

**THE ROLE OF HOUSEHOLD ENVIRONMENT  
ON HEALTH OUTCOMES FOR  
FEMALE ADOLESCENTS IN KENYA**

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by

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**THE ROLE OF HOUSEHOLD ENVIRONMENT  
ON HEALTH OUTCOMES FOR  
FEMALE ADOLESCENTS IN KENYA**

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*I dedicate this work to the memory of my loving grandparents*

Lillian Nyambura Kinyua and Gerishon Muigai wa Karuga

Wacera Mburu and Mburu wa Kuona

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# **THE ROLE OF HOUSEHOLD ENVIRONMENT ON HEALTH OUTCOMES FOR FEMALE ADOLESCENTS IN KENYA**

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## **ABSTRACT**

Chronic illness has a profoundly negative impact on the welfare of households, especially for the adolescents who live there. Those who lack a social welfare safety net, particularly youth, are much more dependent on the capacities of individuals within the household. Therefore, to better understand how to improve the general welfare of households, it is important to understand what factors impact the social welfare and health status of households impacted by chronic illness. This dissertation reports on a study of how the capacities of Kenyan households impact the capacity of female adolescents to cope with chronic illness in the household.

The data for this dissertation came from the 2003 Kenya Demographic and Health Survey (KDHS) (Kenya Central Bureau of Statistics (CBS), Ministry of Health (MOH), & ORC Macro, 2004). The data includes detailed information on maternal and child health from Kenyan females' ages 15 to 49 years. The study focuses on adolescents aged 15 to 24.

The average age for this population was 19.39 years; those between the ages of 20 and 24 comprised nearly half (over 47%) of the sample.

The beginning hypothesis was that higher vulnerability and lower household coping capacity in female adolescents' environments lead to lower health status. This hypothesis was measured by a number of illness indicators within a discrete time period. Nearly 38% of the female respondents reported some form of illness, with significant positive correlation with age. Therefore, the study tested a number of relationships between the environmental factors and health status for this population, such as their exposure to life shock (death, chronic illness of family member) and their relationship to vulnerability to risk behaviors (Appendix 4). The refined hypothesis was that higher household resources could help lower these risks, but absence of parental guidance could increase it.

This study found a strong association between reported illness and environmental factors in the household. Age and marriage were highly significant factors, producing a sevenfold increase in the chance of illness. Risky sexual behavior, sexual abuse and violence were risk factors that were also significantly associated with illness in this adolescent population. Violence and abuse were related to a 14-fold increase in illness. Living in a rural area and limited household coping resources were also significantly associated with illness.

Key words: Coping capacity, adolescent vulnerability, risk and health outcome, Kenya

## TABLE OF CONTENTS

ACKNOWLEDGMENTS .....	ii
ABSTRACT .....	iv
Chapter One .....	1
Introduction.....	1
Background and Rationale.....	1
Conceptual Model.....	3
Ecological Theories .....	6
Regional Impact and Importance of Ethnicity .....	7
Trauma Theory.....	8
Research question .....	9
Hypotheses.....	10
Definition of Terms.....	11
Significance of the Study .....	12
Summary .....	14
Chapter Two.....	15
Review of the Literature .....	15
Adolescence .....	15
Household Coping .....	18
Vulnerability .....	19
Health Status .....	20
Place of Residence and Ethnicity.....	21
Summary .....	23
Chapter Three.....	25
Methodology .....	25
Data: Kenya Demographic and Health Survey (KDHS) .....	25
Survey Design.....	26
Participants.....	26
Data Analysis.....	27
<i>Dependent Variable</i> .....	27
Independent Variables .....	29
Demographic Variable.....	29
Risk Variables.....	30
Household Coping Capacity .....	31
HCC Demographic Characteristics.....	32
HCC Economic Characteristics .....	32
Chapter Four .....	35
Findings.....	35
Descriptive Analysis .....	35
Research Question Results.....	43
Interaction Effect by Age and by Residence of the Female Adolescent.....	48
Logistic Analysis .....	51
Interaction Effects by Age and by Place of Residence of the Adolescent.....	54
Chapter Five.....	58
Discussion, Recommendations and Conclusions.....	58



Discussion of the Findings.....	58
Theoretical Implications .....	62
Implications for Practice .....	63
Policy Implications .....	64
Study Limitations.....	65
Conclusion .....	66
References.....	68
Appendix.....	81
VITA .....	90

## TABLE OF APPENDICES

Appendix	Page
Appendix 1. Household Coping Characteristics.....	81
Appendix 2. Definition of Terms.....	82
Appendix 3. Variable Used in the Models.....	83
Appendix 4. General Regression Models .....	87
Appendix 5. The OLS Regression Model.....	88
Appendix 6. The Logistic Regression Model .....	89

## TABLE OF FIGURES

Figure	Page
Figure 1. Adolescent Social Environment .....	4
Figure 2. Relationship between Kenyan Female Adolescents Health and Environment .....	6

## TABLE OF TABLES

Table	Page
Table 1. HIV/AIDS Infected Population Prevalence in Kenya (2003).....	8
Table 2. Reliability Analysis of Self Reported Incidence of sickness-(SRIS) .....	28
Table 3. Reliability Analysis of Any Violence or Abuse to the Adolescent (VioAbu).....	31
Table 4. Descriptive Statistics for Variable Used in Analysis.....	38
Table 5. Indicators of Household and Female Respondent (age 15-24) Status .....	39
Table 6. Correlation for Variable Used in the Analysis.....	40
Table 7. Indicators of Risky Sexual Behavior and Female Respondent (age 15-24) Status .....	41
Table 8. Indicators of Reported Illness and Female Respondent (age 15-24) Status .....	42
Table 9. Results for Self Reported Incidence of sickness-(SRIS) OLS Regression.....	46
Table 10. Results for Self Reported Incidence of sickness-(SRIS) OLS Regression with 2 Way Interaction Effects .....	50
Table 11. Logistic Regression Results for Adolescent Self Reported Illness.....	53
Table 12. Logistic Regression Results for Adolescent Self Reported Illness with 2 Way Interaction Effect .....	56
Table 13. Logistic Regression Results for Adolescent Self Reported Illness with 2 Way Interaction Effect and Contrast .....	57

# Chapter One

## Introduction

As adult morbidity and mortality rates continue to increase due to HIV/AIDS in many parts of Kenya, the strength of family support systems can be expected to decline (Foster, 2000; Kenya Central Bureau of Statistics (CBS) et al., 2004). As adult mortality rates increase, the number of supportive family members has decreased, weakening the extended family network (Seeley et al., 1993). For many children and adults in Kenya, the extended family is the only social safety net available. The extended family is very important for the protection and development of children and adolescents (Seeley et al., 1993). An increase in the morbidity rate for the adult population in a community also decreases the economic resources available to those impacted families. Extended family members usually take over the caring responsibilities when a child's biological parents are no longer alive or not able to provide them support. Unfortunately the support potential of extended families has been affected by HIV/AIDS; the capacity of communities throughout Kenya to provide care for vulnerable children has been eroded (Ankrah, 1993; Foster, 2000; Vartanian & Buck, 2005).

### ***Background and Rationale***

The latest statistics from the World Health Organization reveal that 39.5 million people worldwide are living with HIV/AIDS; more than 4.9 million people became infected in 2004; an estimated 3.1 million people have died from HIV-related

complications (UNAIDS/WHO, 2004a). In Kenya, by 2004, HIV had infected about 1.2 million people and an estimated 150,000 have died due to HIV/AIDS.

These high numbers of deaths leave behind a large number of children (Akukwe, 1999; UNAIDS, UNICEF, & USAID, 2004). The estimated number of Kenyan children who have lost one or both parents to AIDS was about 650,000 in 2004 (the estimate ranges from 430,000 to 930,000) (UNAIDS/WHO, 2004b). The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimate of the number of orphans originally included only those under 17 years of age; later they began using the age of 18 as the upper limit for these estimations, pushing the estimate of the number of AIDS-related orphans in Kenya to 1.7 million children, 11% of the total population of children (UNAIDS et al., 2004).

This study has examined the health status of vulnerable adolescents and young adults under the age of 24. The average age in Kenya has continuously declined because of the high death rate and increases in the total fertility rate to 4.1, resulting in a population in which nearly half (45%) of the population is under the age of 15 (Kenya Central Bureau of Statistics (CBS) et al., 2004). These adolescents have a lower rate of life expectancy because of high rates of HIV/AIDS infection (Nyaga, Kimani, Mwabu, & Kimenyi, 2004).

Even if we were able to prevent any new HIV infection this year, the AIDS epidemic would have a long-lasting impact. The sheer scale of HIV-related deaths and infections in Kenya affects the country on all levels of development. For example, adolescents in households affected by HIV/AIDS often experience a loss in their ability to earn an income due to their lower educational attainment, the disintegration of their

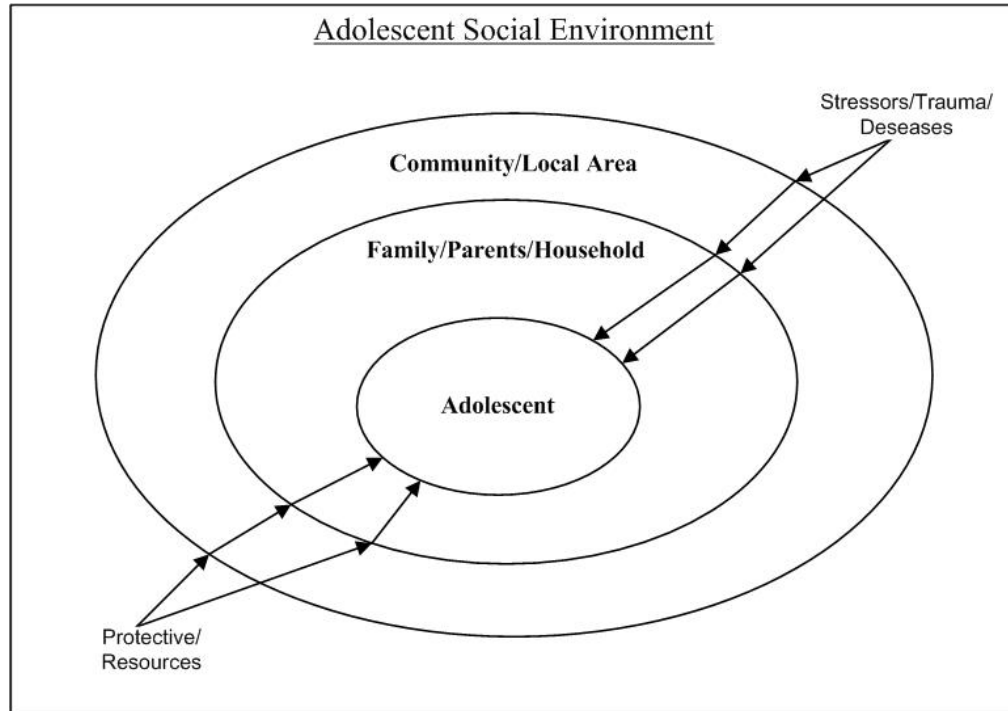
families, isolation from their local communities, and consequent negative health outcomes (Blum, 1998; Call et al., 2002; LaFraniere, 2005b; Nyambedha, Wandibba, & Aagaard-Hansen, 2003a).

The purpose of this study is to investigate the impact of family environment on the vulnerability and self-reported health outcomes of female adolescents in Kenya (Baer, 2002; Bronfenbrenner, 1986; Earls & Carlson, 2001; Liddle & Hogue, 2000). The developmental-ecological theory will inform this research on the effects of the environment on adolescent's health (Baumeister & Leary, 1995; Bogenschneider, 1996; Bronfenbrenner, 1986; Cassel, 1976; Cobb, 1976; Evans, 2004). This theoretical framework connects social, biological and physical factors for coping with health risks in the vulnerable adolescent population.

### ***Conceptual Model***

This study was guided by the theoretical framework of the ecological perspective to understand adolescents' lives in Kenya (Govender & Moodley, 2004; Hogben et al., 2005). These vulnerable adolescents are affected through psychological stresses (personal identity crisis, the need to develop life skills) as well as physical stresses (managing their own health) and social stresses (managing chronic health issues of other family members) (Earls & Carlson, 2001; Woods, 1992). This research is further informed by several developmental, ecological, and trauma theories (Hogben et al., 2005; Macready, 1999).

**Figure 1. Adolescent Social Environment**



This study begins with the premise that families meet the psychosocial and developmental needs of children and hypothesizes that the healthy bond between family members will improve their health outcomes (Govender & Moodley, 2004; Hogben et al., 2005). Trusted relationships between adolescents and their parents improve survival skills and generate a better quality of life (Ankrah, 1993; Bhargava & Bigombe, 2003; Bolton & Wilk, 2004; Eke, 2003). When one or both of the parents die or are faced with chronic illness, adolescents are left to face developmental and survival issues on their own (Earls & Carlson, 2001; LaFraniere, 2005b).

