiva tra educazione ed HIV per le donne, considerando la loro maggiore esposizione e vulnerabilità al rischio di contrarre il virus dell'HIV rispetto agli uomini. Per quanto riguarda invece l'analisi della ricchezza, non sembra esserci una risposta univoca, ma questa dipende dal tipo di misura della ricchezza preso in considerazione. In conclusione, questi risultati suggeriscono che i legami tra condizione socio-economica e salute possono essere più complessi e meno scontati di quanto comunemente ritenuto.

Il terzo ed ultimo capitolo si propone di analizzare se, in un contesto affetto dall'epidemia di AIDS e caratterizzato da esecuzione imperfetta dei contratti di assicurazione privata, le politiche di protezione sociale basate su trasferimenti pubblici in denaro alle famiglie siano in grado di riparare i fallimenti del sistema informale attraverso un rafforzamento dei legami sociali, o, al contrario, rischino di far venire meno quei meccanismi di solidarietà privata che esistevano prima del trasferimento. Il capitolo parte dalla considerazione che i tradizionali sistemi informali di protezione sociale (aiuti tra familiari, vita di comunità ecc) stanno venendo meno in molti paesi dell'Africa sub-Sahariana e di conseguenza le famiglie povere si trovano a fronteggiare un'assenza di protezione quando sia gli interventi formali sia le strutture informali non riescono a fornire una rete minima di sicurezza sociale. Al stesso tempo, oggi molti governi in Africa stanno iniziando a

sperimentare programmi pubblici di protezione sociale e, di conseguenza, la valutazione dell'impatto di tali programmi diventa fondamentale per la formulazione di politiche a livello nazionale e per le decisioni di finanziamento da parte di donatori bilaterali e multilaterali. L'analisi condotta in questo capitolo si concentra su un intervento di protezione sociale basato su trasferimenti pubblici (non condizionali) di denaro avviato dal governo del Malawi e ritenuto uno dei maggiori strumenti di riduzione della povertà nei prossimi anni. In particolare, i dati utilizzati derivano da un programma pilota avviato dal governo nel distretto rurale di Mchinji e che rappresenta uno dei primi esperimenti di protezione sociale nell'Africa sub-Sahariana. Il programma include una componente randomizzata che fornisce una fonte esclusiva di variazione esogena, permettendo quindi una diretta valutazione degli effetti del programma sui consumi e sui trasferimenti privati. Il progetto si rivolge alla classe degli "ultra-poveri", cioè coloro che vengono esclusi anche dai cosiddetti programmi *food-for-work* in quanto impossibilitati a lavorare e che sono generalmente lasciati ai margini anche da molte politiche rivolte ai più poveri. Il capitolo esamina innanzitutto se un intervento pubblico sia giustificato sulla base del tipo di meccanismi di condivisione del rischio esistenti a livello di villaggio e poi valuta come questi interventi pubblici interagiscano con pre-esistenti meccanismi privati di solidarietà. Di conseguenza viene fornito un contributo non solo alla letteratura accademica, portando un riscontro empirico su due questioni tipicamente analizzate dagli economisti in diversi contesti (l'ipotesi di *perfect risk-sharing* e la riduzione di assicurazione informale a seguito di interventi pubblici) ma anche al dibattito più propriamente di *policy* dal momento che questo tipo di interventi è nuovo per l'Africa e, ad oggi, non sono state ancora condotte delle serie valutazioni di impatto. In aggiunta, la struttura del campione è tale da garantire una solidità dell'analisi. I dati permettono infatti di distinguere il diverso effetto dei trasferimenti pubblici su donazioni, prestiti informali e rimesse. Inoltre, viene utilizzata l'informazione sulla spesa per consumi delle famiglie al fine di valutare il tipo di meccanismi di *risk sharing* a livello di villaggio nelle aree rurali. I risultati portano a rifiutare l'ipotesi di *perfect risk sharing* in favore di una condivisione parziale del rischio, un risultato che giustifica quindi il ruolo dell'intervento pubblico. Dall'analisi emerge inoltre un forte effetto di riduzione dei trasferimenti privati, in particolare donazioni e, con minore intensità, rimesse, a seguito dell'intervento pubblico. Al contrario, i prestiti informali sembrano non risentire dell'introduzione del trasferimento pubblico ma dipendere significativamente dalle precedenti transazioni, evidenziando in questo modo un'interessante caratteristica del funzionamento del mercato informale del credito in aree rurali.

## Chapter 1

# Breaking the Net: Family Structure and Street Children in Zambia<sup>1</sup>

### 1.1 Introduction

As AIDS has devastated the population of prime age adults in many African nations, one important spillover effect has been an increase in orphans or otherwise vulnerable children. The increase in the ranks of vulnerable children has compounded the negative consequences of this health crisis. Vulnerable children have much lower human capital (in terms of both schooling and health) than non-orphans and even orphans cared for by members of their extended family. They thereby contribute to the intergenerational transmission of poverty far and above their parents' direct contribution.

Street children represent a particular subcategory of orphans and vulnerable children (OVC) as they typically lack regular family support. The number of street children in Zambia almost doubled over the 1990s. National studies conducted in 1991 and 2004 estimated the number of street children in Zambia to be approximately 35000 and 75000, respectively (Tacon and Lungwangwa 1991; Zambian Ministry of Sport, Youth and Child Development 2004). This represents an increase from about 0.9% to 1.6% of Zambian children living on the street.<sup>2</sup>

---

<sup>1</sup> The present chapter is co-authored with Claudia Olivetti (Boston University & NBER) and Mireille Jacobson (RAND Corporation & NBER).

<sup>2</sup> The percentages have been calculated on the basis of demographic information provided by the CIA World Factbook in 1991 and 2004: in 1991 the Zambian population was 8,112,782 with a share of population in the 0-14 yrs age group equal to 0.48. This implies 3.9 million children ages 0-14 in 1991. So, as the street children population was estimated to be equal to 35,000, this means that 0.9% of the 0-14 yrs age group population was on the street. Similarly for 2004. The total Zambian population was 10,462,436 with a share

A growing body of domestic and international studies and reports describes the situation of children living on the street but evidence on the causes of this phenomenon remains scant. In this chapter we hypothesize that the causes lie in the families of origin. We use data from a unique sample collected through dedicated fieldwork in the slums of Northern Zambia in order to identify the factors that contribute to the breakdown of the safety net provided by the African extended family and give rise to the phenomenon of street children.

In Africa, the extended family was the traditional social security system. Extended family members were responsible for protecting the vulnerable, caring for the poor and sick and passing on traditional social values and education. Families, particularly in traditional societies, involve a large network of connections among people extending through varying degrees of relationship including multiple generations, over a wide geographic area and involving reciprocal obligations (Foster 2000). However, as the number of orphans and vulnerable children increases and an ever larger number of adults is affected by HIV/AIDS, these family networks have come under severe strain.

Against this background the present chapter tries to identify the link between family structure and the street children phenomenon. We present a quantitative analysis of data collected from 220 households, capturing the experience of 1455 nuclear family members, 1685 extended family members, and 102 current and former street children. We provide the questionnaire templates used during the fieldwork and data collection process in Zambia in the Appendix. To our knowledge this is the first paper to study the role of the nuclear and extended family in the street children phenomenon. Previous literature in this area has studied the impact of HIV/AIDS on household income and consumption, on the education and health outcomes of orphans and on the spillover effects on members of the care-giving households. The common assumption in all these studies is that family networks can care for orphans. In contrast, we assess the family network's capacity to care for orphans and vulnerable children. Based on our sample, over 40 percent of the families in the slums either have children living on the street or are at high risk of originating street children. This evidence highlights the straining of extended family networks in modern sub-Saharan Africa and raises the possibility that these networks will not be able to care for the increasing numbers of vulnerable children, as is commonly assumed.

The lack of quantitative studies in this area stems in large part from the difficulty of

---

of population in the 0-14 yrs age group equal to 0.461. This implies that there were 4.8 million children ages 0-14 in 2004. Together this implies  $75,000/4.8\text{million} = 1.6\%$  of children on the street in 2004.

collecting micro-level data with appropriate information on street children and their families of origin. The data collected in this chapter helps fill this gap in the literature as the fieldwork was conducted in the usually off-limit areas where street children and their families live. The analysis of this unique data set provides useful insights on the street child phenomenon and may help formulate effective policies to deal with the growing population of children living on the street.

Our analysis shows that the health status of the male head of the household plays a fundamental role in determining the probability of the street outcome. The composition of the extended family net also matters: a higher number of paternal sisters and the presence of maternal grandparents reduce the probability a family originates street children. A younger composition of children in the household, a lower presence of orphans as well as a higher share of girls in the household are all associated with a lower probability any child ends up on the street. The role of a child within the family also affects the likelihood he ends up on the street: nephews, stepchildren and household heads' siblings are less likely to end up on the street compared to natural son and daughters, suggesting that when an extended family accepts nephews and stepchildren, it is their intention to keep and protect them.

To put the economic gain from policies aimed at preventing the street children in perspective we combine our results with estimates from the economic growth literature. We present a back-of-the-envelope calculation that suggests that moving the male head of household from poor to good self-rated health status would translate into an increase in GDP growth of 0.20 to 0.33 percentage points per year. Hence our findings suggest that policies aimed at improving the health conditions of the male head of household may have large beneficial effects on the long run economic growth in Africa.

At the same time, we urge some caution in interpreting our results too strongly. In our analysis, we focus on those characteristics that distinguish street children or street families from families that, based on observable characteristics, look quite similar. But, unobservable factors that are correlated with these characteristics could drive the likelihood that children end up on the street. At a minimum, however, these unique data and the characteristics they point to as predictors of the street children phenomenon identify important areas for future research and policy intervention.

The chapter is organized as follows: Section 1.2 reviews the existing literature and explores further the contribution of this paper to the academic debate; Section 1.3 describes the institutional environment of Zambia and discusses the data sources and the fieldwork methodology; Section 1.4 describes the empirical methodology and discusses the results; Section 1.5 concludes.

## 1.2 Literature Review

Research on orphans and vulnerable children in Sub-Saharan Africa and on the socioeconomic impact of chronic poverty and AIDS on family structure spans literatures in economics, psychology and socio-medicine as well as in organizational and institutional development. The latter comes largely in the form of detailed reports and analysis produced, either on a regular or on an *ad hoc* basis, by international institutions and agencies (e.g. UNICEF, UNAIDS, World Bank) or by NGOs operating in the field.

The majority of economic studies in this area focus on either the impact of HIV related adult mortality on household income and consumption, or on orphanhood.

At the macroeconomic level, these studies consider the effects of HIV/AIDS on outcomes such as economic growth (Arndt and Lewis 2000; Bloom and Mahal 1997; Cuddington 1993a and 1993b; Young 2005; Santeulàlia-Llopis 2008) and human capital accumulation (McDonald and Roberts 2006; Corrigan, Gloom and Mendez 2006; Bell, Devarajan and Gersbach 2006). This work largely assumes the behavioral responses to the HIV/AIDS pandemic rather than deriving them from micro-level analysis. In general, these studies provide mixed conclusions. For example, Sachs et al. (2001), calculate that 2.2 million AIDS-related deaths in 1999 reduced Africa's GDP growth rate by 35% while Cuddington (1993a) estimates that an HIV prevalence of 10% implies a reduction in economic growth of less than 1%.

At the microeconomic level, at least two main streams of literature can be distinguished, each focusing on slightly different aspects of family structure and childhood vulnerability. A first growing stream of literature focuses on the impact of HIV-related orphanhood on the education and health outcomes of orphans compared to non-orphans residing in the same household. These studies provide evidence of the negative effects of orphanhood on health and education (e.g., Case and Ardington (2006) in South Africa, Evans and Miguel (2007) in Kenya, Yamano and Jayne (2005) also in Kenya). They also show that these effects may vary depending on which parent dies, with maternal death having more severe effects than paternal death, and whether the surviving parent is still taking care of the orphan. Other studies consider how orphans fare compared to the general child population and whether targeting orphans is an efficient strategy to reduce general poverty (Ainsworth and Filmer 2006; Case, Paxson, and Ableidinger 2004). Typically they find that orphans receive lower educational investments than the biological children of the household head, providing



some justification for conditional transfers to households caring for orphans. A recent study assesses how the health and education effects of orphanhood vary with the characteristics of caretakers (Ksoll 2007); selection into higher-wealth caretaking families appears to mitigate any negative effects of orphanhood on education. Another study estimates the spillover effects of taking in orphans on the health and education of non-orphan children and on the health of women in the household and finds these effects to be negligible once selection is taken into account (Evans 2005).

A second stream of literature at the microeconomic level focuses on the impact of HIV-related adult morbidity and mortality on the income and consumption of surviving adult members (Naidu and Harris, 2005). It provides evidence of a significant consumption drop in affected households within the first five years of death and shows that the impacts are larger when the decedent is a female adult (Beegle et al. 2006). Other work in this area focuses on the relationship between socioeconomic status (measured in terms of education and wealth) and HIV/AIDS (Fortson 2008; De Walque 2006). These studies have come to different conclusions and thus generated some debate about the direction of the health gradient in Sub-Saharan Africa.

To our knowledge the present paper is among the first in economics to study microeconomic data on vulnerable children in urban slums in Africa – an institutional context very difficult to study. The only notable exceptions are Abraham, Baland and Platteau (1998) and La Ferrara (2002), which are both based on fieldwork in the informal settlements of Nairobi. However, these papers have a different focus, with La Ferrara (2002) conducting a multivariate analysis of ‘self-help’ groups and Abraham, Baland and Platteau (1998) providing a descriptive analysis of participation in different types of groups (e.g. rotating savings and credit associations, burial societies, health groups, etc.) and on the socio-economic background of respondents.

In contrast to the economics literature, the psychological, socio-medical and international development literature have paid more attention to the impact of growing disease burdens on the extended family safety net. Foster (2000) highlights how the traditional practice of orphan inheritance by uncles and aunts has declined and been replaced with care provided by grandparents or other relatives. He points out the importance of focusing on the children who slip through the safety net, ending up in a variety of vulnerable situations such as on the street, working or heading up households. Others have shed light on the dynamics and main features of street life for children in Latin America (Rodgers 1999) and in South Asia (Conticini and Hulme 2007). The latter makes extensive use of qualitative methods to study children living on the streets in Dhakka (Bangladesh) and argues that children migrate to the streets not because of economic factors (e.g. lack of basic needs) but because of non-economic factors like the breakdown of social relationships. Finally

international agencies and NGOs have also contributed to a large and important institutional literature on orphans and vulnerable children. Five main studies have attempted to illuminate the dire circumstances for street children in Zambia. Of the five studies, only three bear directly on the situation of street children, namely those conducted by Tacon and Lungwangwa (1991), Lungwangwa and Macwan'gi (1996) and the recent survey conducted in 12 Zambian towns by the Ministry of Community Development and Social Services and the Ministry of Sport, Youth and Child Development in 2006. The other two situational analyses, conducted in 1999 and 2004 by UNICEF, USAID and GRZ, tackle the issue of street children only as part of the wider problem of orphans and vulnerable children in Zambia. Smaller scale local assessments and annual reports on the activities of NGOs directly working with street children on a daily basis in Zambia, provide a useful source of descriptive statistics over time on the phenomenon of street children and represent a good starting point for the type of analysis presented here. The goal of our work is to more systematically analyze those factors that give rise to the street child phenomenon.

## **1.3 The Setting**

### **1.3.1 Institutional Environment**

According to UNICEF, vulnerability in Zambia is tied to poverty and orphan status. Vulnerable situations for children may vary from child labor, to substance abuse, imprisonment and living on the street. While there is significant overlap between these areas of vulnerability, the causal connection is not always clear. Street children represent an important sub-category of vulnerable children as their vulnerability is exacerbated by the partial or complete absence of support structures based on kinship, education, parents, siblings and general social cohesion. Orphan status is not the only reason children end up on the street but when this converges with poverty, exclusion from education, and lack of support or alternatives, it pushes many children onto the streets. Once on the streets, they are vulnerable to many other risks that further marginalize them and limit their ability to lead healthy productive lives (UNICEF, 2006). The prevalence of street children in Zambia has increased substantially over the last decade. This increase is seen as a result of poverty (rural and urban), large scale unemployment and the HIV/AIDS epidemic. Zambia currently does not have a specific policy on street children; however, there is a National Child Policy that aims to *“improve the standards of living in general and the quality of life for the Zambian child in particular”*.

Unfortunately official statistics on street children are rare because of the difficulties of surveying an extremely mobile population. National household surveys only recently started to collect data on orphans and vulnerable children but no data, to our knowledge, asks directly about street children. Therefore, policymakers rely on *ad hoc* surveys and specific micro-data collected from field projects. Since the first study in 1991 (Tacon and Lungwangwa 1991), publicity for and public awareness of the situation of street children have increased. A number of interventions have been developed in response. At the time of the first study, poverty, family breakdown, lack of access to education and unemployment were singled out as the most important push-factors driving children onto the streets. This study estimated the population of street-children to be in the order of 35,000. Evidence from the 1996 Situational Analysis and the more recent 2004 OVC Situational Analysis indicate that the problem of street children in Zambia has worsened since 1991. The estimated population of street-children has increased markedly to 75 000 or from 0.9 to 1.6%.<sup>3</sup>

### 1.3.2 Background

To provide a clearer picture of the Zambian street children phenomenon, we conducted two different surveys during the month of November 2008 in three highly populated slums of the city of Ndola, in the Copperbelt region of Zambia (see Figure 1.1).

These slums, often called *peri-urban areas* or *compounds*, vary in terms of dimension, accessibility to basic services and geographical proximity to the city centre.



**Fig. 1.1** – Map of Zambia (Copperbelt region in red)

---

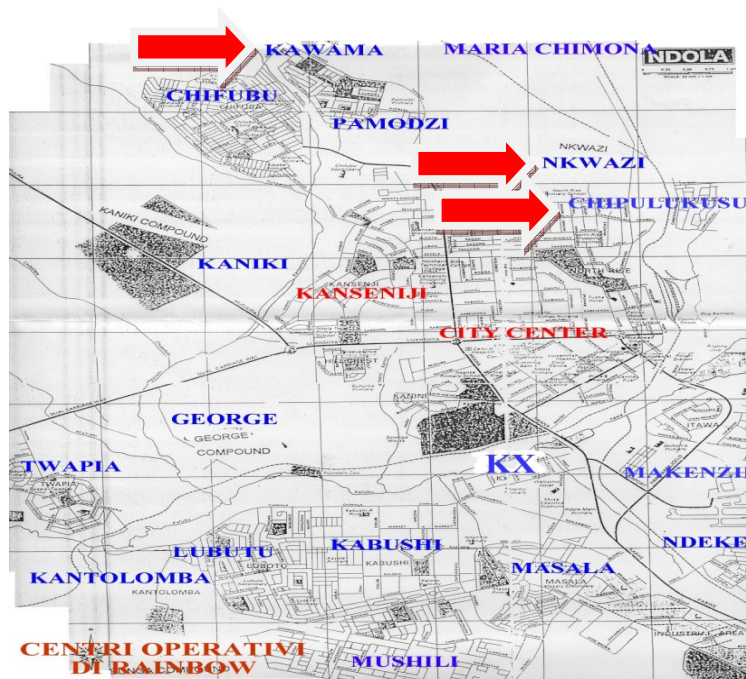
<sup>3</sup> See note 1 above.

Contrary to the similar and more commonly known informal settlements of Nairobi (Kenya), which are squatter communities where inhabitants have generally no legal rights or at most a quasi-legal right granted from a local authority (La Ferrara, 2002), the Zambian slums are, for the majority of cases, recognized as legal settlements by the Housing (Statutory and Improvement Areas) Act of 1975.<sup>4</sup> Living conditions are extremely poor in these slums. Most of Ndola's slums have either no access to clean water or are crowding on single sources of water: communal taps, instead of individual connections, are used in most compounds. Just like water, sewerage is typically not individually connected. Pit latrines and septic tanks are the only facilities available and garbage is not collected in most compounds because the poor cannot afford the service (Ncube 2008). Most houses are built out of any available construction material, like sun-hardened earth brick and scavenged metal roof-sheets held down with rocks. During the rainy season these structures break down with rain washing away walls, running under roof sheets and flooding homes. Due to the lack of drainage systems, the rain forms rivers that rush through the township eroding everything in their path. Some people have regular jobs in Ndola; some grow vegetables wherever they find a plot and sell on the city streets. Others rely on short-term, irregular "piecework" as blacksmith or as carpentry jobs. Many others are unemployed or unable to work. The great majority lives below the official poverty threshold of 1\$ per day. Crime and drug addiction is rampant, making these slums very dangerous.

The three slums in our sample are Nkwazi, Chipulukusu and Kawama, highlighted in Figure 1.2. The first two are among the poorest and largest slums on the outskirts of Ndola, with more than 40,000 residents each, living without any city planning, amenities or utilities. Kawama is slightly smaller and more distant from Ndola than the other two. Basic services such as sanitation and drinking water are very poor in all of them.

---

<sup>4</sup> Under this act, local authorities identify those settlements that should be legalized by the Ministry of Local government: the land is only legalized at the communal level and individuals do not have title deeds to those pieces of land.



*Fig 1.2 – Map of Ndola. Arrows indicate the selected slums.*

### 1.3.3 Data Collection

Our first survey was directed at 102 current and former street children. The survey of street children collected information on their family background, the reasons they took to the streets, the conditions on the street, their main activities and earnings as well as their education, health, sexual behavior and exposure to STDs. This survey was conducted both directly on the streets of Ndola where children gather as well as at the shelters where (former) street children attend programs and participate in activities sponsored by our hosting NGO. Given the potential non-representativeness of this sample of street children, this survey is meant to complement the analysis based on the extended family questionnaire and provide an additional source of insight on the street children phenomenon. The primary focus of our work is the second survey, which aims to assess the status of the extended family safety network and was therefore collected at the household level.<sup>5</sup> By

<sup>5</sup> Approaching children on the street and their families of origin required investing a fair amount of time to establish a relationship of mutual trust with the respondents by adapting to the unwritten rules of the slums as

focusing on the family of origin of street children, this work can more effectively overcome the difficulty of dealing with the high mobility of the street children population and at the same time it can offer a sort of complementary view to the one emerging from surveys of street children.

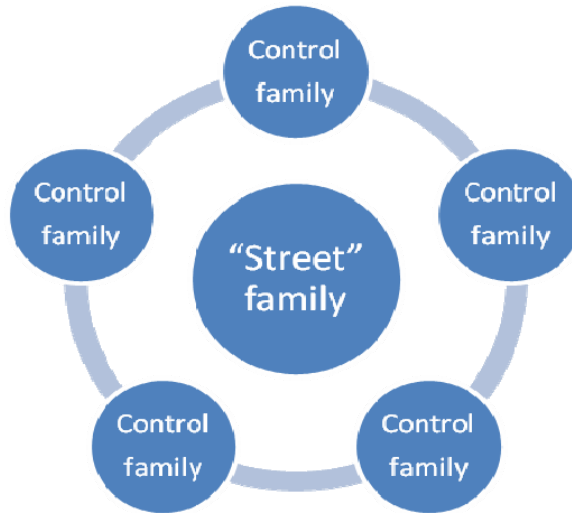
The sampling design for the family survey was based on a two-stage sampling procedure. At the first stage, the selection was done from a list of “clusters” of households, with households themselves selected at the second stage. The “clusters” were represented by the various slums surrounding the city of Ndola. In particular, three slums – Nkwazi, Chipulukusu and Kawama, were selected for the data collection because they had the highest concentration of families of origin of street children traced back by the hosting NGO.

The second stage of the sampling selection procedure was based on a list of 43 families of origin of street children residing in one of the three above mentioned slums. These families were identified through a specific child reintegration program run by the hosting NGO. The number of households to be interviewed per cluster was based on estimates of the proportion of families with street children in each slum provided by local committees of community-based organizations. Estimates, which have been validated by other local sources (e.g. local NGOs and social services’ officers), put the proportion of families with street children at 20-25% in each slum. The number of street children families and of control families to be interviewed in each slum (i.e. cluster) was then selected in order to reflect the suggested proportion.

Data collection began by first interviewing one of the 43 street children families and then, for each one of them, interviewing the first layer of neighbors using the same questionnaire. Given the scattered disposition of houses in the slums, we interviewed neighbors living in a circle around the house of each of the street children families, as shown in Figure 1.3. The aim of this methodology was to gather the same set of information from families that, despite facing similar living conditions, did not originate street children. Our hope is that by comparing families with street children to their immediate neighbors we can isolate those characteristics of the family that put children most at risk of winding up on the street.

---

well as partially and temporarily sharing life conditions and cultural habits. In this sense, the relationships already established by our hosting NGO allowed us to conduct the fieldwork in areas that are normally considered off-limits to non-locals.



**Fig 1.3 – Household selection criterion**

In order to serve as a proper comparison group, a key requirement was that each neighboring family had at least one child. Interviews were carried out through home visits to each family and addressed to the head of the household or his spouse.<sup>6</sup> The questionnaires were in English and a local operator from the hosting NGO assisted during each interview by providing translations in Bemba (a local dialect widely used in the slums) while a second operator, who knew the geographical location of street children families, served as a guide through the slums. Every family we approached agreed to participate in the survey, confirming the high level of cooperation common to household surveys in developing countries.

Based on this methodology, we interviewed a total of 220 families (43 families with street children and 177 control families) and collected information on 1455 individual family members. The survey included modules on demographics, health, education, income, HIV impact and shocks (see Appendix for the questionnaires). Given our interest in understanding not only the characteristics of each nuclear family but also the relevance and the quality of extended family networks, we collected additional information on the geographic locations of and strengths of the relationships with 1685 extended family members. Doing so allows us to reconstruct the extended family network of each interviewed family, focusing both on *inter-generational* links with parents

---

<sup>6</sup> Note that household heads could be male or female. In all cases, however, spouses were female. In other words, females were coded as head of household only in cases where a male was not present in the home.

and adult children living in other households and on *intra-generational* links with siblings living in other households. This information was provided by each household head interviewed and was part of the same questionnaire. Overall, the questionnaire provides relevant information for a detailed assessment of the situation of nuclear families and their networks in the slums of Ndola.

Our data collection efforts identified three main categories of families – “stable” families, “street children” families and “at risk” families. The three categories of families can be described as follows:

- *Stable families* are families that, despite high levels of poverty, are still able to ensure that children in the household attend school regularly.
- *Street children families* are the families of origin of street children: these are the official families that through a lengthy and delicate process have been traced back by the hosting NGO with the final objective of reintegrating the children back into their family of origin.
- *Risk families* are families with children who do not attend school. Although they are not yet on the street, these children spend most of their time hanging around the slums. On the basis of some common features with the families in the previous category, they appear to be at risk of generating street children.

## **1.4 Results**

### **1.4.1 Descriptive Analysis**

Table 1.1 provides basic descriptive statistics from our survey of street children. The age profile of street children in the sample shows that most are between 15 and 18 years old. Almost two-thirds of these children are orphans and a similar share has 3 or more siblings. These figures indicate that street children tend to come from families with multiple children and at least one missing parent. Table 1.1 also sheds light on some of the reasons these children give for taking to the street. For instance, the majority of street children indicate that “lack of food and money” is the main reason for leaving their homes. “Food” is also the main item street children purchase with their daily earnings from street activities, like begging or carrying luggage.



The data on education and health as well as those on the sexual behavior collected through the street children's questionnaire, reinforce the idea of higher vulnerability and higher risk exposure of street children compared to children living inside the safety net of the nuclear and extended family. Our results are broadly in line with the findings of the only national level survey of street children in Zambia, which was conducted by UNICEF for a 2006 *ad hoc* report. In particular, both surveys find that street children are predominantly between 15 and 18 years old and that a lack of food and money are the main reasons for taking to the street. However, while our survey suggests that the second most common reason for going on the street is "abuse at home", this had only marginal relevance at the national level. This difference could reflect regional differences in reasons for taking to the street. But, we suspect the trust established during the course of our survey may have also made these children more comfortable expressing this reason for taking to the streets. In both surveys, money earned on the street is used predominantly for food purchase. However, whereas 45% of the national sample also reported giving part of the money to parents or guardians, this pattern does not emerge in our sample. Another important difference relates to school attendance and HIV awareness: 70% of the national sample but over 80% of our sample did not attend school while on the street. On the other hand, in terms of HIV general awareness, 50% of the national sample indicated that they did not know what HIV and AIDS are while almost all the respondents in our sample reported a general awareness of HIV. Thus, while our sample is representative of street children nationally on many dimensions, they do appear to have less attachment to their families and to local institutions, such as schools, and to have a greater awareness of at least one important health risk.

*Table 1.1 – Descriptive Statistics: Street Children Survey*

<b>Street Children Survey</b>			<b>%</b>
<b>Demographics</b>	<b>Age profile</b>	<b>&lt;=14</b>	<b>7.8</b>
		<b>15-18</b>	<b>62.8</b>
		<b>&gt;=19</b>	<b>29.4</b>
	<b>Orphan status</b>	<b>non orphan</b>	<b>34.3</b>
		<b>orphan</b>	<b>65.7</b>
<b>Street life</b>	<b>Main reasons for going on the streets</b>	<b>death of a parent</b>	<b>19.5</b>
		<b>lack of food and money</b>	<b>41.5</b>
		<b>abuse at home-escaped</b>	<b>24.4</b>
	<b>Average daily earnings</b>	<b>less than 5000K</b>	<b>53.7</b>
		<b>from 5000K to 15000K</b>	<b>24.4</b>
		<b>more than 15000K</b>	<b>22.0</b>
	<b>Spending patterns</b>	<b>food</b>	<b>68.3</b>
		<b>clothes</b>	<b>4.9</b>
		<b>food, clothes and bostik</b>	<b>24.4</b>
<b>Education &amp; health</b>	<b>School attendance while on the street</b>	<b>Yes</b>	<b>14.7</b>
		<b>No</b>	<b>80.4</b>
	<b>Chronic illnesses</b>	<b>Yes</b>	<b>67.7</b>
		<b>No</b>	<b>32.4</b>
<b>Sexual behavior</b>	<b>Sexually active</b>	<b>Yes</b>	<b>52.9</b>
		<b>No</b>	<b>47.1</b>
	<b>Average age at first intercourse</b>	<b>Mean</b>	<b>14.2</b>
	<b>Use of condoms</b>	<b>Yes</b>	<b>33.3</b>
		<b>No</b>	<b>66.7</b>
	<b>HIV general awareness</b>	<b>Yes</b>	<b>98.0</b>
		<b>No</b>	<b>2.0</b>
	<b>Self-awareness of risk exposure to HIV</b>	<b>Yes</b>	<b>51.0</b>
		<b>No</b>	<b>49.0</b>

**Notes:** descriptive statistics based on a sample of 102 street children.

The information collected through the street children survey provides a rich background and is a useful starting point for our analysis. Assuming the street children at our interview location are representative of street children more generally, this survey will also allow us to gauge the representativeness of the children who are the source of the household survey. How do the characteristics of children in this survey compare to the characteristics of the subset of children currently on the streets from the household survey? We might think that the latter differ from children in the street children survey as they have somehow maintained a link with their families of origin, while the others might have not.

Unfortunately we can only compare the two groups of children in terms of family background, education and health, as we do not have information on street life and sexual behavior for children in the household survey. On the basis of these dimensions however, we note that both groups of children are very similar: the average age is 15 for the street children in the household survey, in line with the age profile of children from the street children survey. Moreover almost the same percentage (66% and 67%) are orphans with the higher number of children being paternal orphans, followed by double orphans and only a small group are maternal orphans. In terms of health status, exactly the same percentage (12%) report poor health status in the past year, with malaria being the main type of illness. Finally, school attendance while on the streets is extremely low for both groups (between 0 and 2%).