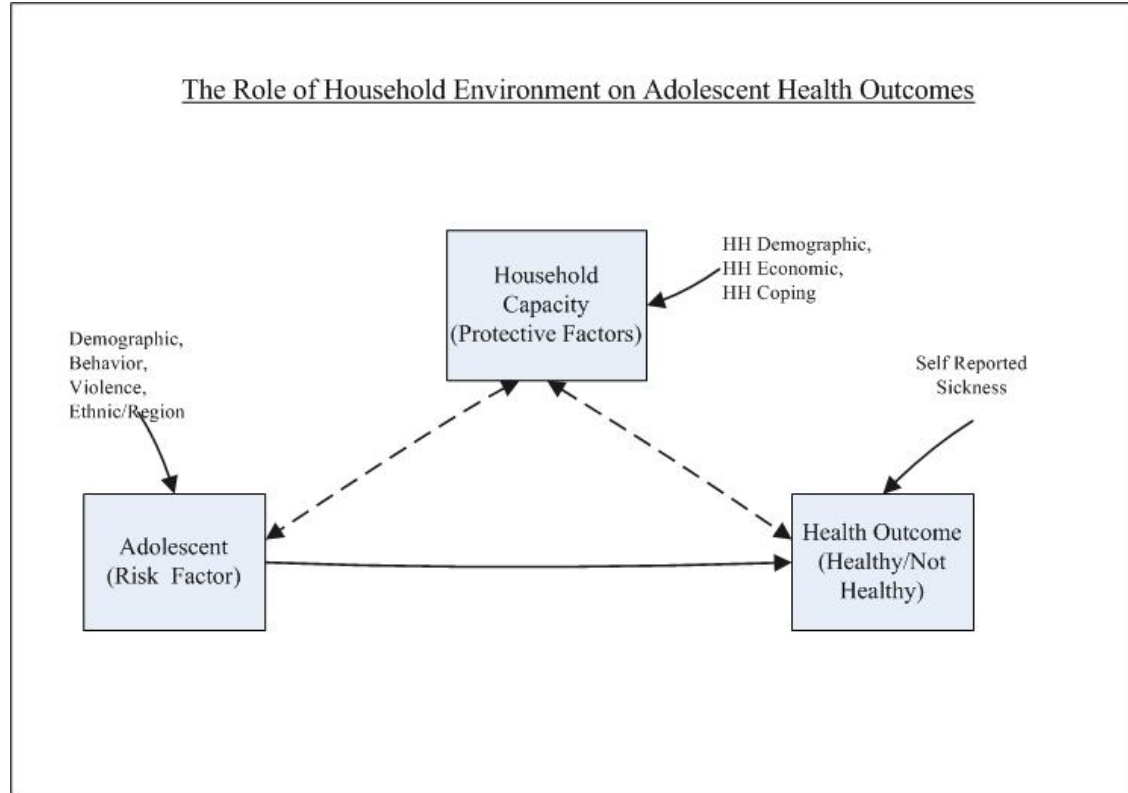
This study focused on female adolescents and their exposure to life shocks (death or chronic illness of family member), which could lead to vulnerability to health risks. These life shocks were expected to lower household resources, which would, in turn, increase their risk for illness. The model assumed that households headed by adults provide a better protective environment for household members than households headed



by adolescents (Bogenschneider, 1996). The type of household the adolescent lives in could affect his or her health risk. The model also assumes that these adolescents are still going through a development stage and may have poor survival life skills. If the parent or guardian is absent or impaired due to chronic disease, there might be some role reversal (Alexander, 2003; King & Mallinckrodt, 2000), resulting in the adolescent taking a leadership role in the family. This change in roles might lead to arrested development and, consequently, poor survival skills and increased health risks. Bronfenbrenner's ecological model (Bronfenbrenner, 1977) suggests that the adolescent develops within a context or ecology (household and place of residence); trauma theory (Cicchetti, Toth, & Maughan, 2000; van der Kolk, 1986) suggests that life shocks increase the chances of vulnerability, especially for adolescents.

The study uses the following model (Figure 2) to investigate the reported illness of female adolescents related to their environment.

**Figure 2. Relationship between Kenyan Female Adolescents Health and Environment**



### ***Ecological Theories***

The ecological approach to human development has its roots in Bronfenbrenner's early work (Bronfenbrenner, 1977). Bronfenbrenner describes four levels of environment affecting the development of a child. Microsystems include the immediate environment, complex relationships between the individual and the environment in his or her settings. Mesosystems encompass interactions among the settings containing the developing individual. Exosystems are the informal and formal social structures that may not contain the individual, but operate at an immediate level, such as the school, the community, and the larger culture. Macrosystems encompass social, economic, educational, legal, and political systems, as an umbrella including all other systems (Bronfenbrenner, 1977, 2005; Cowen, 2000).

The ecological system theory posits that problems or lack of resources in the family or household will affect members in that household. When those individual members are children or adolescents who are still developing, we would expect their health to be affected. In a country such as Kenya, the family's community also may have an effect on the health outcomes of adolescents because of their cultural influence on behaviors (Earls & Carlson, 2001; Tinsley, Lees, & Sumartojo, 2004).

### ***Regional Impact and Importance of Ethnicity***

Highlighting Kenya's administrative boundaries and the distribution of ethnic groups is important because social and economic development follow these distributive boundaries. There are obvious vast differences in vegetation and development from one part of the country to another. Much less visible are the vast cultural differences that influence perception and behavior. There are considerable differences between urban and rural areas because of the population distribution between and within provinces. Table 1 shows those variations in population and HIV prevalence by province in Kenya. Social indicators, such as child mortality rates, women's educational attainment, and literacy rates may not fully explain the differences in HIV rates without also examining the very strong cultural influences (Katz, 2002; Malcarne, Drahota, & Hamilton, 2005; Swezey). Katz (2002) suggests that individual behavior cannot account for the difference in HIV/AIDS rates between regions and suggests researchers examine poverty and the economic environment in order to better understand these differences. There also has been a "feminization of HIV/AIDS" due a to the disproportionately high new infection rate for women (Dworkin & Ehrhardt, 2007). For example, the ratio of women to men with HIV/AIDS in Kenya is 2:1 (Central Bureau of Statistics (CBS), Ministry of Health

(MOH), & ORC Macro, 2004b). These statistics are driving a new focus on gender relations, economics, and migration for policymakers to reduce the highly disproportionate rates of infection (Dworkin & Ehrhardt, 2007).

**Table 1. HIV/AIDS Infected Population Prevalence in Kenya (2003)**

Province	Total Population	Rural Population	Urban Population	Rural Infected	Urban Infected	Total Infected	Province Prevalence %
Central	2,002,932	1,252,282	750,650	81,962	64,581	146,542	7.3
Coast	1,404,333	743,014	661,319	29,867	75,272	105,139	7.5
Eastern	2,378,760	1,675,825	702,935	91,103	49,338	140,442	5.9
Nairobi	1,436,914	-	1,436,914	-	172,430	172,430	12.0
North	541,643	404,734	136,939	16,189	2,739	18,928	3.5
Eastern							
<b>Nyanza</b>	<b>2,203,503</b>	<b>1,303,006</b>	<b>900,497</b>	<b>246,282</b>	<b>198,543</b>	<b>444,825</b>	<b>20.2</b>
Rift	3,384,911	2,734,937	649,974	128,880	48,981	177,861	5.3
Valley							
Western	1,694,571	1,147,032	547,539	89,900	60,014	150,004	8.9
Total	15,047,597	9,260,830	5,786,767	684,273	671,898	1,356,171	9.4

Source: Kenya National AIDS/STD Control Programme (2003)

### ***Trauma Theory***

Trauma theory holds that victimization effects correlate with the degree of victimization. Loss of parental protection may expose adolescents to abuse, violence and psychological trauma (Lachman et al., 2002; Maman, Campbell, Sweat, & Gielen, 2000). Maman and his colleagues (2000) reviewed 29 studies that looked at the relationship between HIV/AIDS and violence and suggested that additional prospective studies should describe how violence victimization could increase a woman's risk for HIV and how being HIV-positive or having AIDS could affect violence risk (Dworkin & Ehrhardt, 2007).

Trauma theory grew out of war trauma studies and was found to have explanatory power for a variety of traumatic events (Cicchetti et al., 2000; van der Kolk, 1986).

Trauma theory suggests that those who have a greater exposure (multiple or prolonged

exposure) to traumatic events show more posttraumatic symptoms than those with less exposure (few or short exposure) and may display Post-Traumatic Stress Disorder (PTSD) symptoms for longer periods. This theory suggests a difference in how an individual who sees a loved one die suddenly experiences the trauma compared with those who lose a loved ones slowly, over a period of time.

Trauma can have lasting developmental consequences for children and adolescents. Children who have experienced abuse or traumatic events may have delays or deficits in their ability to achieve age-appropriate behavioral, cognitive and emotional regulation (DeBellis, 1999). The effect of traumatic consequences include signs and symptoms of PTSD, such as intrusive re-experiencing of the trauma, persistent avoidance of traumatic triggers, numbing of responsiveness and persistent symptoms of increased arousal (Achenbach, 1990; American Psychiatric Association, 1994). Traumatic stress may have an effect on the development of biological systems, leading to various types of psychopathology commonly seen in abused children (Cicchetti et al., 2000; Cobb, 1976; Compass, Howell, Phares, Williams, & Giunta, 1989; DeBellis, 1999). Trauma and stress have been associated with increased health problems and with the reduced ability to fight diseases (Keirle & Thomas, 2000).

### ***Research question***

There are no published statistics on the number of adolescent-headed households or the number of households with children in foster care in Kenya. However, it is logical to assume that the number could be quite high and increasing, due to the high mortality rates of HIV/AIDS. It is important to monitor and track these statistics, due to the impact they can have on local communities and the country as a whole. The data collected so far have

been limited and the definition of the target population was outside the range of most the respondents in health and demographic surveys. In 2004, UNAIDS changed its method of estimating orphans worldwide by increasing the age of adolescents from under 17 years to under 18 (UNAIDS et al., 2004; UNAIDS/WHO, 2004b).

The current study investigated the health risks of female adolescents as the outcome of both their household environment and their individual characteristics. It was expected that there would be some differences among regions in the country and ethnicity.

Ethnicity should capture cultural practices and factors that may influence behavior that affect the risk of sexual and other abuse. The driving question is whether, during the adolescent developmental period, protective household environments help adolescents to develop the survival skills needed to reduce the incidence of illness. The age of the child and his or her relationship with the head of household may be additional factors that enable adolescents to survive on their own. Young adults learn to do many things on their own to reduce their vulnerability; the more they do, the more resilient they become in the face of trauma (Liddle & Hogue, 2000). Household capacity can create a protective factor and reduce health risks.

### ***Hypotheses***

Based on the literature review and conceptual models described above, this study tested a number of relationships between the health outcomes of female adolescents and their environment when exposed to life shocks such as death or the chronic illness of a family member. The overall hypothesis is that higher household resources help lower health risks, but the absence of parental guidance increases these risks. The following specific hypotheses will guide the research:

1. There is difference in self-reported incidences of illness between younger female adolescents and young adults.
2. Higher levels of risky sexual behavior and other risk factors will increase incidence of self-reported illness.
3. Higher household coping capacity will lead to lower incidence of self-reported illness.

### ***Definition of Terms***

*Adolescent:* The research examined Kenyan female adolescents between the ages of 15 and 24. This research examined two groups of adolescents in the study; late adolescents (15-19 years of age) and young adults (20-24 years of age).

*Coping capacity:* Coping capacity refers to ways in which people and organizations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions in a disaster event or process. The strengthening of coping capacities usually builds resilience to withstand the effects of natural disasters and other hazards. To capture the household resources, the *household coping capacity (HCC)* was calculated (Subbarao & Coury, 2004). HCC is an index measure that can capture the extent to which resources provide for its household members. Higher scores on the index signify lower household coping capacity. Each additional increase in score of the index indicates the lowering of coping resources.

*Health Status:* Health risk is defined by the number of adverse events that affect adolescent health. To check for the health outcome, the frequency of self-reported illness was used.

*Provinces and districts:* Provinces and districts are administrative areas in Kenya that closely correlate with ethnic boundaries.

*Risk:* Risk is a combination of the probability or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence. More specifically, a risk was defined as the probability of harmful consequences or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards.

*Vulnerability:* Vulnerability is the degree of fragility of a person, a group, a community or area in terms of defined hazards. In a broader sense, vulnerability defines a set of conditions and processes resulting from physical, social, economic and environmental factors, which increase the susceptibility of an individual to the impact of these hazards. Vulnerability is further determined by the potential of an individual or household to withstand a disaster or stressful event/illness and the resources (physical, social, economical and environmental) they have available to withstand those events (coping capacity).

The United Nations defines a vulnerable child as "a child below the age of 18 who has been abandoned, orphaned or exposed to extreme physical or moral danger" (UNAIDS et al., 2004). For this research the definition is expanded to include adolescents between the ages of 10 and 24 years.

### ***Significance of the Study***

The importance of investigating the health risks of adolescents in Kenya is heightened by the continuing increase in the number of orphans and foster children.



Adolescents need social and parental support to successfully develop (DeBellis, 1999; Taussig, 2002). Children growing up in households with limited resources due to chronic illness and death may face many challenges that could affect their development (March, Amaya-Jackson, Murray, & Shulte, 1998; Perrin, Smith, & Yule, 2000). These challenges may include difficulty in obtaining food and shelter; serious threats to their education due to poverty; a higher risk of being sexually abused by neighbors and relatives; child prostitution, child labor and life on the street (LaFraniere, 2005b; Lalor, 2004; Nyambedha et al., 2003a).

Children living in households headed by an adolescent may struggle to have births registered and to obtain proper health care, social security and other state resources. Customary rules of inheritance make children vulnerable to losing their houses and land. Property grabbing by families and communities who seize the land, cattle, and other assets when the head of the household dies is linked to the spread of HIV/AIDS across Africa (Foster, 2000; Sarigiani, Ryan, & Petersen, 1999; UNAIDS et al., 2004).

Simple survival and caring for siblings creates very real practical problems for adolescent primary caregivers who are still undergoing the transition to adulthood. Focusing on these practical issues can sometimes hide the less obvious deprivations and needs of children growing up in households headed by adolescents, including the psychological trauma of observing a parent's terminal illness and grieving the loss of a parent, as well as the need for love and security and adult guidance and mentoring. These issues have influenced some of the policy work that is now being considered to help meet both the social and physical needs of children living in households headed by adolescents (Children Rights Division, 2001; Nyambedha et al., 2003a; Seeley et al., 1993).

### *Summary*

This research investigated the role of the household environment on Kenyan adolescents' health risk. The research attempted to identify the relationship between household coping capacity and factors that may lead to negative effects on adolescents' health in Kenya.

## Chapter Two

### **Review of the Literature**

Parental support and the protective nature of the family on human children is a universally accepted concept. Parental support allows children the time to properly adjust to adulthood (V. E. Cree, H. Kay, E. K. M. Tisdall, & J. Wallace, 2004a; Govender & Moodley, 2004). The family becomes part of the adolescents' ecology that impacts them in their developmental period. Children who live in most parts of Africa grow up with the additional support system of an extended family (Daniel, Wassell, & Gilligan, 2000; Deininger, Garcia, & Subbarao, 2003; Foster, 2000). The purpose of this study was to investigate the relationship between female adolescents in Kenya and factors in their household environments that could influence their health status outcomes. This literature review considers current research in household/family factors, adolescent development, vulnerability, and health outcomes in Kenya.