We next turn our attention to the household survey. We restrict the sample from this survey to those households with at least one child between the ages of 7 and 18, which are the typical school ages in Zambia. This restriction allows us to better focus on the determinants of the street children phenomenon, as street life is often seen as an alternative to schooling.<sup>7</sup>

The restricted sample is composed of 194 households, of which 91 are stable families, 79 are risk families and 24 are street families (i.e. families having at least one child, age 7-18 yrs old, currently on the street). These three household types represent 232, 250 and 94 children, respectively. Descriptive statistics for the sample of nuclear families are presented in Table 1.2 while Table 1.3 presents descriptive statistics at the individual child level for the group of children age 7-18 years.

---

<sup>7</sup> This is confirmed by the fact that we observe no children below the age of 7 years living on the street.

*Table 1.2 – Descriptive Statistics: Household Level*

	[1]	[2]	[3]	[4]	[5]
	STABLE FAM.		RISK FAM.		STREET FAM.
<b>Households</b>	<b>91</b>		<b>79</b>		<b>24</b>
<b>Total Household size</b>	<b>6.4</b>	***	<b>7.4</b>		<b>7.8</b>
<b>Female headed households</b>	<b>0.20</b>	*** (*)	<b>0.54</b>	**	<b>0.33</b>
<b>Share with orphans</b>	<b>0.43</b>	***	<b>0.80</b>	**	<b>0.96</b>
<b>Age structure</b>					
<i>male head</i>	<b>39.6</b>	***	<b>50.0</b>		<b>47.2</b>
<i>female head</i>	<b>34.5</b>	***	<b>45.5</b>	*	<b>40.8</b>
<i>share of children 0-6 yrs</i>	<b>0.34</b>	** (***)	<b>0.28</b>	*	<b>0.21</b>
<i>share of children 7-13 yrs</i>	<b>0.46</b>		<b>0.44</b>		<b>0.43</b>
<i>share of children 14-18 yrs</i>	<b>0.19</b>	***	<b>0.28</b>		<b>0.35</b>
<b>Education profile</b>					
<i>male head</i>	<b>7.7</b>	** ( )	<b>6.4</b>		<b>7.6</b>
<i>female head</i>	<b>5.8</b>	***	<b>4.3</b>		<b>3.8</b>
<b>Health Status (poorhealth)</b>					
<i>male head</i>	<b>0.38</b>	(***)	<b>0.36</b>	***	<b>0.81</b>
<i>female head</i>	<b>0.42</b>	***	<b>0.62</b>		<b>0.71</b>
<b>Income</b>					
<i>Above poverty line</i>	<b>0.33</b>	***	<b>0.05</b>		<b>0.04</b>
<b>Shocks</b>					
<i>Shocks in the past year</i>	<b>0.54</b>	**	<b>0.71</b>		<b>0.79</b>
<i>No death shocks</i>	<b>0.10</b>	** (***)	<b>0.22</b>		<b>0.29</b>
<b>HIV impact (%)</b>					
<i>HIV-deaths in the past 10yrs</i>	<b>0.35</b>	***	<b>0.53</b>		<b>0.63</b>
<i>HIV Orphans absorption by the hh</i>	<b>0.29</b>	*** (**)	<b>0.82</b>	**	<b>0.57</b>
<i>Financial loss due to HIV-death</i>	<b>0.52</b>	***	<b>0.95</b>		<b>0.93</b>
<b>Nutritional status</b>					
<i>Nr of meals per day</i>	<b>1.97</b>	***	<b>1.33</b>		<b>1.42</b>
<i>Nr of days without enough food in a week</i>	<b>1.04</b>	***	<b>2.54</b>		<b>2.92</b>
<i>Eating meat/chicken/fish in the past week</i>	<b>0.41</b>	***	<b>0.06</b>		<b>0.04</b>
<b>Extended family: Average nr of siblings</b>					
<i>Wife's sisters</i>	<b>2.16</b>	***	<b>1.01</b>		<b>1.00</b>
<i>Wife's brothers</i>	<b>2.20</b>	***	<b>1.24</b>		<b>1.00</b>
<i>Husband's sisters</i>	<b>1.51</b>	***	<b>0.62</b>	**	<b>0.21</b>
<i>Husband's brothers</i>	<b>1.35</b>	***	<b>0.42</b>		<b>0.29</b>
<b>Extended family: parents</b>					
<i>Wife's side</i>	<b>1.01</b>	***	<b>0.58</b>	**	<b>0.25</b>
<i>Husband's side</i>	<b>0.71</b>	***	<b>0.27</b>		<b>0.17</b>

**Notes:** Column 2 reports statistical significance of T-test statistics for the stable vs. at-risk family comparison. In parentheses we report T-test significance for the stable vs. street family comparison only if different from the previous one. Column 4 reports T-test significance for the 'at risk' vs. street family comparison.

Both tables clearly show that stable families differ substantially from the other two (risk and street families) on many key dimensions. In Table 1.2, with the exception of education level and the poor health status of the male head of the household and of the share of children 7 to 13 years old, stable families differ in statistically significant ways from street and risk families on all observed dimensions – household structure, basic demographics, economics shocks and measures of consumption. On average, stable households are less likely to be female headed. They are also less likely to host orphans (43% of stable families vs. 80% and 96% of risk and street families, respectively) and they are characterized by a younger average age for both male and female heads of household (e.g. male household heads are almost 10 years younger than the male heads of risk families and almost 7 years younger than street families). Female heads are also more educated compared to the other two categories. Roughly 33% of stable families live above the 1\$ per day poverty line while only 5% and 4% of risk and street families respectively are above that line. Stable families also differ substantially in terms of the extent to which they are affected by the HIV pandemic. Only 35% of stable families have experienced an HIV-death over the past decade compared to 53% (63%) of at risk (street) families. More importantly, the fraction of households who took in an HIV orphan is approximately two to three times as large for street and at risk families, respectively, than for stable families. This statistic seems to confirm the view that the HIV pandemic puts the extended family network under strain. However, the comparison of at risk and street families also suggests that the HIV pandemic does not seem to have an impact, at the margin, on the probability that a child ends up on the street. Finally, risk and street families also fare worse than stable families in terms of food intake (number of meals per day, or number of days in a week with no food). The difference in terms of the likelihood of eating meat, chicken or fish in the past week is most striking as it is an order of magnitude larger for stable than for at risk and street families.

To capture the importance of the extended family, Table 1.2 shows statistics on the number of existing links at intragenerational level (i.e. with siblings of the head of household's couple divided by gender) and at intergenerational level (i.e. with parents of both male and female head of household). Stable families look significantly different from risk and street families on these dimensions, with a higher number of existing links with extended family members.

In contrast risk and street families are more similar on many dimensions. For instance, risk and street families are very similar in terms of household size, the education profile of the head couple, income level, shocks experienced over the past year, the impact of HIV and nutritional status. However there are some important (statistically significant) differences. Risk families are

disproportionately female headed households. Male heads are more likely to have good health status and female heads in risk families tend to be older than those in street families. Risk families are less likely to have orphans and have a higher share of children in the age group 0-6 years. With respect to extended family links, risk families tend to have a higher number of sisters on the husband's side and a higher presence of grandparents on the wife's side. These differences point to some of the potential risk factors for originating street children – male-headed households, male heads in poor health, a greater share of young children, and fewer female extended family members on the husband's side.

A similar pattern emerges when we analyze the descriptive statistics at the individual child level (see Table 1.3). Here as well, children belonging to stable families differ substantially from the children of street families and children living in families considered “at risk”. The differences between stable families and both street and risk families span demographic characteristics, as well as income level, shocks in the past year, HIV impact on the family, nutritional status and extended family links. Measures of the age and sex of the children indicate that children in stable families tend to be younger than children in risk or street families. Moreover, children in street families are in great majority boys.

The comparison of children from risk families with children from street families reveals only a few statistically significant differences. Children in risk families are more likely to be female and are more likely to have a female head of household. They live in larger households with a lower share of orphans. Moreover, when applicable, children from risk families are more likely to have a male head of the household who is in good health but also who is older and less educated. Children from risk families also have female heads who are older and in better health than those in street families. Children from risk families seem to belong to families where there is a significantly higher absorption of HIV orphans but they also have a significantly lower number of days without enough food in a week. In terms of extended family links, Table 1.3 is in line with Table 1.2 showing that children from risk families have more living aunts on the paternal side and a higher presence of grandparents on the maternal side compared to children belonging to street families. Moreover children from risk families have more maternal uncles.

*Table 1.3 – Descriptive Statistics: Children Level*

	[1]	[2]	[3]	[4]	[5]	
	STABLE FAM.		RISK FAM.		STREET FAM.	
<b>Nr of children</b>	<b>232</b>		<b>250</b>		<b>94</b>	
<b>Children's age</b>	<b>11.60</b>	*** (**)	<b>12.37</b>		<b>12.49</b>	
<b>Children's sex</b>	<b>0.48</b>	(***)	<b>0.51</b>	***	<b>0.33</b>	
<b>Total Household size</b>	<b>7.2</b>	*** (***)	<b>8.1</b>	**	<b>8.70</b>	
<b>Female headed households</b>	<b>0.19</b>	*** (*)	<b>0.56</b>	***	<b>0.26</b>	
<b>Share with orphans</b>	<b>0.46</b>	*** (***)	<b>0.81</b>	***	<b>0.96</b>	
<b>Nr of other orphans i (excluding the respondent)</b>	<b>0.77</b>	*** (***)	<b>2.40</b>		<b>2.7</b>	
<b>Heads of HH charact:</b>						
<b>Age structure</b>						
<i>male head</i>	<b>42.2</b>	*** (***)	<b>51.7</b>	**	<b>48.2</b>	
<i>female head</i>	<b>36.7</b>	*** (***)	<b>45.5</b>	***	<b>41.0</b>	
<b>Education profile</b>						
<i>male head</i>	<b>7.48</b>	***	<b>6.17</b>	***	<b>7.55</b>	
<i>female head</i>	<b>5.91</b>	*** (***)	<b>4.49</b>		<b>4.46</b>	
<b>Health Status (poorhealth)</b>						
<i>male head</i>	<b>0.41</b>	(***)	<b>0.38</b>	***	<b>0.78</b>	
<i>female head</i>	<b>0.41</b>	*** (***)	<b>0.58</b>	**	<b>0.68</b>	
<b>Income</b>	<i>Above poverty line</i>	<b>0.28</b>	*** (***)	<b>0.05</b>	*	<b>0.01</b>
<b>Shocks</b>						
<i>Shocks in the past year</i>	<b>0.52</b>	*** (***)	<b>0.73</b>		<b>0.77</b>	
<i>No death shocks</i>	<b>0.08</b>	*** (***)	<b>0.22</b>		<b>0.26</b>	
<b>HIV impact (%)</b>						
<i>HIV-deaths in the past 10yrs</i>	<b>0.33</b>	*** (***)	<b>0.59</b>		<b>0.63</b>	
<i>HIV-deaths with orphans behind</i>	<b>0.86</b>	** (*)	<b>0.93</b>		<b>0.93</b>	
<i>HIV Orphans absorption by hh</i>	<b>0.20</b>	*** (***)	<b>0.85</b>	***	<b>0.67</b>	
<i>Financial loss due to HIV-death</i>	<b>0.45</b>	*** (***)	<b>0.97</b>	*	<b>0.93</b>	
<b>Nutritional status</b>						
<i>Nr of meals per day</i>	<b>1.92</b>	*** (***)	<b>1.28</b>		<b>1.35</b>	
<i>Nr of days without enough food in a week</i>	<b>1.13</b>	*** (***)	<b>2.65</b>	***	<b>3.11</b>	
<i>Eating meat/chicken/fish in the past week</i>	<b>0.41</b>	*** (***)	<b>0.06</b>		<b>0.07</b>	
<b>Extended family: Average nr of siblings</b>						
<i>Wife's sisters</i>	<b>2.13</b>	*** (***)	<b>1.04</b>		<b>1.04</b>	
<i>Wife's brothers</i>	<b>2.06</b>	*** (***)	<b>1.22</b>	**	<b>0.94</b>	
<i>Husband's sisters</i>	<b>1.50</b>	*** (***)	<b>0.55</b>	***	<b>0.23</b>	
<i>Husband's brothers</i>	<b>1.39</b>	*** (***)	<b>0.37</b>		<b>0.32</b>	
<b>Extended family: parents</b>						
<i>Wife's side</i>	<b>0.95</b>	*** (***)	<b>0.63</b>	***	<b>0.29</b>	
<i>Husband's side</i>	<b>0.64</b>	*** (***)	<b>0.22</b>		<b>0.21</b>	

**Notes:** Column 2 reports statistical significance of T-test statistics for the stable vs. at-risk family comparison. In parentheses we report T-test significance for the stable vs. street family comparison only if different from the previous one. Column 4 reports T-test significance for the 'at risk' vs. street family comparison.

Against this background, because of the considerable differences between the category of stable families compared with risk and street families, the multivariate analysis performed in the next section will focus only on the latter two categories. The relative homogeneity across these two groups should help us isolate those factors which, at the margin, determine the street outcome. For example, Tables 1.2 and 1.3 suggest that many families currently labeled as “stable” may fall in this category simply because the household heads and their spouses are still very young and have not yet developed those risky conditions that lead to street children.

This sample restriction generates an analytical sample composed of 103 households (79 risk and 24 street) and 344 children, of which 31 (or 9% of total children) are currently on the street while the other are considered children at risk. This restriction represents a key element of our analysis as it generates an informal matching between risk and street families and can highlight those structural elements that differ across the two categories. The results of the multivariate analysis presented below show that our findings from the mean comparisons of characteristics of risk and street families in Tables 1.2 and 1.3 largely hold once we control jointly for an array of household and children characteristics.

### **1.4.2 Multivariate Analysis**

In order to identify the characteristics of the nuclear and extended family which, at the margin, distinguish a family that originates street children from a family that is at risk of originating street children but is still able to keep them inside the family net, we run two separate sets of regressions: one at the household level and one at the individual child level controlling for household fixed effects. To check the robustness of our results, we rely on both linear (OLS) probability models and non-linear (PROBIT) models.

The first set of regressions uses “street families” as the dependent variable and measures the probability that a family gives origin to a street child as a function of characteristics of the heads of household and of the nuclear and extended family. This allows us to distinguish families with street children from families at risk, isolating those features of family structure that, at the margin, determine the street children outcome. The second set of regressions has “current street children” as the dependent variable and aims to determine what characteristics of the child within a street family makes him more likely to wind up on the street than others.

Tables 1.4 and 1.5 show the regressions’ results at the household level and report respectively OLS coefficients and average marginal effects based on Probit.



*Table 1.4 – Household Level Regressions: OLS Estimates*

Dependent variable = 1 if the family has at least one child currently on the street						
	[1]	[2]	[3]	[4]	[5]	[6]
male head age	<b>-0.003</b> [0.002]	<b>0.001</b> [0.006]	<b>0.001</b> [0.006]	<b>0.000</b> [0.006]	<b>-0.003</b> [0.006]	<b>-0.005</b> [0.006]
female head age	<b>-0.003</b> [0.003]	<b>-0.006</b> [0.004]	<b>-0.006 *</b> [0.004]	<b>-0.007 *</b> [0.004]	<b>-0.007 *</b> [0.004]	<b>-0.009 **</b> [0.004]
male head educ	<b>0.018</b> [0.015]	<b>0.032 *</b> [0.018]	<b>0.028</b> [0.018]	<b>0.036 *</b> [0.020]	<b>0.030</b> [0.019]	<b>0.025</b> [0.017]
female head educ	<b>-0.016</b> [0.014]	<b>-0.018</b> [0.014]	<b>-0.020</b> [0.014]	<b>-0.024</b> [0.014]	<b>-0.016</b> [0.016]	<b>-0.015</b> [0.015]
male head poor health	<b>0.376 ***</b> [0.114]	<b>0.318 ***</b> [0.120]	<b>0.297 ***</b> [0.116]	<b>0.287 **</b> [0.116]	<b>0.310 ***</b> [0.113]	<b>0.294 ***</b> [0.108]
female head poor health	<b>0.035</b> [0.086]	<b>0.101</b> [0.091]	<b>0.097</b> [0.091]	<b>0.105</b> [0.093]	<b>0.102</b> [0.099]	<b>0.116</b> [0.095]
female headed hh		<b>0.303</b> [0.358]	<b>0.237</b> [0.356]	<b>0.267</b> [0.382]	<b>0.002</b> [0.424]	<b>-0.160</b> [0.417]
hh size		<b>0.018</b> [0.016]	<b>0.016</b> [0.016]	<b>0.017</b> [0.016]	<b>0.013</b> [0.016]	<b>0.023</b> [0.017]
share of boys		<b>0.366 **</b> [0.128]	<b>0.355 **</b> [0.128]	<b>0.335 **</b> [0.130]	<b>0.323 **</b> [0.152]	<b>0.333 **</b> [0.152]
share of children (0-6yrs)		<b>-0.493 **</b> [0.210]	<b>-0.445 **</b> [0.206]	<b>-0.415 *</b> [0.213]	<b>-0.349</b> [0.205]	<b>-0.347</b> [0.201]
share of children (7-13yrs)		<b>-0.102</b> [0.201]	<b>-0.064</b> [0.202]	<b>-0.080</b> [0.201]	<b>-0.003</b> [0.202]	<b>0.069</b> [0.199]
share children/hh size		<b>0.213</b> [0.310]	<b>0.248</b> [0.307]	<b>0.161</b> [0.317]	<b>0.115</b> [0.313]	<b>0.077</b> [0.307]
orphans in the hh			<b>0.165</b> [0.088]	<b>0.132</b> [0.093]	<b>0.119</b> [0.116]	<b>0.061</b> [0.115]
HIV death in past 10yrs				<b>0.098</b> [0.086]	<b>0.094</b> [0.086]	<b>0.097</b> [0.083]
no-death shocks				<b>0.095</b> [0.106]	<b>0.059</b> [0.102]	<b>0.049</b> [0.098]
nr of wife's brothers					<b>0.020</b> [0.035]	<b>0.054</b> [0.039]
nr of wife's sisters					<b>-0.028</b> [0.038]	<b>-0.022</b> [0.037]
nr of husband's brothers					<b>0.013</b> [0.054]	<b>-0.005</b> [0.053]
nr of husband's sisters					<b>-0.086 *</b> [0.040]	<b>-0.067</b> [0.035]
nr of wife's parents						<b>-0.166 **</b> [0.072]
nr of husband's parents						<b>-0.047</b> [0.090]
constant	<b>0.318</b> [0.180]	<b>-0.128</b> [0.367]	<b>-0.204</b> [0.358]	<b>-0.175</b> [0.375]	<b>0.071</b> [0.404]	<b>0.303</b> [0.387]
Number of observations	103	103	103	103	103	103
R-squared	0.18	0.28	0.30	0.31	0.34	0.40

Notes: Robust standard errors in brackets. \*Significance at 10% level. \*\*Significance at 5% level. \*\*\*Significance at 1% level.

*Table 1.5 – Household Level Regressions: Average Marginal Effects Based on Probit Estimates*

<b>Dependent variable = 1 if family has at least one child currently on the street</b>						
	[1]	[2]	[3]	[4]	[5]	[6]
<b>male head age</b>	<b>-0.003</b> [0.002]	<b>-0.002</b> [0.005]	<b>-0.002</b> [0.005]	<b>-0.003</b> [0.005]	<b>-0.005</b> [0.005]	<b>-0.005</b> [0.005]
<b>female head age</b>	<b>-0.003</b> [0.003]	<b>-0.006</b> [0.003]	<b>-0.006 *</b> [0.003]	<b>-0.007 **</b> [0.003]	<b>-0.007 *</b> [0.003]	<b>-0.007 **</b> [0.002]
<b>male head educ</b>	<b>0.017</b> [0.014]	<b>0.020</b> [0.015]	<b>0.018</b> [0.014]	<b>0.020 *</b> [0.014]	<b>0.015</b> [0.014]	<b>0.016</b> [0.016]
<b>female head educ</b>	<b>-0.015</b> [0.013]	<b>-0.017</b> [0.012]	<b>-0.018</b> [0.012]	<b>-0.021</b> [0.012]	<b>-0.018</b> [0.013]	<b>-0.021</b> [0.012]
<b>male head poor health</b>	<b>0.411 ***</b> [0.150]	<b>0.349 **</b> [0.142]	<b>0.308 **</b> [0.138]	<b>0.288 *</b> [0.130]	<b>0.354 **</b> [0.140]	<b>0.329 *</b> [0.130]
<b>female head poor health</b>	<b>0.025</b> [0.086]	<b>0.098</b> [0.086]	<b>0.101</b> [0.086]	<b>0.101</b> [0.085]	<b>0.111</b> [0.080]	<b>0.122</b> [0.074]
<b>female headed hh</b>		<b>0.113</b> [0.307]	<b>0.066</b> [0.299]	<b>0.063</b> [0.310]	<b>-0.088</b> [0.255]	<b>-0.144</b> [0.286]
<b>hh size</b>		<b>0.021</b> [0.013]	<b>0.018</b> [0.012]	<b>0.020</b> [0.012]	<b>0.016</b> [0.012]	<b>0.026 *</b> [0.012]
<b>share of boys</b>		<b>0.407 ***</b> [0.124]	<b>0.380 **</b> [0.126]	<b>0.373 **</b> [0.123]	<b>0.332 **</b> [0.120]	<b>0.313 **</b> [0.110]
<b>share of children (0-6yrs)</b>		<b>-0.519 **</b> [0.194]	<b>-0.440 **</b> [0.188]	<b>-0.409 *</b> [0.188]	<b>-0.286</b> [0.178]	<b>-0.335</b> [0.158]
<b>share of children (7-13yrs)</b>		<b>-0.113</b> [0.174]	<b>-0.071</b> [0.163]	<b>-0.112</b> [0.164]	<b>0.016</b> [0.155]	<b>0.022</b> [0.139]
<b>share children/hh size</b>		<b>0.198</b> [0.289]	<b>0.225</b> [0.270]	<b>0.180</b> [0.267]	<b>0.175</b> [0.239]	<b>0.206</b> [0.221]
<b>orphans in the hh</b>			<b>0.147</b> [0.140]	<b>0.120</b> [0.128]	<b>0.123</b> [0.150]	<b>0.098</b> [0.161]
<b>HIV death in past 10yrs</b>				<b>0.093</b> [0.082]	<b>0.088</b> [0.079]	<b>0.074</b> [0.073]
<b>no-death shocks</b>				<b>0.077</b> [0.089]	<b>0.043</b> [0.085]	<b>0.007</b> [0.074]
<b>nr of wife's brothers</b>					<b>0.034</b> [0.029]	<b>0.054</b> [0.031]
<b>nr of wife's sisters</b>					<b>-0.015</b> [0.027]	<b>-0.004</b> [0.026]
<b>nr of husband's brothers</b>					<b>0.053</b> [0.071]	<b>0.011</b> [0.066]
<b>nr of husband's sisters</b>					<b>-0.150 **</b> [0.057]	<b>-0.080</b> [0.053]
<b>nr of wife's parents</b>						<b>-0.174 ***</b> [0.063]
<b>nr of husband's parents</b>						<b>-0.032</b> [0.073]
<b>Number of observation:</b>	103	103	103	103	103	103
<b>Pseudo R-squared</b>	0.16	0.29	0.30	0.32	0.37	0.43

Notes: Robust standard errors in brackets. \*Significance at 10% level. \*\*Significance at 5% level. \*\*\*Significance at 1% level.

Table 1.4 shows a strong significant impact of the poor health status of the male head of the household across all specifications. Households with a sick male head are about 37% more likely to originate street children. This impact is attenuated (29%) when controlling for the presence of both inter-generational and intra-generational extended family links.

A similar positive impact on the probability of generating street children is given by the share of children in the household. A higher share of boys raises the probability the family has street children by 36%. Girls are simply less likely to take to the street. On the other hand, having a higher share of children in the 0-6 years range lowers the likelihood of originating street children. Families with a younger composition of children are 34 to 49% less likely to have children on the street. Like the effects of gender, this result reflects the fact that only older children take to the street. Families with older females (either as single female heads or as wives of a male head of household) have a lower probability of generating street children.

Finally, extended family links prove to play an important role in reducing the probability the nuclear family originates street children. Surprisingly a higher number of husband's sister can reduce the probability of originating street children by 9%. This effect is no longer significant if we control for intergenerational links. Instead, the presence of maternal grandparents appears to reduce the probability of generating street children by about 16%.

Table 1.5, reports average marginal effects based on Probit models at household level. This table largely confirms the results discussed in Table 1.4. Similarly Tables 1.6 and 1.7 show respectively OLS coefficients and average marginal effects based on Probit models for the set of regressions run at the individual street child level.

As mentioned above, the dependent variable in this set of regressions is a dummy variable indicating whether the child is currently on the streets. These regressions include household fixed effects, to isolate those characteristics of a child in terms of age and the sex, orphan status, health status over the past year and the role in the family (e.g. whether he is a son, grandson, nephew or stepchild with reference to the head of the household) that are associated with living on the street.

In Table 1.6, age and sex of the child have a strongly significant impact across all specifications. In particular, table 1.6 shows that older children have a higher probability of ending up on the streets (+6%) while girls are less likely than boys to become street children (-30%).<sup>8</sup>

---

<sup>8</sup> The latter result needs to be interpreted with caution given that we only had one girl on the street.

*Table 1.6 – Children Level Regressions: OLS Estimates*

<b>Dependent variable = 1 if the child is currently on the street</b>			
	[1]	[2]	[3]
<b>Age</b>	<b>0.063</b> ***	<b>0.063</b> ***	<b>0.065</b> ***
	[0.015]	[0.015]	[0.014]
<b>Female</b>	<b>-0.307</b> ***	<b>-0.307</b> ***	<b>-0.290</b> ***
	[0.067]	[0.068]	[0.069]
<b>Orphan</b>	<b>0.042</b>	<b>0.040</b>	<b>0.388</b> *
	[0.193]	[0.195]	[0.220]
<b>Poor Health</b>		<b>0.066</b>	<b>0.077</b>
		[0.129]	[0.130]
<b>Nephew/Niece</b>			<b>-0.385</b> **
			[0.160]
<b>Grandchild</b>			<b>0.037</b>
			[0.456]
<b>Brother/Sister</b>			<b>-0.477</b> **
			[0.181]
<b>Stepchild</b>			<b>-0.709</b> ***
			[0.203]
<b>Constant</b>	<b>-0.383</b>	<b>-0.392</b>	<b>-0.456</b> *
	[0.266]	[0.267]	[0.234]
<b>Number of observations</b>	94	94	94
<b>Adj. R-squared</b>	0.29	0.28	0.29

Notes: Regressions include household fixed effects. Robust standard errors, clustered at the household level, in brackets. \*Significance at 10% level. \*\*Significance at 5% level. \*\*\*Significance at 1% level.

*Table 1.7 – Children Level Regressions: Average Marginal Effects Based on Probit Estimates*

<b>Dependent variable = 1 if the child is currently on the street</b>			
	[1]	[2]	[3]
<b>Age</b>	<b>0.088</b> ***	<b>0.087</b> ***	<b>0.080</b> ***
	[0.014]	[0.015]	[0.013]
<b>Orphan</b>	<b>-0.234</b>	<b>-0.234</b>	<b>0.456</b> *
	[0.223]	[0.225]	[0.256]
<b>Poor Health</b>		<b>0.002</b>	<b>-0.006</b>
		[0.162]	[0.161]
<b>Nephew/Niece</b>			<b>-0.472</b> ***
			[0.044]
<b>Grandchild</b>			<b>-0.082</b>
			[0.350]
<b>Brother/Sister</b>			<b>-0.419</b> ***
			[0.024]
<b>Stepchild</b>			<b>-0.508</b> ***
			[0.052]
<b>Number of observations</b>	57	57	57
<b>Pseudo R-squared</b>	0.33	0.33	0.37

Notes: Regressions include household fixed effects. Robust standard errors, clustered at the household level, in brackets. \*Significance at 10% level. \*\*Significance at 5% level. \*\*\*Significance at 1% level.

Controlling for relationship and health status, orphan status increases the likelihood the child ends up on the street. Most interestingly, though clearly suggestive of selection issues, are the relationship variables. In these regressions, sons/daughters are the omitted category. Relative to them, step children, nephews/nieces and brothers/sister's are less likely to end up on the street. We interpret this finding as suggestive of the possibility that a child is unlikely to end-up living with an extended family unless this family is likely to "keep" him. The results of the probit regression analysis shown in Table 1.7 confirm these results.

The phenomenon of street children might have a long lasting negative impact for the economy because, by propagating its effects across consecutive generations, it amplifies the loss in human capital of prime age individuals due to the HIV/AIDS pandemic. In order to get a sense of the economic benefit of public policies aimed at preventing the phenomenon of street children we performed a simple back-of-the-envelope calculation. According to our estimates, (see Table 1.4) having the head of household in poor health increases the probability that the household produces a street child by 29% to 38%. Moreover, based on our data, street children tend to have -1.88 to -1.56 fewer years of schooling (depending on the specification) than idle children. We combine these findings with cross-country estimates based on the Barro and Lee data set (see Barro 2001) showing that, everything else being equal, an additional year of schooling raises the growth rate of an economy by 0.44% per year.<sup>9</sup> Multiplying the 0.44 loss of yearly GDP growth times the 1.56 (or 1.88) fewer years of education of a street child, times the range of coefficients for the health of the head of household from Table 1.4 we get that moving the self-reported health of the household head from poor to good would imply an increase in the growth rate of the economy by 0.20 to 0.31 of a percentage point per year. This is a sizeable effect. Hence, our analysis suggests that policies aimed at improving the health conditions of the male head of household could potentially have very large economic benefits not only in the short run but, more importantly, in the long run.

---

<sup>9</sup> Barro (2001) actually provides a range of estimates, from 0.23 to 0.84 of a percentage point per year, for the effect of schooling on growth. The upper bound of this range is obtained for the sample of poor-countries. Because Barro (2001) discusses 0.44 as a benchmark estimate, we use it as the basis for our back-of-the-envelope calculation.

## 1.5 Conclusions

Our analysis highlights several interesting features of the role of family structure on the street children phenomenon.

Contrary to common belief, income is not a main determinant of the street children phenomenon as most families in this setting live below the poverty line. The same applies to the impact of HIV and other shocks at the household level. These play an important role in separating “stable” families from the group of “risk” and “street” families but within the latter group these elements have little influence on the probability of generating street children. While many street children come from poor families and families affected by HIV, poverty and the impact of HIV per se do not lead children to take to the streets

Looking at both set of regressions (i.e. those at household level, assessing the probability a family originates street children, and those at the individual child level, assessing the characteristics of a child within a street family that make him more likely to end up on the street) the following elements emerged: the health status of the male head of the household plays a fundamental role in determining the probability of the street outcome. Moreover the extended family net matters. A higher number of husband’s sisters and the presence of maternal grandparents reduce the probability of originating street children. Finally a younger composition of children in the household, a lower presence of orphans as well as a higher share of girls in the household are all associated with a lower probability of the street children outcome. In addition, the role of the child within the family matters: nephews, stepchildren and household heads’ siblings are less likely to end up on the street compared to natural son and daughters, thus indicating that when an extended family accepts nephews and stepchildren, it is because there is the intention to keep and protect them.

Overall these results confirm the importance of the extended family safety net as well as the key role of the female presence in the household in reducing the likelihood that children end up on the street. They suggest that promoting the role of women in the household and supporting extended family links may represent an important avenue for policies aimed at reducing the risk of street life. Moreover, we consider that the phenomenon of street children might have a long lasting negative impact for the economy through the loss in human capital of prime age individuals. We calculate that policies aimed at improving the health conditions of the male head of household could

potentially have very large economic benefits in the long run, increasing the growth rate of the economy by 0.20 to 0.31 of a percentage point per year. However, we urge some caution in interpreting these results too strongly. In our analysis, we focus on those characteristics that distinguish street children or street families from families that, based on observable characteristics, look quite similar. But, there could be unobservable factors that are correlated with these characteristics and drive the likelihood that children end up on the street. Nonetheless, we think these unique data and the characteristics they point to as predictors of the street children phenomenon identify important areas for future research.