### ***Adolescence***

Adolescence is the developmental period that serves as the bridge between childhood and adulthood. This period involves rapid physical and psychological growth and provokes changes in social functioning (Baumeister & Leary, 1995; Coughlan, Coughlan, & Jameson, 1996). This developmental period also allows for the testing of new behaviors and roles. Effective coping skills and coping resources, such as social support, can mitigate the potentially harmful effects of stress. However, when coping strategies and resources are inadequate, stressful situations may produce negative physical, cognitive or behavioral outcomes and can lead to the onset of a host of

psychological, physical, and other problems (Compass et al., 1989; Cross, 2001; Hogben et al., 2005; Klein-Hessling, Lohaus, & Ball, 2005). Therefore, the development of effective skills and resources to cope with stressors is crucial for adolescents' successful adaptation to the environment. Further study in the area of adolescent coping is warranted (Coughlan et al., 1996; Macintyre, Rutenberg, Brown, & Karim, 2004; Silberschmidt & Rasch, 2001).

Adolescents orphaned by HIV/AIDS may have arrested development of social skills and education (Eaton, Flisher, & Aaro, 2003; Govender & Moodley, 2004; Harrison, Xaba, Kunene, & Ntuli, 2001; Hogben et al., 2005; Macintyre et al., 2004; Malaka, 2003; Meyer-Weitz, Reddy, Van den Borne, Kok, & Pietersen, 2000; Pratt, Obeng-Quaidoo, Okigbo, & James, 2000; Silberschmidt & Rasch, 2001). The stress and trauma of witnessing their parents' lingering illness and death may permanently damage their emotional development (V. E. Cree, H. Kay, K. Tisdall, & J. Wallace, 2004b; Peltzer, 1999; Traut et al., 2002). The shock of being rejected by the community because of stigma associated with HIV/AIDS and the despair of having to fend for themselves at a very early age may also add to the trauma (Cree et al., 2004b; Macintyre et al., 2004). Lack of financial support normally provided by parents or guardians may also force them to drop out of school. This lack of education can increase their level of vulnerability. If the adolescent is the head of the household, health care decisions will affect other members in the home (Keirle & Thomas, 2000; Malherbe, 2002). Youth, inexperience, lack of knowledge about signs and symptoms of some illnesses, uncertainty about where to seek help, fear of stigma or embarrassment, and influence of gender considerations can affect the entire household (Coughlan et al., 1996; Malaka, 2003; Pratt et al., 2000).

Adolescents' knowledge and life skills can affect their ability to seek help from individuals and organizations around them (Meyer-Weitz et al., 2000; Snell, 2002). Their help-seeking behavior and their healthcare-seeking behavior could be affected at different levels by a web of individual and societal factors (Meyer-Weitz et al., 2000; Meyer-Weitz, Reddy, Weijts, Van den Borne, & Kok, 1998). Meyer-Weitz and colleagues (2000) investigated adolescents' delayed health care-seeking behavior in a sample of 292 patients with sexually-transmitted disease symptoms. The adolescents' early health care-seeking behavior was linked to their perception of the seriousness of STDs and the absence of self-treatment prior to seeking care.

Although adolescents may seek help for common illnesses, such as malaria or upper respiratory tract infections, they may be less likely to seek help for sexual and reproductive health complaints (Cicchetti et al., 2000; Jejeebhoy, 1996; WHO, 2001). Many are very sensitive to seeking help for conditions that are related to social stigma, such as mental health problems or diseases that affect their appearance (Senderowitz, 1999, 2000). Many complaints are treated without consultation; a large number of adolescents make use of pharmacies and other sources of help (Cicchetti et al., 2000; WHO, 2000, 2001). The World Health Organization (WHO) Consultative meeting on adolescent health (WHO, 2001) highlighted problems for help-seeking behavior in youth and how their environment affects those behaviors. The WHO (2001) also underscored the importance of adolescent developmental issues that affect their access of health care and negative experience at the health care facility, their knowledge of their illness, and community characteristics.

The WHO defines an adolescent to be a child between the ages of 10 and 19 years of age. Arnett (2004) extended the idea of adolescence to include "emerging adulthood." He defines "emerging adults" as those between 18 and 25 years of age (Allison, 2002; Little & Rubin, 1987; Tabachnick & Fidell, 2007).

### ***Household Coping***

To understand the ecological impact of HIV/AIDS and other ecological factors on adolescents, one must consider the household in which they live (Cross, 2001; Earls & Carlson, 2001; Seeley et al., 1993; Woods, 1992). Households with very sick members and/or those who have experienced death will have some or all of its resources depleted (Dieden & Gustafsson, 2003; Malcarne et al., 2005). Households that have seriously ill parents or those in which parents have died have changing definitions of the head of the household (Onyango-Ouma, Aagaard-Hansen, & Jensen, 2005). This change in head of household may also result in a change in the resource level available and the capacity to manage those resources. Adolescents whose caregivers are terminally ill often become the head of the household (Preble, 1990; UNAIDS et al., 2004) when their parents become too sick to do what was necessary to maintain the household (Deininger et al., 2003; Kamali et al., 1996). This position of responsibility may make them as vulnerable as those adolescents who have already lost their primary caregiver (Ankrah, 1993; Govender & Moodley, 2004; Miller & Murray, 1999). Some of these adolescent heads of households may themselves be infected by HIV/AIDS.

Most orphaned children are absorbed into extended family and community networks (Foster, 2000). However, as HIV/AIDS takes its toll among the adult population, many households become less able to raise this generation of orphans. The

impact of HIV/AIDS has a different impact than other disasters, such as drought and famine, because of the incremental nature of the epidemic. Over time, HIV/AIDS wears down the household and the resources in extended families. The African extended family does not have an infinite capacity to care for orphans, especially when the number of adult family members are declining rapidly in some communities (Ankrah, 1993). The role of the extended family as a safety net and assumptions that relatives will be ready and able to assist extended family members should be reexamined, given the changing demographic environment in Kenya (Seeley et al., 1993; Wax, 2003).

This study examined the changes in the context of distinct ethnic groups because of the unique cultural practices that have affected the ways children have become orphans. These cultural practices have also affected the way these communities have responded and are coping with the need to parent this group of children. The community they live in influences these households. Wife cleansing and rape of young children are practices influenced by culture (Bernstein & Van Rooyen, 1994; Earls & Carlson, 2001; Eaton et al., 2003; Leclerc-Madlala, 2002a).

### ***Vulnerability***

Vulnerable adolescents can be defined as those who are most at risk of facing increased negative outcomes (Pillai, Sunil, & Gupta, 2003). Although HIV/AIDS is currently a major cause of death among the adult population in Kenya, it may be totally inappropriate to distinguish orphans by the nature of the death of their parents (such as AIDS orphans). It will necessary for this research to distinguish the impact on the stigma of HIV/AIDS (Cree et al., 2004b; UNAIDS et al., 2004). Due to the infectious nature of HIV/AIDS and lack of knowledge about the disease, stigma may spread to other

members of the family. Although all Kenyan adults have heard of AIDS, 49% of women and 35% of men surveyed had inaccurate knowledge about HIV transmission (Central Bureau of Statistics (CBS) et al., 2004b).

The degree and type of vulnerability faced by adolescents are shaped by risk and stress characteristics (the magnitude, frequency, duration, and history) to which they (but also the households and communities) are exposed. They tend to vary between countries and over time (Grinspun, 2005; Harrison, Xaba, Kunene et al., 2001). The level of HIV prevalence within a region will shape the degree of vulnerabilities faced by adolescents as well as the phase of the epidemic in the region (Leclerc-Madlala, 2002a; Swezey). East and South African countries have witnessed high prevalence rates as well as higher levels of vulnerabilities for children (Grinspun, 2005; Lalor, 2004; Leatherman, 2005; Luginaah, Elkins, Maticka-Tyndale, Landry, & Mathui, 2005). A number of these areas have seen an increase in child prostitution and child laborers.

### ***Health Status***

The health status of household members depends on their resources and environment; it may also be influenced by historical, social, and economic circumstances (Earls & Carlson, 2001). Women are impacted differently because of social factors (Jewkes, Levin, & Penn-Kekana, 2003; Koenig et al., 2004; Lalor, 2004; Swezey, 1993). For example, some cultures practice female genital mutilation, force women to marry at a young age, and do not allow women to inherit property. Others force women to be inherited when their spouse dies (Dworkin & Ehrhardt, 2007; Kamei-Mbote, 1995; LaFraniere, 2005a; Luginaah et al., 2005). Masculine cultural norms have also been used as excuses for violence against women.



The breakdown or perceived lack of parental safety nets can lead adolescents to choose risky behaviors (Eke, 2003; Govender & Moodley, 2004; Harrison, Xaba, Kunene et al., 2001; Silberschmidt & Rasch, 2001). Silberschmidt and Rasch, (2001) showed that Tanzanian adolescents engaged in risky sexual behavior leading to early pregnancy, induced abortions and an increase in HIV infections. Harrison and colleagues (2001) confirmed the behavior of South African adolescent (14-15 years old) girls with multiple partners, relationships with older men, sex for money, and coercive sex.

Rural and street children in urban areas engage in behaviors that increase their vulnerability due lack of parental guidance (Lalor, 2004; Meyer-Weitz et al., 2000). Sexual relationship with older adults expose these adolescents to STDs (Silberschmidt & Rasch, 2001). Early sexual activity among adolescent girls often results in early pregnancy (Harrison, Xaba, & Kunene, 2001; Lalor, 2004; Lawson, 1999). Poverty and lack of resources results in many adolescents exposing themselves to serious health risks, including induced abortion, without realizing their vulnerability (Othieno, Obondo, Kathuku, & Ndeti, 2000).

These vulnerable children also engage in other activities that affect their health, such as substance abuse (Eke, 2003; Lalor, 2004). Mental health factors may affect these children who live alone, thus increasing their vulnerability to abuse and violence against them (Bernstein & Van Rooyen, 1994; Edwards, 2002; Leclerc-Madlala, 2002b).

### ***Place of Residence and Ethnicity***

Community characteristics, including cultural norms, can affect the health status of adolescents (Earls & Carlson, 2001; Moen, Elder, Lèuscher, & Bronfenbrenner, 1995; Voeten, Egesah, & Habbema, 2004). Some regions have easier access to health care than

others. Regional differences in the access to health facilities may depend upon location and the type of health problem faced by the individual. Rural and urban residents can choose from a range of modern medicine when a health facility is nearby, but cultural practices may push them to the local traditional healer (Keirle & Thomas, 2000; Mbiti). For those who choose to use modern medicine, the cost of services, the income of the adolescents and the degree of illness may affect the way help is sought and may be important contributing factors in health status outcomes (Glynn et al., 2001; LaFraniere, 2005a).

In western Kenya, for example, the Luo people are found mostly in the Nyanza province (this group extends to Uganda and Tanzania). The Nyanza province has the highest rate of prevalence of HIV/AIDS in Kenya. This high prevalence rate has been associated with some Luo cultural practices. One of those practices is the “wife inheritance” practice, which has been blamed for the high infection rate (Dada-Adegbola, 2004; Glynn et al., 2001). This practice has been long embedded in the patrilineal kinship structure of the Luo people. It involves a compulsory marriage of the widow to a brother or cousin of her deceased husband. In cases where no man from the extended family is found to be willing or appropriate to “inherit” the widow, it is not uncommon for the clan to “hire” an outsider to perform the ritual (Dada-Adegbola, 2004; Glynn et al., 2001). The ritual involves being “inherited” or having sexual intercourse with a hired professional to fulfill the traditional Luo customs. Since it is not traditional to use a condom in these cultural practices, these liaisons can transmit HIV. The Luo men also have multiple wives, which has made the virus easily spread among the Luo and led to the large number of infected people. If a widow refuses to participate in the tradition, she is outcast from the

clan and community (Auvert et al., 2001; Weiss, Quigley, & Hayes, 2000). Her status will also affect how her children interact with other members of the extended family.

Circumcision is another cultural factor that differentiates the Luo from the other African groups in Kenya. Many Kenyan groups use it as a rite of passage to adulthood. The Luo are one of the very few groups in Kenya that do not circumcise their males as a rite of passage. A number of recent research studies have associated the lack of circumcision with higher rates of HIV/AIDS (Johnson, 2006; Meier, Bukusi, Cohen, & Holmes, 2006; UNAIDS/WHO, 2004a). A number of randomized controlled trial studies in Kenya and Uganda have now shown a link between male circumcision and lower rates of HIV infection (Atashili, 2006; Auvert et al., 2001; Auvert et al., 2006; Bailey et al., 2007; Caldwell & Caldwell, 1993; Gray et al., 2007; Meier et al., 2006; Siegfried et al., 2007). Male circumcision and “wife inheritance” could be having a confounding effect on HIV/AIDS rates for the Luo. These cultural practices among the Luo community may be associated with the higher levels of HIV/AIDS prevalence in the Nyanza province. In 2004, the region had an estimated 35% prevalence rate compared with a 6.9% prevalence rate for Kenya as a whole.

### ***Summary***

Based on the review of the literature and conceptual models described, this study tested a number of relationships between environmental factors and health outcomes for female adolescents in Kenya. The relationship between adolescents’ exposure to a life shock such as death or the chronic illness of family member and their vulnerability to behaviors that put them at risk for illness was tested. Higher household resources may

help lower health risk, while the absence of parental guidance could increase it. Regional differences were anticipated, due to the varying cultural landscape of the country.

Adolescents' ability to cope depends on the environment in which they live. Children orphaned by HIV/AIDS or given up due to economic or other reasons have different coping strategies. If they become the head of the household due to parental death, their limited life experience may affect all members in that household.

## **Chapter Three**

### **Methodology**

This study uses secondary data analysis to explore the relationship between the household environment of Kenyan female adolescents and their health to determine what factors impact their health. The study uses data from the 2003 Kenya Demographic and Health Survey (KDHS) (Arnett, 2004). The variables selected from this dataset include 1) individual demographic information (age, marital status, education, place of residence, ethnicity, relationship with head of household), 2) the household coping capacity (HCC) (Demographic, Economic and Coping Characteristics Indices), 3) risk factors (risky behavior, incidence of violence) and 4) self-reported incidence of illness reported within two weeks of the survey. Statistical analyses used to examine the data include descriptive statistics and multiple linear regressions. SPSS statistical software was used to conduct the analysis for this study.

#### ***Data: Kenya Demographic and Health Survey (KDHS)***

The 2003 Kenya Demographic and Health Survey (KDHS) is the latest in a series of national level population and health surveys to be carried out in Kenya in the last three decades. The 2003 KDHS was designed to provide data to monitor the population and health in Kenya. It serves as a follow-up to the 1989, 1993, and 1998 KDHS surveys (Central Bureau of Statistics (CBS), Ministry of Health (MOH), & ORC Macro, 2004a).