## **Bibliography**

[1] Abraham, A., J-M. Baland, and J-P. Platteau (1998), “Groupes Informels de Solidarité dans un Bidonville du Tiers-Monde: Le Cas de Kibera, Nairobi (Kenya)”, *Non-Marchand*, 2, 29-52.

[2] Ainsworth, M. and D. Filmer (2006). Inequality in Children’s Schooling: AIDS, Orphanhood, Poverty, Gender. *World Development* 34(6), 1099-1128.

[3] Arndt, C. and J.D. Lewis. (2000). The Macro Implications of HIV/AIDS in South Africa: A Preliminary Assessment. *South African Journal of Economics* 68(5), 1-32.

[4] Barro, R.J. (2001). Education and Economic Growth, <http://www.oecd.org/dataoecd/5/49/18254>

[5] Beegle, K., J. De Weerd, and S. Dercon (2006). Adult mortality and consumption growth in the age of HIV/AIDS. World Bank Policy Research Paper 4082.

[6] Bell, C., S. Devarajan, and H. Gersbach (2006). The Long-run Economic Costs of AIDS: With an Application to South Africa. *World Bank Economic Review* 20(1), 55-89.

[7] Bloom, D. and A. Mahal (1997). Does the AIDS epidemic Threaten Economic Growth? *Journal of Econometrics* 77(1), 105-124.

[8] Case, A. and C. Ardington (2006). The Impact of Parental Death on School Enrollment and Achievement: Longitudinal Evidence from South Africa. *Demography* 43(3), 401-420.

- [9] Case, A., C. Paxson, and J. Ableidinger (2004). Orphans in Africa: Parental Death, Poverty, and School Enrollment. *Demography* 41(3), 483–508.
- [10] Conticini, A. and D. Hulme (2007). Escaping Violence, Seeking Freedom. Why Children in Bangladesh Migrate to the Street. *Development and Change* 38(2): 201–227 (2007).
- [11] Corrigan, P., G. Glomm, and F. Mendez (2005). AIDS Crisis and Growth. *Journal of Development Economics* 77(1), 107-124.
- [12] Cuddington, J. (1993a). Modelling the Macroeconomic Effects of AIDS, with an Application to Tanzania. *World Bank Economic Review* 7(2), 173-189.
- [13] Cuddington, J. (1993b). Further Results on the Macroeconomics Effects of AIDS: The Dualistic Labor Surplus Economy. *World Bank Economic Review* 7(3), 403-417.
- [14] De Walque (2006). Who gets AIDS and how? The determinants of HIV infection and sexual behavior in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania. *Policy research working paper*, vol. 3844, World Bank, Washington D.C.
- [15] Evans, D. (2005). The Spillover Impacts of Africa's Orphan Crisis. Unpublished manuscript. RAND Corporation. Santa Monica.
- [16] Evans, D. and E. Miguel (2007). Orphans and Schooling in Africa: A Longitudinal Analysis. *Demography* 44(1), 35-57.
- [17] Fortson J. G. (2008). The gradient in Sub-Saharan Africa: socioeconomic status and HIV/AIDS, *Demography*, 45, 2, 303-3232
- [18] Foster, G. (2000). The Capacity of the Extended Family Safety Net for Orphans in Africa. *Psychology, Health and Medicine* 5(1), 55-62.
- [19] GRZ (1999). Orphans and Vulnerable Children: A situation analysis. Joint GRZ, USAID, UNICEF and SIDA Study Fund Project, Lusaka.
- [20] Ksoll, C. (2007). Family networks and Orphan Caretaking in Tanzania. Oxford University Discussion Paper Series, No. 361.



- [21] La Ferrara, E. (2002). Self help groups and income generations in the informal settlements of Nairobi. *Journal of African Economies* 11, 61-89.
- [22] Lungwangwa, G. and M. Macwan'gi (1996). Street children in Zambia – a situation analysis. UNICEF, Lusaka.
- [23] McDonald, S. and J. Roberts (2006). AIDS and Economic Growth: A Human Capital Approach. *Journal of Development Economics* 80(1), 228-250.
- [24] Ministry of Community Development and Social Services et al. (2006). Report on survey and analysis of the situation of street children in Zambia. Supported by UNICEF, PCI and RAPIDS.
- [25] Ministry of Sport, Youth and Child Development (2004). Orphans and vulnerable children in Zambia – a situational analysis. Supported by USAID, UNICEF, SIDA and FHI, Lusaka.
- [26] Naidu, V. and G. Harris (2005). The Impact of HIV/AIDS Morbidity and Mortality on Households: A Review of Household Studies. *South African Journal of Economics* 73, 533-544.
- [27] Ncube, N. (2008). Progress Report for Zambia: People's Process on Housing and Poverty in Zambia. Slum Dwellers International (SDI), Lusaka.
- [28] Rodgers, D. (1999). Youth Gangs and Violence in Latin America and the Caribbean: a literature survey. *LCR Sustainable Development Working Paper No 4*. The World Bank, Washington DC.
- [29] Sachs, J. et al. (2001). Macroeconomics and Health: Investing in Health for Economic Development, Report of the Commission of Macro-economics and Health to the Director-General of the World Health Organization p. 42.
- [30] Santaaulalia-Llopis, R. (2008). Aggregate effects of AIDS on development. University of Pennsylvania, *Dissertation Paper*. <http://repository.upenn.edu/dissertations/AAI3328646>
- [31] Tacon, P. and G. Lungwangwa (1991). Street children in Zambia. Institute for African Studies. University of Zambia, Lusaka.
- [32] UNAIDS, UNICEF, and USAID (2006). Africa's Orphaned and Vulnerable Generations. Children Affected by AIDS. UNICEF, New York.

- [33] UNAIDS, UNICEF, and USAID (2004). Children on the Brink 2004. A Joint Report of New Orphan Estimates and a Framework for Action. USAID, Washington.
- [34] UNICEF (2000). Poverty reduction begins with children. UNICEF, New York.
- [35] Yamano, T. and T. S. Jayne (2005). Working-Age Adult Mortality and Primary School Attendance in Rural Kenya. *Economic Development and Cultural Change* 53, 619-653.
- [36] Young, A. (2005). The Gift of the Dying: The Tragedy of AIDS and the Welfare of Future African Generations. *Quarterly Journal of Economics* 120 (2), 423-466.

## APPENDIX 1

The largest set of variables exploited in our multivariate analysis comes from the extended families survey. The survey is divided into four sections organized as follows:

- The first section aims to provide a detailed overview of the family's structure in terms of the number of household members, their role with respect to the head of the household as well as their characteristics in terms of education, employment and, for those members who are less than 18 years old, their orphan status. The questionnaire also provides information related households that have inter- and/or intra-generational links with the head of the household. In particular, the structure of the questionnaire enabled us to collect information on the number of links, their strength and geographical proximity as well as their possible differences due to gender bias and to the distinction between relatives on the wife's side versus the husband's side.
- The second section focuses on health by looking at individual members' illnesses over the past year and their possible impact on work activity and therefore income generation. This section also includes a specific set of questions on the presence of HIV positive members in the household, on their eventual use of ARV and on deaths due to HIV in the extended family during the past 10 years, which may have contributed to either a direct absorption of HIV orphans by the household at the centre of the analysis or by the extended family, as well as an adverse effect on income through the loss of a breadwinner.
- The third section focuses on the external support for those orphans taken in by the surveyed families. We investigate the type and the provider of support offered, as well as the adequateness of the support relative to the actual needs. Similar questions were posed to families with chronically ill members.
- The fourth and last section focuses on the household's economic situation. We assess the household's main sources of income, the types of job held, the amount of income received and its periodicity. We further assess the household's economic situation through information on the number of meals consumed the day before the interview, caloric intake during the past week and the average number of days spent without eating during a typical week over the past month. We also study the role of credit on the extended family's situation by asking whether the household has received any loans during the past year, from whom and for what purpose. We ask an analogous set of questions in the context of household lending over the past year. Finally, this section considers shocks faced by the household over the past year such as theft, business failures or deaths in the family and their role on household wellbeing.

## 2008 SITUATION ANALYSIS OF EXTENDED FAMILIES' SAFETY NETS IN NDOLA, ZAMBIA

TOWN: _____
LOCATION (compound): _____
DATE: _____
TIME STARTED INTERVIEW: _____ TIME ENDED INTERVIEW: _____
INTERVIEWER'S NAME: _____
HOUSEHOLD CODE: _____ RESPONDENT NAME: _____

*Hello my name is \_\_\_\_\_ I am working with the Rainbow office, collecting information about your household and the people who usually live with you. The information is to help us get a better idea about the socio-economic situation in your area. **Any information you share is completely confidential and your name or names of household members will not be shared with anyone or attached to information you give.** Please may I proceed with the interview? IF YES, CONTINUE.*

*INTERVIEWER SIGN HERE TO ACKNOWLEDGE THAT CONSENT WAS GIVEN*

\_\_\_\_\_  
*Date* \_\_\_\_\_.

**INSTRUCTIONS:**

**ALL QUESTIONS SHOULD BE ANSWERED BY THE HEAD OF THE HOUSEHOLD.  
ANSWERS GIVEN BY THE RESPONDENTS HAVE TO BE WRITTEN IN THE BOX PROVIDED.  
ALL THE INFORMATION IS CONSIDERED STRICTLY CONFIDENTIAL AND WILL BE TREATED AS SUCH.**

**SECTION 1: FAMILY'S GENERAL OVERVIEW**  
**Table 1.1 – Household members' main characteristics**

Name of each household member (Please give me the names of persons who usually live in your household)	F110. Relationship to the head of household: (see list below)	F111. Sex?	F112. Does (name) usually sleep here? 1.Yes 2.No	F113. Age of each household member? (Years)	PARENTAL SURVIVORSHIP AND RESIDENCE FOR MEMBERS LESS THAN 18 YEARS OLD				F118. What is the level of education of each household member?  (specify the last completed grade. Write 0 if never gone to school)	F119. What is the employment status of each household member? 1. Employed 2. Unemployed 4. Retired 4. Self employed 5. Don't know 6. Not Applicable	ONLY FOR CHILDREN LIVING IN THE HOUSEHOLD		
					F114. Is [NAME's] natural or "birth" mother alive? 1.Yes 2.No	F115. If Yes, does she live in this household? 1.Yes 2.No	F116. Is [NAME's] natural father alive? 1.Yes 2.No	F117. If Yes, does he live in this household? 1.Yes 2.No			F120. What each child in the household does as main activity?  1.Go To School 2.Work 3. Stay on the street 4.Other,(specify)	F120A. During the past week, on a school day, did (child's name) helped with one or more of the activities listed below?	F120B. Has any of these activities prevented the child from going to school?  1.Yes 2.No
1													
2													
3													
4													
5													
6													
7													
8													
9													

**CODES FOR RELATIONSHIP TO HEAD OF HOUSEHOLD**

- |                                  |                      |                               |
|----------------------------------|----------------------|-------------------------------|
| 1= HEAD                          | 5= GRANDCHILD        | 10= OTHER RELATIVE            |
| 2= WIFE / HUSBAND                | 6= PARENT            | 11= ADOPTED/FOSTER/STEP CHILD |
| 3= SON / DAUGHTER                | 7= PARENT-IN-LAW     | 12= NOT RELATED               |
| 4= SON-IN-LAW OR DAUGHTER-IN-LAW | 8= BROTHER OR SISTER | 0= DON'T KNOW                 |

**LIST OF ACTIVITIES (F120A):**

- |  |                             |                           |           |         |
|--|-----------------------------|---------------------------|-----------|---------|
| 1=SHOPPING, CLEANING, COLLECTING WATER | 2=CARING FOR OTHER CHILDREN | 3=CARING FOR OTHER ADULTS | 4=DO IGAs | 5=OTHER |
|--|-----------------------------|---------------------------|-----------|---------|



**SECTION 2: HOUSEHOLD MEMBERS' HEALTH AND HEALTHCARE**

**Table 2.1 – Illnesses and care practices**

Name of each household member	F210. In general, how would you rate (name's) health over the past year? 1. Excellent 2. Good 3. Fair 4. Poor	F211. Has (name) been sick during the last month? 1. Yes 2. No (go to F213)	F212. What main illness did (name) suffer from in the last month? (See list below)	F213. Has (name) been sick for more than one month in the past year? 1. Yes 2. No (go to F215)	F214. What main illness did (name) suffer from in the past year? (See list below)	F215. During (name) last illness, did he/she have to stop normal activities? 1. Yes 2. No	F216. Did anyone else have to stop activities to care for (name) during his/her last illness? 1. Yes 2. No
1							
2							
3							
4							
5							
6							
7							
8							
9							

**List of the main illnesses:**

- 1=Malaria (tested?)
- 2=Chest pain
- 3=TB
- 4=Asthma
- 5=Bronchitis/Sore throat
- 6=Diarrhea
- 7=Abdominal pains
- 8=Anemia
- 9= Dark patches on skin
- 10=Other Skin infection
- 11=Shingles
- 12=Pneumonia

- 13=AIDS
- 14=High blood pressure
- 15=Diabetes
- 16=Eye infection
- 17=Ear infection
- 18=Mouth infection
- 19=Cough
- 20=Vomiting
- 21=Athrits/Rheumatism
- 22=Fever
- 23=headache
- 24=Other (specify)
- 25=Do not know

Table 2.2 – HIV/AIDS

NO	QUESTIONS	ANSWER CODE
F220	Is one or more member of the household living with HIV/AIDS? 1. Yes 2. No (go to Q334)	
F221	How many members of the household live with HIV/AIDS?	
F222	Are members living with HIV/AIDS on ARV? 1. Yes 2. No (go to 334)	
F223	If yes, how many are on ARV?	
F224	Has one or more household member died due to HIV/AIDS in the past 10 years? 1. Yes 2. No	
F225	Has the household absorbed children from other households because caregivers or others died of HIV/AIDS? 1. Yes (Specify the number) 2. No	
F226	Has the household absorbed adults from other households because caregivers or others died of HIV/AIDS? 1. Yes (Specify the number) 2. No	
F227	Has the household ever lost financial support due to the death of a person who provided money/food etc? 1. Yes 2. No	



**SECTION 3: EXTERNAL SUPPORT****Table 3.1 – Support for orphans and chronically ill household members**

<b>NO</b>	<b>ORPHANS</b>	<b>ANSWER CODE</b>
F310	Are there any orphaned children in this household? 1.Yes                      2.No (go to F455)	
F311	In the past year have you received any external support to care for orphans? 1.Yes 2.No	
F312	If yes, what kind of support did you receive? 1.medical (supplies of medicines)    2.counselling/psychological support    3.material (food, clothing)    4.financial (loans) 5. school costs    6. Other	
F313	Who provides the support? 1.CBOs    2.Local church    3.NGO    4.Government    5.Village head    6.Other	
F314	Is the support adequate to meet the needs? 1. Yes    2. No	
<b>NO</b>	<b>CHRONICALLY ILL MEMBERS</b>	<b>ANSWER CODE</b>
F315	Are there any adults in this household who have been sick for more than 1 month out of the past year? 1.Yes                      2.No (go to table 4.6)	
F316	In the past year have you received any external support to care for sick adults? 1.Yes 2.No	
F317	If yes, what kind of support did you receive? 1.medical (supplies of medicines)    2.counselling/psychological support    3.material (food, clothing)    4.financial (loans) 5. Other	
F318	Who provides the support? 1.CBOs    2.Local church    3.NGO    4.Government    5.Village head    6.Other	
F319	Is the support adequate to meet the needs? 1. Yes    2. No	

**SECTION 4: HOUSEHOLD'S ECONOMIC SITUATION****Table 4.1 – Sources of income**

Item nr.	In the past 12 months, did your household or anyone in your household obtain income or support from any of the following sources?	Item nr.	F410.Received by household? 1.Yes 2.No	F411. What amount in Zambian Kwacha and per what period? 0.Day 1.Week 2.Month 3. Year		F412. In the past year, how many (days/weeks/months) did your household earn this income?
				Amount	Period	
1	Paid job with an organization (salaries, wages, etc)	1				
2	Profit from rental property of your own	2				
3	Domestic service in someone else's house	3				
4	Self-employment (selling things, doing repairs etc)	4				
5	Payment for work on a commercial farm	5				
6	Selling your own agricultural products	6				
7	Grants from government	7				
8	Remittances from family employed elsewhere	8				
9	Gift from family/friends/others	9				
10	Loan from family/friend/other	10				
11	Grants from NGO, CBO or religious organization	11				
12	Loan from NGO, CBO or religious organization	12				
13	Loan from a bank or other financial institutions	13				
14	Sale of assets (livestock, land)	14				
15	Any other source (specify)	15				

**Table 4.2 – Nutritional status of the household**

<b>NO</b>		<b>ANSWER CODE</b>
F420	How many meals did this household take <b>yesterday</b> ? 0.No meals                      1.One meal 2.Two meals                      3. Three meals                      4. Four meals	
F421	In the <b>past week</b> did you eat meat or fish or chicken meals?	
F422	Over the past month, on a typical week, how many days did your household not have enough food to eat? 0.None, enough food all days                      1.One day                      2. Two days                      3.Three days 4. Four days                      5. Five days                      6. Six days                      7. Seven days                      8. More than seven	

**Table 4.3 – Credit**

<b>NO</b>	<b>RECEIVED</b>	<b>ANSWER CODE</b>
F430	Has anyone in the household borrowed money in the past year? 1.Yes                      2.No (go to F446)	
F431	Where was the largest loan from? 1.relative (specify)   2.neighbor   3.money lender   4.employer   5.religious group   6.NGO   7.Other (specify)	
F432	What was the reason for obtaining the loan? 1.to buy land   2.to buy farming inputs   3.to buy food   4.pay for healthcare   5.schooling   6.business   7.Other	
<b>NO</b>	<b>GIVEN</b>	<b>ANSWER CODE</b>
F433	Has anyone in the household lent money in the past year? 1.Yes                      2.No (go to table 5.5)	
F434	Who was the money lent to? 1.relative (specify)   2.neighbor   3.friend   4.Other (specify)	
F435	What was the reason for giving the loan? 1.to buy land   2.to buy farming inputs   3.to buy food   4.pay for healthcare   5.schooling   6.business   7.Other	

**Table 4.4– Shocks in the household**

Item Nr	Item category	F440. Over the past year, has your household experienced any of these events?  1. Yes 2. No	F441. If yes, did this result in a loss of income or assets?  1. Yes 2. No	F442. Did this result in any children having to leave school for more than one week?  1. Yes 2. No	F443. Did this result in a reduction of the number of meals per day?  1. Yes 2. No
1	Household business failure				
2	Loss of salaried employment				
3	End of regular assistance, aid or remittances from outside				
4	Large rise in price of food				
5	Illness or accident of household member				
6	Birth in household				
7	Death in household				
8	Death of working member household				
9	Theft				
10	Damage to house				
11	Lower crop yields due to drought or floods				
12	Crop disease or crop pests				
13	Livestock died or stolen				
14	Marriage				
15	Other (specify)				

**APPENDIX 2****INDIVIDUAL CHILD SURVEY 2008**

TOWN: _____
LOCATION (compound): _____
DATE:
TIME STARTED INTERVIEW: _____ TIME ENDED INTERVIEW: _____
INTERVIEWER'S NAME: _____
CHILD CODE: _____ RESPONDENT NAME: _____

Hello, My name is \_\_\_\_\_ and I am collecting information on children status in Ndola in collaboration with the Rainbow Office and the Cicetekelo Youth Project. I would like to ask some questions about you and your family of origin, the life on the street, your education, your health and your sexual behaviour.

**Please be assured that this discussion is strictly confidential and that the information you provide is all completely private and anonymous and cannot be linked to you.**

May I continue?

*INTERVIEWER SIGN HERE TO ACKNOWLEDGE THAT CONSENT WAS GIVEN*

\_\_\_\_\_ *Date* \_\_\_\_\_.

**INSTRUCTIONS:**

**ALL QUESTIONS SHOULD BE ANSWERED BY THE CHILD.**

**ANSWERS GIVEN BY THE RESPONDENTS HAVE TO BE WRITTEN IN THE BOX PROVIDED.**

**ALL THE INFORMATION IS CONSIDERED STRICTLY CONFIDENTIAL AND WILL BE TREATED AS SUCH.**

**Table 1.1 – General Information**

NO	QUESTIONS	ANSWE R CODE
C11 0	SEX 1. Male 2. Female	
C11 1	How old are you?	
C11 2	Where were you born? 1. In this town in Zambia 2. In another town in Zambia 3. In a village in Zambia 4. In another country (Name of Country.....) 5. Don't know	
C11 3	How long have you been living in this town?	

**Table 1.2 - Orphan Status**

NO	QUESTIONS	ANSWE R CODE
C120	Are both of your parents alive? 1. Yes (go to Q124) 2. No	
C121	if <b>NO</b> , is it your father or mother that has died? 1. Father 2. Mother 3. Both	
C122	Do you know what caused the death of your Parent(s) 1. Yes 2. NO 3. Don't know	
C123	If YES, could you specify what caused the death of your Parent(s) _____	
C124	How many brothers/sisters do you have? (number and age)	
C125	What does each one of them do? 1. Go To School 2. Work 3. Other (specify)	
C126	Are your grandparents alive? 1. Yes, all 2.No, all 3. maternal grandmother only 4. maternal grandfather only 5. paternal grandmother only 6. paternal grandfather only 7. maternal grandparents only 8. paternal grandparents only 9. don't know	
C127	Who do you live with in this town? 1. alone 2. with both parents 3. with mother only 4. with father only 5. with maternal grandmother 6. with maternal grandfather 7. with paternal grandmother 8. with paternal grandfather 9. with maternal grandparents 10. with paternal grandparents 11. with siblings 12. with uncles/aunts 13. Other (specify)	

NO	QUESTIONS	ANSWER CODE
C128	Where do you sleep? 1. At home with parents 2. At home with grandparents 3. At home with uncles/aunts 4. At the centre 5. On the street 6. Other (specify)	

**Table 1.3 Life on the street**

NO.	QUESTIONS	ANSWER CODE
C130	Why do/did you go on the streets? 1. Sent by parents 2. To earn money 3. To meet friends 4. Abuse at home 5. Poverty 6. Other (specify)	
C131	How long have you been going on the streets?	
C132	How often do/did you go on the streets? 1. Everyday full time 2. Everyday part time 3. Weekends full time 4. Weekends part time 5. Other (specify)	
C133	What type of activities do/did you engage in while on the streets? MULTIPLE RESPONSE 1. Selling 2. Delivering goods 3. Washing cars 4. Begging 5. Playing 6. Sex 7. Other (specify)	
C134	How much do/did you get per day from these activities on the streets?	
C135	What do/did you do with the money that you earn on the streets? 1. Spend it immediately 2. Give it to parents/guardians 3. Deposit in the bank 4. Share with friends 5. Food 6. Clothes 7. Education 8. Entertainment 9. Other (specify)	
C136	Who introduced you to the activities you engage(d) in on the streets? 1. Parents 2. Guardian 3. Friends 4. Other (specify)	

**Table 1.4 – Educational Status**

NO	QUESTIONS	ANSWER CODE
C140	Did you attend school while you were on the street? 1. Yes 2. No 3. Sometimes	
C141	Do you attend school now? 1. Yes 2. No	
C142	What Grade are you in?	

NO	QUESTIONS	ANSWER CODE
C143	If you are not in school what is the last Grade that you completed? 0. Never been to school 1. Specify grade	
C144	Can you read any written material, such as a letter or newspaper? 1. Yes 2. No	
C145	If you have never been to school or dropped out, could you explain why you left school? _____	

**Table 1.5 - Health and healthcare**

NO	QUESTIONS	ANSWER CODE
C150	What common health problems do you experience? _____	
C151	In general, how would you rate your health over the past year? 1. Excellent 2. Good 3. Fair 4. Poor	
C152	Have you been sick during the last month? 1. Yes 2. No	
C153	If yes, what are the two most important illnesses or symptoms you suffered from in the last month? (see list below)	
C154	Have you been ill for most than 1 month in the past year? 1. Yes 2. No	
C155	If yes, what did you suffered from in the past year? (see list below)	
C156	Have you visited any health centers during your last illness? 1. Yes 2. No	
C157	If YES, where do you go? 0. Government Hospital 1. Private Health Facility 2. Local dispensary 4. Traditional healer 5. Other (specify) _____	
C158	If NO, why? 0. No time 1. No money 2. No transport 3. Illness not serious 4. Other (specify)	

**List of the main illnesses:**

1=Malaria (tested?)

2=Chest pain

3=TB

4=Asthma

5=Bronchitis/Sore throat

6=Diarrhea

7=Abdominal pains

8=Anemia

9= Dark patches on skin

10=Other Skin infection

11=Shingles

12=Pneumonia

13=AIDS

14=High blood pressure

15=Diabetes

16=Eye infection

17=Ear infection

18=Mouth infection

19=Cough

20=Vomiting

21=Athritus/Rheumatism

22=Fever

23=headache

24=Other (specify)

25=Do not know







## **Chapter 2**

# **HIV/AIDS in Sub-Saharan Africa: Gender Disparities and Socio-Economic Status**

### **2.1 Introduction**

The spread of HIV/AIDS represents a serious threat for the socioeconomic development process in developing countries. Unlike many other health-related diseases, the HIV/AIDS epidemic has a selective feature and presents important links with individuals' behavior. In particular, the African region seems to be the most problematic case with more than 24.5 millions of people infected in the Sub-Saharan area in 2005 (see UNAIDS 2006). It is then relevant to analyze the socioeconomic profile of the HIV/AIDS epidemic in order to better understand who gets infected and therefore what are the policy implications.

The relationship between health and socioeconomic status has been generally considered to be positive (e.g. those with higher level of wealth and education have also better health conditions) especially in developed countries where relevant information is more easily available. In developing countries, due also to information constraints, there is not much empirical evidence on the association between health and education/income, despite that Wagstaff (2000) confirms that the positive relationship observed for developed countries holds also for developing ones.

On the contrary, the evidence on the link between HIV/AIDS and socioeconomic status with particular reference to Sub-Saharan Africa is particularly mixed. Most of the studies on this relationship can be found in the socio-medical and epidemiological literature.

This chapter aims at contributing at the academic and institutional debate on the socioeconomic determinants of HIV/AIDS in Sub-Saharan Africa by looking, in particular, at the

effects of education and wealth on HIV-prevalence rates from a gender-based perspective. So far, most of the studies have been looking at this relationship on the basis of individual HIV tests results drawn either from limited and specific areas (see Nunn et al. 1994; De Walque 2003 and 2004), or from selected groups of individuals presenting some relevant characteristics, like pregnant women attending ante-natal care clinics or so-called “high risk groups” (Fylkesnes et al. 1997; Kilian et al. 1999; Nagot et al. 2002). These studies, therefore, cannot be considered to be representative of the entire population: their results need to be taken with caution and cannot be generalized at the national level. Among the few studies that have used nationally representative samples in order to assess the relationship existing between education/wealth and HIV, De Walque (2006) and Fortson (2008) seem to reach divergent conclusions starting from the same set of 5 Sub-Saharan Africa countries, thus raising an interesting debate on the topic and opening the floor to further research. Fortson (2008), on the basis of a quadratic specification, finds evidence of a robust positive education gradient in HIV infection showing that better-educated respondents are more likely to be HIV-positive, while evidence of the existence of a wealth gradient in HIV is somehow weaker and sensitive to the choice of measure of wealth. On the other hand, De Walque (2006), analyzing the determinants of HIV infection on the same set of countries and using linear specifications, concludes that education is not positively associated with HIV status.

The starting point of this chapter is the framework adopted by Fortson (2008)<sup>1</sup>. Yet, the present study improves on previous research by using a larger and more differentiated sample of countries, dividing them between high and low-&-moderate HIV prevalence countries. Moreover I use some among the most recent national surveys and introduce important changes in the way the econometric analysis is conducted as I adopt a specific gender-based approach which provides more useful and striking insights than the aggregate level approach adopted in previous research. It is interesting in fact to note that part of the analysis conducted by JF is based on a gender specific approach. Nevertheless, the main empirical results are obtained at the national level. In this chapter I show that using a gender based approach not only provides more information but also it generally drives the results obtained using both sexes combined. This is crucial also from a policy formulation perspective since it helps understanding what is the key factor/gender affecting the results at the national level.

As in JF, I first perform a non-parametric analysis in order to assess the non-linearity of the relationship linking education/wealth to HIV infection and I then turn to a parametric analysis based

---

<sup>1</sup> Henceforce “JF”

on a quadratic specification.

On the basis of a gender-based approach I find presence of a positive and robust education gradient in HIV infection for women while the evidence is weaker for men. This result highlights the crucial contribution of the female component to the aggregate level results in the relationship between education and HIV infection. Further empirical analysis seems to reveal that the positive gradient is a consequence of the individual risk behaviors. More specifically, we find that more educated individuals tend to have more lifetime sexual partners and premarital sex. Considering the higher vulnerability of females to HIV infection, the previous findings might be interpreted as a possible cause of the dramatic spread of HIV among more educated females. By contrast, evidence of the existence of a wealth gradient in HIV is mixed also if studied at gender level, thus confirming the conclusions already reached by Fortson at aggregate level.

This study uses data from nine Demographic and Health Surveys (DHS). These include the results of an HIV test and are designed to be nationally representative of the population living in households. The datasets are from Liberia (2007), Tanzania (2007), Ethiopia (2005), Guinea (2005), Rwanda (2005), Zambia (2007), Swaziland (2006), Zimbabwe (2005/2006) and Malawi (2004).

The chapter is organized as follows: Section 2.2 reviews the existing literature and explores further the contribution of this paper to the academic debate; Section 2.3 describes the data sources; Section 2.4 discusses the methodology and the empirical specification; Section 2.5 provides results while Section 2.6 focuses on a risk factors analysis. Section 2.7 concludes.

## **2.2 Socioeconomic determinants of HIV/AIDS: what do we know?**

As mentioned above, relevant research on the link between HIV infection and socioeconomic status in sub-Saharan Africa provides mixed conclusions and, most of the time, based on samples which cannot be considered nationally representative. Years/levels of education and wealth have been considered so far as the two main elements used for measuring the socioeconomic status.

Beegle and De Walque (2009) provide a useful discussion of the main methodological challenges of empirical studies of the relation between socio-economic status and HIV and focus on some controversial evidence about these patterns. Education is an important determinant since, as noted by Hargreaves and Glynn (2002), in the absence of a vaccine and widely available treatment, the main method of reducing heterosexual transmission is by behavior change which is linked to educational level. Nevertheless, as already pointed out by Mann and Tarantola (1996), it is worth

emphasizing that more educated persons do not necessarily receive more HIV-related health education at school especially in African countries. In other words, it is more reasonable to associate a well educated person with a rich person rather than a more conscious person of the HIV-risks. Most of the literature has attempted to analyze whether or not the level of education is negatively associated with the HIV/AIDS prevalence.

Hargreaves and Glynn (2002) provide a systematic literature review of the relation between educational attainment and HIV/AIDS. They show that early contributions, focusing on the period of HIV/AIDS spread (eighties and nineties), found that in Africa higher education is often associated with a greater risk of HIV/AIDS infection. The association, despite being stronger in rural areas and younger cohorts, was similar for men and women. Blanc (2000) and Gregson, Waddell and Chandiwana (2001) provide a clear interpretation of the positive linkage between education and HIV/AIDS. In particular, it is noted that in the absence of HIV/AIDS epidemic, more educated people generally have higher rates of sexual partner change due to the greater personal autonomy and spatial mobility. Considering this behavior, more educated and wealthier people are particularly vulnerable to HIV/AIDS infection in the early stage of HIV/AIDS epidemic. However, once the HIV/AIDS spreads across individuals, more educated populations may be expected to respond more speedily. Furthermore, after the manifestation of the epidemic, the pattern of new HIV/AIDS infection may be changing towards a greater burden among the less educated as noted by Hargreaves and Glynn (2002). This seems to be confirmed by the recent findings of De Walque (2007) who provides evidence from rural Uganda. Using a data set from a longitudinal survey across 12 years, the empirical findings of De Walque (2007) seem to confirm the previous assessments of Blanc (2000) and Gregson, Waddell and Chandiwana (2001). For example he notes that by looking at early data on 1990 there is no robust association between HIV prevalence and educational attainment. On the contrary, after a decade, HIV prevalence decreases twice as much among more educated individuals (especially among females). Similar results have been obtained by Chapoto and Jayne (2006) that compare data on Zambia between 2001 and 2004. In particular, they found a general negative relation between education attainment and the probability of disease-related death for females in Zambia.

All these studies, however, use datasets which are not nationally representative but are based on limited areas or specific categories of individuals. On the other hand, as anticipated in the Introduction, De Walque (2006), using HIV/AIDS prevalence data for a sample of 5 different countries in Sub-Saharan Africa, found that education is not associated positively with the epidemic. However, a crucial finding is that education is particularly important for protective

behavior such as condom use, use of counseling and testing. As highlighted already, JF uses the same data but achieves completely different results finding a robust positive education gradient in HIV/AIDS infection on the basis of a quadratic relation. On the same issue, Corno and De Walque (2007) find that, using data for Lesotho, education appears to have a protective effect since it is negatively associated to HIV/AIDS infection and it strongly predicts preventive behaviors. The second finding can be considered particularly relevant as it protects from potential future spread of the disease as the HIV/AIDS epidemic is a dynamic process. Lachaud (2007) also finds that HIV/AIDS prevalence is negatively related to the level of education in Burkina Faso. The same was found by Fylkesnes et al. (2001) in urban Zambia. In a recent study Baker et al. (2009) perform a cohort analysis of formal education and HIV infection in 11 African countries (based on DHS data) and they conclude that among younger adults more schooling is associated with a lower risk of HIV infection.

As far as concerns the study of the relationship between wealth and HIV, the general belief is that more educated people are also wealthier. In other words, beside education, it is then important to analyze if the income plays a role as a determinant of HIV/AIDS. This is also a contrasted issue that has not yet found a general consensus. According to Pritchett and Summers (1994) healthier people are definitely wealthier. More specifically they find strong evidence that the relationship between income and health is not merely associative but causal and structural. However, empirical evidence in developing countries does not necessarily reveal the same as shown by Shelton, Cassell and Adetunji (2005). It is reasonable to argue that richer individuals can afford better health care and hence improve their living conditions. Nevertheless, whether or not income can be considered as a determinant of HIV/AIDS remains an open issue. Most of the studies do not separate these effects and make it difficult to disentangle the contribution of wealth to HIV infection from the contribution of education. The paper of JF, as mentioned, is a good example of an analysis which aims at isolating the effects of education and wealth and analyzes them separately. Yet, her conclusions concerning the presence of a wealth gradient in HIV are mixed and sensitive to the measure of wealth taken into consideration.

## 2.3 Data

This section focuses on the dataset used in the empirical analysis and discusses some of the main features of the data employed. I use data from Demographic and Health Surveys (DHS) for 9 Sub-Saharan African countries. These datasets include HIV testing results for a nationally representative sample of the adult population. Tanzanian data are based on standard AIS<sup>2</sup> while the remaining 8 countries are based on standard DHS. However, for the purpose of the analysis, the variables included in the dataset are perfectly comparable across countries.

The nine countries employed can be divided into two main groups: low-&-moderate HIV-prevalence countries and high HIV-prevalence countries.

*Table 2.1 HIV prevalence by gender*

HIV/AIDS prevalence (in percentage)	Male	Female
<b><i>Low &amp; moderate prevalence</i></b>		
Ethiopia (2005)	0.91	1.86
Guinea (2005)	1.10	1.89
Liberia (2007)	1.29	2.09
Rwanda (2005)	2.20	3.61
Tanzania (2007)	4.56	6.61
<b><i>High prevalence</i></b>		
Malawi (2004)	10.23	13.31
Swaziland (2006)	19.70	31.15
Zambia (2007)	12.29	16.09
Zimbabwe (2005-6)	14.77	21.10

*Source: DHS.*

HIV prevalence statistics by gender are reported in Table 2.1. In all countries the difference in HIV prevalence rates between females and males is evident thus confirming the crucial role played by

---

<sup>2</sup> AIDS Indicator Survey.



gender in HIV infection.

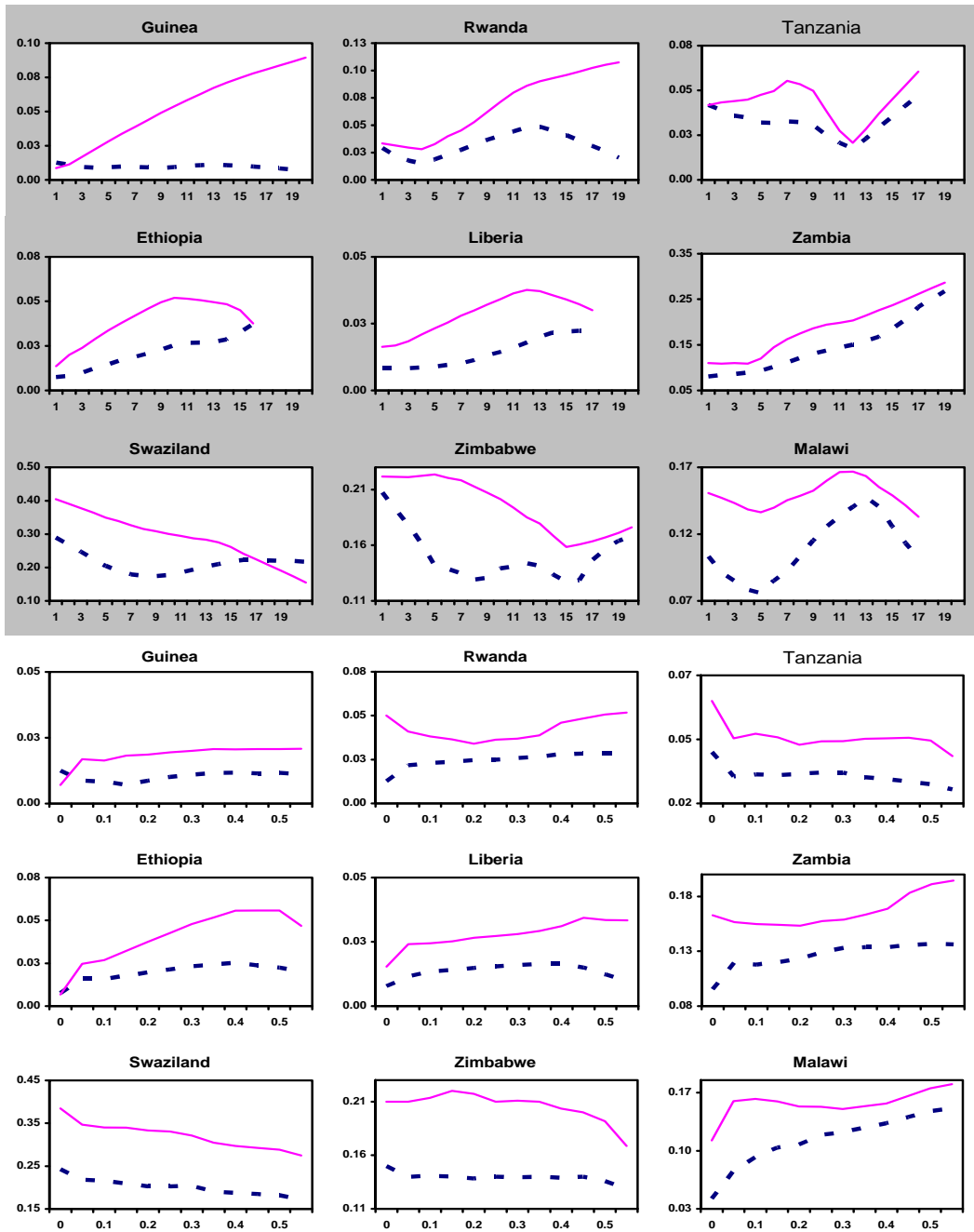
Similarly to JF I start the analysis by performing a non-parametric lowess regression for each country by gender in both education and wealth analysis<sup>3</sup>. I use years of schooling and wealth as proxies for socioeconomic status. The wealth index is calculated as the fraction of nine assets and amenities of the respondent's household (radio, television, refrigerator, bicycle, motorcycle, car, telephone, electricity and flush toilet or pit latrine) and is considered to be a good proxy for showing the wealth status of households across countries.

The choice of using a wealth index based on household assets and amenities instead of the DHS-provided wealth index is in line with the precedent used in Case, Paxson and Ableidinger (2004) and in JF as I also think that this index provides an easier and more understandable interpretation of the coefficients. In addition, it also allows for a direct comparison across different countries, as in this case. I therefore use this index in the remainder of the parametric analysis for wealth.

These results provide some general directions on the relationship between HIV and education/wealth. More specifically this procedure allows plotting how the percentage of HIV infected people varies with the years of education/levels of wealth. The graphical results are reported in Figure 2-1.

---

<sup>3</sup> Note however that Fortson (2008) does not perform the non-parametric regression of HIV on years of education. I decided to employ this procedure not only to be consistent but also because it provides a useful tool to visualize the relationship between the variables.



**Notes:** Each chart plots the smoothed values of HIV prevalence carried out using a locally weighted lowess regression of HIV on education/wealth by gender for each country. Charts surrounded by the gray area refer to years of education; those in white refer to wealth. Results for women are in solid lines, those for males in dotted line.

*Fig. 2.1 - Lowess Regressions of HIV on Education/Wealth by Gender for each Country*

Each chart plots the smoothed values of HIV prevalence carried out using a locally weighted regression of HIV on education/wealth by gender for each country. It can be noted that the relationship between HIV and years of education appears to be nonlinear.

Moreover, it is worth drawing some remarks on the patterns emerging from the charts. The positive and non linear relationship between HIV and education is especially evident for women in Guinea, Rwanda, Zambia, Ethiopia and Liberia. For men, on the contrary, the graphical evidence seems to be weaker than for women and this provides an important indication which will be subsequently confirmed in the econometric analysis. On the other hand, it is curious to note that Swaziland shows a negative non-linear relationship for women which appears to be an exception in the present cross country analysis.

As far as it concerns the link between wealth and HIV the evidence is mixed. In fact it is hard to identify specific patterns. The only cases where the relationship appears to be positive are those of men in Malawi and women in Ethiopia.

In general, based on the empirical evidence provided in this section, the approach used by JF seems to be the most appropriate. In fact, focusing on a different set of countries, the author estimates non linear specifications for both education and wealth based on the nonlinearities in the data revealed by the non-parametric estimates. Given the presence of nonlinearities in the data as in Figure 2.1, this analysis represents an extension of the analysis adopted in JF using recent DHS data for countries with low and high HIV prevalence. However, as shown in the next section, due to the strong gender disparities already observed in the preliminary results, we opt for a gender-specific approach.

## **2.4 Econometric Specification and Methodology**

Before describing the methodology employed, further descriptive statistics are shown in tables 2.2 and 2.3 referring to women and men respectively. In each table, panel A reports descriptive statistics for the subsample of HIV-negative individuals while panel B refers to the HIV-positive subsample.

*Table 2.2 – Sample Means (Women)*

<b>A. (HIV negative)</b>	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<i>Years of schooling</i>	6.355	4.503	3.514	8.168	7.885	5.456	3.754	1.789	1.477
<i>Years of schooling=0</i>	0.108	0.248	0.443	0.073	0.045	0.214	0.241	0.671	0.774
<i>Wealth Index</i>	0.257	0.253	0.145	0.369	0.297	0.167	0.195	0.087	0.271
<i>Age</i>	27.674	27.733	29.463	27.068	26.672	28.229	28.164	27.846	29.250
<i>Rural</i>	0.614	0.856	0.582	0.757	0.618	0.758	0.841	0.839	0.691
<i>Currently</i>	0.624	0.748	0.644	0.401	0.586	0.643	0.485	0.644	0.791
<i>Formerly</i>	0.096	0.091	0.099	0.060	0.105	0.107	0.120	0.100	0.042
<i>Widowed</i>	0.024	0.024	0.026	0.037	0.039	0.025	0.035	0.033	0.017
<i>Nr. of observations</i>	4766	2443	6320	3142	5922	8303	5441	5800	3774
<b>B. (HIV positive)</b>									
<i>Years of schooling</i>	7.238	4.648	5.141	7.595	7.773	5.556	4.905	4.370	3.666
<i>Years of schooling=0</i>	0.070	0.254	0.294	0.104	0.043	0.194	0.207	0.361	0.537
<i>Wealth Index</i>	0.275	0.251	0.175	0.336	0.274	0.166	0.200	0.232	0.289
<i>Age</i>	30.867	30.502	30.407	29.102	30.669	31.533	33.227	30.816	31.933
<i>Rural</i>	0.395	0.794	0.370	0.687	0.606	0.596	0.603	0.289	0.334
<i>Currently</i>	0.560	0.698	0.613	0.427	0.555	0.590	0.375	0.542	0.684
<i>Formerly</i>	0.294	0.243	0.163	0.157	0.339	0.322	0.455	0.362	0.211
<i>Widowed</i>	0.143	0.095	0.018	0.103	0.202	0.120	0.177	0.156	0.161
<i>Nr. of observations</i>	947	421	147	1437	1547	408	222	142	68

*Table 2.3 – Sample Means (Men)*

<b>A. (HIV negative)</b>	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<i>Years of schooling</i>	7.674	5.552	6.140	8.020	8.577	6.277	4.094	3.134	3.870
<i>Years of schooling=0</i>	0.047	0.122	0.195	0.066	0.011	0.116	0.195	0.443	0.514
<i>Wealth Index</i>	0.268	0.273	0.154	0.366	0.298	0.173	0.207	0.084	0.295
<i>Age</i>	29.565	29.142	30.032	24.244	26.500	27.989	29.958	30.468	32.541
<i>Rural</i>	0.586	0.832	0.600	0.736	0.608	0.770	0.832	0.864	0.619
<i>Currently</i>	0.537	0.632	0.575	0.223	0.420	0.516	0.514	0.574	0.596
<i>Formerly</i>	0.035	0.028	0.052	0.025	0.032	0.044	0.024	0.031	0.038
<i>Widowed</i>	0.007	0.004	0.006	0.006	0.006	0.001	0.006	0.006	0.003
<i>Nr. of observations</i>	4512	2161	5144	2886	4752	6134	4610	5037	2888
<b>B. (HIV positive)</b>									
<i>Years of schooling</i>	8.455	6.200	8.169	7.802	8.393	6.021	5.015	5.115	4.001
<i>Years of schooling=0</i>	0.030	0.126	0.104	0.121	0.020	0.140	0.211	0.365	0.606
<i>Wealth Index</i>	0.285	0.299	0.197	0.336	0.291	0.175	0.229	0.171	0.309
<i>Age</i>	35.280	34.194	33.270	32.841	34.702	34.313	37.628	35.503	38.369
<i>Rural</i>	0.441	0.711	0.293	0.631	0.567	0.672	0.567	0.607	0.557
<i>Currently</i>	0.703	0.897	0.509	0.519	0.715	0.696	0.709	0.783	0.811
<i>Formerly</i>	0.155	0.049	0.088	0.144	0.142	0.126	0.095	0.091	0.000
<i>Widowed</i>	0.059	0.010	0.010	0.047	0.062	0.031	0.049	0.043	0.000
<i>Nr. of observations</i>	649	243	62	702	780	199	115	70	35

The information contained in these two tables is important for two reasons: first it complements the preliminary analysis already discussed in the previous section. Secondly, it provides further insights on the socioeconomic disparities across gender which will be instrumental for identifying a meaningful set of controls to be used in the econometric analysis.

Despite that the overall HIV sample is fairly balanced between sexes, the number of infected women is definitely higher than that of men. As a matter of fact, in 7 countries out of 9, for every HIV positive male there are at least two HIV positive females. These figures not only highlight the strong gender disparities, but also lead us to believe that any analysis carried out at the national level would be strongly influenced by the female component.

Comparing panels A and B of table 2.2, some relevant differences arise in the characteristics of the HIV infected and of those who are not. First of all the average number of years of schooling for HIV positive women is higher than that of HIV negative women especially in Rwanda, Ethiopia, Guinea, Liberia. On the other hand, this does not hold for men in Table 2.3 despite the case of Liberia and Ethiopia. The exception is represented by Swaziland where for both genders the average number of years of education of the HIV-negative individuals is higher than that of HIV-positive ones. The proportion of women with no years of education is generally lower among those who are infected in nearly all countries. On the other hand, this holds only in the cases of Zambia, Liberia and Ethiopia for men. In other words, the descriptive statistics seem to reveal that more educated women are more likely to be HIV-positive while the same cannot be claimed for men. Interestingly, the comparison of wealth index across gender and samples does not provide any systematic and significant difference among HIV-negative and HIV-positive individuals. This result strengthens the evidence already discussed from the non-parametric analysis. Age seems to be fairly homogenous and comparable across countries in the different subsamples. Nevertheless it is worth noting that the average age of HIV positive men is 4 years higher than the average age of HIV positive women, while for the HIV-negatives the difference is negligible. This result thus shows that women tend to be infected at a younger age compared to men. The type of residence also plays an important role, showing how the percentage of HIV negative people is usually higher in rural than in urban environment.

Another crucial result is represented by the differences in marital status across subsamples. Concerning the variables used for marital status, the omitted category refers to individuals who have never been married. "Currently" includes legally married people as well as people living together in an informal marriage. "Formerly" includes divorced or separated individuals while "Widowed" includes only widowed individuals.

Table 2.2 shows a clear trend in the women subsample concerning a tendency for formerly married and widowed women to be exposed to HIV infection. Across all countries, in fact, the average number of HIV positive women who were formerly married or widow is always higher than that of HIV-negative. On the other hand, the proportion of currently married women who are infected is always lower than that of not infected, with the exception of Swaziland. The picture for men, reported in Table 2.3, is completely different. In fact, the percentage of currently married men who are HIV positive is on average nearly double than that of HIV-negative. These features are clear indicators of the remarkable difference in the social behavior within the two groups and therefore lead us to consider the variables on the marital status as important controls to be used in the econometric analysis. The marital status has been already fully employed in the regression analysis by Corno and De Walque (2007) and De Walque (2006) but not by JF.

## 2.5 Results

I now turn to the parametric analysis. In order to study the relationship between socioeconomic status and HIV status I initially followed the approach used in JF, looking at the quadratic relationship between education/wealth and HIV prevalence by country.

However, on the basis of the results emerged from the descriptive statistics analysis and from the non-parametric analysis above discussed, a gender-based econometric analysis was adopted. Due to the high level of correlation between education and wealth, I chose to analyse them separately by running separate sets of regressions. In addition to years of schooling and wealth index, I use other independent variables in the regressions such as marital status, dummies for 5-year age groups, regional dummies and area of residence.

Table 2.4 contains the coefficients of the non-linear specification (i.e.  $y_i = \alpha x + \beta x_i^2 + \varepsilon_i$ ). Panels A and B refer to education for women and men, respectively, while panels C and D refer to the wealth equations for the two sexes. By looking at the education panels, a positive concave gradient emerges for 6 out of 9 countries for women. This result suggests the presence of a robust positive education gradient in HIV infection for women. In addition, those estimates imply that women who completed 6 years of schooling are 7.4 (Zambia), 3.4 (Ethiopia), 2.5 (Zimbabwe), 2.2 (Guinea), 1.3 (Liberia), 1.1 (Rwanda) percentage points more likely to be infected than women with no schooling. The relation is not statistically significant for Malawi and Tanzania. These results are in line with the patterns already observed in the descriptive statistics.

*Table 2.4 – Education and Wealth: Quadratic Specifications*

Education	Zambia	Malawi	Liberia	Swaziland	Zimbabwe	Tanzania	Rwanda	Ethiopia	Guinea
<b>A. WOMEN</b>									
Years of school	<b>0.015***</b> <i>0.005</i>	<b>-0.003</b> <i>0.005</i>	<b>0.002*</b> <i>0.001</i>	<b>-0.011**</b> <i>0.006</i>	<b>0.009</b> <i>0.007</i>	<b>0.001</b> <i>0.003</i>	<b>-0.001</b> <i>0.002</i>	<b>0.008***</b> <i>0.003</i>	<b>0.004</b> <i>0.004</i>
Years of school sq	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.001</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>-0.001**</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.001**</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>
F statistic	<b>17.54</b>	<b>0.48</b>	<b>5.59</b>	<b>9.48</b>	<b>3.62</b>	<b>0.15</b>	<b>9.58</b>	<b>6.50</b>	<b>6.04</b>
p-value	<b>0.000</b>	<b>0.620</b>	<b>0.000</b>	<b>0.000</b>	<b>0.030</b>	<b>0.860</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
Nr of observations	5713	2864	6467	4579	7469	8711	5660	5942	3842
<b>B. MEN</b>									
Years of school	<b>0.007</b> <i>0.006</i>	<b>0.006</b> <i>0.006</i>	<b>0.001</b> <i>0.001</i>	<b>-0.027***</b> <i>0.006</i>	<b>-0.005</b> <i>0.008</i>	<b>-0.003</b> <i>0.003</i>	<b>0.000</b> <i>0.002</i>	<b>0.000</b> <i>0.001</i>	<b>-0.001</b> <i>0.001</i>
Years of school sq	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.002***</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>	<b>0.000</b> <i>0.000</i>
F statistic	<b>10.01</b>	<b>2.77</b>	<b>4.64</b>	<b>11.25</b>	<b>0.35</b>	<b>0.80</b>	<b>2.88</b>	<b>3.02</b>	<b>0.64</b>
p-value	<b>0.000</b>	<b>0.060</b>	<b>0.010</b>	<b>0.000</b>	<b>0.700</b>	<b>0.450</b>	<b>0.060</b>	<b>0.050</b>	<b>0.520</b>
Nr of observations	4745	2267	5196	3588	5283	6333	4323	4630	2465
<i>Chow test</i>	<b>13.32</b>	<b>5.11</b>	<b>5.76</b>	<b>51.69</b>	<b>29.36</b>	<b>7.06</b>	<b>8.82</b>	<b>5.33</b>	<b>6.96</b>
<i>p-value</i>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
<b>C. WOMEN</b>									
Wealth index	<b>0.120</b> <i>0.087</i>	<b>0.009</b> <i>0.115</i>	<b>0.049</b> <i>0.034</i>	<b>-0.126</b> <i>0.133</i>	<b>0.191**</b> <i>0.081</i>	<b>0.025</b> <i>0.061</i>	<b>-0.030</b> <i>0.060</i>	<b>0.298***</b> <i>0.065</i>	<b>0.044</b> <i>0.031</i>
Wealth squared	<b>-0.096</b> <i>0.132</i>	<b>-0.030</b> <i>0.162</i>	<b>-0.051</b> <i>0.057</i>	<b>-0.010</b> <i>0.151</i>	<b>-0.349***</b> <i>0.102</i>	<b>-0.051</b> <i>0.090</i>	<b>0.067</b> <i>0.082</i>	<b>-0.340***</b> <i>0.093</i>	<b>-0.049</b> <i>0.040</i>
F statistic	<b>1.98</b>	<b>0.04</b>	<b>1.85</b>	<b>6.82</b>	<b>10.45</b>	<b>0.19</b>	<b>0.59</b>	<b>16.30</b>	<b>1.05</b>
p-value	<b>0.139</b>	<b>0.960</b>	<b>0.150</b>	<b>0.000</b>	<b>0.000</b>	<b>0.820</b>	<b>0.550</b>	<b>0.000</b>	<b>0.340</b>
Nr of observations	5712	2864	6481	4584	7469	8711	5663	5942	3842
<b>D. MEN</b>									
Wealth index	<b>0.162**</b> <i>0.074</i>	<b>0.498***</b> <i>0.102</i>	<b>0.082***</b> <i>0.027</i>	<b>0.056</b> <i>0.136</i>	<b>0.082</b> <i>0.076</i>	<b>0.009</b> <i>0.059</i>	<b>0.020</b> <i>0.056</i>	<b>0.071**</b> <i>0.034</i>	<b>0.011</b> <i>0.032</i>
Wealth squared	<b>-0.182*</b> <i>0.102</i>	<b>-0.541***</b> <i>0.117</i>	<b>-0.125***</b> <i>0.045</i>	<b>-0.178</b> <i>0.148</i>	<b>-0.134</b> <i>0.097</i>	<b>-0.007</b> <i>0.100</i>	<b>0.021</b> <i>0.088</i>	<b>-0.064</b> <i>0.054</i>	<b>-0.018</b> <i>0.035</i>
F statistic	<b>2.54</b>	<b>12.07</b>	<b>4.56</b>	<b>6.04</b>	<b>1.22</b>	<b>0.02</b>	<b>1.28</b>	<b>4.01</b>	<b>0.36</b>
p-value	<b>0.080</b>	<b>0.000</b>	<b>0.010</b>	<b>0.000</b>	<b>0.290</b>	<b>0.980</b>	<b>0.270</b>	<b>0.020</b>	<b>0.690</b>
Nr of observations	4755	2272	5205	3602	5283	6333	4326	4630	2467

**Notes:** All specifications are weighted least squares regressions (using the weights provided by the DHS surveys) with clustering on the households. The dependent variable indicates whether or not the respondent is HIV-positive infected. All samples include women and men aged 15-49 tested for HIV. The F-statistics tests the joint significance of the parameters of the quadratic specifications (standard errors are in *Italic*): \*\*\* significant at 1 percent level; \*\* significant at 5 percent level; \* significant at 10 percent level. The wealth index was not included for individuals with at least 5 missing values of the nine goods considered.

## 2.6 Risk Factors

In the previous section I showed the existence of a positive and concave gradient in education for women regardless of the measure of education employed, while the same conclusion could not be reached for men. I now want to find possible explanations to this somehow counterintuitive result. In particular, I intend to investigate what is the relationship between education and behaviors that increase the probability of HIV infection.

Following anecdotal evidence as well as findings from literature, I tend to exclude the intravenous drug use and blood transfusion as significant modalities of transmission with reference to Africa. Similarly, following Fortson (2008), I exclude the so-called vertical transmission (mother-to-child) as, also in my analysis as already in Fortson's, the education gradient proves to be robust to the exclusion of those younger than 20 years old and the vertical transmission is more likely to affect the youngest respondents. Clearly, caution is needed in performing a similar analysis as there are many risk factors for HIV which the data do not allow to analyze. My aim is simply to assess the existence of a link between education and some risky behavior which would allow us to conclude that differences in sexual behavior may represent one plausible explanation to the positive education gradient in HIV for women showed in the previous section. As demonstrated already by Glick and Sahn (2008) and confirmed by Fortson (2008), past estimates of the relationship between education and risk factors showed that it is important to separate men and women as these would significantly differ from each other.

In table 2.9 I look at the relationship between education and two specific risk factors, separately for women and for men. The analysis was carried out using only the HIV respondents as the aim was to give an explanation to the main findings of this chapter. In particular, panel A (for women) and panel B (for men) use as dependent variable an indicator for whether the respondent had premarital sex, while panels C and D use the number of lifetime partners as dependent variable. These two specific sexual behaviors represent reliable risky factors that can be associated with HIV infection. I estimate weighted least squares regressions on linear and quadratic terms for years of schooling. Moreover, in both specifications I control for five-year age groups, the area of residence, the marital status and the region of residence. Panel A of table 2.9 shows that in 6 out of 9 countries (Zambia, Liberia, Swaziland, Zimbabwe, Tanzania and Guinea) more educated women are more likely to have premarital sex. Also for male, 6 countries out of 9 report a positive and significant relation (Zambia, Malawi, Zimbabwe, Tanzania, Rwanda and Ethiopia). In other words, by looking at the whole panel of 9 countries, the empirical evidence indicates that premarital sex seems to be a



risky behavior associated to more educated individuals.

As far as concerns the second risk factor, it is worth noting that the relationship between number of lifetime partners and education is also positive in 5 out of 8 countries for females (DHS survey for Malawi does not report this risk factor). For male, the relation is positive and significant in all the countries except for Swaziland, even if in 3 countries the relation holds only at a 10% significance level. In conclusion, the analysis provided evidence on the links between education and certain risky behaviors which are conducive to HIV. In particular, considering the higher vulnerability of females to HIV, this analysis helps explaining the existence of gender disparities in HIV infection.

One major concern emerging from the analysis is whether the results are driven by non-response bias. Using the information provided by the DHS Final Reports<sup>8</sup>, I looked at the percentage of HIV test non-respondents with reference to each national sample, separately for women and men. Despite that the literature (Mishra et al., 2006) has showed that estimates of HIV prevalence based on national surveys like the DHS are not biased by non-response, I believe that non-response percentages by sex represent an important factor that needs to be taken into consideration when interpreting the findings. It is worth noting that non-response rates for women are in all cases lower than non-response rates for men. Focusing on male figures, only two countries show a percentage below 20% (i.e. 4% in Rwanda and 12% in Guinea) while all remaining countries have higher non-response rates (20% in Liberia and Tanzania, 22% in Swaziland, 25% in Ethiopia, 28% in Zambia and 37% in Malawi and Zimbabwe). On the contrary, the percentage of non-response for women is below 20% in 6 out of 9 countries (3% in Rwanda, 7% in Guinea, 10% in Tanzania, 13% in Liberia and Swaziland and 17% in Ethiopia) while only in Zambia, Zimbabwe and Malawi it reaches 23, 24 and 30% respectively. Accordingly, the non-response figures cast some doubts on the male empirical results while reinforcing the validity of women results achieved in the regression analysis.

---

<sup>8</sup> Available on the website: [www.dhsmeasure.com/publications](http://www.dhsmeasure.com/publications).