The 2003 KDHS was the first survey in the Demographic and Health Surveys (DHS) program to cover the entire country, including the North Eastern Province and other northern districts that had been excluded from prior surveys. The survey collected

demographic and health information on issues related to women of reproductive ages (15-49) and from men age 15-54 years in the households selected in the country.

### **Survey Design**

The 2003 KDHS surveyed 9,865 households to represent Kenya as a whole, including urban and rural areas and eight provinces. The survey used 400 clusters selected from enumeration areas developed for the 1999 population census; 129 urban and 271 rural areas were selected from the master frame. All interviewed women were either usual residents of the households in the sample or visitors present in the household on the night of the survey. In addition, in every second household selected in the survey, the men were interviewed

### ***Participants***

The research study assumed a Kenyan adolescent's age range to be between 10 and 24 years old. The KDHS sampled women from 15 to 49 years; this study examined data for those respondents between 15 and 24 years of age.

There were a total of 8,195 women interviewed in the KDHS. Using the adolescence definition, the sample was reduced to 3,547. Of these, 1,856 (52.3%) were between 15 and 19 years of age. Of the 2,377 male-headed households, 8.9 % were headed by adolescents. Among the 1,172 female-headed households, 20.8 % were headed by adolescents. The majority of the sample respondents (2,635 or 74.3.5%) lived in rural areas and the mean number of household members per household was 5.81 (SD 2.879). Throughout Kenya, women had a higher HIV prevalence rate than men with a female-male ratio of almost 2 to 1. The prevalence rates were higher in urban areas than in the

rural areas. Nyanza province had the highest HIV/AIDS infection rate in the country, 15.1%.

### ***Data Analysis***

All the variables in the analysis were screened for missing data and normality. The relationships between the variables were explored and the scales were tested for reliability within the newly created variables.

The data were screened for missing values using the Frequencies option in SPSS. A small number of missing values were identified, which appeared to be scattered randomly. Group means were calculated based on the available data and used to replace the missing values as recommended by statistical recommended techniques (Chatterjee, Bailey, & Aronoff, 2001; Nyambedha, Wandibba, & Aagaard-Hansen, 2003b).

The data were screened for normality using the EXPLORE option in SPSS. The variables were screened for measures of skewness and kurtosis using histograms. Skewness and kurtosis were not extreme. However, moderate skewness was associated with some variables. The histograms of the variables similarly indicated normal distributions for most variables, with skewness for some.

### ***Dependent Variable***

The dependent variable was an index variable created from self-reported incidence of illness in the last two weeks of the respondents. Self Reported Incidence of Sickness (SRIS) was an index variable that was created from 14 variable items from the 2003 KDHS survey. Reliability and factor analysis were carried out to find common factors from multiple variables in the survey. There were 14 variable in the SRIS measure that

were reduced to a few measurable factors. This reduction helped in the final hypothesis analysis.

Reliability analysis of the illness survey items was carried out using Cronbach's alpha criterion ( $\alpha$ ). The analysis found a Cronbach's Alpha of 0.763. The items were collapsed into one index measure (SRIS) with a mean of 1.03 (SD = 1.458). A dummy variable (SRISD) was also created, with a mean of 0.38 (SD = 0.486). SRIS had a normal curve but was slightly skewed within an acceptable range (SRIS= 0.108).

**Table 2. Reliability Analysis of Self Reported Incidence of sickness-(SRIS)**

Domain	SRIS (n=3547)	
	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
Signs of illness: not able to drink	0.467	0.741
Signs of illness: fever shivering	0.598	0.724
Signs of illness: repeated vomiting	0.414	0.745
Signs of illness: diarrhea	0.437	0.742
Signs of illness: blood in stools	0.447	0.753
Signs of illness: fast breathing	0.359	0.750
Signs of illness: convulsions	0.356	0.753
Signs of illness: weakness	0.420	0.747
Signs of illness: getting sicker	0.351	0.751
Signs of illness: crying	0.320	0.754
Signs of illness: coughing	0.352	0.753
Signs of illness: change of color of eyes	0.337	0.755
Signs of illness: sleepy	0.388	0.753
Signs of illness: other	0.438	0.754
Total Alpha		0.763

A factor analysis was conducted on the SRIS to determine the validity of the factor created by the items. A principal component factor analysis was conducted on the entire sample of n=3,547, including a varimax rotation of the solution in order to aid the interpretation of the factors. Only one component was loaded, making it unnecessary to do further analysis.



## **Independent Variables**

### ***Demographic Variable***

To control for any natural effects on health outcome by the other independent variables, demographic information for the respondent was added first to check for the effect on the model. Age, marital status, education level, place of residence and ethnicity were the main demographic variables used.

With so many ethnic groups represented in Kenya, the ethnic variable was broken down into regional blocks, with the Luo being the main referent. The ethnic blocks were divided into those in Central Kenya, those in the East and along the Coast, those in the Rift Valley, those in the West and the Luo in Nyanza. Those in Central Kenya represented the largest group (40.7%), while the Coast represented the smallest region, with only 8.9%.

The relationship with the head of the household variable was used to compare the adolescents' health outcome to different types of households. Two variables of relationship with the head of the household were used: the 'age of household head' and the 'the type of relationship' (parent, foster, spouse, brother e.g.). The age of the head of the household was defined by two categories: adolescent (15-24 years) and adult (25 and older). The older category was added into the adult households' category, even though it was expected that the elderly would have a reduced ability to generate resources and capacity (Garcia-Moreno & Watts, 2000; Glynn et al., 2001). The adolescent household dummy variable had a mean of 0.13 (SD = 0.334), with about half (244) headed by a female. There were more adolescent-headed households in the 20 to 24 year old group (286) than in the younger age group (170). The "type of relationship" variable was

divided into 4 categories: biological parent, foster/orphan, spouse, and self (respondent was the head). The parent category was the only one used in the model. It was used to compare those adolescents living in parental homes with those living on their own, in foster care and married. Adolescents living in parental homes accounted for 42.2% (1,497) of the households surveyed.

### ***Risk Variables***

The risk factor variables included risky sexual behaviors and reported incidence of violence or abuse by the adolescent. Two composite variables on sexual risk reported in the survey were chosen that could to create a sexual risk behavior factor. The risky sexual behavior variable included the number of partners in the previous year and condom use or lack of use in their last sexual encounter (Appendix 3). Of those who were engaging in sexual activities, nearly half (1,669 or 47%) were not using a condom for protection. The highest risk group was those who had multiple sex partners and did not use condoms (418); the lowest risk group included those who did not have any sexual relations (1,719).

The survey also included a number of items that reported abuse and violence by a relative, spouse or stranger. The four items used created an aggregate measure of any violence to create a measure for violence. The analysis of these four items had a Cronbach's alpha of 0.642. Although this was less than the desired alpha of 0.7 or higher, it was not too low to be acceptable. Deleting any of the items would not have improved the measure.

**Table 3. Reliability Analysis of Any Violence or Abuse to the Adolescent (VioAbu)**

Domain	VioAbu (n=3547)	
	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
Ever any emotional violence	0.489	0.497
Experienced any less severe violence	0.496	0.505
Experienced any severe violence	0.350	0.620
Experienced any sexual violence	0.385	0.578
Total Alpha		0.642

A factor analysis of the items produced only one component and no further analysis was done. The items were collapsed into one violence measure and produced a mean of 0.14 (SD =0.342). Adolescents who had experienced violence or engaged in risky behavior might have a higher chance of health risk (Garcia-Moreno & Watts, 2000; Hogben et al., 2005; Klein-Hessling et al., 2005; WHO, 2000). WHO (2000) and Hogben and colleagues (2005) argued that the behavior of adolescents affects their health; Garcia-Moreno and Watt's (2000) study associated violence against women with the spread of HIV/AIDS.

### ***Household Coping Capacity***

The last important independent variable was the measure of household coping capacity (HCC). HCC was a composite index of measures of the level of resources available to the members within the household (Appendix 3). Higher values of the HCC index indicate a lower household capacity. Each additional score was added to the index as the household resources were reduced. The household coping capacity (HCC) consisted of three main indexes: Demographic, Economic and Coping Characteristics Indexes.

### ***HCC Demographic Characteristics***

The HCC demographic index was composed of the gender of the head of the household and the dependency ratio. The dependency ratio was the number of adults that support children and elderly (55 years and over) in the household. The mean of the dependency ratio was 1.68 (SD = 1.41). Demographic characteristics can have a great impact on household resource management and availability. Women may be disproportionately affected by HIV/AIDS, other chronic diseases, or the death of a spouse, due to country's gender relations, economics, and migration. Many women in rural areas may have spouses who live far away in urban areas. In this sample, female-headed households had an average age of 8.6 for orphans and foster care children and 5.9 other relatives and non-relatives in their household. Male-headed households had an average age of 12.5 for orphans and foster care children, and no other relatives and non-relatives in the household. There were 33% female-headed households, compared with 67% male-headed households.

### ***HCC Economic Characteristics***

The HCC economic index is composed of housing, wealth, and employment information for the head of the household. Housing includes the condition of the house and the occupation rate. The occupation rate is the number of household members per household size (number of rooms, excluding the kitchen). On average, there were 2.98 people per room for the households in the survey. Another component in housing is the condition of the house. This was derived from the state of repair and the type of floor and roof material. Permanent housing in a good state of repair earned the lowest value, while temporary shelter in a poor state of repair had the highest value. The variable "HousCon"

had a range of 0 to 4 and mean of 1.43. Seven people did not have any place to stay; 1,344 lived in permanent housing in a good state of repair.

Wealth included ownership of land and dwelling. About 70% of the respondents owned land and a house; 16% owned only the land. Over 21% of the respondents were self-employed and 31% had a paid job. These were reverse coded to put weight for those who did not have any property. All these variables were added together to get the HCC economic index measure (Appendix 3).

### ***HCC Coping Characteristics***

HCC coping was modified to include a ratio of dead siblings to the total born, the education enrollment, those reporting HIV positive tests, and those who have a child who had died. Information on children's workload and the number of ill persons in the household were not available in the data set. The percent of siblings of the respondent who had died was calculated as a ratio of those who had died compared with the total number born. Educational enrollment counted the current school enrollment and educational attainment of the respondent. Those with the lowest score were those who were still in school and had attained a higher than a secondary school education; those with the highest score were those who were not in school with no education.

These three factors were later added to generate the Household coping capacity (HCC). The HCC had a mean 20.28 (SD = 4.43) and the histogram showed a normally distributed graph. A hierarchical Ordinary Least Squares (OLS) multivariate regression analysis was used to examine the association of demographic, risk and household variables with reported illness (Appendix 3). The independent variables were added in

steps to check their effects on the model. A two-way interaction effects between all the other independent variables with age and place of residence of respondents was later added separately to check for the interaction effect.

Multivariate logistical regression was also used to check the for any differences in two age groups and the cultural groups' on the model (Chen & Dey, 2003; Höfler, Brueck, Lieb, & Wittchen, 2005; Tabaei & Herman, 2002). It was also used to determine the odds ratio of the independent variables to its dependent variable. A dichotomous reported illness variable was used to test the model. The main occupants of Nyanza province, the Luo, were used as the referent for ethnicity.

## Chapter Four

### Findings

This study explored the household environment of Kenyan female adolescents in order to better understand the factors that influence their health. Individual characteristics were explored, along with their place of residence, ethnicity, violence or abuse they had experienced, risky sexual behavior they engaged in, and other household characteristics.

This chapter includes a brief description of the variables used in the models. It is organized according to the research questions posed in Chapter 1. Data are presented for adolescents' self-reported illness during the two weeks prior to the survey. These data include frequency of self reported of illness, age, highest level of education, marital status, type of residence, ethnicity, self-report of engaging in risky sexual behavior, self-report of experience of violence or abuse, and household coping characteristics. Cross-tabulations and correlation analyses were conducted to look for relationships between the variables. Data were analyzed using SPSS.

#### ***Descriptive Analysis***

The average age for this sample was 19.39 (SD=2.833). The group was about equally split between adolescents (15-19, 52.3%) and young adults (ages 20-24; 47.7%). Nearly two-thirds (64.7%) had only completed primary school; most of those were adolescents. Nearly one in four (24.8%) had secondary schooling; only a small percentage (7.1%) had no formal education; even fewer had more than a secondary school education (3.4%). Nearly three-fourths of the sample (74.3%) lived in rural areas. The largest number of respondents was from Central Kenya (40.7%). Those from the east

and the coastal districts had the smallest number of respondents (8.9%). Almost all of the respondents reported no (48%) or low (36%) risky sexual behaviors and no abuse (86%).

More than a third (38%) of the respondents in the sample reported some form of illness in the two weeks prior to the survey. A much larger percentage of adolescents (61%) reported illness compared to emerging adults. There was a significant positive correlation ( $p < .0001$ ) between self-reported illness and the age and gender of the head of household (Table 5). Female respondents living in households headed by an adult male had the highest reported rate of illness (24.06%); those in households headed by an adult female were much less likely to report recent illness (6.03%). Respondents living in households headed by a female adolescent had the lowest reported rate of illness (3.83%).

There was a significant relationship between age of the female respondent and whether they lived in a household headed by an adult. Only a very small portion of 15-19 year olds who were married (3.7%) lived in adult-headed homes. Even fewer (1.7%) lived in a household headed by an adolescent. The age of the respondent was also significantly related to the reported incidence of illness and household coping characteristics. Households headed by females were most often headed by an unmarried female. Adolescents in these households also were less likely to report illness but were more likely to be enrolled in school or have completed some schooling.

Those from the Central and Nyanza regions were significantly more likely to report illness, particularly HIV+ status, compared to those from other regions. There was no significant relationship between ethnicity and the age of the head of household. Adolescents (15-19) who reported no risky sexual behavior were more likely (62%) to report no chance of getting AIDS than young adults (20-24; 50%) (Table 7). Less than a



third (30%) of the adolescents in the high-risk group reported that they thought they had no chance of getting AIDS; only 22% of the young adults in the high-risk group thought they were unlikely to get AIDS.

Among those who were pregnant, the young adults were more likely to report illness (42%, Table 8) compared to adolescent. Those reporting no risk of getting AIDS were significantly less likely to report illness (Table 7) than those who reported any risk factors. Among the married respondents who reported illness, those whose husbands had other sexual partners were less likely to report illness overall; young adults were more likely to report illness and adolescents were less likely to report illness (Table 7).