*Table 2.5 – Education Gradient in HIV with controls*

<b>A. Controlling for Marital Status (WOMEN)</b>									
	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<b>Years of schooling</b>	<b>0.018***</b>	<b>0.000</b>	<b>0.003**</b>	<b>-0.002</b>	<b>0.025***</b>	<b>0.003</b>	<b>0.002</b>	<b>0.012***</b>	<b>0.006</b>
	<i>0.005</i>	<i>0.006</i>	<i>0.001</i>	<i>0.006</i>	<i>0.007</i>	<i>0.003</i>	<i>0.940</i>	<i>0.003</i>	<i>0.004</i>
<b>Years of schooling squared</b>	<b>-0.001</b>	<b>2.000</b>	<b>0.000</b>	<b>0.000</b>	<b>-0.001***</b>	<b>0.000</b>	<b>0.000</b>	<b>-0.001**</b>	<b>0.000</b>
	<i>0.000</i>	<i>0.001</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>F statistic</b>	<b>27.00</b>	<b>2.30</b>	<b>5.90</b>	<b>4.13</b>	<b>7.16</b>	<b>2.82</b>	<b>12.74</b>	<b>8.31</b>	<b>7.88</b>
<b>p-value</b>	<b>0.000</b>	<b>0.100</b>	<b>0.003</b>	<b>0.017</b>	<b>0.000</b>	<b>0.064</b>	<b>0.000</b>	<b>0.000</b>	<b>0.001</b>
<b>B. Controlling for Marital Status, Age Group Controls, Rural Indicator and Region Fixed Effect (WOMEN)</b>									
<b>Years of schooling</b>	<b>0.017***</b>	<b>0.008</b>	<b>0.003**</b>	<b>0.005</b>	<b>0.023***</b>	<b>0.002</b>	<b>0.003</b>	<b>0.009***</b>	<b>0.004</b>
	<i>0.005</i>	<i>0.006</i>	<i>0.001</i>	<i>0.006</i>	<i>0.007</i>	<i>0.003</i>	<i>0.002</i>	<i>0.003</i>	<i>0.004</i>
<b>Years of schooling squared</b>	<b>-0.001***</b>	<b>0.000</b>	<b>0.000</b>	<b>-0.001***</b>	<b>-0.002***</b>	<b>0.000</b>	<b>0.000</b>	<b>-0.001***</b>	<b>0.000</b>
	<i>0.000</i>	<i>0.001</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>F statistic</b>	<b>7.61</b>	<b>3.36</b>	<b>2.73</b>	<b>36.35</b>	<b>10.01</b>	<b>0.19</b>	<b>3.66</b>	<b>5.44</b>	<b>4.02</b>
<b>p-value</b>	<b>0.001</b>	<b>0.036</b>	<b>0.067</b>	<b>0.000</b>	<b>0.000</b>	<b>0.829</b>	<b>0.027</b>	<b>0.005</b>	<b>0.019</b>
Nr of observations	5713	2864	6467	4579	7469	8711	5660	5942	3842
<b>Chow Test</b>	<b>11.82</b>	<b>2.11</b>	<b>4.03</b>	<b>31.81</b>	<b>4.29</b>	<b>1.79</b>	<b>1.89</b>	<b>2.59</b>	<b>5.80</b>
<b>P-value</b>	<b>0.00</b>	<b>0.10</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.15</b>	<b>0.13</b>	<b>0.05</b>	<b>0.00</b>
<b>C. Controlling for Marital Status Controls (MEN)</b>									
	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<b>Years of schooling</b>	<b>0.014**</b>	<b>0.010*</b>	<b>0.001</b>	<b>-0.001</b>	<b>0.015**</b>	<b>-0.003</b>	<b>0.001</b>	<b>0.001</b>	<b>0.000</b>
	<i>0.006</i>	<i>0.006</i>	<i>0.001</i>	<i>0.005</i>	<i>0.008</i>	<i>0.003</i>	<i>0.002</i>	<i>0.002</i>	<i>0.001</i>
<b>Years of schooling squared</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>-0.001**</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>F statistic</b>	<b>18.38</b>	<b>6.15</b>	<b>4.58</b>	<b>0.22</b>	<b>2.13</b>	<b>0.50</b>	<b>2.33</b>	<b>4.35</b>	<b>0.09</b>
<b>p-value</b>	<b>0.000</b>	<b>0.000</b>	<b>0.011</b>	<b>0.805</b>	<b>0.120</b>	<b>0.606</b>	<b>0.099</b>	<b>0.013</b>	<b>0.913</b>
<b>D. Controlling for Marital Status, Age Group Controls, Rural Indicator, Region Fixed Effect (MEN)</b>									
<b>Years of schooling</b>	<b>0.015***</b>	<b>0.015**</b>	<b>0.002</b>	<b>0.009*</b>	<b>0.021***</b>	<b>-0.002</b>	<b>0.002</b>	<b>0.002</b>	<b>0.000</b>
	<i>0.006</i>	<i>0.006</i>	<i>0.001</i>	<i>0.005</i>	<i>0.007</i>	<i>0.003</i>	<i>0.002</i>	<i>0.002</i>	<i>0.001</i>
<b>Years of schooling squared</b>	<b>-0.001*</b>	<b>-0.001*</b>	<b>0.000</b>	<b>-0.001***</b>	<b>-0.001***</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>F statistic</b>	<b>7.02</b>	<b>3.94</b>	<b>1.42</b>	<b>10.06</b>	<b>7.72</b>	<b>1.47</b>	<b>0.80</b>	<b>1.86</b>	<b>0.02</b>
<b>p-value</b>	<b>0.001</b>	<b>0.020</b>	<b>0.244</b>	<b>0.000</b>	<b>0.001</b>	<b>0.231</b>	<b>0.449</b>	<b>0.156</b>	<b>0.983</b>
Nr of observations	4745	2267	5196	3588	5283	6333	4323	4630	2465

**Notes:** All specifications are weighted least squares regressions (using the weights provided by the DHS surveys) with clustering on the households. The dependent variable indicates whether or not the respondent is HIV-positive infected. All samples include women and men aged 15-49 tested for HIV. The F-statistics tests the joint significance of the parameters of the quadratic education specification (standard errors are in *Italic*): \*\*\* significant at 1 percent level; \*\* significant at 5 percent level; \* significant at 10 percent level. 5-years age groups variables are used as control.

I now turn to the parametric analysis of wealth based on the wealth index discussed above which represents my second proxy for the socioeconomic status. Looking at Table 2.4 (panels C and D) and at Table 2.6, the evidence on the existence of a wealth gradient is much weaker and mixed than that observed for the years of education. More specifically, for women (panel C, table 2.4), it seems that there exists a negative and significant relationship between wealth and HIV infection in Swaziland and Zimbabwe, while the only positive and significant relation is in Ethiopia. It should be however noted that Swaziland and Ethiopia represent the only cases where the quadratic impact continues to be consistently negative and positive respectively, even including controls for marital status or the full set of controls (see table 2.6). On the contrary, the joint effect of the coefficients of the quadratic specification for wealth is not stable across specifications for Zimbabwe, due to the change of sign. Similarly for men, the evidence on the presence of a wealth gradient in HIV is mixed. Four countries out of nine present a significant relationship: Ethiopia and Malawi present a joint positive impact while Swaziland has a negative impact. In Liberia, although the significance of the F-test, it can be observed that the joint impact is null. Yet, Swaziland and Malawi are the only countries where the relations (negative and positive, respectively) are consistent across all the remaining different specifications and controls. Results at the aggregate level (not shown in the Tables) report a positive and significant relation for Ethiopia, Malawi and Liberia and a negative one for Swaziland and Zimbabwe. Therefore the empirical evidence seems to be ambiguous as in the first group of countries it seems that the rich are more likely to be infected, while the reverse is true for the second group. In addition, out of these 5 countries, only Ethiopia and Swaziland present a correspondent significant relation at gender level for both sexes. On the other hand Liberia and Malawi present a significant relation only for males while Zimbabwe presents a significant relation only at female level. This suggests that gender-based analysis seems to be less important when considering wealth as compared to its relevance in the analysis of education discussed above.

As a last step, I further test the robustness of the results on the education and wealth gradient, by performing econometric analysis using a set of alternative measures for education and wealth. In particular, in Table 2.7 I show the relationship between education and HIV infection using educational achievements as a proxy for education, as in JF. The omitted category is individuals that did not complete primary education, while the remaining three categories are respectively: completed primary, completed secondary and higher education. The specifications for both education and wealth include complete set of controls already employed before.

Table 2.6 – Wealth Gradient in HIV with controls

A. Quadratic with Marital Status Controls (WOMEN)									
	Zambia	Malawi	Liberia	Swaziland	Zimbabwe	Tanzania	Rwanda	Ethiopia	Guinea
Wealth index	<b>0.250***</b>	<b>0.266**</b>	<b>0.049</b>	<b>-0.038</b>	<b>0.225***</b>	<b>0.124**</b>	<b>0.061</b>	<b>0.307***</b>	<b>0.051</b>
	<i>0.081</i>	<i>0.115</i>	<i>0.033</i>	<i>0.131</i>	<i>0.080</i>	<i>0.061</i>	<i>0.059</i>	<i>0.064</i>	<i>0.033</i>
Wealth squared	<b>-0.192</b>	<b>-0.253</b>	<b>-0.047</b>	<b>-0.084</b>	<b>-0.324***</b>	<b>-0.152*</b>	<b>-0.015</b>	<b>-0.333***</b>	<b>-0.050</b>
	<i>0.121</i>	<i>0.160</i>	<i>0.057</i>	<i>0.148</i>	<i>0.099</i>	<i>0.090</i>	<i>0.079</i>	<i>0.090</i>	<i>0.040</i>
F statistic	<b>9.79</b>	<b>3.35</b>	<b>2.20</b>	<b>4.77</b>	<b>5.96</b>	<b>2.21</b>	<b>2.94</b>	<b>18.50</b>	<b>1.30</b>
p-value	<b>0.000</b>	<b>0.036</b>	<b>0.113</b>	<b>0.009</b>	<b>0.003</b>	<b>0.111</b>	<b>0.054</b>	<b>0.000</b>	<b>0.274</b>
B. Quadratic with Marital Status, Age Group Controls, Rural Indicator, Region Fixed Effect (WOMEN)									
Wealth index	<b>0.023</b>	<b>0.240**</b>	<b>0.003</b>	<b>-0.112</b>	<b>0.122</b>	<b>0.076</b>	<b>0.044</b>	<b>0.123**</b>	<b>0.014</b>
	<i>0.073</i>	<i>0.111</i>	<i>0.033</i>	<i>0.121</i>	<i>0.075</i>	<i>0.057</i>	<i>0.058</i>	<i>0.051</i>	<i>0.033</i>
Wealth squared	<b>-0.173</b>	<b>-0.298*</b>	<b>-0.012</b>	<b>-0.061</b>	<b>-0.304***</b>	<b>-0.187**</b>	<b>-0.114</b>	<b>-0.225***</b>	<b>-0.064</b>
	<i>0.105</i>	<i>0.154</i>	<i>0.057</i>	<i>0.137</i>	<i>0.090</i>	<i>0.087</i>	<i>0.076</i>	<i>0.067</i>	<i>0.042</i>
F statistic	<b>3.99</b>	<b>2.35</b>	<b>0.05</b>	<b>10.12</b>	<b>11.58</b>	<b>3.06</b>	<b>2.28</b>	<b>5.73</b>	<b>3.65</b>
p-value	<b>0.019</b>	<b>0.097</b>	<b>0.954</b>	<b>0.000</b>	<b>0.000</b>	<b>0.048</b>	<b>0.104</b>	<b>0.004</b>	<b>0.027</b>
Nr of observations	5712	2864	6481	4584	7469	8711	5663	5942	3842
C. Quadratic with Marital Status Controls (MEN)									
Wealth index	<b>0.190***</b>	<b>0.471***</b>	<b>0.081***</b>	<b>0.133</b>	<b>0.079</b>	<b>0.011</b>	<b>0.027</b>	<b>0.087**</b>	<b>0.011</b>
	<i>0.072</i>	<i>0.099</i>	<i>0.027</i>	<i>0.119</i>	<i>0.073</i>	<i>0.060</i>	<i>0.055</i>	<i>0.035</i>	<i>0.032</i>
Wealth squared	<b>-0.114</b>	<b>-0.424***</b>	<b>-0.123***</b>	<b>-0.264**</b>	<b>-0.091</b>	<b>0.023</b>	<b>0.025</b>	<b>-0.079</b>	<b>-0.014</b>
	<i>0.100</i>	<i>0.113</i>	<i>0.045</i>	<i>0.133</i>	<i>0.091</i>	<i>0.101</i>	<i>0.088</i>	<i>0.055</i>	<i>0.035</i>
F statistic	<b>7.68</b>	<b>12.37</b>	<b>4.45</b>	<b>7.04</b>	<b>0.60</b>	<b>0.38</b>	<b>2.24</b>	<b>5.19</b>	<b>0.08</b>
p-value	<b>0.000</b>	<b>0.000</b>	<b>0.012</b>	<b>0.001</b>	<b>0.547</b>	<b>0.686</b>	<b>0.108</b>	<b>0.006</b>	<b>0.920</b>
D. Quadratic with Marital Status, Age Group Controls, Rural Indicator, Region Fixed Effect (MEN)									
Wealth index	<b>0.082</b>	<b>0.422***</b>	<b>0.037</b>	<b>0.071</b>	<b>0.020</b>	<b>-0.012</b>	<b>-0.006</b>	<b>0.063**</b>	<b>0.023</b>
	<i>0.074</i>	<i>0.100</i>	<i>0.027</i>	<i>0.113</i>	<i>0.077</i>	<i>0.061</i>	<i>0.058</i>	<i>0.031</i>	<i>0.034</i>
Wealth squared	<b>-0.144</b>	<b>-0.491***</b>	<b>-0.092**</b>	<b>-0.241*</b>	<b>-0.097</b>	<b>0.004</b>	<b>-0.013</b>	<b>-0.084</b>	<b>-0.018</b>
	<i>0.100</i>	<i>0.125</i>	<i>0.043</i>	<i>0.125</i>	<i>0.089</i>	<i>0.107</i>	<i>0.100</i>	<i>0.052</i>	<i>0.036</i>
F statistic	<b>1.13</b>	<b>8.92</b>	<b>2.61</b>	<b>12.96</b>	<b>2.32</b>	<b>0.06</b>	<b>0.21</b>	<b>2.05</b>	<b>0.33</b>
p-value	<b>0.325</b>	<b>0.000</b>	<b>0.075</b>	<b>0.000</b>	<b>0.099</b>	<b>0.943</b>	<b>0.813</b>	<b>0.130</b>	<b>0.718</b>
Nr of observations	4755	2272	5205	3602	5283	6333	4326	4630	2467

**Notes:** All specifications are weighted least squares regressions (using the weights provided by the DHS surveys) with clustering on the households. The dependent variable indicates whether or not the respondent is HIV-positive infected. All samples include women and men aged 15-49 tested for HIV. The wealth index was not included for individuals with at least 5 missing values of the nine goods considered. The F-statistics tests the joint significance of the parameters of the quadratic wealth specification (standard errors are in *Italic*): \*\*\* significant at 1 percent level; \*\* significant at 5 percent level; \* significant at 10 percent level. 5-years age groups variables are used as control.

*Table 2.7 – Education Gradient in HIV with alternate measure*

Controlling for Marital Status, Age Group Controls, Rural Indicator and Region Fixed Effect									
WOMEN	Zambia	Malawi	Liberia	Swaziland	Zimbabwe	Tanzania	Rwanda	Ethiopia	Guinea
Primary	<b>0.027**</b> <i>0.013</i>	<b>0.050***</b> <i>0.019</i>	<b>0.009</b> <i>0.006</i>	<b>-0.042***</b> <i>0.015</i>	<b>0.015</b> <i>0.012</i>	<b>-0.000</b> <i>0.008</i>	<b>0.003</b> <i>0.007</i>	<b>0.015</b> <i>0.014</i>	<b>0.034***</b> <i>0.013</i>
Secondary	<b>-0.013</b> <i>0.023</i>	<b>-0.001</b> <i>0.044</i>	<b>0.001</b> <i>0.015</i>	<b>-0.117***</b> <i>0.021</i>	<b>-0.091***</b> <i>0.031</i>	<b>-0.060***</b> <i>0.015</i>	<b>0.040</b> <i>0.028</i>	<b>-0.015</b> <i>0.035</i>	<b>-0.055***</b> <i>0.018</i>
Higher	<b>-0.031</b> <i>0.039</i>	<b>-0.204***</b> <i>0.041</i>	<b>-0.021</b> <i>0.020</i>	<b>-0.051*</b> <i>0.031</i>	<b>-0.019</b> <i>0.043</i>	<b>0.076**</b> <i>0.032</i>	<b>-0.060</b> <i>0.050</i>	<b>-0.044</b> <i>0.036</i>	<b>0.121</b> <i>0.090</i>
Currently	<b>0.012</b> <i>0.020</i>	<b>0.012</b> <i>0.024</i>	<b>0.006</b> <i>0.006</i>	<b>-0.040*</b> <i>0.024</i>	<b>0.023*</b> <i>0.014</i>	<b>0.017*</b> <i>0.001</i>	<b>0.003</b> <i>0.008</i>	<b>0.021***</b> <i>0.008</i>	<b>0.012</b> <i>0.009</i>
Formerly	<b>0.140***</b> <i>0.030</i>	<b>0.132***</b> <i>0.033</i>	<b>0.021*</b> <i>0.012</i>	<b>0.161***</b> <i>0.044</i>	<b>0.182***</b> <i>0.026</i>	<b>0.097***</b> <i>0.018</i>	<b>0.083***</b> <i>0.0151</i>	<b>0.048***</b> <i>0.013</i>	<b>0.028</b> <i>0.022</i>
Widow	<b>0.232***</b> <i>0.037</i>	<b>0.106*</b> <i>0.058</i>	<b>-0.019</b> <i>0.013</i>	<b>0.079</b> <i>0.049</i>	<b>0.212***</b> <i>0.029</i>	<b>0.104***</b> <i>0.040</i>	<b>0.050*</b> <i>0.029</i>	<b>0.028</b> <i>0.027</i>	<b>0.110</b> <i>0.083</i>
Rural	<b>-0.106***</b> <i>0.015</i>	<b>-0.048**</b> <i>0.022</i>	<b>-0.009</b> <i>0.006</i>	<b>-0.066</b> <i>0.02</i>	<b>-0.019</b> <i>0.017</i>	<b>-0.059***</b> <i>0.001</i>	<b>-0.049***</b> <i>0.010</i>	<b>-0.075***</b> <i>0.014</i>	<b>-0.030***</b> <i>0.001</i>
F statistic	<b>2.08</b>	<b>22.61</b>	<b>1.07</b>	<b>22.88</b>	<b>7.41</b>	<b>5.16</b>	<b>0.94</b>	<b>4.28</b>	<b>3.98</b>
p-value	<b>0.09</b>	<b>0.00</b>	<b>0.36</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.42</b>	<b>0.00</b>	<b>0.00</b>
Nr of observations	5713	2864	6482	4584	7469	8711	5663	5942	3842
MEN	Zambia	Malawi	Liberia	Swaziland	Zimbabwe	Tanzania	Rwanda	Ethiopia	Guinea
Primary	<b>0.038</b> <i>0.011</i>	<b>0.028</b> <i>0.017</i>	<b>0.001</b> <i>0.003</i>	<b>-0.027*</b> <i>0.014</i>	<b>0.012</b> <i>0.011</i>	<b>-0.001</b> <i>0.008</i>	<b>0.007</b> <i>0.006</i>	<b>0.013***</b> <i>0.005</i>	<b>-0.001</b> <i>0.004</i>
Secondary	<b>0.004</b> <i>0.017</i>	<b>-0.059</b> <i>0.044</i>	<b>0.012</b> <i>0.008</i>	<b>-0.109***</b> <i>0.029</i>	<b>-0.050**</b> <i>0.022</i>	<b>-0.017</b> <i>0.045</i>	<b>-0.018</b> <i>0.015</i>	<b>0.014</b> <i>0.024</i>	<b>0.030</b> <i>0.026</i>
Higher	<b>-0.017</b> <i>0.033</i>	- <i>-</i>	<b>-0.012</b> <i>0.013</i>	- <i>-</i>	<b>-0.030</b> <i>0.029</i>	<b>-0.007</b> <i>0.048</i>	<b>-0.036*</b> <i>0.020</i>	<b>-0.025</b> <i>0.023</i>	<b>-0.039</b> <i>0.026</i>
Currently	<b>0.070***</b> <i>0.021</i>	<b>0.056***</b> <i>0.017</i>	<b>-0.018**</b> <i>0.008</i>	<b>0.093***</b> <i>0.030</i>	<b>0.056**</b> <i>0.026</i>	<b>-0.011</b> <i>0.017</i>	<b>-0.006</b> <i>0.008</i>	<b>0.005</b> <i>0.004</i>	<b>0.006</b> <i>0.006</i>
Formerly	<b>0.231***</b> <i>0.045</i>	<b>0.092*</b> <i>0.053</i>	<b>-0.008</b> <i>0.014</i>	<b>0.274***</b> <i>0.052</i>	<b>0.195***</b> <i>0.044</i>	<b>0.029</b> <i>0.022</i>	<b>0.009</b> <i>0.025</i>	<b>0.007</b> <i>0.014</i>	<b>-0.007*</b> <i>0.004</i>
Widow	<b>0.292***</b> <i>0.093</i>	<b>0.011</b> <i>0.155</i>	<b>0.001</b> <i>0.020</i>	<b>0.107</b> <i>0.099</i>	<b>0.258***</b> <i>0.074</i>	<b>0.350***</b> <i>0.114</i>	<b>0.082</b> <i>0.082</i>	<b>0.125</b> <i>0.113</i>	<b>-0.001</b> <i>0.001</i>
Rural	<b>-0.063***</b> <i>0.011</i>	<b>-0.074***</b> <i>0.029</i>	<b>-0.005</b> <i>0.005</i>	<b>-0.023</b> <i>0.017</i>	<b>-0.019</b> <i>0.019</i>	<b>-0.022*</b> <i>0.012</i>	<b>-0.045***</b> <i>0.012</i>	<b>-0.008</b> <i>0.009</i>	<b>0.003</b> <i>0.004</i>
F statistic	<b>4.06</b>	<b>1.80</b>	<b>0.86</b>	<b>9.39</b>	<b>5.15</b>	<b>0.99</b>	<b>4.10</b>	<b>2.39</b>	<b>2.49</b>
p-value	<b>0.00</b>	<b>0.16</b>	<b>0.46</b>	<b>0.00</b>	<b>0.00</b>	<b>0.39</b>	<b>0.00</b>	<b>0.07</b>	<b>0.06</b>
Nr of observations	4755	2272	5206	3602	5283	6333	4326	4630	2467

**Notes:** All specifications are weighted least squares regressions (using weights provided by the DHS surveys) with clustering on the households. The dependent variable indicates whether or not the respondent is HIV-positive infected. All samples include women and men aged 15-49 tested for HIV. “Primary” indicates whether an individual completed at least primary education. The same holds for “Secondary”. The F-statistics tests the joint significance of the three parameters of the educational level (standard errors are in *Italic*): \*\*\* significant at 1 percent level; \*\* significant at 5 percent level; \* significant at 10 percent level. Rural indicate whether or not the individual lives in rural area. Currently and formerly refer to marriage. Note also that “-” stands for dropped.

The results for education are in line with the results obtained using years of education as a proxy. In fact, the joint significance on the education terms holds in 7 countries out of 9. In addition, also the coefficients of completed primary education seem to be in line with the previous results. I consider the coefficient of completed primary important as it includes all individuals with at least six years of education and therefore it represents a counterpart for all those individuals with zero or less than six years of education. According to the results shown in Table 2.7 for women, 7 countries out of 9 report positive coefficients of primary education, while Swaziland reports a negative coefficient. As for men, only 4 countries out of 9 report the joint significance of the education coefficients. Also in this case, Zambia, Zimbabwe and Rwanda report a positive coefficient of the primary education variable. The reverse is true for Swaziland since, as for the years of education, there seems to be a negative relation between males with at least 6 years of education and HIV infection. On the basis of these results, I conclude that there is a positive and concave gradient in education for women regardless the measure of education employed. On the other hand, the same conclusion cannot be reached for men.

In table 2.8 I estimate the relationship between wealth and HIV infection by gender, using indicators for quintiles of the DHS-provided wealth index as a proxy for wealth. The results show that for women the quintiles are jointly significant in 5 countries: in Zambia, Malawi, Zimbabwe and Ethiopia people belonging to higher wealth quintiles seem to be more likely to be HIV-positive. The reverse is true for Swaziland where the coefficients become more strong and negative moving from poorer to richer women. These results are also in line with those observed before using the constructed wealth index based on household's assets and amenities.

The results for men seem to hold with a positive sign only in Zambia and Malawi while Swaziland presents a significant and increasingly negative relationship between wealth quintiles and HIV (this is especially true for the richest). Overall, the impression is that using the DHS-provided wealth index, does not contradict the previous results and therefore the evidence of the existence of a positive wealth gradient in HIV remains mixed.

*Table 2.8 – Wealth Gradient in HIV with alternate measure<sup>1</sup>*

<b>WOMEN</b>	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<b>Wealth Quintile = 2</b>	<b>0.006</b> <i>0.014</i>	<b>0.018</b> <i>0.023</i>	<b>0.001</b> <i>0.005</i>	<b>0.003</b> <i>0.023</i>	<b>0.042**</b> <i>0.018</i>	<b>0.016</b> <i>0.012</i>	<b>-0.002</b> <i>0.007</i>	<b>0.009</b> <i>0.005</i>	<b>-0.006</b> <i>0.007</i>
<b>Wealth Quintile = 3</b>	<b>0.035**</b> <i>0.015</i>	<b>0.049**</b> <i>0.021</i>	<b>0.003</b> <i>0.006</i>	<b>-0.015</b> <i>0.024</i>	<b>0.053**</b> <i>0.022</i>	<b>-0.001</b> <i>0.011</i>	<b>0.012</b> <i>0.008</i>	<b>0.005</b> <i>0.004</i>	<b>-0.009</b> <i>0.007</i>
<b>Wealth Quintile = 4</b>	<b>0.076***</b> <i>0.020</i>	<b>0.070***</b> <i>0.021</i>	<b>0.001</b> <i>0.007</i>	<b>-0.019</b> <i>0.023</i>	<b>0.059**</b> <i>0.023</i>	<b>0.006</b> <i>0.011</i>	<b>0.011</b> <i>0.008</i>	<b>-0.000</b> <i>0.004</i>	<b>0.003</b> <i>0.008</i>
<b>Wealth Quintile = 5</b>	<b>0.056**</b> <i>0.025</i>	<b>0.094***</b> <i>0.026</i>	<b>0.011</b> <i>0.008</i>	<b>-0.085***</b> <i>0.026</i>	<b>-0.037</b> <i>0.027</i>	<b>0.031***</b> <i>0.015</i>	<b>0.018**</b> <i>0.001</i>	<b>0.032***</b> <i>0.010</i>	<b>-0.006</b> <i>0.020</i>
<b>Currently</b>	<b>0.015</b> <i>0.019</i>	<b>0.009</b> <i>0.023</i>	<b>0.005</b> <i>0.005</i>	<b>-0.026</b> <i>0.025</i>	<b>0.016</b> <i>0.014</i>	<b>0.018*</b> <i>0.001</i>	<b>0.001</b> <i>0.008</i>	<b>0.022***</b> <i>0.007</i>	<b>0.006</b> <i>0.001</i>
<b>Formerly</b>	<b>0.145***</b> <i>0.030</i>	<b>0.144***</b> <i>0.033</i>	<b>0.020*</b> <i>0.012</i>	<b>0.176***</b> <i>0.043</i>	<b>0.176***</b> <i>0.027</i>	<b>0.100***</b> <i>0.018</i>	<b>0.082***</b> <i>0.015</i>	<b>0.049***</b> <i>0.013</i>	<b>0.024</b> <i>0.022</i>
<b>Widow</b>	<b>0.230***</b> <i>0.037</i>	<b>0.104*</b> <i>0.058</i>	<b>-0.019</b> <i>0.013</i>	<b>0.082*</b> <i>0.049</i>	<b>0.212***</b> <i>0.027</i>	<b>0.104***</b> <i>0.039</i>	<b>0.051*</b> <i>0.029</i>	<b>0.029</b> <i>0.027</i>	<b>0.106</b> <i>0.083</i>
<b>Rural</b>	<b>-0.075***</b> <i>0.018</i>	<b>-0.024</b> <i>0.023</i>	<b>-0.008</b> <i>0.006</i>	<b>-0.074***</b> <i>0.023</i>	<b>-0.045*</b> <i>0.026</i>	<b>-0.047***</b> <i>0.011</i>	<b>-0.045***</b> <i>0.010</i>	<b>-0.055***</b> <i>0.015</i>	<b>-0.034***</b> <i>0.001</i>
<b>F statistic</b>	<b>5.15</b>	<b>5.38</b>	<b>0.68</b>	<b>3.81</b>	<b>11.86</b>	<b>1.90</b>	<b>1.89</b>	<b>3.57</b>	<b>1.36</b>
<b>p-value</b>	<b>0.00</b>	<b>0.00</b>	<b>0.60</b>	<b>0.00</b>	<b>0.00</b>	<b>0.10</b>	<b>0.11</b>	<b>0.00</b>	<b>0.24</b>
Nr of observations	5713	2864	6482	4584	7469	8711	5663	5942	3842
<b>MEN</b>									
<b>Wealth Quintile = 2</b>	<b>0.026*</b> <i>0.015</i>	<b>-0.002</b> <i>0.020</i>	<b>0.000</b> <i>0.004</i>	<b>0.023</b> <i>0.023</i>	<b>0.025</b> <i>0.022</i>	<b>-0.009</b> <i>0.009</i>	<b>0.005</b> <i>0.007</i>	<b>-0.005</b> <i>0.004</i>	<b>-0.015*</b> <i>0.009</i>
<b>Wealth Quintile = 3</b>	<b>0.041***</b> <i>0.014</i>	<b>0.067***</b> <i>0.023</i>	<b>0.000</b> <i>0.004</i>	<b>-0.013</b> <i>0.023</i>	<b>0.015</b> <i>0.017</i>	<b>0.002</b> <i>0.011</i>	<b>0.004</b> <i>0.006</i>	<b>0.001</b> <i>0.005</i>	<b>-0.017**</b> <i>0.008</i>
<b>Wealth Quintile = 4</b>	<b>0.078***</b> <i>0.019</i>	<b>0.065***</b> <i>0.023</i>	<b>0.003</b> <i>0.006</i>	<b>-0.009</b> <i>0.023</i>	<b>0.023</b> <i>0.022</i>	<b>0.004</b> <i>0.011</i>	<b>0.007</b> <i>0.006</i>	<b>-0.004</b> <i>0.005</i>	<b>-0.007</b> <i>0.008</i>
<b>Wealth Quintile = 5</b>	<b>0.046*</b> <i>0.025</i>	<b>0.094***</b> <i>0.029</i>	<b>0.008</b> <i>0.008</i>	<b>-0.070***</b> <i>0.026</i>	<b>-0.003</b> <i>0.026</i>	<b>0.016</b> <i>0.014</i>	<b>0.009</b> <i>0.007</i>	<b>0.011</b> <i>0.007</i>	<b>-0.006</b> <i>0.010</i>
<b>Currently</b>	<b>0.073***</b> <i>0.020</i>	<b>0.068***</b> <i>0.017</i>	<b>-0.018**</b> <i>0.008</i>	<b>0.094***</b> <i>0.030</i>	<b>0.059**</b> <i>0.026</i>	<b>-0.009</b> <i>0.013</i>	<b>-0.004</b> <i>0.008</i>	<b>0.004</b> <i>0.004</i>	<b>0.007</b> <i>0.006</i>
<b>Formerly</b>	<b>0.217***</b> <i>0.043</i>	<b>0.099*</b> <i>0.053</i>	<b>-0.008</b> <i>0.014</i>	<b>0.280***</b> <i>0.051</i>	<b>0.199***</b> <i>0.044</i>	<b>0.033</b> <i>0.022</i>	<b>0.010</b> <i>0.025</i>	<b>0.005</b> <i>0.014</i>	<b>-0.005</b> <i>0.004</i>
<b>Widow</b>	<b>0.301***</b> <i>0.092</i>	<b>0.043</b> <i>0.149</i>	<b>-0.001</b> <i>0.021</i>	<b>0.110</b> <i>0.097</i>	<b>0.260***</b> <i>0.074</i>	<b>0.347***</b> <i>0.113</i>	<b>0.085</b> <i>0.082</i>	<b>0.123</b> <i>0.111</i>	<b>-0.003</b> <i>0.007</i>
<b>Rural</b>	<b>-0.046***</b> <i>0.017</i>	<b>-0.050</b> <i>0.030</i>	<b>-0.004</b> <i>0.005</i>	<b>-0.042**</b> <i>0.020</i>	<b>-0.019</b> <i>0.025</i>	<b>-0.011</b> <i>0.012</i>	<b>-0.042***</b> <i>0.012</i>	<b>-0.006</b> <i>0.001</i>	<b>0.004</b> <i>0.007</i>
<b>F statistic</b>	<b>5.24</b>	<b>6.2</b>	<b>0.24</b>	<b>3.89</b>	<b>1.00</b>	<b>0.89</b>	<b>0.61</b>	<b>1.75</b>	<b>1.39</b>
<b>p-value</b>	<b>0.00</b>	<b>0.00</b>	<b>0.91</b>	<b>0.00</b>	<b>0.40</b>	<b>0.46</b>	<b>0.65</b>	<b>0.13</b>	<b>0.23</b>
Nr of observations	4755	2272	5206	3602	5283	6333	4326	4630	2467

<sup>1</sup> **Notes:** All specifications are weighted least squares regressions (using weights provided by the DHS surveys) with clustering on the households. The dependent variable indicates whether or not the respondent is HIV-positive infected. All samples include women and men aged 15-49 tested for HIV. The F-statistics tests the joint significance of the four parameters of the wealth index (standard errors are in *Italic*): \*\*\* significant at 1 percent level; \*\* significant at 5 percent level; \* significant at 10 percent level. The wealth index is provided by the DHS surveys. Rural indicates whether or not the individual lives in rural area. Currently and Formerly refer to marriage.