**Table 4. Descriptive Statistics for Variable Used in Analysis**

Variable	Value	N	%	Mean	Std. Dev
Self Reported Incidence of sickness (SRIS)		3547	100%	1.03	1.458
Self Reported Incidence of sickness: (SRISD)		3547		0.38	0.486
	0 No Sick Report	2198	61.97%		
	1 Reported Sick	1349	38.03%		
Age (5-year intervals) (V013)		3547		1.48	0.5
	1 15-19	1856	52.33%		
	2 20-24	1691	47.67%		
Adolescent Head of Household		3547		0.13	0.335
	0 No	3091	87.1%		
	1 Yes	457	12.9%		
Parent Head of Household		3547		0.42	0.494
	0 No	2051	57.8		
	1 Yes	1497	42.2		
Highest educational level (V106)		3547		1.25	0.628
	0 No education	250	7.05%		
	1 Primary	2296	64.73%		
	2 Secondary	880	24.81%		
	3 Higher	121	3.41%		
Marital Status (MStatus)		3547		0.37	0.482
	0 Not Married	2250	63.43%		
	1 Married	1297	36.57%		
Place of residence (V025)		3547		1.74	0.437
	1 Urban	912	25.71%		
	2 Rural	2635	74.29%		
Ethnic groups: Central (CenEthnic)		1444	40.71%		
Ethnic groups: Rift Valley (RVEthnic)		520	14.66%		
Ethnic groups: East (CoastEthnic)		316	8.91%		
Ethnic groups: West (WestEthnic)		800	22.55%		
Risky sexual behavior (RiskyBe)		3545		0.79	0.973
	0 No Risk -	1719	48.46%		
	1 Low Risk	1279	36.06%		
	2 Moderate Risk	131	3.69%		
	3 High Risk	416	11.73%		
Any Report Violence or Abuse (VioAbu)		3547		0.14	0.342
	0 No	3067	86.47%		
	1 Yes	481	13.56%		
Household Coping Characteristics (HCC)		3502	98.73%	18.96	4.433

Source: Kenya Demographic and Health Survey 2003

**Table 5. Indicators of Household and Female Respondent (age 15-24) Status**

	Adolescents	Emerging Adults	Chi-Square
Age range	15-19	20-25	
N	1856 (52.33%)	1691 (47.67%)	
<i>Gender of Head of Household</i>			
Female	665	506	
Male	1191	1186	
<i>Gender and age of Head of Household</i>			
Adolescent HH Female	53	191	53.684****
Male	117	96	
Adult HH Female	612	315	70.309****
Male	1074	1090	
<i>Marital Status and age of Head of Household</i>			
Adolescent HH Not Married	107	185	0.061
Married	62	102	
Adult HH Not Married	1554	1011	221.740****
Married	132	394	
<i>Abuse experience and age of Head of Household</i>			
Adolescent HH Abused	124	203	0.245
Not Abused	46	84	
Adult HH Abused	1628	1112	230.872****
Not Abused	58	293	
<i>Highest level of education and age of Head of Household</i>			
Adolescent HH			14.766***
No Education /Incomplete	22	27	
Primary	128	184	
Secondary	19	67	
Higher	1	9	
Adult HH			129.272****
No Education /Incomplete	105	97	
Primary	1179	806	
Secondary	393	401	
Higher	10	101	
<i>Reported Illness and age of head of household</i>			
Adolescent HH Not Sick	88	87	20.542****
Sick	82	199	
Adult HH Not Sick	1456	567	716.210****
Sick	230	837	

Chi-Square \*p &lt; .05 \*\*p &lt; .01 \*\*\*p &lt; .001 \*\*\*\*p &lt; .0001

Source: Kenya Demographic and Health Survey 2003

**Table 6. Correlation for Variable Used in the Analysis**

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Any Violence or Abuse to the Adolescent	1.00	.244**	.035*	-0.01	.271**	.128**	-.132**	.168**	-.194**	.353**	-.107**	0.01	-.038*	.092**	.064**
2	Age 5-year groups		1.00	.085**	-.144**	.117**	.189**	-.063**	.116**	.237**	.428**	.068**	-0.01	-0.02	-.038*	-0.02
3	HIV Positive Recode			1.00	.078**	.069**	.080**	0.01	0.01	.043**	.070**	-.062**	-.033*	-0.03	-0.01	.160**
4	Household Coping Characteristics				1.00	.376**	-0.03	.044**	-.193**	-0.01	.043**	-.178**	.090**	.197**	-.052**	.063**
5	School enrollment and attainment					1.00	.201**	-.064**	.169**	.256**	.347**	-.155**	.078**	.263**	-.076**	0.02
6	Sexual risky behavior						1.00	0.02	.118**	.121**	.214**	-0.01	-.060**	-.052**	0.00	.126**
7	Female Head of the Household							1.00	.166**	-.161**	-.105**	.046**	-.073**	-0.02	0.01	0.01
8	Adolescent-headed household								1.00	.160**	.170**	0.00	0.02	-0.01	0.00	0.00
9	Marital Status									1.00	.337**	-0.02	0.02	.091**	-.072**	0.02
10	Self Reported Incidence of sickness										1.00	-.127**	.072**	0.01	.036*	.056**
11	Ethnic groups: Center											1.00	-.344**	-.259**	-.447**	-.323**
12	Ethnic groups: Rift Valley												1.00	-.130**	-.224**	-.161**
13	Ethnic groups: East & Coast													1.00	-.169**	-.122**
14	Ethnic groups: West														1.00	-.210**
15	Ethnic groups: Nyanza															1.00

$p < .05$ , \*\*  $p < .01$

Source: Kenya Demographic and Health Survey 2003

**Table 7. Indicators of Risky Sexual Behavior and Female Respondent (age 15-24) Status**

	No Risk - No Sex	Low Risk - Has sex with single partner	Moderate Risk - Has sex with multiple partners and uses condom	High Risk- Has sex with multiple partners and does not use condom	Chi-Square
N	1719 (49%)	1279 (36%)	131 (4%)	418 (12%)	
<i>Chances of getting AIDS by Female Adolescent respondents Age</i>					
15-19 No Risk at all	748 (62%)	103 (33%)	24 (38%)	66 (30%)	222.144****
Small	387 (32%)	146 (46%)	33 (51%)	92 (41%)	
Moderate	36 (3%)	42 (13%)	0 (0%)	43 (36%)	
Great	37 (3%)	25 (8%)	7 (11%)	22 (19%)	
20-24 No Risk at all	238 (50%)	292 (31%)	23 (39%)	43 (22%)	85.954****
Small	181 (38%)	398 (43%)	26 (39%)	92 (48%)	
Moderate	42 (9%)	150 (16%)	13 (20%)	36 (19%)	
Great	13 (3%)	95 (10%)	4 (6%)	21 (11%)	
<i>Female circumcision practiced in the community by Female Adolescent respondents Age</i>					
15-19 No	851 (69%)	190 (58%)	45 (69%)	155 (69%)	15.897***
Yes	383 (31%)	140 (42%)	20 (31%)	70 (31%)	
20-24 No	346 (72%)	621 (65%)	49 (74%)	134 (70%)	7.036
Yes	138 (28%)	328 (35%)	17 (26%)	58 (30%)	
<i>Reason for not having sex: Husband has other women by Female Adolescent respondents Age</i>					
15-19 No	305 (25%)	77 (23%)	15 (23%)	45 (20%)	11.507**
Yes	930 (75%)	251 (77%)	51 (77%)	181 (80%)	
20-24 No	88 (18%)	243 (21%)	6 (9%)	26 (14%)	1.544
Yes	395 (82%)	747 (79%)	60 (91%)	165 (86%)	
<i>Currently pregnant by Female Adolescent respondents Age</i>					
15-19 No	1235 (100%)	235 (71%)	64 (98%)	200 (89%)	364.890****
Yes	0 (0%)	95 (29%)	1 (2%)	25 (21%)	
20-24 No	484 (100%)	762 (80%)	65 (98%)	177 (92%)	128.209****
Yes	0 (0%)	187 (20%)	1 (2%)	16 (8%)	

Chi-Square \*p < .05 \*\*p < .01 \*\*\*p < .001 \*\*\*\*p < .0001

Source: Kenya Demographic and Health Survey 2003

**Table 8. Indicators of Reported Illness and Female Respondent (age 15-24) Status**

	Not Sick	Reported Sick	Chi-Square
N	2198 (62%)	1349 (38%)	
<i>Chances of getting AIDS</i>			
15-19 No Risk at all	847 (56%)	94 (31%)	101.479***
Small	530 (35%)	128 (36%)	
Moderate	74 (5%)	48 (16%)	
Great	59 (4%)	32 (11%)	
20-24 No Risk at all	280 (43%)	315 (31%)	33.969***
Small	261 (40%)	436 (43%)	
Moderate	68 (11%)	172 (17%)	
Great	39 (6%)	95 (9%)	
<i>Female circumcision practiced in the community</i>			
15-19 No	1052 (68%)	190 (61%)	6.219*
Yes Female circumcision	491 (32%)	122 (39%)	
20-24 No	463 (71%)	687 (66%)	3.529
Yes Female circumcision	192 (29%)	349 (34%)	
<i>Reason for not having sex: Husband has other partner</i>			
15-19 No	381 (25%)	62 (20%)	11.363**
Yes other women	1161 (75%)	251 (80%)	
20-24 No	108 (14%)	216 (21%)	5.237
Yes other women	548 (86%)	820 (79%)	
<i>Currently pregnant</i>			
15-19 No	1453 (94%)	282 (90%)	5.899*
Yes Currently pregnant	91 (6%)	30 (10%)	
20-24 No	587 (90%)	900 (87%)	3.152
Yes Currently pregnant	67 (10%)	136 (13%)	

Chi-Square \*p < .05 \*\*p < .01 \*\*\*p < .001 \*\*\*\*p < .0001

Source: Kenya Demographic and Health Survey 2003

### ***Research Question Results***

The research questions explored the relationship between individual characteristics of adolescents' environments and behaviors and their self-report of illness.

*Hypothesis 1:* There is a difference between younger female adolescents and emerging adults in their self-reported incidences of illness.

*Hypothesis 2:* Higher levels of risky sexual behavior and other risk factors will increase incidence of illness.

*Hypothesis 3:* Higher household coping capacity will lead to lower incidence of illness.

Demographic information, ethnicity, risk factors and household coping capacity variables were entered into hierarchical regression analysis in four steps for each group. Variables were entered in steps based on the order hypothesized by the model. Age, education (in years), marital status, place of residence, childhood place of residence, and the age of the head of household were entered in the first step and then all ethnicity groups, except the Luo, were added in the next step. Ethnicity was added separately to check for its effect on the other individual variables. Risky sexual behavior and reported abuse were added next. In the final step, the household coping characteristic was added to check the effect of lack of resources on reported illness.

The results presented in Table 9 reveal a significant relationship for all the models with self-reported illness. The first model was significant, explaining more the 33% of the variance ( $p < .0001$ ,  $R^2 = 0.334$ ). Age was significantly related to illness: young adults were more likely to report illness than adolescents ( $p < .0001$ ). This finding was

contrary to expectation, as one might assume that as the Kenyan adolescent grows older she would acquire skills needed to reduce the chance of illness.

Educational attainment was, as expected, significantly related to illness: those with higher levels of education were less likely to report illness ( $p < .0001$ ). Marital status was also related to illness, as those who were married were more likely to report being ill ( $p < .0001$ ). Living in the rural areas was positively associated with illness ( $p < .0001$ ) but those reporting childhood residence in a city or town were more likely to report illness ( $p < .0001$ ). Those in households headed by an adolescent were more likely to report illness than those than those in households headed by an adult ( $p < .001$ ). Households headed by adolescents were expected to have fewer life skills to help them and others in the household reduce their chances of illness. As expected, households headed by parents or other adults appeared to have some form of protection against illness ( $p < .0001$ ), as they had significantly fewer reports of illness.

The next model added the factor of ethnicity, which was a significant factor. Ethnicity explained more the 34% of the variance ( $p < .0001$ ,  $R^2 = 0.345$ ). Adding ethnicity to the model decreased the significance of childhood place of residence, but relationships with the other variables remained the same. However, only ethnic groups from Central Kenya and the Coast were significant in the model. They were both negatively associated with reported illness in the sample population.

The third model included risk factors in the adolescents' lives. Risky sexual behavior and reported abuse were significant predictors of illness ( $p < .0001$ ). Increases in both factors increased the chances of illness. This model explained 40% of the variance ( $p < .0001$ ,  $R^2 = 0.400$ ). Adding these risk factors eliminated any significant



relationship between illness and those living in household with an adolescent head of household; it also eliminated any relationship with those in ethnic groups from the Coast. Adding ethnicity to the model decreased the power of the relationship between illness and two factors: living in a household with an adult head of household ( $p < .004$ ) and ethnic groups from Central Kenya ( $p < .001$ ).

The last model to be tested involved adding household coping characteristics. This model proved to be highly significant, explaining more than 40% of the variance ( $p < .0001$ ,  $R^2 = 0.406$ ). An increase in the value indicates a decrease in household coping capacity. There was a positive association between household coping capacity and the illness. If the household had less coping capacity, there was an increase in illness. The addition of the household coping characteristic to the model reduced the power of education as a predictive factor, from  $p < .0001$  to  $p < .035$ . Ethnic groups from Central Kenya and the Coast were also more likely to report illness ( $p < .007$  and  $p < .048$ , respectively). The age of the head of household significantly predicted illness (adult,  $p < .012$ ; adolescent,  $p < .010$ ).

**Table 9. Results for Self Reported Incidence of sickness-(SRIS) OLS Regression**

	Model 1	Model 2	Model 3	Model 4
Intercept	-3.304****	3.131****	-2.753****	-3.563****
Current age	0.220****	0.222****	0.169****	0.170****
Education	-0.065****	-0.066****	-0.036****	-0.016*
Marital Status	0.564****	0.588****	0.998****	1.019****
Place of residence	0.470****	0.400****	0.369****	0.344****
Childhood place of residence	-0.092****	-0.067**	-0.057**	-0.060**
Adolescent Head of Household	0.203***	0.203***	0.077	0.159**
Adult Head of Household	-0.395****	-0.359****	-0.139**	-0.121*
Ethnic groups: Center	-	-0.336****	-0.220***	-0.173**
Ethnic groups: Rift Valley	-	-0.011	0.094	0.083
Ethnic groups: East & Coast	-	-0.361****	-0.165	-0.173*
Ethnic groups: West	-	-0.026	-0.002	0.023
Violence or Abuse to the Adolescent	-	-	1.167****	1.190****
Sexual risky behavior	-	-	0.081****	0.080****
Household Coping Characteristics	-	-	-	0.032****
Std. Error	1.191	1.181	1.129	1.124
Adj. R-square	0.334****	0.345****	0.400****	0.406****
F-value	254.204	170.425	182.955	174.107
N	3542	3542	3542	3542

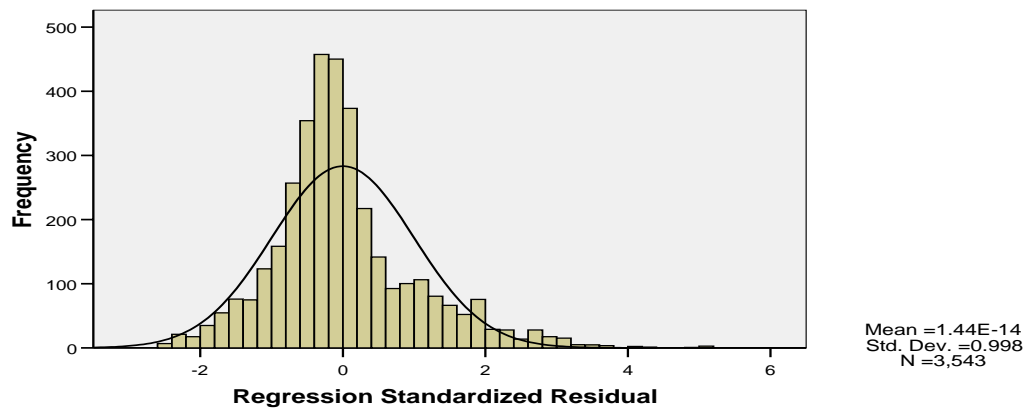
\* p<.05, \*\* p<.01, \*\*\* p<.001, \*\*\*\* p<.0001

Source: Kenya Demographic and Health Survey 2003

In summary, the regression analyses demonstrated that the variables of the model predicted a significant portion of the reported illness (Adj.  $R^2 = .345$  for controls, Adj.  $R^2 = .400$  for risk factor, Adj.  $R^2 = .406$  for Household Coping Capacity). Although all three hypotheses were rejected, the factors in the models were important in predicting reported illnesses.

## Histogram

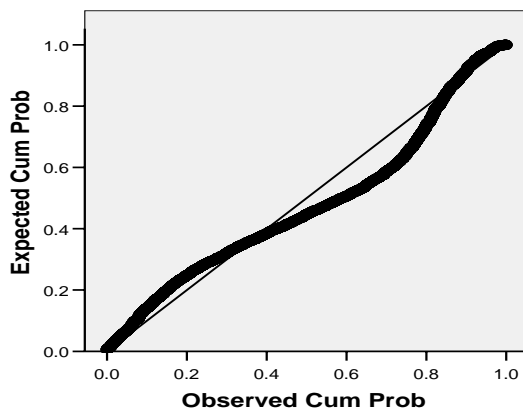
Dependent Variable: Self Reported Incidence of sickness



Cases weighted by COMPUTE RWeight = V005 / 1000000 (COMPUTE)

## Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Self Reported Incidence of sickness



Cases weighted by COMPUTE RWeight = V005 / 1000000 (COMPUTE)

A histogram plot of the predicted and residual value of the model yielded a normal curve. The zresid histogram provides a visual way of assessing whether the assumption of normally distributed residual error is met. The normal probability plot (zresid normal p-p plot) is another test of normally distributed residual error. Under perfect normality, the plot would be a 45-degree line. Regression was robust in the face of some deviation from this assumption (Cohen & Cohen, 1983).

The presence of parents in the household was an important factor in reducing illness; the absence of parents in adolescent-headed households was associated with an increase in illness. Ethnicity was also important in explaining the findings. Those from the Coast and Central regions of Kenya were less likely to report illness. Those from the Rift Valley and Western Kenya were not significantly associated with reported illness, but were associated with an increase in the *likelihood* of illness.

Overall, the hierarchical four-block model provided an incremental R-Square on each step and had a significant influence on reported illness for the population surveyed. The combination of demographic variables, the age of the head of household, report of risky sexual behaviors, exposure to abuse and violence, and household coping characteristics contributed moderately but significantly to the reported illness variance (Adj.  $R^2 = .406$ ). A review of collinearity statistics for the final model did not indicate a multicollinearity problem. The highest VIF value was 2.822 (Tolerance = 0.354).

#### ***Interaction Effect by Age and by Residence of the Female Adolescent***

The findings suggest some interaction between age and place of residence with other variables because of the observed correlation between these two variables and other variables in the model (Table 10). A two-way interaction effect was tested by creating

new variables, multiplying age with all other variables, and then doing the same with the place of residence. Twelve new variables were created and added into the regression for analysis. These new variables were 1) Age by Marital Status, 2) Age by Adolescent Head of Household, 3) Age By Adult Head of Household, 4) Place of Residence by Marital Status, 5) Place of Residence by Adolescent Head of Household, 6) Place of Residence by Adult Head of Household, 7) Age by Abuse, 8) Age by Risky Sexual Behavior, 9) Place of Residence by Abuse, 10) Place of Residence by Risky Sexual Behavior, 11) Age by HCC, 12) Place of Residence by HCC.

In the final model (Model 4), age had a significant interaction with the risk factors (abuse and risky sexual behavior) and HCC. Although all of these variables were positively associated with reported illness when examined alone, adding age to the model led to a negative relationship between abuse and illness. That is, adults who reported abuse were less likely to report illness.

The age of the head of household, risky sexual behavior, household coping characteristics and the place of residence of the adolescent were significantly associated with reported illness. Those living in urban areas in a household headed by an adult were more likely to report illness. Those in rural areas engaged in risky sexual behavior were also more likely to report illness.

The final model explained more than 41% of the variance ( $\text{Adj. } R^2=0.417$ ). Age, the place of residence, childhood place of residence, the age of the head of household, ethnicity, and violence and/or abuse were significantly associated with illness after adding the interaction variables.

**Table 10. Results for Self Reported Incidence of sickness-(SRIS) OLS Regression with 2 Way Interaction Effects**

	Model 1	Model 2	Model 3	Model 4
Intercept	-4.274****	-4.048****	-3.161****	-4.263****
Current age	.250****	.250****	.181****	.097**
Education in single years	-.062****	-.063****	-.036*	-.012
Marital Status	1.060	.927	.302	.756
Place of residence	.653****	.591****	.468****	1.506****
Childhood place of residence	-.075****	-.048*	-.043*	-.049*
Adolescent-headed household	.910	.872	-.077	.012
Parent-headed Household	1.725****	1.722****	1.081**	1.192**
Age By Marital Status	-.004	0.00005.43	.043	.026
Age By Adolescent Household	-.048	-.043	.010	.021
Age By Parent Household	-.063****	-.058***	-.026	-.025
Residence By Marital Status	-.258*	-.219	-.142	-.191
Residence By Adolescent Household	.162	.121	-.030	-.157
Residence By Parent Household	-.519****	-.546****	-.417****	-.476****
Ethnic groups: Center	-	-.349****	-.233****	-.178**
Ethnic groups: Rift Valley	-	-.042	.084	.108
Ethnic groups: East & Coast	-	-.370****	-.178*	-.170
Ethnic groups: West	-	-.040	-.009	.012
Violence or Abuse to the Adolescent	-	-	3.029****	3.308****
Sexual risky behavior	-	-	-.119	-.159
Age By Any Abuse			-.075**	-.089****
Age By Risky Sexual Behavior			.001	.004**
Residence By Any Abuse			-.178	-.167
Residence By Risky Sexual Behavior			.111*	.096*
Household Coping Characteristics	-	-	-	.046
Age By HCC				.004**
Residence By HCC				-.052****
Std. Error	1.185	1.175	1.124	1.114
Adj. R-square	0.340****	0.351****	0.406****	0.417****
F-value	141.537	113.829	106.156	98.247
N	3542	3542	3542	3542

\* p<.05, \*\* p<.01, \*\*\* p<.001, \*\*\*\* p<.0001

Source: Kenya Demographic and Health Survey 2003

### ***Logistic Analysis***

As in the OLS regression analysis, demographic information, risk factors and HCC variables were entered in different steps in the logistic analysis for each group. Self Reported Incidence of Sickness (SRIS) was converted to a dichotomous variable with a mean of 0.38 (SD = 0.486). Age was divided into two groups, older adolescents (ages 15-19) and emerging adults (ages 20-24).

Table 11 shows the logistic regression coefficient and odds ratio for each of the predictors. Employing a .05 criterion of statistical significance, age, education, marital status, place of residence, childhood place of residence, the age of the head of household, abuse, risky sexual behavior and household coping characteristic variables had significant partial effects. The odds ratio for age indicates that when holding all other variables constant, the emerging adult was 7.5 times more likely to report an illness than an older adolescent. Being married also increased the odds of illness by a factor of 7.5. Although the age of the head of household (OD = 1.531), risky sexual behavior (OD = 1.415) and reduced the household coping capacity (OD= 1.099) increased the odds of illness, none had a greater effect than reported abuse. Those reporting abuse were 13.9 times more likely to also report illness.

The presence of an adult or parent as the head of household was negatively associated with illness. Those living in parent-headed households were 59% (OD=0.411) less likely to report illness. Living in a rural area increased the odds of illness 2.2 times, but those who spent their childhood in rural areas were 13% less likely to report illness.

For the final model (Model 4), the Hosmer–Lemeshow (H–L) inferential goodness-of-fit test yielded a  $\chi^2$  (8) of 28.315 and was significant ( $p < .0001$ ), suggesting that the

model did not fit the data well. This indicates that the model does significantly differ in its predictive abilities. The -2 Log Likelihood statistics for the final model was 2827.809. The Cox & Snell  $R^2$  was 0.412 and the Nagelkerke  $R^2$  was 0.560. When only the demographic factors were considered, the Hosmer–Lemeshow (H–L) yielded a  $\chi^2$  (8) of 10.202; it was not significant ( $p > .259$ ), suggesting that the model did fit to the data well.



**Table 11. Logistic Regression Results for Adolescent Self Reported Illness**

	<b>Model 1</b>		<b>Model 2</b>		<b>Model 3</b>	
<i>Parameter</i>	<i>B</i>	<i>Odds Ratio</i>	<i>B</i>	<i>Odds Ratio</i>	<i>B</i>	<i>Odds Ratio</i>
Current age	2.274****	9.719	1.941****	6.968	2.012****	7.481
Education	-0.170****	0.844	-0.124****	0.883	-0.068****	.934
Marital Status	1.234****	3.435	1.912****	6.766	2.016****	7.511
Place of residence	0.792****	2.208	0.820****	2.270	0.769****	2.157
Childhood place of residence	-0.131**	0.878	-0.136**	0.873	-0.148**	.863
Adolescent-headed household	0.434***	1.544	0.182	1.199	0.426**	1.531
Parent Household	-0.888****	0.411	-0.348**	0.706	-0.301*	.740
Ethnic groups: Center	-0.387**	0.679	-0.067	0.936	0.076	1.079
Ethnic groups: Rift Valley	-0.093	0.911	0.276	1.318	0.248	1.281
Ethnic groups: East & Coast	-0.823****	0.439	-0.321	0.725	-0.334	.716
Ethnic groups: West	0.092	1.096	0.217	1.243	0.287	1.332
Violence or Abuse to the Adolescent	--	--	2.500****	12.177	2.633****	13.913
Sexual risky behavior	--	--	0.340****	1.405	0.347****	1.415
Household Coping Characteristics	--	--	--	--	0.094****	1.099
Intercept	-3.544****		-4.636****		-7.128****	
Model statistic						
-2 log likelihood	3241.093		2879.633		2752.608	
R <sup>2</sup>	0.461		0.548		0.560	

\* p<.05, \*\* p<.01, \*\*\* p<.001, \*\*\*\* p<.0001

Source: Kenya Demographic and Health Survey 2003

Although the goodness-of-fit statistic for the final model indicates a poor fit with the data, it provides some insight on the impact of some of the factors that could affect self-reporting of illness for this population.

### ***Interaction Effects by Age and by Place of Residence of the Adolescent***

To further investigate whether age and the place of residence of the adolescent influenced other variables, a two-way interaction analysis was added in the logistic regression. The interaction analysis was performed without contrast (Table 12) and with contrast on the referent group within the categorical variable (Table 13). This manipulation of the data yielded additional information on the within-groups associations and their relationships with reported illness.

Adding interaction effects for risky sexual behavior and reported abuse to the logistic regression models showed that low levels of risky sexual behavior were positively associated with reported illness; higher levels of risky behavior were less strongly associated with illness. The interaction between risky sexual behavior and age was also significant for those at low levels of risky sexual behavior and negatively associated with reported illness. Those who are older may be less likely to engage in risky sexual behavior.

Age combined with the age of the head of the household was positively and significantly associated with illness. The interaction between household coping capacity and the place of residence was significant and negatively associated with illness in the logistic regression.

Adding the interaction variable to the model improved the fit of the model. For the final model (Model 4), the Hosmer–Lemeshow (H–L) inferential goodness-of-fit test yielded a  $\chi^2$  (8) of 9.120 and was significant ( $p < .332$ ), suggesting that the model did fit the data well. This finding indicates that the model prediction does not significantly differ from the observed. The -2 Log Likelihood statistics for the final model was 2554.105.

The Cox & Snell  $R^2$  was 0.455 and the Nagelkerke  $R^2$  was 0.619. This interaction of the variables yielded an improved model.