## 2.6 Risk Factors

In the previous section I showed the existence of a positive and concave gradient in education for women regardless of the measure of education employed, while the same conclusion could not be reached for men. I now want to find possible explanations to this somehow counterintuitive result. In particular, I intend to investigate what is the relationship between education and behaviors that increase the probability of HIV infection.

Following anecdotal evidence as well as findings from literature, we tend to exclude the intravenous drug use and blood transfusion as significant modalities of transmission with reference to Africa. Similarly, following Fortson (2008), I exclude the so-called vertical transmission (mother-to-child) as, also in my analysis as already in Fortson's, the education gradient proves to be robust to the exclusion of those younger than 20 years old and the vertical transmission is more likely to affect the youngest respondents. Clearly, caution is needed in performing a similar analysis as there are many risk factors for HIV which the data do not allow to analyze. My aim is simply to assess the existence of a link between education and some risky behavior which would allow us to conclude that differences in sexual behavior may represent one plausible explanation to the positive education gradient in HIV for women showed in the previous section. As demonstrated already by Glick and Sahn (2008) and confirmed by Fortson (2008), past estimates of the relationship between education and risk factors showed that it is important to separate men and women as these would significantly differ from each other.

In table 2.9 I look at the relationship between education and two specific risk factors, separately for women and for men. The analysis was carried out using only the HIV respondents as the aim was to give an explanation to the main findings of this chapter. In particular, panel A (for women) and panel B (for men) use as dependent variable an indicator for whether the respondent had premarital sex, while panels C and D use the number of lifetime partners as dependent variable. These two specific sexual behaviors represent reliable risky factors that can be associated with HIV infection. I estimate weighted least squares regressions on linear and quadratic terms for years of schooling. Moreover, in both specifications I control for five-year age groups, the area of residence, the marital status and the region of residence. Panel A of table 2.9 shows that in 6 out of 9 countries (Zambia, Liberia, Swaziland, Zimbabwe, Tanzania and Guinea) more educated women are more likely to have premarital sex. Also for male, 6 countries out of 9 report a positive and significant relation (Zambia, Malawi, Zimbabwe, Tanzania, Rwanda and Ethiopia). In other words, by looking at the whole panel of 9 countries, the empirical evidence indicates that premarital sex seems to be a



risky behavior associated to more educated individuals.

As far as concerns the second risk factor, it is worth noting that the relationship between number of lifetime partners and education is also positive in 5 out of 8 countries for females (DHS survey for Malawi does not report this risk factor). For male, the relation is positive and significant in all the countries except for Swaziland, even if in 3 countries the relation holds only at a 10% significance level. In conclusion, the analysis provided evidence on the links between education and certain risky behaviors which are conducive to HIV. In particular, considering the higher vulnerability of females to HIV, this analysis helps explaining the existence of gender disparities in HIV infection.

One major concern emerging from the analysis is whether the results are driven by non-response bias. Using the information provided by the DHS Final Reports<sup>8</sup>, I looked at the percentage of HIV test non-respondents with reference to each national sample, separately for women and men. Despite that the literature (Mishra et al., 2006) has showed that estimates of HIV prevalence based on national surveys like the DHS are not biased by non-response, I believe that non-response percentages by sex represent an important factor that needs to be taken into consideration when interpreting the findings. It is worth noting that non-response rates for women are in all cases lower than non-response rates for men. Focusing on male figures, only two countries show a percentage below 20% (i.e. 4% in Rwanda and 12% in Guinea) while all remaining countries have higher non-response rates (20% in Liberia and Tanzania, 22% in Swaziland, 25% in Ethiopia, 28% in Zambia and 37% in Malawi and Zimbabwe). On the contrary, the percentage of non-response for women is below 20% in 6 out of 9 countries (3% in Rwanda, 7% in Guinea, 10% in Tanzania, 13% in Liberia and Swaziland and 17% in Ethiopia) while only in Zambia, Zimbabwe and Malawi it reaches 23, 24 and 30% respectively. Accordingly, the non-response figures cast some doubts on the male empirical results while reinforcing the validity of women results achieved in the regression analysis.

---

<sup>8</sup> Available on the website: [www.dhsmeasure.com/publications](http://www.dhsmeasure.com/publications).

*Table 2.9 – Modelling risk factors with controls*

<b>RISK FACTOR: Had premarital sex</b>									
<b>A. WOMEN</b>	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<b>Years of schooling</b>	<b>0.018***</b>	<b>-0.010</b>	<b>0.008</b>	<b>0.019***</b>	<b>0.009***</b>	<b>0.012***</b>	<b>-0.005</b>	<b>-0.000</b>	<b>0.014**</b>
	<i>0.005</i>	<i>0.009</i>	<i>0.005</i>	<i>0.005</i>	<i>0.003</i>	<i>0.004</i>	<i>0.004</i>	<i>0.004</i>	<i>0.006</i>
<b>Years of schooling squared</b>	<b>-0.000</b>	<b>0.002***</b>	<b>-0.000</b>	<b>-0.001***</b>	<b>-0.000***</b>	<b>-0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>-0.000</b>
	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>F statistic</b>	<b>40.45</b>	<b>12.01</b>	<b>7.43</b>	<b>6.95</b>	<b>5.21</b>	<b>8.74</b>	<b>1.02</b>	<b>0.82</b>	<b>13.12</b>
<b>p-value</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.36</b>	<b>0.44</b>	<b>0.00</b>
Nr of observations	5708	2858	6438	4574	7486	8708	5657	5934	3831
<b>B. MEN</b>									
<b>Years of schooling</b>	<b>0.011**</b>	<b>0.016**</b>	<b>0.006</b>	<b>0.007*</b>	<b>0.007**</b>	<b>0.003</b>	<b>0.003</b>	<b>0.002</b>	<b>-0.005</b>
	<i>0.005</i>	<i>0.008</i>	<i>0.004</i>	<i>0.004</i>	<i>0.003</i>	<i>0.003</i>	<i>0.004</i>	<i>0.004</i>	<i>0.005</i>
<b>Years of schooling squared</b>	<b>-0.000</b>	<b>-0.001</b>	<b>-0.000</b>	<b>-0.000</b>	<b>-0.000**</b>	<b>0.000</b>	<b>0.000</b>	<b>0.001*</b>	<b>0.000</b>
	<i>.000</i>	<i>0.001</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<b>F statistic</b>	<b>12.42</b>	<b>3.46</b>	<b>1.63</b>	<b>2.28</b>	<b>3.21</b>	<b>3.80</b>	<b>14.02</b>	<b>13.41</b>	<b>0.93</b>
<b>p-value</b>	<b>0.00</b>	<b>0.03</b>	<b>0.19</b>	<b>0.10</b>	<b>0.04</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.39</b>
Nr of observations	5146	2396	5186	3587	5542	6332	4715	5046	2914
<b>RISK FACTOR: No. of lifetime partners</b>									
<b>C. WOMEN</b>	<b>Zambia</b>	<b>Malawi</b>	<b>Liberia</b>	<b>Swaziland</b>	<b>Zimbabwe</b>	<b>Tanzania</b>	<b>Rwanda</b>	<b>Ethiopia</b>	<b>Guinea</b>
<b>Years of schooling</b>	<b>0.048**</b>	--	<b>0.386***</b>	<b>-0.003</b>	<b>-0.031*</b>	<b>0.044**</b>	<b>-0.002</b>	<b>0.025</b>	<b>0.012</b>
	<i>0.019</i>		<i>0.117</i>	<i>0.042</i>	<i>0.017</i>	<i>0.022</i>	<i>0.025</i>	<i>0.029</i>	<i>0.025</i>
<b>Years of schooling squared</b>	<b>-0.002*</b>	--	<b>-0.023***</b>	<b>-0.002</b>	<b>0.001***</b>	<b>-0.005***</b>	<b>-0.000</b>	<b>-0.006*</b>	<b>0.002</b>
	<i>0.001</i>		<i>0.009</i>	<i>0.003</i>	<i>0.000</i>	<i>0.002</i>	<i>0.001</i>	<i>0.003</i>	<i>0.002</i>
<b>F statistic</b>	<b>4.48</b>	--	<b>6.59</b>	<b>3.04</b>	<b>6.96</b>	<b>5.38</b>	<b>0.43</b>	<b>3.42</b>	<b>6.51</b>
<b>p-value</b>	<b>0.01</b>	--	<b>0.00</b>	<b>0.05</b>	<b>0.00</b>	<b>0.00</b>	<b>0.65</b>	<b>0.03</b>	<b>0.00</b>
Nr of observations	4969	--	5738	3661	5929	7017	3881	4507	3423
<b>D. MEN</b>									
<b>Years of schooling</b>	<b>0.512***</b>	--	<b>0.456**</b>	<b>-0.062</b>	<b>0.167**</b>	<b>0.236**</b>	<b>-0.002</b>	<b>0.094</b>	<b>0.247***</b>
	<i>0.126</i>		<i>0.194</i>	<i>0.139</i>	<i>0.079</i>	<i>0.100</i>	<i>0.002</i>	<i>0.073</i>	<i>0.089</i>
<b>Years of schooling squared</b>	<b>-0.030***</b>	--	<b>-0.007</b>	<b>0.001</b>	<b>-0.002**</b>	<b>-0.0149**</b>	<b>0.000</b>	<b>0.001</b>	<b>-0.007</b>
	<i>0.008</i>		<i>0.015</i>	<i>0.009</i>	<i>0.001</i>	<i>0.007</i>	<i>0.000</i>	<i>0.008</i>	<i>0.006</i>
<b>F statistic</b>	<b>8.41</b>	--	<b>15.98</b>	<b>0.63</b>	<b>2.80</b>	<b>2.83</b>	<b>2.72</b>	<b>6.77</b>	<b>12.78</b>
<b>p-value</b>	<b>0.00</b>	--	<b>0.00</b>	<b>0.53</b>	<b>0.06</b>	<b>0.06</b>	<b>0.07</b>	<b>0.00</b>	<b>0.00</b>
Nr of observations	4372	--	3729	2318	4005	4534	4724	5060	2407

**Notes:** All specifications are weighted least squares regressions (using the weights provided by the DHS surveys) with clustering on the households. Both specifications use age group, rural indicator, marital status and region fixed effect controls (coefficients of those controls are not reported). All samples include women and men aged 15-49. The F-statistics tests the joint significance of the parameters of the quadratic education specification (standard errors are in *Italic*): \*\*\* significant at 1 percent level; \*\* significant at 5 percent level; \* significant at 10 percent level.

## 2.7 Conclusions

The gender-based analysis carried out in this chapter, using recent DHS for 9 Sub-Saharan African countries, provides evidence of the existence of gender disparities in the relationship between years of education and HIV. In fact, I show that in the majority of countries in the sample, better-educated women are more likely to be HIV-positive: in particular women with at least 6 years of schooling are as much as 7 percentage points more likely to be infected with HIV than women with no schooling. Therefore I conclude that in these countries there exists a positive education gradient in HIV for women, which is also robust to a full set of controls including marital status, age groups, area and region of residence.

Moreover, even using an alternate measure of education based on completed educational levels, the positive relation for women holds leading us to the conclusion that a positive and concave gradient in education for women exists regardless of the measure of education employed. The same result does not apply for men in most of the countries, both in terms of number of countries where the relationship holds and in terms of magnitude of the quadratic impact.

Conducting this analysis at aggregate national level with the two sexes combined shows how the aggregate level result is basically driven by the female component of the population, thus confirming that a gender-based analysis of the relationship between education and HIV infection is able to provide more meaningful insights than an aggregate level analysis.

Further empirical analysis on the relation between sexual behaviours and education shows that more educated individuals tend to have more lifetime sexual partners and premarital sex. This seems to be a plausible explanation for the presence of a positive education gradient in HIV for females, considering their higher exposure and vulnerability to HIV infection compared to men. However, the results provided in this chapter need to be interpreted with caution in terms of policy implications.

On the other hand, the evidence of the existence of a wealth gradient in HIV is much weaker and mixed than that observed for education, with some countries showing that the rich are more likely to be infected while others showing the opposite. Moreover these results are unstable across genders and are highly sensitive to the measure of wealth considered. I therefore confirm the findings of JF concerning the relationship between wealth and HIV. A notable exception in the dataset is represented by Swaziland that consistently shows the presence of a negative and significant link between wealth and HIV. This exception is important given that Swaziland has been recently flagged as the country having the highest HIV prevalence ever found in a national-based

population survey anywhere (UNAIDS, 2008).

Overall the results presented in this chapter should help in fostering a debate at academic and institutional level on the presence of gender disparities in the relationship between HIV/AIDS and socioeconomic status by highlighting the role of women and indicating the direction for future research.

## **Bibliography**

[1] Baker D., Collins J. and Leon J. (2009) "Risk factor or social vaccine? The historical progression of the role of education in HIV and AIDS infection in Sub-Saharan Africa", *Prospects: Quarterly Review of Comparative Education*, Springer.

[2] Beegle C. and De Walque D. (2009), "Demographic and Socioeconomic Patterns of HIV/AIDS Prevalence in Africa", *Policy Research Working Paper 5076*, World Bank, Washington, DC.

[3] Blanc, A. K. (2000) "The Relationship between Sexual Behavior and Level of Education in Developing Countries." UNAIDS, Geneva, Switzerland.

[4] Case A., Lubotsky D. and Paxson C. (2002). "Economic Status and Health in Childhood: The Origins of the Gradient". *American Economic Review* 92:1308–34.

[5] Chapoto A. and Jayne (2006), "Socioeconomic characteristics of individuals afflicted by AIDS-related prime-age mortality in Zambia", in *AIDS, poverty and hunger* by Gillespie S. R.

[6] Corno L. and De Walque D. (2007). The determinants of HIV infection and related sexual behaviors: evidence from Lesotho, Policy research working paper, vol. 4421, World Bank, Washington D.C.

[7] De Walque, D. 2003. "How Do Information and Education Affect Health Decisions? The Cases of HIV/AIDS and Smoking." Ph.D. Dissertation, University of Chicago, Chicago, Illinois.

[8] De Walque, D. 2004. "How Do Education and Information Affect Smoking Decisions: Evidence from Smoking Histories (1940-2000) in the United States." *Policy Research Working Paper 3362*, World Bank, Washington, DC.

- [9] De Walque D. (2006). "Who gets AIDS and how? The determinants of HIV infection and sexual behavior in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania". *Policy Research Working Paper, 3844*, World Bank, Washington D.C.
- [10] De Walque D. (2007). "How does the impact of an HIV/AIDS information campaign vary with the educational attainment? Evidence from Uganda", *Journal of Development Economics*, 84, 686-714.
- [11] Dupas P. (2006). "Relative risks and the market for sex: teenagers, sugar daddies and HIV in Kenya", *mimeo*.
- [12] Fylkesnes, K., Mubanga Musonda R., Kasumba K., Ndhlovu Z., Mluanda F., Kaetano L., and Chipaila C.. 1997. "The HIV epidemic in Zambia: socio-demographic prevalence patterns and indications of trends among childbearing women." *AIDS*, 11, 339-45.
- [13] Fortson J. G. (2008). "The gradient in Sub-Saharan Africa: socioeconomic status and HIV/AIDS", *Demography*, 45, 2, 303-322.
- [14] Frolich and Vasquez-Alvarez (2008). "HIV/AIDS Knowledge and behaviour: Have information campaigns reduced HIV infection? The case of Kenya", *working paper, University of St.Gallen*, Swiss Institute for Empirical Economic Research (SEW).
- [15] Fylkesnes K., Musonda R. M., Sichone M., Ndhlovu Z., Tembo F. and Nonze M. (2001). "Declining HIV prevalence and risk behavior in Zambia: evidence from surveillance and population-based surveys", *AIDS*, 15, 907-916.
- [16] Gallant M. and Maticka-Tyndale E. (2004). "School-based HIV prevention programmes for African youth", *Social Science and Medicine*, 58, 7, 1337-1351.
- [17] Gregson S., Waddell H. and Chandiwana S. (2001), "School education and HIV control in Sub-Saharan Africa: from discord to harmony?", *Journal of International Development*, 13, 4, 467-485.
- [18] Hargreaves J. R. and Glynn J. R. (2002). "Educational attainment and HIV-1 infection in developing countries: a systemic review". *Tropical Medicine & International Health*, 7, 489-498.

- [19] Kilian, A. H. D., Gregson S., Ndyabangi B., Walusaga K., Kipp W., Sahlmuller G., Garnett G.P., Asiime-Okiror G., Kabagambe G., Weis P., and von Sonnenburg F.. (1999). "Reductions in risk behaviour provide the most consistent explanation for declining HIV-1 prevalence in Uganda." *AIDS*, 13, 391-98.
- [20] Lachaud J.P. (2007). "HIV prevalence and poverty in Africa: micro and macro econometric evidence applied to Burkina-Faso", *Journal of Health Economics*, 26, 483-504.
- [21] Mann J.M. and Tarantola D.J.M. (1996) *Aids in the World II*. Oxford University Press, New York.
- [22] Mishra, V. Vaessen M., Ties Boerma J., Arnold F., Way A., Barrere B., Cross A., Hong R., and Sangha J. (2006), "HIV Testing in National Population-Based Surveys: Experiences from the Demographic and Health Surveys," *Bulletin of the World Health Organization*, 84(7), pp. 537-545.
- [23] Nagot N., Ouangré A., Ouedraogo A., Cartoux M., Huygens P., Defer M.C., Zékiba T., Meda N., and an de Perre P.. (2002). "Spectrum of Commercial Sex Activity in Burkina Faso: Classification Model and Risk of Exposure to HIV", *Journal of Acquired Immune Deficiency Syndromes*. 29: 517-521.
- [24] Nunn, A. J., Jane F. Kengeya-Kayondo, Sam S. Malabar, Janet A. Seeley, and Daan W. Mulder. (1994). "Risk factors for HIV-1 infection in adults in a rural Ugandan community: a population study." *AIDS*, 8: 81-86.
- [25] Pritchett L. and Summers L. H. (1993). "Wealthier is healthier". *Policy Research working paper series, 1150*, World Bank, Washington D.C.
- [26] Shelton J. D., Cassel M. M. and Adetunji J. (2005). "Is poverty or wealth at the root of HIV?" *Lancet*, 366, 1057-1058.
- [27] UNAIDS (2004). Aids epidemic update: December 2004, Geneva, Switzerland.
- [28] UNAIDS, UNICEF, and USAID (2006). Africa's Orphaned and Vulnerable Generations. Children Affected by AIDS. UNICEF, New York.
- [29] UNAIDS (2008). Sub-Saharan Africa. AIDS epidemic update: March 2008, Geneva, Switzerland.

[30] Wagstaff, A. (2000), "Socioeconomic Inequalities in Child Mortality: Comparisons Across Nine Developing Countries," *Bulletin of the World Health Organization*, 78(1), pp. 19-29.





## **Chapter 3**

# **Social Protection in an Epidemic Context: the Interaction of Formal and Informal Support in Rural Malawi**

### **3.1 Introduction**

The traditional informal system of social protection based on family aid and communal living is being eroded in many sub-Saharan African countries where poverty and AIDS have further destabilized households, orphaning an increasing number of children and changing demographic patterns (UNICEF, 2006). As a consequence, families living amidst widespread poverty in AIDS-affected communities, face a social protection vacuum when both formal interventions and informal arrangements fail to provide the safety net that families need to survive (Miller, 2007).

Over the last decade, social protection policy frameworks have gained increasing interest and support among governments and donors in Sub-Saharan Africa and the development community is now attributing growing emphasis to the use of market-oriented demand-side interventions aiming at directly supporting the poor and acting as a complement to usual supply-side interventions, such as investments in schools and health centers.

In particular, social protection in the form of cash transfers is considered to be a critical component in fighting poverty and responding to families that have been overwhelmed by disease, illnesses, and other shocks (Barrientos and DeJong, 2004).

Moreover, the growing momentum of social protection policies is confirmed by the “Livingstone Call for Action” (2006) where 13 Eastern and Southern African governments pledged

to establish national social transfer plans within three years: as a consequence, the government of Malawi is now in the process of moving away from safety net programming towards more long-term predictable social protection programming in order to help poor households to deal with risks and shocks through a more institutionalized and coordinated approach (World Bank, 2007).

Therefore the impact evaluation of social protection programs becomes a fundamental tool for policy formulation at the national level as well as for funding decisions from bilateral and multilateral donors. However, a proper evaluation of the impact of such interventions cannot be done independently from assessing the presence of informal mechanisms and requires a careful analysis of the interaction of a formal safety net with the pre-existing informal insurance arrangements in a particular context. In fact, when evaluating a public program, it is important to take into account that such programs, when put in place, interact with existing mechanisms within a society. This means that in addition to direct effects there are also indirect effects of government interventions which might change the incentives to participate into private arrangements. These indirect effects can be quite important, inducing crowding out of private insurance schemes, thus breaking down the fragile social fabric that maintains some form of social insurance among related individuals. However, the side effects of a public intervention program do not need to be negative: while it is possible that some activities are crowded out, others could grow as a consequence of it (Albarran and Attanasio, 2003).

The analysis carried out in this chapter is based on the Mchinji Social Cash Transfer Pilot Scheme<sup>1</sup>, one of the first social protection experiments in Sub-Saharan Africa and considered a major tool for poverty reduction in the Government of Malawi's National Social Protection Policy. The Scheme was designed to alleviate poverty, reduce malnutrition and improve school enrolment among the poorest 10% of households in Malawi, by delivering regular and reliable cash transfers to ultra poor households that are also labor constrained. The pilot project covers more than 800 households living in rural villages in the Mchinji area (central Malawi) and is based on a randomized design, distinguishing treatment and control villages according to a gradual phase-in approach.

From an econometric perspective, most of the studies of the crowding out effect suffer from important endogeneity problems due to the so-called "program placement effect" (Rosenzweig and Wolpin, 1994). Typically, public programmes are targeted towards households that are in particular need of transfers and this makes it difficult to identify the net effect of public transfer programmes

---

<sup>1</sup> For further details on the program see [www.childpolicyresearch.org](http://www.childpolicyresearch.org)

on private transfers and to assess what the level of private transfers would have been in the absence of a given programme comparing beneficiaries to non-beneficiaries.

In this chapter I avoid the program placement effect by exploiting the source of exogenous variation given by the randomized design of the dataset, that allows to properly isolate the effect of cash transfers on the recipients' welfare. More specifically, I first assess the type of risk sharing arrangements (i.e. perfect, partial or autarchy) existing at village level by measuring the impact of unconditional cash transfers on households' consumption expenditures, controlling for aggregate resources. Moreover, I am interested in understanding how previously existing arrangements based on private inter-household transfers are affected by the introduction of public transfers. To this aim, the dataset allows to distinguish between three different types of private transfers: gifts (i.e. monetary or in-kind transfers without any repayment expectations attached), loans (i.e. monetary transfers with mandatory repayment) and remittances (monetary transfers from household members living abroad). This distinction leads to a better understanding of how crowding out effects may differ on the basis of the specific type of private transfer taken into consideration.

Therefore the contribution of this chapter to the academic and institutional debate on social protection policies is twofold: on one side, it shows that, once again, the perfect risk sharing hypothesis does not represent a proper description of the reality, even with reference to small village economies deeply affected by the HIV/AIDS epidemic, thus suggesting that there might be a role for public interventions aiming at helping households to pool risk more effectively. On the other side, it provides empirical support to the analysis of the interaction of public programmes and private transfers, showing how certain types of transfers are more likely to be crowded out than others and therefore provides useful insights for the proper design and implementation of social protection policies based on unconditional cash transfers in a context characterized by imperfect enforceability of private insurance contracts and imperfect capital markets.

While there have been some studies of crowding out effects of social cash transfers programs in Latin America, very few studies have been done in sub-Saharan Africa and even fewer are based on a randomized experiment. Moreover, given the specific context of Malawi, where the structure of the household and consequently the informal relationships are deeply affected by the HIV/AIDS pandemic, evaluating whether a public transfers program actually weakens or reinforces an already fragile social fabric is particularly interesting. By doing so, this chapter fills a gap in the current economic literature concerning the effects of social protection programs based on cash transfers in Sub-Saharan Africa.

It is important to note that the proposed analysis should not be considered as an evaluation

of how successful was the social cash transfers program in achieving its stated goals, but only evaluate whether the program has affected other aspects of the life of the households living in villages.

The chapter is organized as follows: Section 3.2 further explores the literature and the theoretical framework; Section 3.3 presents the main features of the Mchinji cash transfer program; Section 3.4 describes the data; Section 3.5 shows the econometric analysis and the results; Section 3.6 concludes.

## **3.2 Theoretical Framework**

The Government of Malawi defines social protection as “*all public and private initiatives that provide income or consumption transfers to the poor, protect the vulnerable against livelihood risks and enhance the social status and rights of the marginalized, with the overall objective of reducing their economic and social vulnerability*” (Government of Malawi, 2007).

The International Labour Organization (ILO, 2001) distinguishes these initiatives into three main broad categories: social insurance (i.e. usually contributory and tax-funded schemes), labor market regulation (i.e. legal frameworks aimed at ensuring minimum standards of working conditions) and social assistance (i.e. usually publicly funded and non contributory schemes aimed at addressing poverty and vulnerability). Social cash transfers are included in the latter category and can be defined as the “provision of assistance in the form of cash to the poor or those who face a probable risk, in the absence of the transfer, of falling into poverty” (Tabor, 2002)<sup>2</sup>.

Therefore I distinguish two main streams of economic literature, an institutional and an academic one, dealing with public interventions aimed at reducing idiosyncratic risks for vulnerable groups. The institutional literature focuses mainly on technical aspects of practical implementation and project evaluation of social cash transfer schemes. It includes regular reports (e.g. the World Bank’s Social Protection Status Report) as well as *ad hoc* publications: for instance Tabor (2002) discusses the advantages of cash transfers and provides detailed examples on how to design cash transfer programs in a developing country context. Similarly, policy notes and papers prepared by

---

<sup>2</sup> As pointed out by Hulme (2009), in the case of sub-Saharan Africa social assistance programmes have taken the lead and dominated the most recent social protection policies, in contrast with North Africa where social insurance is the main approach.

DFID (2006) and by the ODI (2001) provide useful indications on the use of social transfers to improve human development and on the practical policy implications. An interesting overview of social assistance programs in the form of cash transfers throughout the world looking at the experiences of Mexico, Brazil, India and South Africa and how they improve the financial standing of vulnerable households is provided by the Chronic Poverty Research Center (2005).

The academic literature has dealt specifically with the smoothing of consumption in small agricultural societies (e.g. village economies) and the interaction of public (i.e. formal) and private (i.e. informal) insurance schemes.

The first line of research, started by the seminal work of Townsend (1994) on Indian villages, focused on testing the perfect risk sharing hypothesis. Townsend showed that perfect insurance markets (i.e. markets which allow individuals to smooth idiosyncratic income shocks) are not a good description of the reality. Since his work, several other empirical works aimed at testing the perfect risk sharing hypothesis by looking at whether idiosyncratic shocks have an impact on consumption growth. They all have found evidence of partial risk sharing practices in several different contexts such as households in North Nigeria (Udry, 2004) or extended families in the US (Hayashi et al., 1996). Dercon and Khrisnan (2000) has further developed this type of research by looking at intra-household risk sharing practices in rural Ethiopia and end up rejecting the collective model of household organization, while Grimard (1997) looked directly at community level mechanisms and investigates the hypothesis that households in Cote d'Ivoire take part in spatially diversified risk-sharing arrangements with members of their own ethnic group. Along these lines, Jayne et al. (2006) present a first attempt of quantitative research in this innovative area with a study on community-level impacts of AIDS related mortality in Zambia. By using a set of community level indicators (e.g. changes in area of cultivated land, crop output and per capita income), they examine rural community resilience, that is those factors explaining why some communities appear better than others to share the idiosyncratic shocks linked to AIDS related mortality despite similar adult mortality rates. Dercon and Krishnan (2003) use public transfers in the form of food aid to test for the presence of perfect risk sharing arrangements at the village level in rural Ethiopia. They end up rejecting the perfect risk sharing hypothesis in favor of partial risk sharing via transfers and they also address the issue of crowding out of informal insurance, thus bridging with the part of the academic literature that deals specifically with the investigation of the effects of public transfers on private arrangements. In fact, if, on one side, the rejection of the perfect risk sharing hypothesis suggests that there might be an important role for interventions aiming at helping households to pool risk more effectively (Morduch, 1999), on the other side, such

interventions do not occur in a vacuum but the direct and indirect effects of certain government interventions can change the incentives to participate into private arrangements (Attanasio and Rios-Rull, 2000).

Studies on how public insurance can substitute private arrangements have been done with reference to both developed and developing countries: Cutler and Gruber (1996) on the expansion of Medicaid coverage and the reduction of private coverage; Cox et al. (1998) on the crowding out effect of social security benefits on private transfers in Peru; Jensen (2003) focuses on a large increase in state old age pensions in South Africa and shows that for each rand of public pension income to the elderly, there is a .25-.30 rand reduction in private transfers from children living away from home. In order to fully understand how public transfers affect private transfers it is then important to analyse what are the underlying motives for private transfers. In fact, different motives can have different implications as well as different channels of interaction for private and public transfers. In addition to altruistic or exchange motives, private transfers can also be just part of an insurance scheme where households are linked in order to share idiosyncratic risk, through either perfect or imperfect risk sharing practices. The imperfections that prevent risk sharing can be due to asymmetric information or impossibility of enforcing contracts. In the latter case individuals facing idiosyncratic risk can partly reduce it by entering contracts that are self-enforceable and there is a stream of theoretical literature dealing precisely with the issue of contract enforcement and limited commitment in risk sharing (Kocherlakota, 1996, Thomas and Worrall 1988, Dubois et al. 2007). As stated by Albarran and Attanasio (2003), models with imperfect enforceability describe well small village economies, characterized by good information flows, repeated interactions and can replicate features of inter-households agreements. The main prediction of this type of models is that a welfare programme that involves public transfers to some or all partners of an insurance agreement with imperfect enforceability is likely to reduce private transfers but the amount by which private transfers are reduced is determined by features of the economy like the variance of income and its persistence. As contracts are self-enforcing, the amount of risk sharing depends on the value of autarky: whatever increases the value of autarky, decreases risk sharing (e.g. decreasing the variance of income process or increasing the persistence of idiosyncratic shocks).

Unconditional cash transfers, according to this class of models, induce an increase in the value of autarky which implies a reduction in risk sharing reflected by reduced private transfers. However, empirical evidence on models with imperfect enforceability is still limited: Foster and Rosenzweig (2001), Ligon et al. (2002) and Krueger and Perri (2001) consider different implications of imperfect enforceability and test them on data from Bangladesh, India and the US

respectively.

The closest work to the type of analysis carried out in the second part of the chapter, is the one of Albarran and Attanasio (2001) where the two authors exploit the randomized design of the PROGRESA dataset in Mexico and show the crowding out effect of the programme on pre-existing private transfers that leads to an overall welfare decrease in the beneficiaries. In a subsequent work (Albarran and Attanasio, 2003), they focus on empirical implications of models with limited risk sharing due to imperfect enforceability of contracts and they show that the amount by which public transfers reduce private transfers is affected by features of the economy such as the variance of income at village level.

Therefore, in the present chapter I combine the stream of academic research on perfect risk sharing in village economies with the one on the interaction of public and private transfers. Moreover, I overcome the usual endogeneity problem due to placement effect that characterizes many studies on crowding out by exploiting the source of exogenous variation given by the randomized design of the dataset.