**Table 12. Logistic Regression Results for Adolescent Self Reported Illness with 2 Way Interaction Effect**

Model	3	
<i>Parameter</i>	B	<i>Odds Ratio</i>
Age	1.928***	6.875
Education	-.065***	.937
Marital Status	4.560****	95.595
Place Of Residence	3.051****	21.137
Childhood Residence	-.122*	.885
Adolescent Household	1.471	4.354
Parent Household	1.735*	5.670
Age By Marital Status	-.510	.600
Age By Adolescent Household	-.212	.809
Age By Parent Household	.191	1.210
Place Of Residence By Marital Status	-.996***	.369
Place Of Residence By Adolescent Household	-.402	.669
Place Of Residence By Parent Household	-1.282****	.278
Ethnic groups found in the Center	.124	1.131
Ethnic groups found in the East & Coast	.326	1.386
Ethnic groups found in the Rift Valley	-.340	.712
Ethnic groups found in the West	.287	1.332
Any Abuse	5.099****	163.893
Risky Sexual Behavior	.444	1.559
Age By Any Abuse	-.769*	.463
Age By Risky Sexual Behavior	-.251**	.778
Place Of Residence By Any Abuse	-.724*	.485
Place Of Residence By Risky Sexual Behavior	.168	1.183
HCC	.223**	1.250
Age By HCC	.026	1.026
Place Of Residence By HCC	-.090**	.914
Intercept	-11.290****	.000
Model Statistic		
<i>-2 Log Likelihood</i>	2764.943	
<i>R<sup>2</sup></i>	0.574	

\* P<.05, \*\* P<.01, \*\*\* P<.001, \*\*\*\* P<.0001

Source: Kenya Demographic And Health Survey 2003

**Table 13. Logistic Regression Results for Adolescent Self Reported Illness with 2 Way Interaction Effect and Contrast**

<b>Model</b>	<b>3</b>	
<i>Parameter</i>	<i>B</i>	<i>Odds Ratio</i>
Age(1)	-1.539*	.215
Education	-.040*	.961
Marital Status (1)	-.656**	.519
Place Of Residence	2.684****	14.639
Childhood Place of Residence	-.121*	.886
Adolescent Head of Household(1)	-.602**	.548
Parent Head of Household(1)	-.491**	.612
AGE(1) By Marital Status (1)	.141	1.152
AGE(1) By Adolescent Household(1)	.066	1.068
AGE(1) By Parent Household(1)	.580*	1.786
Ethnic Groups Found In The Center(1)	-.190	.827
Ethnic Groups Found In The East & Coast(1)	-.407*	.666
Ethnic Groups Found In The Rift Valley(1)	.383	1.467
Ethnic Groups Found In The West(1)	-.274	.760
Any Abuse	-.147	.863
Risky Sexual Behavior	****	
Risky Sexual Behavior(1)	-.527	.590
Risky Sexual Behavior(2)	2.105***	8.203
Risky Sexual Behavior(3)	-1.205	.300
Any Abuse * Risk Sexual Behavior	****	
Any Abuse By Risk Sexual Behavior(1)	4.162****	64.212
Any Abuse By Risk Sexual Behavior(2)	1.163*	3.200
Any Abuse By Risk Sexual Behavior(3)	2.984*	19.764
AGE(1) By Any Abuse	.167	1.181
Age * Risk Sexual Behavior	**	
AGE(1) By Risk Sexual Behavior(1)	-.752*	.471
AGE(1) By Risk Sexual Behavior(2)	-.021	.980
AGE(1) By Risk Sexual Behavior(3)	.713	2.040
Place Of Residence By Any Abuse	.132	1.142
Place Of Residence * Risk Sexual Behavior		
Place Of Residence By Risk Sexual Behavior (1)	-.311	.733
Place Of Residence By Risk Sexual Behavior (2)	-.486	.615
Place Of Residence By Risk Sexual Behavior (3)	-.018	.983
HCC	.302****	1.352
Age(1) By HCC	-.032	.969
Place Of Residence By HCC	-.094**	.911
Intercept	-4.983****	.007
Model statistic		
-2 log likelihood	2554.106	
R <sup>2</sup>	0.619	

\* p<.05, \*\* p<.01, \*\*\* p<.001, \*\*\*\* p<.0001

Source: Kenya Demographic and Health Survey 2003

## Chapter Five

### Discussion, Recommendations and Conclusions

The following section describes the major findings and impact of the research presented in the previous chapters. Each research question is examined in the light of the study results. This chapter concludes with key strengths and limitations of the study and outlines a series of implications and future research recommendations.

#### *Discussion of the Findings*

This study found a strong association between reported illness and the household environment of adolescents in Kenya. Prior research had suggested that the development of life skills and the protective nature of households headed by parents would have an effect on reported illness of adolescents in the household. This study examined data from households headed by an adolescent as well as those headed by adults, based on the assumption that those in households headed by an adolescent would have poor life skills and lesser household coping capacity.

Research Question: Is there a relation between individual characteristics and self-report of the illness in the selected population? Does the presence of parents in the home affect adolescent health outcomes in Kenya?

*Hypothesis 1:* There is a difference between younger female adolescents and emerging adult individual factors with regard to their self-reported incidence of illness.

An increase in age was significantly associated with an increase in report of illness for this population in all study analyses. It was assumed that with age comes the

development of life skills necessary to improve one's health. However, young adults may be at more risk for illness because they leave the parental protection of home when they move out on their own. Over 57% of the respondents indicated that they did not live with their parents. These results suggest that being in a parent-headed household was a protective factor. Those living in households headed by an adult were more likely to report recent illness.

As expected, an increase in the level of education was associated with lower reports of illness. With education may come knowledge of self-care as well as improved income, leading to better diet (Wojcicki, 2005).

An unexpected finding was that marriage was positively associated with reported illness. Married respondents reported more illness than unmarried respondents. Shared resources and income for married adolescents were expected to have a protective effect but they did not. Pregnancy could have been an explanatory factor but further analyses to understand these results indicate only a small number were currently pregnant. Only a small portion of those that reported a recent illness were currently pregnant. But a large number (80%) of the female respondents (both adolescent and emerging adult) did report refusing to have sex with their husbands at one time because they had another partner. Additional sexual partners could expose the couples to increase risk to illness.

The place of residence also had an effect on illness. A large number of the respondents live in rural areas (74.29%), which prove to be negatively related to health. This finding may be explained by the fact that many rural women have husbands who work in urban areas and are thus -living alone and supporting themselves (Keirle & Thomas, 2000).

Another unexpected response was that those respondents who spent their childhood in a rural area were significantly less likely to report illness than those who grew up in the city. They may have developed better nutritional skills while growing up in rural areas, which helped them later on. The harsher rural environment may also have prepared them with survival skills necessary to reduce illness. Finally, an improvement in access to the health care when moving to the city might reduce illness.

Ethnic groups from the Central region of Kenya and those from the Coast were less likely to report illness than those from other regions. The Luo were used as the referent group; they had high levels of HIV positive status, reports of abuse, low Household Coping Characteristics, risky sexual behavior and self-reported illness. The groups closest to the Luo were those in the West. Although results were not significant, membership in this ethnic group was positively correlated with reported illness. The introduction of ethnicity to the model did affect the significance level of the childhood place of residence.

Research Question: What adolescent risk factors influence reported incidence of illness?

*Hypothesis 2:* Higher levels of risky sexual behavior and other risk factors will increase reported incidence of illness.

Risky sexual behavior and abuse of and/or violence to female adolescents were both considered risk factors that were added to the third model. They were both significantly associated with the reporting of illness by adolescents and emerging adults. Reported risky sexual behavior seems to increase reported illness, but abuse seems to have a particularly greater impact on the reported illness. Adding these risk factors in the OLS



models reduces the significance of the age of the head of the household in the model.

Only ethnic groups in from Central Kenya were significantly (negatively) associated with illness in this model. Violence and abuse could be generating traumatic stress that affects the development of adolescent biological systems and illness (Cicchetti et al., 2000; Cobb, 1976; Compass et al., 1989; DeBellis, 1999).

Although there was no large effect of risky sexual behavior on reported illness as there was for violence and abuse, this may change over time (Harrison, Xaba, Kunene et al., 2001; LaFraniere, 2005b; Lalor, 2004; Morison et al., 2001). Apart from the developmental challenges these adolescents face, financial survival becomes critical if they live on their own. A number of these adolescents with few marketable skills are resorting to prostitution and other risky sexual behaviors to enhance their income. Promise of income security could lead to cohabitation with older men and stopping their education, putting them at risk for illness.

The interaction effects for risky sexual behavior and reported abuse showed low levels of risky sexual behavior as having a significant effect. These two risk factors could be interrelated in their impact on adolescent illness.

Research Question: What is the relationship between household coping capacity and adolescent illness in Kenya?

*Hypothesis 3:* Higher household coping capacity will lead to lower incidence of illness.

Household characteristics were significantly associated with the reporting of illness. Decreases in household coping capacity were related to increases in reported illnesses. However, it had a smaller effect than expected. Adding the household coping capacity to

the model brought the age of the head of household back into the model as a significant factor. This finding suggests some influence of the household coping capacity on households headed by adolescents. Perhaps household coping capacity moderates the negative impact of households headed by those who are not yet ready for this role.

The final analysis includes only a composite household coping characteristic. A separate analysis of the components that makeup HCC revealed different effects on the reported illness. Demographic and coping characteristics were significantly related to illness, ( $p < .0001$ ), but economics were not. Family support and the type of people in the household were more important than household economics.

The interaction between household coping characteristics and the place of residence was significant and negatively associated in the logistic regression (Table 12). Rural residents may be facing challenges unique to them. They may have fewer resources and lesser coping capacity, less access to health care, lower income and lesser access to clean water. However, the interaction between age and household coping characteristics was not significant.

### ***Theoretical Implications***

This study has provided some useful insights into factors that might influence illness for adolescents and emerging adults in Kenya. The study of household coping capacity can be seen as an extension of Bogenschneider's (1996) theory of how risk and protective factors influence adolescents' behavior and, indirectly, their physical health. Adolescent health was expected to be influenced by environmental and cultural factors, including the presence of family members (and extended family) they live with. Life shocks, such as losing a parent, likely would increase an adolescent's vulnerability.

HIV positive status was not significantly associated with reported illness when it was added to the overall model. HIV results were significant in the inferential analysis for comparing households by the age of the head of household with reported illness and age of the adolescent (Pearson  $\chi^2$  (1, N = 1453) = 26.488,  $p < .000$ ).

The sizable effect of abuse and violence on the respondents' reporting of illness confirmed the association of the impact of trauma on physical health. Trauma and stress have been associated with increased health problems, increased risk for HIV, and reduced ability to fight diseases (Arnett, 2001).

Older respondents were expected to report less illness, due to increased self-care skills gained over time. This expectation was not confirmed in this study. Further research needs to examine both households headed by adolescents and adults to better understand how these and other factors can affect the health of adolescents.

Ethnicity was expected to have a large influence on the incidence of illness in Kenya because of differential health behaviors due to cultural differences. Although there were some differences, not all were statistically significant. It is possible that regions that border the Luo could be affected by some of the same socioeconomic and cultural factors in that region.

Demographic factors had a strong influence on the incidence of illness for this population. Behaviors and the environment in which they live added additional factors that may influence their health.

### ***Implications for Practice***

The study provides direction for health care practitioners who work with adolescents and emerging adults in Kenya. Practitioners should be advised to consider the

potential of abuse or violence among those consistently reporting illness. Abuse and violence appear to be significant factors associated with reported illness. Health care practitioners can also advocate for policies that increase the protection of adolescents. High rates of adolescent abuse may increase medical costs associated with both physical and mental health.

The findings of this study inform the need for increased awareness of marriage among adolescents. Marriage among adolescents appears to increase the risk of illness. Social workers can work with communities to create contextually-appropriate interventions designed to protect adolescents from exploitative early marriage and abuse.

Culturally- and age-appropriate information about risky sexual behavior should be introduced in schools. Kenya has a vast network of women's groups that could assist in the dissemination of information to local communities. Mothers and grandmothers could provide a local context for the message to adolescents.

Work with households headed by adolescents to reduce the effects of illness should be a priority among health care practitioners. Low levels of education and diminished household coping capacity can compound illness in these households. Interventions to keep youth in school and to increase the capacity for coping could lead to a reduction in illness among adolescents.

### ***Policy Implications***

A major policy implication for this study is the need to encourage acceptable methods of protection for adolescents and emerging adults. The findings can inform policy-makers and decision-makers about the associated problems of adolescents who report illness. For example, early marriages and abuse among this population increase the

chances of illness. Circumstances that lead to an adolescent heading a household increase the chance of illness. Communities need to work together to provide alternative solutions in populations with high proportions of households led by adolescents.

A better system is needed to protect adolescents from abuse in Kenya. Whether the abuse is perpetrated by a family member, spouse, or stranger, adolescents should be afforded some level of protection. District-level monitoring and reporting should be established and information made public to ensure community discussion of the problem. The creation of a central clearinghouse for collecting data and disseminating information could allow for the exchange of ideas and information among the district, provincial, and central governments. For communities that are nomadic, including those that cross the border, mobile reporting systems could be created. As in any type of behavioral intervention, law enforcement alone will not work without community education. Cultural justification of abuse demonstrates the need for culturally appropriate and relevant interventions.

In this study, those in rural areas were twice as likely to report recent illness. Although this study did not measure access to health care, income, distance to health care facilities and lack of knowledge could be factors related to increased illness in rural populations. Efforts to increase access to health care should be promoted.

### ***Study Limitations***

Several issues limited this study. First, the study was based upon a secondary data analysis. Therefore the analysis was limited to the measures used as part of the original survey. Second, the study was cross-sectional in design, so measurement occurred at only one point in time. Third, with many ethnic groups in Kenya, the hope was that the

interviews and questions were the same and not differentially translated, leading to distortions in the responses. The questions were translated from English into 12 local languages; Kiswahili, Embu, Kalenjin, Kamba, Kikuyu, Kisii, Luhya, Luo, Maasai, Meru, Mijikenda, and Somali. About 4% of the total households selected refused to participate in the survey, while 94% of the women and 86% of the men responded to the individual interview (Wojcicki, 2005).

Although the 2003 Kenya Demographic and Health Survey (KDHS) had a large number of variables available for analysis, a number of important variables that would have added rich contextual information to the study were missing from the dataset. More information on respondents' parents, siblings and other relatives in the household would have added some information on kinship care that is present in many parts of Kenya. Information on the well-being of the other relatives might include any contribution those relatives add to the health care of members of the household.

This study would have also benefited from more information on community networks. Information on community groups and activities would have provided another dimension to the study.

### ***Conclusion***

This study contributes to the understanding of adolescent life in Kenya. As the country continues to change economically, culturally and socially, systematic data collection on children as they pass through adolescence and develop into adults should be encouraged. This information can assist parents, health care practitioners and policy makers with key indicators related to the risk of growing up in Kenya. This work could be extended to other parts of Africa. In light of the effects of HIV/AIDS on families,

these studies should examine not only the economic impact, but also the impact on social support for families.

Studies of protective factors on families and children should be encouraged to build the body of knowledge, contextualized to different populations. Risk factors should be identified to promote intervention knowledge. This study showed that family support and protection from violence/abuse was greater than economic factors.

Given its large youth population, Kenya needs to better understand the implication of risk factors on the health of its young citizens. More work needs to be done on the relationship between violence and abuse on health in other age groups, such as children and younger adolescents.

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# Appendix

## Appendix 1. Household Coping Characteristics

The characteristics of the household

### Household characteristics

### Score

#### Demographic Characteristics

If the head was a (an).

- |    |  |  |
|----|--|--|
| a) | Headed by a woman ( <i>Female1</i> )     | Male: 0, Female: 1                               |
| b) | Adult Head of the Household              | Adult =0, Adolescent/Elderly =1 ( <i>Adoll</i> ) |
| c) | Dependency ratio: ( <i>DepRatio</i> )    | (children + elderly) / adults                    |
|    | -Number of adults (15–49 years old):     | #  |
|    | -Number of elderly (50 years and older): | #  |
|    | -Number of children: (Under 15 year)     |  |
|    | biological:                              | #  |
|    | fostered/orphans:                        | #  |

#### Economic Characteristics

##### Housing:

- |    |  |   |
|----|--|---|
| d) | -Housing condition: ( <i>HousCon</i> ) | From 4-Does not exist, 3-poor, 2-moderate, 1-Good, 0 -Excellent |
|    | roof:                                  |   |
|    | walls:                                 |   |

- |    |  |                          |
|----|--|--------------------------|
| e) | -Number of rooms (excluded kitchen):   | #                        |
|    | -Occupation rate: ( <i>OccRate</i> )   | # of persons /# of rooms |
|    | (i.e., household size/number of rooms) |                          |

##### Wealth:

- |    |   |                |
|----|---|----------------|
| f) | -If the household possesses:  | Yes: 0 / No: 2 |
|    | house: ( <i>OwnHouse</i> )  | Yes: 0 / No: 2 |
|    | radio: ( <i>Radio</i> )   | Yes: 0 / No: 2 |
|    | Farm land: ( <i>OwnLand</i> )   | Yes: 0 / No: 2 |
|    | private business: ( <i>OwnLand</i> )  | Yes: 0 / No: 2 |
| g) | -If household has another income-generating activity: (adolescent/elderly value is % of adult) ( <i>Remit</i> ) | Yes: 0 / No: 2 |
| h) | -If the household head or spouse has a formal job: (adolescent/elderly value is % of adult) ( <i>PWork</i> )    | Yes: 0 / No: 2 |

#### Coping Mechanisms

- |    |  |                |
|----|--|----------------|
| i) | -Enrolled in School or Finished high school: ( <i>SchEnr</i> )   |                |
|    | Higher than Secondary School=0, Secondary school and still in School=1, Some education and still in School=2, Some education=3, No education and not in school=4 |                |
| j) | -Percent of Siblings that are dead   |                |
|    | 50 percent or more   | Yes: 0 / No: 2 |
| k) | Number of children that are dead   | Yes: 0 / No: 2 |
| l) | Living with Parents  | Yes: 0 / No: 2 |

Source: (Subbarao & Coury, 2004)

Final score: added values (higher values of the index will indicate lower capacity)

Similar calculation will be conducted on all the households in the sample to enable arrival at a mean score and a ranking, given the type of household (e.g., child-headed household, household with sick guardians, or household fostering orphans), according to its capacity to cope.

## Appendix 2. Definition of Terms

<u>Variable</u>	<u>Descriptions</u>
<i>Adolescent:</i>	The dissertation studied Kenyan adolescence age range 15 to 24 years old. There were two groups of adolescent females in the study; late adolescent 15-19 years of age and emerging adult 20-24 years .
<i>Coping capacity:</i>	Capacity refers to way in which people and organizations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event or process. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and other hazards. This was measured using the <i>household coping capacity (HCC)</i> that was a composite index for the level resources available to the members within the household. The higher the value of the HCC index , the lower household capacity it will indicate. Household coping capacity (HCC) was made with three main indexes: Demographic, Economic and Coping Characteristics Indexes. HCC demographic index was composed of gender of the head of the household and the reciprocal of the dependency ratio. Dependency ratio was the number of adults that supported children and elderly (60 years and over) in the household. HCC economic index was composed of housing, wealth and employment information on head of the household. Housing includes condition for the house and the occupation rate. Occupation rate was the number of household members over the household size (number of rooms excluding the kitchen). HCC coping was composed household education enrollment, children workload, and number of sick persons in the household. Education enrolment looks at any school age children in the household and compares biological to foster/adopted children in the house. The same analysis was done for the children's workload.
<i>Health Status:</i>	<i>Health risk</i> would be the adverse events that affect human health. To check for the health outcome, the frequency of disease was measured on the individual and household.
<i>Provinces and districts:</i>	Provinces and districts are administrative areas in Kenya that could closely correlate with ethnic boundaries Culture and local tradition could influence risk of parental death and treatment of the children after they are gone. Culture was also link to ways the local community creates and maintain social network.

### Appendix 3. Variable Used in the Models

<i>Variable type</i>	<i>Variable</i>	<i>Description</i>
<b>Adolescent</b>	<b>Individual</b>	V013 Age 5-year groups
		V501 Current marital status
		V133 Education in Single Years
		V025 Place of residence
		Recode
		Rural Residence is in Rural area
		V131 Ethnicity
		Recode
		CenEthnic.....
		CoastEthnic.....
<b>Risk</b>	<b>Relationship</b>	RVEthnic.....
		WestEthnic.....
		LuoEthnic.....
		V150 Relationship structure
		Recode to:
		RelateFC Relationship-Foster Care
		RelateWS Relationship - Wife or Spouse
		ParentHH Relationship to Head Parent (Referent)
		RelateHH Relationship-Other relationship
		V151 Sex of head of household
<b>Risk</b>	<b>Sexual Risk</b>	Recoded to:
		FemaleHH Female Head of the Household
		V152 Age of head of household
		Recode to:
		AdolHH Adolescent-headed household dummy
		V765A Last sex reason used a condom
		V766A No. other than husband had sex in last 12 months
		V766B No. had sex including husband in last 12 months
		Recode
		RiskyBe
<b>Risk</b>	<b>Violence (index)</b>	0 No Risk - No Sex
		1 Low Risk - Has sex with single partner
		2 Moderate Risk -Has sex with multiple partners and uses condom
		3 High Risk- Has sex with multiple partners and does not use condom
		Any Violence or Abuse (VioAbu)
		Missing values were replaced with the mean.
		Reliability Statistics
		Cronbach's Alpha = 0.642
		N of Items = 4

<i>Variable type</i>	<i>Variable</i>	<i>Description</i>
<i>Household characteristics</i>		D104 Ever any emotional violence D106 Experienced any less severe violence D107 Experienced any severe violence D108 Experienced any sexual violence
	<i>HCC Demographic Characteristics</i>	V151 Sex of household head Recode FemaleH Female Head of the Household' DepRatio Dependency ratio Recode from HV009 Number of household members HV010 Number of eligible women in HH HV011 Number of eligible men in HH DepRatio= $\text{HV009} - (\text{HV010} + \text{HV011}) / (\text{HV010} + \text{HV011})$
	<i>HCC Economic Characteristics</i>	V190 Wealth index Was Inverse Recoded Wealth 'Recode for Wealth Index'.
		<i>Housing</i> HV009 Number of household members SH25A Rooms used for sleeping Recode OccRate Household Occupation Rate' OccRate = $\text{HV009} / \text{Rooms}$
		SH27B State of repair of dwelling HV213 Main floor material HV215 Main roof material Recode HousCon Housing condition
		HV207 Has radio Recode Radio1 Has Radio
		SH28a Household own structure Recode House Own the House
		SH28b Household own land which structure sits Recode OwnHouse 'Own the House and land'.
		V705 Recode PWork 'Partner has a Job' .
		V740 Type of land where resp. works Recode



<i>Variable type</i>	<i>Variable</i>	<i>Description</i>
		OwnLand Has or Own Land'
		V741 Type of earnings for work Recode Remit 'Respondent is paid'.
		V719 Work for family, others, self Recode Remit 'Respondent is paid'.
	<i>HCC Coping Mechanisms</i>	HV109 Educational attainment HV110 Member still in school Recode SchEnr 'School enrollment and attainment'.
		MMC1 Number of siblings of resp. MMC2 Preceding births before resp. SiblingsD Number of siblings that are Dead DSibRate Dead Sibling Rate ' Recode DSibRate = SiblingsD/MMC1. YSiblings Total number of younger siblings LostSup Lost sibling support through death (half of them)
		RESF Final test HIV result Recode HIVPos1 HIV Positive Recode
<i>Household Coping Characteristics</i>		DemoChar 'Demographic Characteristics'. DemoChar = FemaleH + DepRatio + Adol1 + Parent1.
		EcoChar Economic Characteristics' EcoChar = OccRate + HousCon + Radio + OwnHouse + Ownland + OwnBiz + Remit + PWork.
		CopeChar 'Coping Characteristics' CopeChar = LostSup + SchEnr + HIVPos1 + ChildDied.
		HCC 'Household Coping Characteristics Index COMPUTE HCC = DemoChar + EcoChar + CopeChar .
<i>Health outcome</i>	<i>Self Reported Incidence of sickness (index)</i>	Reliability Statistics Cronbach's Alpha = 0.763 N of Items = 14

<i>Variable type</i>	<i>Variable</i>	<i>Description</i>
		s489a Signs of illness: not able to drink
		s489b Signs of illness: fever shivering
		s489c Signs of illness: repeated vomiting
		s489d Signs of illness: diarrhea
		s489e Signs of illness: blood in stools
		s489f Signs of illness: fast breathing
		s489g Signs of illness: convulsions
		s489h Signs of illness: weakness
		s489i Signs of illness: getting sicker
		s489j Signs of illness: crying
		s489k Signs of illness: coughing
		s489l Signs of illness: change of color of eyes
		s489m Signs of illness: sleepy
		s489x Signs of illness: other
		Recode
		SRIS -Self Reported Incidence of sickness.
		SRISD -Self Reported Incidence of sickness dummy'.

#### **Appendix 4. General Regression Models**

Health Outcome =Self Reported Incidence of sickness-(SRIS)

$$H_1 \quad \text{SRIS} = \text{Individual Characteristic} + \text{error (unexplained factor)}$$

$$H_2 \quad \text{SRIS} = \text{Individual Characteristic} + \text{Risk factors (Risky Sexual behavior, Violence)} + \text{error (unexplained factor)}$$

$$H_3 \quad \text{SRIS} = \text{Individual Characteristic} + \text{Risk factors (Risky Sexual behavior, Violence)} + \text{Protective factors (Household coping capacity(Demographic + Economic + Coping))} + \text{error (unexplained factor)}$$

## Appendix 5. The OLS Regression Model

The OLS regression model

Adolescent-headed

$$y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + b_{14}X_{14} + b_{15}X_{15} + u$$

where

y = ..... Self Reported Incidence of Sickness (0=Not sick, 1=Sick)

*Demographic Characteristics*

X<sub>1</sub> = ..... Current age – respondent

X<sub>2</sub> = ..... Current marital status (0= Not Married, 1 = Married/Cohabiting)

X<sub>4</sub> = ..... Highest year of education

X<sub>5</sub> = ..... Place of Residence (Rural, Urban)

X<sub>6</sub> = ..... Childhood Residence (Rural, Urban)

X<sub>7</sub> = ..... Adolescent headed household dummy (0=No, 1=Yes)

X<sub>8</sub> = ..... Parent Head of Household (0=No, 1=Yes)

X<sub>9</sub> = ..... Ethnic groups : Central (0=No, 1=Yes)

X<sub>10</sub> = Ethnic groups: East & Coast (0=No, 1=Yes)

X<sub>11</sub> = Ethnic groups: Rift Valley (0=No, 1=Yes)

X<sub>12</sub> = Ethnic groups found in the west (0=No, 1=Yes)

*Risk Characteristics*

X<sub>13</sub> = risky sexual behavior (0 No Risk ,1 Low Risk, 2 Moderate Risk, 3 High Risk)

X<sub>14</sub> = Any Violence or Abuse to the Adolescent (0=No, 1=Yes)

*HCC Characteristics*

X<sub>15</sub> = Household coping capacity

U = error

## Appendix 6. The Logistic Regression Model

Adolescent-headed

$$\text{Logit}(y) = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + b_{14}X_{14} + b_{15}X_{15} + u$$

where

.....  
y = ..... Self Reported Incidence of Sickness (0=Not sick, 1=Sick)

*Demographic Characteristics*

X<sub>1</sub> = ..... Current age – respondent (0=15-19 yrs, 1=20-24 yrs)

X<sub>2</sub> = ..... Current marital status (0= Not Married, 1 = Married/Cohabiting)

X<sub>4</sub> = Highest year of education (0=none, 1=primary, 2=secondary, 4=higher)

X<sub>5</sub> = ..... Place of Residence (Rural, Urban)

X<sub>6</sub> = ..... Childhood Residence (Rural, Urban)

X<sub>7</sub> = ..... Adolescent headed household dummy (0=No, 1=Yes)

X<sub>8</sub> = ..... Parent Head of Household (0=No, 1=Yes)

X<sub>9</sub> = ..... Ethnic groups : Central (0=No, 1=Yes)

X<sub>10</sub> = Ethnic groups: East & Coast (0=No, 1=Yes)

X<sub>11</sub> = Ethnic groups: Rift Valley (0=No, 1=Yes)

X<sub>12</sub> = Ethnic groups found in the west (0=No, 1=Yes)

*Risk Characteristics*

X<sub>13</sub> = risky sexual behavior (0 No Risk ,1 Low Risk, 2 Moderate Risk, 3 High Risk)

X<sub>14</sub> = Any Violence or Abuse to the Adolescent (0=No, 1=Yes)

*HCC Characteristics*

X<sub>15</sub> = Household coping capacity

U = error

## **VITA**

Andrew Mburu Muriuki was born June 28th 1964, Mombasa, Kenya. He did his schooling at Loreto Convent Primary School, Mombasa and later did his high school at Nairobi School, Nairobi. He has received the following degrees: B.A. Business, Moravian College (1990); M.S. Policy Analysis, Carnegie Mellon University (1993); and Ph.D. Social Work, University of Missouri-Columbia (2007).

As a doctoral student, Andrew published couple of articles and was able to present some of them in a number of major conferences.

He is interested on the effects of social environmental factors on the adolescent health and in the household they leave in. He is interested on how the African household will continue to be affected by HIV/AIDS and other chronic diseases. Additionally, he is interested in the importance of African cultural tradition on social development and behavioral change.