### **3.3 The Institutional Framework**

Barrientos et al. (2009) distinguish between two models of social protection emerged in sub-Saharan Africa over the last two decades: a “Southern African model” emerged in the 1990s and a “Middle African model” emerged since 2000. The former is largely financed from domestic revenues, supported by domestic political constituencies and is centered on non-contributory pensions for poor elderly people. The latter is much more centered on the provision of cash transfers to vulnerable groups (e.g. ultra poor and destitute households, orphan and vulnerable children), and is currently mainly based on pilot and experimental projects initiated by donors and financed through foreign aid.

Malawi falls into the second category and the Social Cash Transfer Programme at the centre of this analysis is currently a pilot project: hence the relevance of evaluating its impact on the welfare of the poor.

### **3.3.1 The Context of Malawi**

Based on the CIA World Fact Book (2009), Malawi is one of the poorest countries in the world where 85% of the population live in rural areas (entire population =14.2 million). Malawi ranks 160 out of 188 countries in the 2007 Human Development Index and is an agricultural society (UNDP 2007), dependent on smallholder farming and fishing. Malawi has high infant mortality (91 per 1000 births), high fertility (5.7 births per woman) and low life expectancy (43 years).

In 2008, gross domestic product (GDP) was USD 800 per capita, with the percentage share of household income in the poorest 10% of households at 2.9% compared to 32% in the wealthiest 10%. The HIV prevalence rate in 2006 was estimated at 14% so that 940,000 people are living with HIV, while 550,000 children have been orphaned (UNAIDS, 2006). According to the World Bank's Malawi Social Protection Status Report (2007) the national poverty line of Malawi is set at MK16,165/year corresponding to MK44.3 or USD 0.50 per person per day, significantly below the standard USD 1 per day per person. Poverty in Malawi is also deep. The average poor household subsists on an income of around MK36.4 - 17.8 percent below the MK44.3 daily poverty line while the ultra poor subsist on MK26.40, on average.

The Malawian Integrated Household Survey (IHS) indicates that 52% of households in Malawi fall below the poverty line, and of these, 22% fall below the ultra poverty line, so that approximately 7 million people living in an estimated 1.3 million households are absolutely poor and 3 million people living in 550,000 households are ultra poor (NSO2005).

Vulnerability is defined as inability of households to deal with shocks to their livelihoods. Rising vulnerability implies both an increasing likelihood of shocks taking place and a declining ability to overcome shocks without experiencing livelihood collapse. Vulnerabilities affecting Malawi include:

- agricultural vulnerability (i.e. erratic rainfall, land constraints, lack of livestock and constrained access to fertilizers, inputs and credit);
- economic shocks and processes (undiversified livelihoods, weak markets, interactions between transitory shocks and chronic poverty);
- health and nutrition risks (high incidence of diarrhoea, acute respiratory infection, cholera and malaria) and HIV/AIDS;



- demographic vulnerability (high population growth, increasing numbers of households headed by women, children or the elderly).

### **3.3.2 The Mchinji Social Cash Transfer Program**

The Malawi Social Cash Transfer Scheme represents one of the key elements of the Malawi Growth and Development Strategy, a nationally owned strategy for investing in both economic growth and development. The overall goal of the Cash Transfer Scheme is to protect and promote the livelihoods and welfare of the poorest and most vulnerable people: in particular, it has been designed to reach all households that are ultra poor and labor constrained, an estimated 10% of all Malawian households (Miller, 2008 – Targeting report).

More specifically, ultra poor households are all those living below the ultra poverty line defined at national level. These households are generally in the lowest expenditure quantile, consume one meal per day and lack any valuable assets. Labor constrained households are those with no able bodied member between 19-64 who is fit for work (all are chronically sick or disabled or elderly or children) or when they have one member who is fit for work this has to care for more than 3 dependents.

The Social Cash Transfer Scheme was launched in 2007 and by February 2009 was operational in 7 out of the country's 28 districts, distributing monthly cash transfers to more than 23000 households. The plan is to scale the scheme throughout Malawi by 2012 (Miller, 2009).

The dataset used in this chapter is based on the Mchinji Social Cash Transfer Pilot. The Center for International Health and Development (CIHD) at Boston University in collaboration with the Centre for Social Research (CSR) from the University of Malawi have been appointed as external evaluators of the SCTS pilot in the Mchinji district and have undertaken an impact evaluation based on three rounds of data collection.

By March 2007, approximately 29 Village Development Groups (VDGs) within four out of nine Traditional Authorities (TAs) in the district were included in the SCTS. VDGs contain multiple villages so that the combined number of households per VDG is approximately 1000. Among these, the poorest 10% of households (approximately 100 households) per VDG are identified to receive the SCTS. However, not all VDGs within the four TAs had been reached by the SCTS in March 07, given that the scheme was scaling up through the district as time and human resources allowed. When in February 2007 the District Assembly identified the next 8 VDGs eligible for the SCT according to the scale-up plan, the impact evaluation team randomly assigned 4 village groups to an

“intervention” group and 4 to a “control” group. The team then followed both groups for one year until the comparison group of eligible households began to receive the transfer. While the choice of the VDGs to be assigned to treatment and control was random, the selection of beneficiaries within each VDG was based on a multi participatory community based targeting, which enables local community leaders to determine which households among them are the worst off and most vulnerable<sup>3</sup>. Data collection to examine the impact of the Mchinji Social Cash Transfer Pilot occurred between March 2007 and April 2008. The study included a longitudinal household survey, consisting of three rounds of collection with a panel of intervention and control households in cash transfer recipient and nonrecipient VDGs.

Baseline data were collected in March 2007, before households received the cash transfer according to the government's schedule for rolling out the scheme. The second follow-up was in August 2007 and the final round in March 2008.

The household survey, used in the three data collection rounds, was adapted from existing household surveys used with similar populations throughout Malawi, such as the Integrated Household Survey (IHS), Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS). The household questionnaire documents basic health, demographic and economic conditions, including anthropometric measurements; food security (including the quality and quantity of meals, food diversity, and satisfaction with meals based); educational data; health, hygiene and health seeking behaviors; economic data; time use and adult and child care patterns; emotional wellbeing; mobility and migration; coping behaviors; and characteristics of the house and inhabitants. The household questionnaire was administered to the person registered to receive the cash transfer (Miller, 2008).

---

<sup>3</sup> The District Secretariat trained a Community Social Protection Committee (CSPC) to help implement the scheme. The CSPC made a list of ultra poor labor constrained households based on community knowledge and the local Village Headman signs on this list. The CSPC then visited the households to fill out an application for each household. Next, the CSPC ranked households and chose the 10% poorest. A community meeting occurred where the ranking was discussed. Then Village, District, and National Committees approved the list of eligible households. Once fully approved, recipients started receiving transfers on a monthly basis.

### 3.4 The Data

In this chapter I use data from the baseline (March 2007) and final round (March 2008) of data collection. The latter, includes 767 households of which 374 had already started to receive the cash transfer at the time of the interview and 393 had not yet received it. I will then refer to the first as “treatment” group and the second as “control” group in the remainder of the chapter. Moreover, I decided to restrict the sample only to those households headed by an adult, thus excluding so-called child-headed household, which might be significantly different from adult-headed households and not directly comparable. The analytical sample used for the econometric analysis is therefore composed by 749 households (387 control and 362 treatment).

Table 3.1 provides descriptive statistics. The statistics are grouped according to the following categories: assets’ ownership, shocks, social safety nets, annual consumption expenditures, private transfers, household’s characteristics and head of household’s characteristics. The latter two categories show that the intervention and comparison households were not demographically identical at baseline, as the community social protection committees appear to have prioritized elderly households in the comparison VDGs and households with more children in the intervention VDGs. Still, as highlighted in Miller et al. (2008), households were statistically the same in terms of consumption expenditures, food insecurity and asset ownership at baseline, thus confirming the robustness of the randomization.

Table 3.1 indicates that, at baseline, the average household size was 4 members per household. More than half of the households in the sample had orphans, 20% had members with some forms of disabilities, over 30% included chronically ill members. 64% were female headed and 56% were headed by over 65years old heads. Descriptive statistics in the final round show several statistically significant differences between treatment and control groups. For instance, assets’ ownership (measured as the number of furniture, animals and agricultural tools) increased significantly for households in the treatment group. Moreover households who received a cash transfers are more likely to face a shock related to livestock stolen or died, and are less exposed to income shocks due to house damages. They also significantly reduce the access to social safety nets based on free food distribution or agricultural inputs compared to control households. A relevant impact is observed on health-related variables: the self-reported index of poor health status for the head of the households decreases from 74% to 3% in the treatment group while it remains almost stable for the control. Similarly, the percentage of heads of household who have been sick for more

than one month in the previous year is halved between the baseline and the final round, dropping from 35% to 17%.

*Table 3.1 – Descriptive Statistics at Baseline and at the Final Round*

variable (% of)	Baseline			Final Round		
	control	treatment	full sample	control	treatment	full sample
<b>Assets' ownership</b>						
furnitures (bed, table, chairs)	0.09	0.08	0.09	<b>0.1 ***</b>	<b>0.24</b>	<b>0.17</b>
animals (chicken, goats, others)	0.11	0.13	0.12	<b>0.11 ***</b>	<b>0.89</b>	<b>0.49</b>
agricultural tools (hoe, axe, sickle)	0.9	0.88	0.88	<b>0.8 ***</b>	<b>0.96</b>	<b>0.89</b>
<b>Shocks (over the past 2 yrs)</b>						
lower yields due to drought/floods	0.43 ***	0.59	0.49	<b>0.21</b>	<b>0.19</b>	<b>0.2</b>
crop disease	0.26	0.30	0.28	<b>0.11 **</b>	<b>0.17</b>	<b>0.14</b>
livestock stolen or died	0.19	0.17	0.18	<b>0.08 ***</b>	<b>0.28</b>	<b>0.18</b>
rise in price of food	0.53	0.57	0.55	<b>0.48 ***</b>	<b>0.57</b>	<b>0.52</b>
birth in hh in past 2 years	0.05	0.06	0.06	0.01	0.01	0.01
theft	0.09	0.08	0.09	0.06	0.04	0.05
house damage	0.37	0.38	0.37	<b>0.31 ***</b>	<b>0.18</b>	<b>0.25</b>
<b>Social safety nets</b>						
Free food distribution	0.34	0.30	0.32	<b>0.20 ***</b>	<b>0.13</b>	<b>0.16</b>
Agricultural inputs (starter pack)	0.07	0.1	0.08	<b>0.00 ***</b>	<b>0.03</b>	<b>0.02</b>
Inputs subsidy program	0.40 ***	0.49	0.44	0.52 ***	0.66	0.59
<b>Annual consumption expenditures per adult equivalent</b>						
Total consumption (mean)	3593.4	3944.7	3763.2	<b>4361.2 ***</b>	<b>28247.8</b>	<b>15905.8</b>
tot cons (median)	1648	1748	1681.2	<b>2127.9 ***</b>	<b>23060.2</b>	<b>9207.8</b>
Food consumption (mean)	2630.4	2798.9	2711.8	<b>2695.3 ***</b>	<b>20111.2</b>	<b>11112.6</b>
food cons (median)	547.3	751.1	630.3	<b>511.5 ***</b>	<b>16156.3</b>	<b>4471.0</b>
<b>Private transfers</b>						
Gifts	0.32 *	0.37	0.34	<b>0.35 ***</b>	<b>0.08</b>	<b>0.22</b>
Remittances	0.08	0.07	0.07	<b>0.05 ***</b>	<b>0.01</b>	<b>0.03</b>
Loans (informal)	0.13	0.16	0.14	0.12	0.13	0.13
<b>Head of household's characteristics</b>						
gender (female=1)	0.65	0.63	0.64	0.67	0.63	0.65
no education	0.63 ***	0.43	0.53	0.61 ***	0.47	0.54
age (mean)	63.8 **	60.9	62.4	65.1 ***	61.4	63.3
over 65	0.61 ***	0.51	0.56	0.62 ***	0.50	0.57
poor health status (self reported)	0.77	0.74	0.75	<b>0.67 ***</b>	<b>0.3</b>	<b>0.49</b>
sick for more than 1 month	0.31	0.35	0.33	<b>0.22 **</b>	<b>0.17</b>	<b>0.2</b>
married	0.26	0.27	0.27	<b>0.25 *</b>	<b>0.3</b>	<b>0.27</b>
single	0.02	0.02	0.02	0.02	0.02	0.02
widow	0.56	0.53	0.57	<b>0.57 **</b>	<b>0.51</b>	<b>0.54</b>
divorced	0.15	0.16	0.16	0.15	0.16	0.16
<b>Household characteristics</b>						
presence of orphans	0.46 ***	0.59	0.52	0.43 ***	0.52	0.47
hhsiz	3.5 ***	4.7	4.1	3.5 ***	4.5	4
hhchildren	2.05 ***	3.09	2.55	2 ***	2.8	2.4
persons living with HIV	0.03	0.02	0.03	0.04	0.05	0.04
members with disabilities	0.22	0.21	0.21	0.14	0.12	0.13
chronically ill adults	0.31	0.35	0.33	<b>0.24 *</b>	<b>0.20</b>	<b>0.22</b>
nr of meals the day before	1.49	1.46	1.47	<b>1.50 ***</b>	<b>2.4</b>	<b>1.9</b>

**Notes:** based on the sample of 749h (387 control and 362 treatment). "\*" indicates significance level (at the \*\*\* 1% level, \*\* 5% level, \* 10% level) of t-test comparing treatment and control. Figures in **bold** highlight the most relevant changes occurred at the final round compared to baseline.

Finally the variables on annual real total consumption and food only consumption expenditures per adult equivalent confirm the well executed randomized design at baseline, and shows impressive changes in the final round, which will be further analyzed in the multivariate econometric analysis in the next section. The same applies to the descriptive statistics on private transfers: these show significant changes in gifts and remittances between baseline and the final round that will be also part of the econometric analysis of the crowding out effect in the next section.

In order to perform the econometric analysis on consumption, I calculated the expenditure per adult equivalent so to take into account the different size and composition of the households. As far as concerns the analysis of private arrangements, I rely on the information on transfers received by each household provided in the questionnaire. In particular, under the section dedicated to the sources of income, respondents were asked about the sources of support and income that the household may have received in the 12 months preceding the interview. For each of these income sources we know whether the household received it or not and, if yes, the amount in local currency, the frequency and the periodicity in the past year.

On the basis of this information, I focused on three specific sources of income and support which are most likely to be related to the concept of inter-household private transfers and arrangements: remittances from family members employed elsewhere; gifts from family/friend/other; loans from family/friend/other. These three sources are all defined at the household level and therefore the household is my unit of analysis.

For each of these three categories I have built an indicator that takes value one if a household has received the transfer. Moreover, by aggregating the information provided for these three transfers' sources separately, I have built an indicator for those households that have received at least one transfer in the past year, regardless of the type of transfer.

### **3.5 Econometric Analysis**

The econometric analysis is divided into two parts: the first aims at testing for the presence of perfect risk sharing arrangements at village level by asking what the impact of unconditional cash transfers on consumption is. The second part aims at measuring the impact of cash transfers on pre-existing private arrangements and consequently at assessing the presence and the level of crowding out effects of private insurance by public transfers.

### 3.5.1 Risk sharing and cash transfers

The idea at the basis of most of the standard tests in the risk sharing literature is to assess whether idiosyncratic shocks contain any information that could explain consumption growth. The perfect risk sharing hypothesis implies that such shocks will have no impact as their effects will be perfectly shared across the members of the community.

In Section 3.2, it has been highlighted how the literature has rejected this hypothesis in a variety of contexts. Still it is interesting to investigate it in the context of rural Malawi, as its rejection would provide support for the introduction of social protection mechanisms helping households to pool risk more effectively. At the same time, this analysis is complemented by the one carried out in the next subsection assessing whether public intervention crowd out pre-existing private arrangements. The dataset allowed to construct the consumption variables for both round 1 (i.e. baseline round) and round 3 (final round). I looked at two specifications of consumption: food consumption and total consumption. The food consumption variable has been constructed as the sum of the expenditures on more than 110 food items consumed at household level over the week preceding the interview. In particular, the food items can be grouped in the following categories: cereals and grains, roots and tubers, pulses, vegetables, meat, fish and animal products, fruits, cooked food from vendors, milk and milk products, sugar, fats and oil, beverages, spices and miscellaneous. The non-food consumption variable is the result of the sum of expenditures on more than 30 non-food items divided on the basis of one week, one month or one year recall. The one week recall category includes items like charcoal, cigarettes, matches, newspapers and public transports; the one month recall category includes a range of items from bar soap and other personal care products to light bulbs, bicycle and vehicle repair services, electricity and telephone units; the one year recall category includes carpets, mosquito nets, building items, insurance, funeral costs, marriage costs and gifts.

Both consumption variables have been harmonized as annual variables, assuming, in the case of weekly expenditures, a constant consumption over the year. It is important to acknowledge that the sample contains households of different sizes and compositions: it is therefore important to adjust our consumption estimates for these differences as I would introduce an important distortion in the results otherwise (White and Masset, 2003). This leads to the concept of adult equivalence scales. Using OECD equivalence scales, I then calculated the expenditure per adult equivalent following the same approach used by White and Masset (2003), with the total number of adult equivalents per household  $i$  given by:

$$AE_i = \sum \beta_{j,i}$$

where  $\beta_{j,i}$  is the adult equivalent for individual  $j$  in household  $i$ . I use a single calorific equivalence scale based on OECD recommendations and I assign to each child in the age group 0-18 years a value of  $\beta= 0.3$  of an adult, and a value of  $\beta= 0.5$  to each other adult in the household which is not head of the household. Against this background, I constructed the total consumption variable to be used in the econometric specification, as the sum of household food and non food consumption scaled by equivalents. Consumption is expressed in March 2007 prices using the annual inflation rate for rural areas provided by the Malawi Statistical Office.

I use quantile regression models evaluated at the median and at the .25 and .75 quantile: this choice allows for a type of robust regression analysis which reduces the influence of outliers. The dependent variable used in the analysis is given by the ratio of the variation of consumption between the final round and the baseline round over the average total consumption measured at  $t_0$  and  $t_1$ . This is an alternative measure of consumption variation used in place of the more traditional difference in logarithmic consumption at  $t_1$  and  $t_0$ . The econometric specification I use can be written as:

$$\Delta c_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \beta_3 Z_i + \varepsilon_i \quad (1)$$

where the dependent variable, defined as  $[(c_1 - c_0) / (c_1 + c_0)] * 2$ , is regressed on a constant and a set of taste shifters  $Z_i$  like the household composition as well as age, sex, health and marital status of the head of the household. Moreover, I use a set of variables  $X_i$  measuring idiosyncratic shocks at household and village level affecting the level of income, such as crop pests, livestock stolen and price shocks. The transfer  $T$  is also part of the regression. Under the perfect risk sharing hypothesis, the coefficients on idiosyncratic shocks and on the transfer should be equal to zero. If this is not the case, then it means that transfers and other shocks to income have an impact on the household's level of consumption and therefore the perfect risk sharing hypothesis is ruled out. In fact while usually negative shocks are considered good candidates for testing the effect of idiosyncratic shocks to consumption, I use here a positive shock, in the form of an unconditional cash transfers given to some households in the village, as idiosyncratic shock. Positive shocks should in fact also be shared and not affect household consumption directly, but only through aggregate village resources.

*Table 3.2 – Quantile Regressions: Total Consumption Expenditures*

Dependent variable: Ratio of the variation of consumption between t1 and t0 over total average consumption in t1 and t0						
	Median		.25 quantile		.75 quantile	
	[1]	[2]	[3]	[4]	[5]	[6]
<b>treated</b>	<b>1.391 ***</b> [0.036]	<b>1.317 ***</b> [0.074]	<b>2.207 ***</b> [0.085]	<b>1.965 ***</b> [0.076]	<b>0.698 ***</b> [0.038]	<b>0.660 ***</b> [0.040]
<b>Village level shocks</b>						
Lower yields due to drought or floods	<b>-0.004</b> [0.038]	<b>-0.007</b> [0.075]	<b>-0.130</b> [0.087]	<b>-0.247 ***</b> [0.078]	<b>-0.015</b> [0.041]	<b>0.000</b> [0.040]
Rise in food prices	<b>-0.103 ***</b> [0.038]	<b>-0.111</b> [0.073]	<b>-0.096</b> [0.087]	<b>0.012</b> [0.076]	<b>-0.023</b> [0.041]	<b>-0.009</b> [0.040]
<b>HH level shocks</b>						
Crop disease	<b>0.030</b> [0.041]	<b>0.012</b> [0.079]	<b>0.063</b> [0.095]	<b>0.063</b> [0.082]	<b>0.017</b> [0.043]	<b>0.044</b> [0.043]
Livestock died or stolen	<b>-0.106 **</b> [0.047]	<b>-0.046</b> [0.091]	<b>0.025</b> [0.111]	<b>-0.023</b> [0.096]	<b>0.009</b> [0.049]	<b>-0.008</b> [0.048]
Theft	<b>-0.125 **</b> [0.063]	<b>-0.119</b> [0.122]	<b>-0.006</b> [0.148]	<b>-0.051</b> [0.131]	<b>0.003</b> [0.068]	<b>-0.026</b> [0.066]
House damage	<b>-0.079 **</b> [0.037]	<b>-0.105</b> [0.072]	<b>-0.183 **</b> [0.087]	<b>-0.198 ***</b> [0.076]	<b>-0.043</b> [0.040]	<b>-0.041</b> [0.038]
Safety net (food)	<b>0.029</b> [0.039]	<b>0.005</b> [0.076]	<b>-0.102</b> [0.092]	<b>-0.165 **</b> [0.082]	<b>-0.012</b> [0.041]	<b>-0.014</b> [0.040]
Safety net (agr. inputs)	<b>-0.273 ***</b> [0.037]	<b>-0.226 ***</b> [0.075]	<b>-0.228 ***</b> [0.087]	<b>-0.170 **</b> [0.080]	<b>-0.120 ***</b> [0.039]	<b>-0.107 ***</b> [0.040]
<b>HH assets</b>						
Furnitures (mattress, table, chairs)		<b>0.101</b> [0.128]		<b>0.258 **</b> [0.129]		<b>0.009</b> [0.068]
Animal (chickens, pigs, etc)		<b>-0.022</b> [0.108]		<b>0.119</b> [0.113]		<b>-0.065</b> [0.059]
Agr tools (axe, sickle, hoe)		<b>-0.193 *</b> [0.115]		<b>-0.283 **</b> [0.123]		<b>-0.059</b> [0.061]
<b>HH characteristics</b>						
HH size		<b>0.023</b> [0.021]		<b>0.016</b> [0.025]		<b>0.004</b> [0.011]
Chronically ill adults		<b>0.087</b> [0.077]		<b>0.199 **</b> [0.082]		<b>0.054</b> [0.041]
Presence of orphans		<b>-0.015</b> [0.083]		<b>-0.110</b> [0.087]		<b>0.009</b> [0.045]
Deaths in the past 5 years		<b>-0.012</b> [0.078]		<b>0.193 **</b> [0.082]		<b>-0.004</b> [0.040]
Disable persons		<b>0.040</b> [0.087]		<b>0.037</b> [0.093]		<b>0.071</b> [0.045]
<b>Head of HH's charact.</b>						
Female headed		<b>0.030</b> [0.116]		<b>0.310 **</b> [0.127]		<b>0.035</b> [0.060]
Over 65 yrs old		<b>-0.044</b> [0.083]		<b>-0.097</b> [0.086]		<b>0.001</b> [0.044]
No education		<b>0.004</b> [0.074]		<b>-0.076</b> [0.079]		<b>-0.005</b> [0.039]
Poor health status in the past year		<b>0.118</b> [0.090]		<b>0.317 ***</b> [0.092]		<b>0.016</b> [0.049]
Employment in past year		<b>-0.093</b> [0.097]		<b>-0.193 **</b> [0.103]		<b>-0.053</b> [0.051]
Married		<b>-0.029</b> [0.252]		<b>-0.435 *</b> [0.263]		<b>0.032</b> [0.134]
Divorced		<b>-0.054</b> [0.260]		<b>-0.588 **</b> [0.275]		<b>0.021</b> [0.138]
Widow		<b>-0.106</b> [0.252]		<b>-0.671 **</b> [0.270]		<b>0.015</b> [0.135]
Constant	<b>0.496 ***</b> [0.042]	<b>0.573 **</b> [0.277]	<b>-0.598 ***</b> [0.101]	<b>-0.119</b> [0.289]	<b>1.248 ***</b> [0.044]	<b>1.218 ***</b> [0.142]
Nr. of obs.	749	744	749	744	749	744
R-sq	0.23	0.25	0.31	0.34	0.13	0.14

**Notes:** Significant at the \*\*\* 1% level, \*\* 5% level, \* 10% level. Robust standard errors in squared brackets.



Given that the design of the dataset I use for testing my hypothesis is based on perfect randomization, I can rule out the risk of distortions due the so-called “program placement effect”, that occurs when aid, (or in this case, cash transfers), is targeted to specific types of households.

Table 3.2 summarizes the econometric results for total consumption while table 3.3 shows the results for food-only consumption. I present two specifications for each of the three quantile regressions. The first specifications controls only for village and household level shocks, while the second specification includes the whole set of controls (i.e. adding to the previous also household’s assets, household’s characteristics, and head of household’s characteristics). The results across all specifications for the coefficient on the variable of interest (indicating the reception of cash transfer) confirm the rejection of the hypothesis of perfect risk sharing, as in all cases, controlling for village level aggregate resources, the consumption levels are clearly affected by the (positive) idiosyncratic shock represented by cash transfers. More specifically, Table 3.2 shows the impact of cash transfers on total consumption. It is interesting to note how the coefficient of “treated” varies according to the quantile regression. The coefficient in fact should be interpreted as the difference in median (or in the .25 or .75 quantile accordingly) of the variation of consumption in  $t_1$  and  $t_0$  between the treatment and the control group. So while across all groups the increase in the variation of consumption is statistically significant at the 1% level across all specifications, it is worth noting that those households in the .25 quantile of the distribution, meaning those household whose consumption would have varied the less in the absence of the cash transfers, are precisely those taking more advantage of the transfer by increasing their variation of consumption by a coefficient of 1.96. On the other side, those households in the .75 quantile of the distribution, represent those who would have increased more their consumption in any case, so their variation of consumption is still significant, but it increases less (the coefficient is equal to 0.66) compared to those in the median or in the .25 quantile of the distribution. A similar trend is observable in Table 3.3 concerning the food-only consumption.

As far as it concerns the significance of control variables, Table 3.2 shows that the presence of a social safety net based on agricultural inputs have a negative effect on the variation of consumption expenditures across the whole distribution (median, .25 and .75 quantile), probably explained by the fact that households who receive agricultural inputs are then able to cultivate and consume their own products, thus reducing consumption expenditures. Only those in the .25 quantile register a statistically significant reduction in their increase of consumption expenditures due to the presence of shocks like house damages, lower crop yields due to drought or floods and the presence of safety nets based on the distribution of free food.

Moreover, while the remaining categories of covariates used as controls are not statistically significant for those in the median and those in the .75 quantile of the distribution (with the only exception of agricultural tools for those in the median), this does not apply to households in the .25 quantile, whose consumption expenditures are then influenced by household's characteristics (e.g. presence of chronically ill adults or deaths in the family in the past 5 years) as well as by head of household's characteristics (e.g. female headed households have a positive impact on consumption while single head of households increase their consumption more compared to married, divorced and widows).

Similarly for the covariates in Table 3.3 concerning food only consumption. Here the full control specifications confirm the impact of safety nets consisting of agricultural inputs, while village level shocks, like a rise in the prices of food, have a negative impact on households in the median of the distribution. An increase in household's assets does not have any effect on the variation of consumption for those households in the .75 quantile of the distribution, while it seems to affect those in the median and those in the .25 quantile. In fact, for the former it's an increase in the number of animals that have a positive "wealth effect" on consumption expenditures, while for the latter the increase in furniture's ownership has a positive effect and the increase in the number of agricultural tools available has a negative impact. Female headed households seem to have a statistically significant and positive impact on the variation of consumption only for those in the .25 quantile and in the median, while it is not significant for those living in the .75 quantile. The same applies to the condition of widows but with a negative impact on the variation of consumption. Finally, a counterintuitive result is given by the negative impact of employment in the past year across all specifications. A possible explanation could be that, given the rural environment, many temporary and irregular jobs are related to cultivation and the payment can be in kind instead of being monetary. In this hypothesis then, the expenditures for consumption would be consistently lower.

*Table 3.3 – Quantile Regressions: Food Consumption Expenditures*

	Dependent variable: Ratio of the variation of food cons. between t1 and t0 over total average food cons. in t1 and t0					
	Median		.25 quantile		.75 quantile	
	[1]	[2]	[3]	[4]	[5]	[6]
<b>treated</b>	<b>1.710 ***</b> [0.056]	<b>1.694 ***</b> [0.048]	<b>2.587 ***</b> [0.112]	<b>2.333 ***</b> [0.087]	<b>0.691 ***</b> [0.020]	<b>0.677 ***</b> [0.029]
<b>Village level shocks</b>						
Lower yields due to drought or floods	<b>-0.089</b> [0.059]	<b>-0.101 **</b> [0.049]	<b>-0.046</b> [0.117]	<b>-0.190 **</b> [0.088]	<b>0.005</b> [0.022]	<b>0.019</b> [0.029]
Rise in food prices	<b>-0.117 **</b> [0.058]	<b>-0.113 **</b> [0.048]	<b>-0.232 **</b> [0.117]	<b>-0.028</b> [0.087]	<b>-0.032</b> [0.021]	<b>-0.046</b> [0.029]
<b>HH level shocks</b>						
Crop disease	<b>0.048</b> [0.063]	<b>0.031</b> [0.052]	<b>0.130</b> [0.126]	<b>0.101</b> [0.091]	<b>0.005</b> [0.022]	<b>0.052 *</b> [0.031]
Livestock died or stolen	<b>-0.007</b> [0.072]	<b>0.029</b> [0.060]	<b>0.050</b> [0.148]	<b>-0.010</b> [0.106]	<b>-0.005</b> [0.025]	<b>-0.007</b> [0.035]
Theft	<b>0.019</b> [0.098]	<b>0.006</b> [0.080]	<b>-0.216</b> [0.193]	<b>-0.130</b> [0.146]	<b>-0.003</b> [0.035]	<b>-0.029</b> [0.049]
House damage	<b>-0.086</b> [0.058]	<b>-0.036</b> [0.047]	<b>-0.225 **</b> [0.116]	<b>-0.139</b> [0.086]	<b>-0.021</b> [0.021]	<b>-0.029</b> [0.028]
Safety net (food)	<b>0.020</b> [0.061]	<b>0.029</b> [0.050]	<b>-0.054</b> [0.122]	<b>-0.005</b> [0.090]	<b>0.009</b> [0.021]	<b>0.006</b> [0.029]
Safety net (agr. inputs)	<b>-0.118 **</b> [0.058]	<b>-0.126 **</b> [0.049]	<b>-0.181</b> [0.115]	<b>-0.156 *</b> [0.088]	<b>-0.040 **</b> [0.020]	<b>-0.025</b> [0.028]
<b>HH assets</b>						
Furnitures (mattress, table, chairs)		<b>0.060</b> [0.084]		<b>0.446 ***</b> [0.146]		<b>0.074</b> [0.050]
Animal (chickens, pigs, etc)		<b>0.183 **</b> [0.072]		<b>0.065</b> [0.125]		<b>0.007</b> [0.041]
Agr tools (axe, sickle, hoe)		<b>-0.045</b> [0.073]		<b>-0.363 ***</b> [0.140]		<b>-0.008</b> [0.045]
<b>HH characteristics</b>						
HH size		<b>0.006</b> [0.014]		<b>0.032</b> [0.025]		<b>-0.002</b> [0.008]
Chronically ill adults		<b>0.129 **</b> [0.051]		<b>0.301 ***</b> [0.092]		<b>0.044</b> [0.030]
Presence of orphans		<b>-0.022</b> [0.055]		<b>-0.216 **</b> [0.092]		<b>0.004</b> [0.033]
Deaths in the past 5 years		<b>0.040</b> [0.051]		<b>0.218 **</b> [0.092]		<b>0.003</b> [0.030]
Disable persons		<b>0.085</b> [0.057]		<b>0.062</b> [0.104]		<b>0.042</b> [0.034]
<b>Head of HH's charact.</b>						
Female headed		<b>0.152 **</b> [0.077]		<b>0.320 **</b> [0.136]		<b>0.068</b> [0.048]
Over 65 yrs old		<b>-0.048</b> [0.054]		<b>-0.179 *</b> [0.094]		<b>-0.052 *</b> [0.032]
No education		<b>0.020</b> [0.048]		<b>-0.062</b> [0.088]		<b>0.013</b> [0.029]
Poor health status in the past year		<b>0.012</b> [0.059]		<b>0.354 ***</b> [0.102]		<b>0.014</b> [0.035]
Employment in past year		<b>-0.164 **</b> [0.064]		<b>-0.241 **</b> [0.114]		<b>-0.108 ***</b> [0.038]
Married		<b>-0.056</b> [0.163]		<b>-0.704 **</b> [0.292]		<b>0.160</b> [0.100]
Divorced		<b>-0.258</b> [0.172]		<b>-0.912 ***</b> [0.306]		<b>0.119</b> [0.104]
Widow		<b>-0.280 *</b> [0.166]		<b>-1.004 ***</b> [0.299]		<b>0.098</b> [0.101]
Constant	<b>0.199</b> [0.065]	<b>0.237</b> [0.180]	<b>-1.060 ***</b> [0.134]	<b>-0.373</b> [0.323]	<b>1.290 ***</b> [0.022]	<b>1.115 ***</b> [0.104]
Nr. of obs.	749	744	749	744	749	744
R-sq	0.23	0.25	0.3	0.33	0.09	0.1

Notes: Significant at the \*\*\* 1% level, \*\* 5% level, \* 10% level. Robust standard errors in squared brackets.

### 3.5.2 Crowding out of private arrangements

In this part of the analysis I use Probit models to measure the impact of the social cash transfer on the probability of receiving private transfers. The presence of crowding out effects has been tested by using a structure of controls similar to the one used for testing consumption smoothing and includes aggregate shocks at village level, idiosyncratic shocks at household level, the presence of other externally provided safety nets, household characteristics and also demographic characteristics of the heads of household (i.e. age, gender, education level, health status and marital status and employment in the past year). I first looked at the crowding out effects of any private transfers without making distinctions based on the type of transfers. Secondly I applied the same methodology on the probability for a household of receiving a transfer distinguishing between remittances, gifts and loans.

The randomized design of the dataset allows to precisely isolate the effect of the public transfers by simply comparing treatment and control households and checking whether treatment households receive less frequent transfers than control households. Moreover the distinction between remittances, gifts and loans allows enriching the analysis with considerations linked to the geographical proximity (e.g. by comparing remittances from elsewhere and gifts from family or friends living closer to the reference household).

The results for the average marginal effects based on Probit models are reported in Tables 3.4 to 3.7. Table 3.4 refers to any transfer. The control structure is progressively adding categories of control variables in each specification. It is interesting to note that the crowding out effect (i.e. a reduction of 24% in probability) of cash transfers (CT) on any private transfer is consistently significant across all specifications at 1% level. As shown in the next tables, the effects of gifts is likely to be dominant in the dependent variable used in table 3.4, which aggregates the three different types of transfers. Moreover, the covariates included in the control structure, show that an increase in assets (animals or agricultural tools) can reduce by 10 to 13% the probability of receiving private transfers, while the presence of disable members in the household or the shock given by a theft in the past year can increase the probability of transfers by 8 and 10% respectively.

**Table 3.4 – Marginal effects after Probit - Any private net transfer received**

<b>Dependent variable = 1 if the household received a private transfer in the last 12 months</b>						
	[1]	[2]	[3]	[4]	[5]	[6]
<b>treated</b>	<b>-0.245 ***</b>	<b>-0.246 ***</b>	<b>-0.247 ***</b>	<b>-0.251 ***</b>	<b>-0.238 ***</b>	<b>-0.242 ***</b>
	[0.033]	[0.034]	[0.034]	[0.034]	[0.035]	[0.036]
<b><u>Village level shocks</u></b>						
Lower yields due to drought or floods		<b>0.023</b>	<b>0.023</b>	<b>0.022</b>	<b>0.019</b>	<b>0.006</b>
		[0.037]	[0.037]	[0.038]	[0.038]	[0.039]
Rise in food prices		<b>-0.032</b>	<b>-0.025</b>	<b>-0.017</b>	<b>-0.001</b>	<b>0.000</b>
		[0.036]	[0.037]	[0.037]	[0.038]	[0.038]
<b><u>HH level shocks</u></b>						
Crop disease			<b>0.031</b>	<b>0.041</b>	<b>0.058</b>	<b>0.060</b>
			[0.040]	[0.041]	[0.041]	[0.042]
Livestock died or stolen			<b>-0.079 *</b>	<b>-0.066</b>	<b>-0.063</b>	<b>-0.058</b>
			[0.043]	[0.044]	[0.045]	[0.045]
Theft			<b>0.100</b>	<b>0.104 *</b>	<b>0.097 *</b>	<b>0.101 *</b>
			[0.065]	[0.065]	[0.066]	[0.067]
House damage			<b>0.012</b>	<b>0.009</b>	<b>0.006</b>	<b>0.004</b>
			[0.037]	[0.037]	[0.037]	[0.037]
Safety net (food)			<b>0.033</b>	<b>0.029</b>	<b>0.013</b>	<b>0.006</b>
			[0.038]	[0.038]	[0.039]	[0.039]
Safety net (agr. inputs)			<b>-0.022</b>	<b>-0.004</b>	<b>0.013</b>	<b>0.001</b>
			[0.036]	[0.036]	[0.038]	[0.039]
<b><u>HH assets</u></b>						
Furnitures (mattress, table, chairs)				<b>-0.001</b>	<b>-0.010</b>	<b>-0.026</b>
				[0.063]	[0.063]	[0.064]
Animal (chickens, pigs, etc)				<b>-0.100 *</b>	<b>-0.091 *</b>	<b>-0.103 *</b>
				[0.052]	[0.053]	[0.053]
Agr tools (axe, sickle, hoe)				<b>-0.144 ***</b>	<b>-0.135 **</b>	<b>-0.138 **</b>
				[0.060]	[0.061]	[0.063]
<b><u>HH characteristics</u></b>						
HH size					<b>-0.012</b>	<b>-0.008</b>
					[0.009]	[0.011]
Chronically ill adults					<b>-0.008</b>	<b>-0.026</b>
					[0.038]	[0.039]
Presence of orphans					<b>-0.040</b>	<b>-0.040</b>
					[0.040]	[0.042]
Deaths in the past 5 years					<b>0.026</b>	<b>0.027</b>
					[0.040]	[0.041]
Disable persons					<b>0.080 *</b>	<b>0.082 *</b>
					[0.046]	[0.046]
<b><u>Head of HH's charact.</u></b>						
Female headed						<b>-0.018</b>
						[0.042]
Over 65 yrs old						<b>0.037</b>
						[0.042]
No education						<b>-0.022</b>
						[0.038]
Poor health status in the past year						<b>0.058</b>
						[0.045]
Employment in past year						<b>0.040</b>
						[0.051]
<b>Nr. of obs.</b>	749	749	749	749	748	744
<b>R-sq</b>	0.05	0.06	0.06	0.07	0.08	0.09

**Notes:** Table reports estimated marginal effects after probit. Significant at the \*\*\* 1% level, \*\* 5% level, \* 10% level. Robust standard errors in squared brackets.

Given the detailed information I have, it is useful to look at the different types of transfers separately in order to be able to isolate the net effect of cash transfer on each one of them as done in tables 3.5 to 3.7. Table 3.5 refers to remittances only. Here there is a small crowding out effect on private transfers due to the cash transfer (a reduction of 1.5% in the probability of receiving remittances for those households that receive CT). Remittances come from members of the household living abroad, either within or outside the country. The econometric analysis indicates that these have a compensation function with respect to shocks occurring at household level as when livestock die or is stolen implying a 2% increase in the probability of receiving a remittance. The presence of orphans in the household reduces by 1 percentage point the probability of receiving remittances and this is explained by the fact that the orphan status of children implies a lower probability of family members surviving and working abroad. Moreover, the age of the household head plays also an important role: the older the household head, the higher the probability of receiving a remittance, thus confirming the role of informal “social security” that private transfer plays especially in developing countries where formal social security schemes are in most of the cases absent. Finally, an increase in the number of agricultural tools implies a decrease in the probability of receiving remittances, as agricultural tools can be interpreted as an instrument for wealth. Table 3.6 refers to gifts from family and friends. Here the crowding out effect on private transfer is strong and persistent with a 24% reduction in the probability of receiving private gifts for those households who receive the CT. Contrary to the case of remittances, here the loss of livestock implies a reduction of 6% in the probability of receiving a transfer. This difference of impact can be explained with the fact that livestock might well be a common resource which is shared among neighbor households. Therefore its loss implies a reduction in the inter-household level of transfers, while for a family member living abroad and whose income is not linked to livestock, a similar loss implies an increase in the probability of making a transfer. Here as well, an increase in the household’s assets and particularly in agricultural tools indicates an increase in wealth and therefore implies a 10% reduction in the probability of receiving gifts. On the contrary the presence of disable members is associated with a 9% increase in probability. The fact that the crowding out effect is much stronger than in the case of remittances is in line with the idea that people living in the village or near-by have better information on the nature of the grant and therefore can react more to its introduction. This can also be read as a positive element, meaning that the flow of money in the village from members living outside is only marginally affected by the introduction of the cash transfer scheme and consequently it is possible to argue that the overall level of wealth in the village increases.

*Table 3.5 – Marginal effects after Probit - Remittances*

Dependent variable = 1 if the household received a remittance in the last 12 months						
	[1]	[2]	[3]	[4]	[5]	[6]
<b>treated</b>	<b>-0.033 ***</b> [0.012]	<b>-0.030 **</b> [0.012]	<b>-0.027 **</b> [0.011]	<b>-0.028 **</b> [0.011]	<b>-0.023 **</b> [0.010]	<b>-0.015 ***</b> [0.007]
<b><u>Village level shocks</u></b>						
Lower yields due to drought or floods		<b>-0.012</b> [0.012]	<b>-0.013</b> [0.011]	<b>-0.011</b> [0.011]	<b>-0.010</b> [0.009]	<b>-0.007 **</b> [0.005]
Rise in food prices		<b>-0.003</b> [0.012]	<b>-0.002</b> [0.011]	<b>-0.002</b> [0.010]	<b>0.000</b> [0.009]	<b>0.000</b> [0.004]
<b><u>HH level shocks</u></b>						
Crop disease			<b>-0.003</b> [0.011]	<b>-0.001</b> [0.011]	<b>-0.002</b> [0.010]	<b>-0.001</b> [0.004]
Livestock died or stolen			<b>0.032 **</b> [0.019]	<b>0.031 **</b> [0.019]	<b>0.029 **</b> [0.017]	<b>0.020 ***</b> [0.012]
Theft			<b>0.019</b> [0.023]	<b>0.019</b> [0.023]	<b>0.017</b> [0.022]	<b>0.011</b> [0.013]
House damage			<b>-0.006</b> [0.010]	<b>-0.005</b> [0.010]	<b>-0.004</b> [0.009]	<b>-0.001</b> [0.004]
Safety net (food)			<b>0.003</b> [0.011]	<b>0.002</b> [0.010]	<b>0.001</b> [0.010]	<b>-0.001</b> [0.004]
Safety net (agr. inputs)			<b>0.012</b> [0.011]	<b>0.014</b> [0.011]	<b>0.011</b> [0.010]	<b>0.004</b> [0.005]
<b><u>HH assets</u></b>						
Furnitures (mattress, table, chairs)				<b>-0.007</b> [0.013]	<b>-0.007</b> [0.011]	<b>-0.004</b> [0.003]
Animal (chickens, pigs, etc)				<b>0.007</b> [0.017]	<b>0.006</b> [0.015]	<b>0.002</b> [0.006]
Agr tools (axe, sickle, hoe)				<b>-0.035 *</b> [0.026]	<b>-0.036 **</b> [0.026]	<b>-0.023 **</b> [0.018]
<b><u>HH characteristics</u></b>						
HH size					<b>0.001</b> [0.002]	<b>0.001</b> [0.001]
Chronically ill adults					<b>-0.005</b> [0.009]	<b>-0.003</b> [0.003]
Presence of orphans					<b>-0.024 **</b> [0.012]	<b>-0.011 **</b> [0.007]
Deaths in the past 5 years					<b>0.012</b> [0.012]	<b>0.007</b> [0.007]
Disable persons					<b>-0.014</b> [0.008]	<b>-0.005</b> [0.004]
<b><u>Head of HH's charact.</u></b>						
Female headed						<b>-0.003</b> [0.004]
Over 65 yrs old						<b>0.024 ***</b> [0.009]
No education						<b>-0.013 ***</b> [0.007]
Poor health status in the past year						<b>-0.005</b> [0.007]
Employment in past year						<b>0.003</b> [0.006]
<b>Nr. of obs.</b>	749	749	749	749	748	744
<b>R-sq</b>	0.03	0.04	0.08	0.1	0.14	0.27

**Notes:** Table reports estimated marginal effects after probit. Significant at the \*\*\* 1% level, \*\* 5% level, \* 10% level. Robust standard errors in squared brackets.

**Table 3.6 – Marginal effects after Probit - Gifts**

<b>Dependent variable = 1 if the household received a gift in the last 12 months</b>						
	[1]	[2]	[3]	[4]	[5]	[6]
<b>treated</b>	<b>-0.26 ***</b> [0.028]	<b>-0.258 ***</b> [0.029]	<b>-0.257 ***</b> [0.029]	<b>-0.259 ***</b> [0.034]	<b>-0.240 ***</b> [0.030]	<b>-0.239 ***</b> [0.030]
<b><u>Village level shocks</u></b>						
Lower yields due to drought or floods		<b>0.020</b> [0.031]	<b>0.030</b> [0.031]	<b>0.028</b> [0.038]	<b>0.026</b> [0.031]	<b>0.022</b> [0.032]
Rise in food prices		<b>-0.076 *</b> [0.031]	<b>-0.073 *</b> [0.031]	<b>-0.066 **</b> [0.037]	<b>-0.046</b> [0.031]	<b>-0.045</b> [0.031]
<b><u>HH level shocks</u></b>						
Crop disease			<b>-0.024</b> [0.033]	<b>-0.016</b> [0.041]	<b>0.004</b> [0.034]	<b>0.005</b> [0.035]
Livestock died or stolen			<b>-0.076 **</b> [0.033]	<b>-0.069 *</b> [0.044]	<b>-0.064 *</b> [0.034]	<b>-0.058 *</b> [0.035]
Theft			<b>-0.007</b> [0.051]	<b>-0.003</b> [0.065]	<b>-0.012</b> [0.050]	<b>-0.013</b> [0.050]
House damage			<b>-0.007</b> [0.031]	<b>-0.009</b> [0.037]	<b>-0.010</b> [0.030]	<b>-0.013</b> [0.030]
Safety net (food)			<b>0.048</b> [0.033]	<b>0.046</b> 0.038]	<b>0.024</b> [0.033]	<b>0.023</b> [0.033]
Safety net (agr. inputs)			<b>-0.013</b> [0.030]	<b>0.000</b> [0.037]	<b>0.022</b> [0.032]	<b>0.016</b> [0.032]
<b><u>HH assets</u></b>						
Furnitures (mattress, table, chairs)				<b>0.005</b> [0.063]	<b>-0.009</b> [0.051]	<b>-0.022</b> [0.051]
Animal (chickens, pigs, etc)				<b>-0.071</b> 0.0517	<b>-0.056</b> [0.043]	<b>-0.069</b> [0.042]
Agr tools (axe, sickle, hoe)				<b>-0.113 **</b> [0.060]	<b>-0.096 **</b> [0.054]	<b>-0.105 **</b> [0.056]
<b><u>HH characteristics</u></b>						
HH size					<b>-0.018 **</b> [0.008]	<b>-0.013</b> [0.009]
Chronically ill adults					<b>0.010</b> [0.031]	<b>0.002</b> [0.033]
Presence of orphans					<b>-0.017</b> [0.034]	<b>-0.019</b> [0.035]
Deaths in the past 5 years					<b>0.026</b> [0.033]	<b>-0.004</b> [0.034]
Disable persons					<b>-0.011 **</b> [0.040]	<b>0.088 **</b> [0.041]
<b><u>Head of HH's charact.</u></b>						
Female headed						<b>-0.021</b> [0.035]
Over 65 yrs old						<b>0.043</b> [0.035]
No education						<b>-0.002</b> [0.032]
Poor health status in the past year						<b>0.007</b> [0.039]
Employment in past year						<b>-0.027</b> [0.041]
<b>Nr. of obs.</b>	749	749	749	749	748	744
<b>R-sq</b>	0.1	0.1	0.11	0.12	0.14	0.15

**Notes:** Table reports estimated marginal effects after probit. Significant at the \*\*\* 1% level, \*\* 5% level, \* 10% level. Robust standard errors in squared brackets.



Finally, table 3.7 focuses on loans. What is interesting to note is that there is no crowding out effect at all when we look at loans from other family members and friends. In this case the reception of the public cash transfer seems to not have any significant impact on the probability of receiving a loan from family or friends. On the contrary, an explanatory variable for informal loans showing a strong statistical significance is a dummy indicating whether the household had already been borrowing money in the past (i.e. before the start of the program). In fact, those households who were already borrowing money have a 20% increase in the probability of receiving a loan which is independent from the fact of being or not a cash transfer recipient. This highlights an interesting mechanism of the functioning of informal rural credit markets. Moreover, by looking at the rest of covariates in the regression model, the probability of receiving a loan seems to be also influenced by shocks and head of household's characteristics: for instance, the fact of having a shock at agricultural output level (e.g. a crop disease), increases the probability of receiving a loan by 6%, while an older head of household has a 6% probability less of receiving a loan as an old person is probably less likely to work and therefore to be able to repay the loan.

Against this background a question remains open about whether the crowding out observed for gifts should be interpreted as a negative side-effect of the intervention and therefore requires a correction in the program design or, on the contrary, it could be seen as a signal that resources are re-allocated within the village economy and directed to other needy recipients. Additional information provided by the questionnaire tells us that 9% of cash transfer beneficiaries share the received cash with neighbors or others outside the household, 14% regularly share food bought with the cash transfer with neighbors or others, while 23% have started a business with funds from the cash transfer. This piece of information, coupled with the result on remittances which shows that the crowding out effect on this type of transfer is extremely small, seems to suggest that the amount of additional resources generated by the cash transfer can be used for a better re-allocation of resources among households within the village. Further research and data collection is currently ongoing in order to investigate the spillover effects of the cash transfers on the wider village community (i.e. including the non-beneficiaries).

*Table 3.7 – Marginal effects after Probit - Loans*

Dependent variable = 1 if the household received a loan in the last 12 months						
	[1]	[2]	[3]	[4]	[5]	[6]
<b>treated</b>	<b>0.0086</b> [0.024]	<b>0.004</b> [0.025]	<b>0.002</b> [0.024]	<b>0.002</b> [0.024]	<b>0.007</b> [0.028]	<b>0.007</b> [0.028]
<b><u>Village level shocks</u></b>						
Lower yields due to drought or floods		<b>0.022</b> [0.025]	<b>0.011</b> [0.026]	<b>0.011</b> [0.026]	<b>0.011</b> [0.025]	<b>0.004</b> [0.025]
Rise in food prices		<b>0.035</b> [0.025]	<b>0.038</b> [0.025]	<b>0.038</b> [0.025]	<b>0.028</b> [0.025]	<b>0.023</b> [0.025]
<b><u>HH level shocks</u></b>						
Crop disease			<b>0.061 **</b> [0.030]	<b>0.061 **</b> [0.030]	<b>0.059 **</b> [0.030]	<b>0.064 **</b> [0.030]
Livestock died or stolen			<b>-0.028</b> [0.029]	<b>-0.025</b> [0.030]	<b>-0.025</b> [0.028]	<b>-0.026</b> [0.028]
Theft			<b>0.082 *</b> [0.052]	<b>0.081 *</b> [0.052]	<b>0.062</b> [0.049]	<b>0.068</b> [0.049]
House damage			<b>0.000</b> [0.025]	<b>0.001</b> [0.025]	<b>0.000</b> [0.024]	<b>0.002</b> [0.024]
Safety net (food)			<b>-0.029</b> [0.025]	<b>-0.029</b> [0.025]	<b>-0.026</b> [0.025]	<b>-0.028</b> [0.025]
Safety net (agr. inputs)			<b>-0.004</b> [0.025]	<b>-0.002</b> [0.025]	<b>-0.020</b> [0.025]	<b>-0.025</b> [0.025]
<b><u>HH assets</u></b>						
Furnitures (mattress, table, chairs)				<b>-0.002</b> [0.043]	<b>-0.002</b> [0.043]	<b>-0.009</b> [0.042]
Animal (chickens, pigs, etc)				<b>-0.026</b> [0.034]	<b>-0.027</b> [0.033]	<b>-0.031</b> [0.033]
Agr tools (axe, sickle, hoe)				<b>0.012</b> [0.038]	<b>0.004</b> [0.039]	<b>0.008</b> [0.037]
<b><u>HH characteristics</u></b>						
HH size					<b>0.005</b> [0.006]	<b>0.005</b> [0.007]
Chronically ill adults					<b>0.020</b> [0.026]	<b>0.004</b> [0.026]
Presence of orphans					<b>0.019</b> [0.027]	<b>0.010</b> [0.027]
Deaths in the past 5 years					<b>0.000</b> [0.026]	<b>0.000</b> [0.026]
Disable persons					<b>0.003</b> [0.030]	<b>0.007</b> [0.030]
Credit in past year					<b>0.210 ***</b> [0.063]	<b>0.206 ***</b> [0.063]
Credit*treated					<b>-0.055</b> [0.038]	<b>-0.057</b> [0.036]
<b><u>Head of HH's charact.</u></b>						
Female headed						<b>0.018</b> [0.027]
Over 65 yrs old						<b>-0.042</b> [0.028]
No education						<b>-0.012</b> [0.024]
Poor health status in the past year						<b>0.062 **</b> [0.024]
Employment in past year						<b>0.009</b> [0.032]
<b>Nr. of obs.</b>	749	749	749	749	748	744
<b>R-sq</b>	0.01	0.01	0.02	0.02	0.06	0.08

**Notes:** Table reports estimated marginal effects after probit. Significant at the \*\*\* 1% level, \*\* 5% level, \* 10% level. Robust standard errors in squared brackets.

### 3.6 Conclusions

In this chapter I explore the short-run consumption expenditures dynamics and the interaction of public and private arrangements using a sample of rural households in Malawi. In fact, the context of rural Malawi represents an extremely interesting setting due to the high level of HIV/AIDS prevalence that has inevitably shaped the social structure of many households. Moreover, the cash transfer pilot project used in the analysis represents one of the first experiments of social protection policies based on unconditional cash transfers in Sub-Saharan Africa. Based on a sample of 749 households, I exploit the unique source of exogenous variation provided by the randomized component of the program in order to isolate the effect of cash transfers on consumption expenditures as well as the net crowding out effect of cash transfers on private arrangements.

I find a large effect in the level of consumption expenditures for those households receiving the cash transfer. The effect is statistically significant across all specifications. The magnitude of the coefficient varies on the basis of the distribution's quantile, showing that households in the .25 quantile of the variation of consumption's distribution (i.e. those households that, in the absence of the cash transfer, would have shown a smaller variation in consumption expenditures) are those who register the highest increase in their consumption expenditures, while households in the .75 quantile increase less their expenditures, as they would have probably increased it in any case.

These findings confirm the rejection of the perfect risk sharing hypothesis and suggest that there might be an important role for public interventions that might help households to pool risk more effectively. Consequently, the government's initiative of implementing a public cash transfer program seems to be well justified by the type of risk sharing arrangements and market imperfections existing at the village level. However, in order to test how such public interventions interact with pre-existing private arrangements at village level I have also looked at the effects of cash transfers on private transfers in a context where the social fabric is already heavily compromised by the presence of high HIV/AIDS rates, and characterized by imperfect enforceability of contracts.

On the basis of the detailed information provided in the dataset, I could distinguish among three different types of private transfers: remittances, informal loans from friends or other family members and gifts from friends or other family members without the expectation of repayment. Results confirm the presence of crowding out effects on private arrangements when looking at gifts and, to a lesser extent, remittances, while informal loans seem to be completely independent from the cash transfer's reception. The fact that the crowding out effect is much stronger in the case of

gifts than in the case of remittances is in line with the idea that people living in the village, or nearby, have better information on the nature of the grant and therefore can react more to its introduction. The control structure used in the analysis, checking for shocks at household and village level as well as for household's specific characteristics, confirm the robustness of the findings which are not an artifact of shocks or demographic features. Finally, the result concerning informal loans that depend on pre-existing credit transactions rather than on the public cash transfer highlights an interesting feature of the functioning of informal rural credit markets which should be further explored in future research on the basis of additional data collections.

From a policy perspective the present chapter offers a contribution to the evaluation of the very recent wave of social protection policies based on (unconditional) cash transfers in Sub-Saharan Africa, on one side by showing that similar policies may be well motivated on the basis of the imperfect risk sharing arrangements existing at village level and, on the other side, by highlighting the importance of taking into account the interactions of these policies with pre-existing private arrangements.

## **Bibliography**

- [1] Albarran P. and Attanasio O.P. (2001), "Do public transfers crowd out private transfers? Evidence from a randomized experiment in Mexico", *WIDER Discussion paper No 2002/6*, (January).
- [2] Albarran P. and Attanasio O.P. (2003), "Limited commitment and crowding out of private transfers: Evidence from a randomized experiment", *Economic Journal*, 113 (March).
- [3] Attanasio O.P. and Rios Rull J.V. (2000), "Consumption smoothing in island economies: can public insurance reduce welfare?", *European Economic Review*, vol. 44, pp. 1225-58
- [4] Barrientos, A., & DeJong, J. (2004). "*Child poverty and cash transfers.*" London: Chronic Poverty Research Centre.
- [5] Barrientos, A., Hulme, D., Nino-Zarazua M. (2009), "Will the green shoots blossom? A new wave of social protection in Sub-Saharan Africa", mimeo, Brooks World Poverty Institute, University of Manchester.

- [6] Central Intelligence Agency (2008). "World Fact Book." Washington, D.C. <https://www.cia.gov/library/publications/the-world-factbook/print/mi.html>. Accessed November 2009.
- [7] Chronic Poverty Research Centre (2005). *"The role of cash transfers in tackling childhood poverty."* London: Save the Children, Chronic Poverty Research Centre.
- [8] Cox, D., Eser, Z., Jimenez, E., (1998) "Motives for private transfers over the life cycle: an analytical framework and evidence for Peru", *Journal of Development Economics*. (55): 57-80.
- [9] Cutler D. and Gruber J. (1996), "Does public insurance crowd out private insurance?", *The Quarterly Journal of Economics*, vol. 111, No. 2, pp. 391-430.
- [10] Dercon D. and Krishnan P. (2003), "Risk sharing and public transfers", *Economic Journal*, 113, March.
- [11] DFID (2006). Using social transfers to improve human development. Social Protection Briefing Note Series, No. 3, February.
- [12] Dubois P., Jullien B. and Magnac T., (2007), "Formal and Informal Risk Sharing in LCDs: Theory and Empirical Evidence", *IZA Discussion Paper Series*, Discussion Paper No. 2842.
- [13] Foster A. and Rosenzweig M. (2001), "Imperfect commitment, altruism and the family: evidence from transfer behavior in low-income rural areas", *Review of Economics and Statistics*, vol. 83, pp.389-407.
- [14] Government of Malawi (2007). Social Protection: a Right for All. Prepared by the Working Group of the Social Protection Technical Committee, Lilongwe.
- [15] Grimard, F. (1997). Household consumption smoothing through ethnic ties: evidence from Cote d'Ivoire. *Journal of Development Economics*, 53(2), 391-422.
- [16] ILO (2001) Facts on Social Security in Africa. Geneva: International Labour Organization.
- [17] ILO (2001) Social Security. A New Consensus. Geneva, International Labour Office.

- [18] Jayne et al. (2006). Community-level Impacts of AIDS-related Mortality: Panel Survey Evidence from Zambia. *Review of Agricultural Economics*, 28(3), 440-457.
- [19] Jensen R. (2003), "Do private transfers displace the benefits of public transfers? Evidence from South Africa", *Journal of Public Economics*, vol. 88, pp.89-112.
- [20] Kocherlakota N.R. (1996), "Implications of efficient risk sharing without commitment", *Review of Economic Studies*, 63, pp. 595-609.
- [21] Krueger D. and Perri F. (2006), "Does income inequality lead to consumption inequality? Evidence and theory", *Review of economic studies*, vol.73 (1), pp. 163-193.
- [22] Ligon E., Thomas J. and Worrall T. (2002), "Informal insurance arrangements in village economies", *Review of economic studies*, vol. 69 (1), pp. 209-44.
- [23] Miller, C. (2007). "Social Welfare in Africa: Meeting the needs of households caring for orphans and affected by AIDS." Alberto Minujin and Enrique Delamonica Eds. in *Social protection initiatives for children, women and families*. New School University and UNICEF.
- [24] Miller, C., Tsoka, M., Reichert, K. (2008). *Targeting evaluation of the Mchinji Social Cash Transfer*. Report to the Government of Malawi and other stakeholders including UNICEF and USAID. Available online at <http://childresearchpolicy.org>.
- [25] Miller, C.(2009). *Economic Impact Report of the Mchinji Social Cash Transfer Pilot*. Draft.
- [26] Morduch J. (1999), "Between the state and the market: can informal insurance patch the safety net?" *World Bank Research Observer*, vol. 14, no. 2, pp. 187-207.
- [27] Overseas Development Institute (2001). Social Protection Concepts and Approaches: Implications for Policy and Practice in International Development. *Working Paper 143*, London.
- [28] Rosenzweig M. and Wolpin K. (1994), "Credit Market constraints, consumption smoothing and the accumulation of durable production assets in low-income countries: investments in bullocks in India", *Journal of Political Economy*; vol. 101, no.2, pp 223-244.
- [29] Tabor, S. (2002). Assisting the Poor with Cash: Design and Implementation of Social Transfer Programs. World Bank Social Protection Discussion Paper 0223.

- [30] Townsend R.M. (1994), "Risk and insurance in village India", *Econometrica*, vol. 62 (3), pp. 539-91.
- [31] Thomas J. and Worrall T., (1988), "Self-enforcing wage contracts", *Review of Economic Studies*, LV pp. 541-554.
- [32] White H. and Masset E. (2003), "The importance of household size and composition in constructing poverty profiles: an illustration from Vietnam", *Development and Change*, vol. 34(1), pp. 105-126.
- [33] Udry, C. (1994). Risk and insurance in a rural credit market: an empirical investigation in northern Nigeria. *Review of Economic Studies*, 61, 495-526.
- [34] UNAIDS, UNICEF, and USAID (2006). Africa's Orphaned and Vulnerable Generations. Children Affected by AIDS. UNICEF, New York.
- [35] UNDP. (2007). "Human Development Report 2007/2008." Available online at [Http://hdr.undp.org/en/reports/global/hdr2007-2008/](http://hdr.undp.org/en/reports/global/hdr2007-2008/). Accessed November 2009.
- [36] World Bank (2007). Malawi Social Protection Status Report, Report No. 40027-MW.