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Alexandra Fehr 21 April 2011

Stress, Menstruation and School Attendance: Effects of Water Security on Adolescent Girls in South Gondar, Ethiopia

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An abstract of
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Abstract

Stress, Menstruation and School Attendance: Effects of Water Security on Adolescent Girls in South Gondar, Ethiopia

By Alexandra Fehr

Background: Water, sanitation and hygiene (WASH) issues are a growing concern globally and disproportionately affect women and girls in low-resource settings. Many of the physical health outcomes of poor WASH have been studied, but little attention has been garnered to mental health. This is especially true among adolescents, an oft-neglected group in public health research. Initial research on the topic has shown that water insecurity, much like food insecurity, is significantly associated with poor mental health among women.

Objective: The objective of this study is to determine to what extent water insecurity, particularly water collection, menstrual management and school hygiene, affect stress and school attendance among adolescent girls, aged 13-18. This study took place in South Gondar, Ethiopia during the summer of 2010.

Methods: This study was conducted using a survey, free-listing and ranking activities, in addition to focus group discussions. A variety of qualitative and quantitative analysis methods, including consensus analysis, were used.

Results: 38% and 43% of participants had missed school due to water collection and menstruation, respectively. School hygiene was found to be in a poor state, with 90% of post-menarcheal girls stating their school did not have a place to maintain hygiene while menstruating. Consensus analysis, however, showed that among the items causing stress and school absence, menstruation was ranked eighth for stress and ninth for school absence.

Discussion: This study has several implications. First, it further demonstrates the need for WASH interventions and studies to include mental health outcomes in addition to physical ones. Second, it sheds light on the complications of adolescent life, especially in regard to barriers to health, well-being and school attendance. Thirdly, by analyzing this study's results and the already established associations between different components of WASH and health, this study proposes a theoretical model for which water insecurity leads to gender disparities in health.

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Chapter 1: Introduction

In rural Ethiopia, where water sources are often distant and unsafe, women and girls typically experience the greatest burden of water insecurity, as they are traditionally responsible for providing for the water and hygiene needs of the family. The physical health effects of drinking unsafe water, not washing one's hands, and not safely disposing of human waste in a latrine are well established, and development projects typically aim to improve these physical health outcomes in their target populations.

However, the social and emotional effects of having poor access to proper water, sanitation, and hygiene (WASH) conditions are not well understood, and there are few studies on this topic. A recent study conducted in Bolivia found a positive association between water security, psychosocial stress, and being female (Wutich and Ragsdale 2008). Although based in an urban setting, this was the first study to systematically analyze some of the psychosocial effects that occur in relation to water access conditions. In addition, other studies have found that resource security is significantly associated with other mental health effects, specifically anxiety and depression. For example, a study in Tanzania found that food security is significantly associated with poor mental health outcomes among women in the study area (Hadley and Patil 2006).

Information is also lacking for understanding the intersection between school attendance and the onset of menarche in sub-Saharan Africa. A study in Tanzania by Marni Sommer (2009) found that menstruation was accompanied by fear, shame and confusion for the girls in the study population, and that there is a gap in knowledge about puberty and menstruation. In addition, the study found that other structural aspects

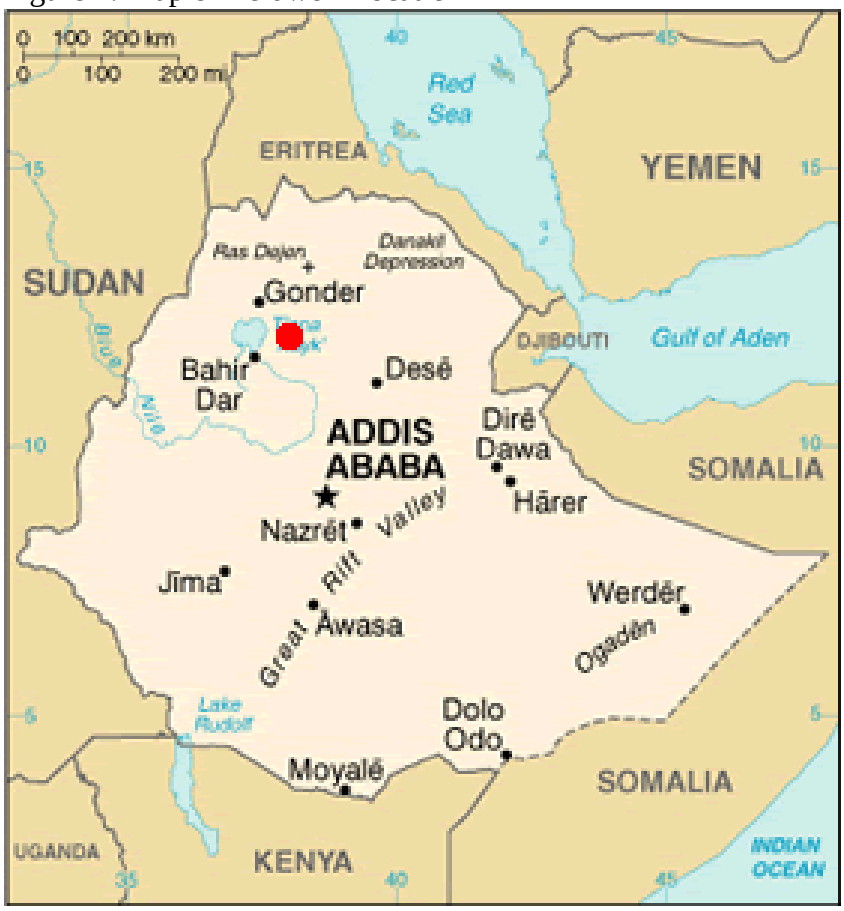
worsened the fear and shame experienced by the girls - mainly a lack of adequate sanitation facilities and water at the schools and a predominantly male staff.

Stress or anxiety that may be felt in response to difficult living conditions are of concern to development organizations, as they affect the overall well-being and quality of life of the communities they serve. Understanding the degree to which WASH may affect stress and emotional well-being and social relationships might assist development organizations in better addressing the holistic needs of their beneficiaries. Furthermore, the disproportionate amount of stress experienced by women and girls as a result of water insecurity may be a contributing factor to gender disparities in health.

The *Water, Women and Development* (WWD) project is a collaborative research project between Emory University and CARE Ethiopia with the collaboration of colleagues from Jimma University and funding from Emory's Institute for Developing Nations. It aims to examine the relationship of WASH conditions with psychosocial health among women and girls in Ethiopia. This research is a part of this project, focusing specifically on adolescent girls. It was funded by the IDN and the Eugene J. Gangarosa Global Field Experience Fund.

Fieldwork was conducted in three kebeles (communities) around the town of Debre Tabor in South Gondar, Ethiopia (seen in Figure 1) during June and July of 2010. Research and analysis took place during 2010 and 2011 with the purpose of examining the following research question: to what extent does water security, particularly water collection, menstrual management and school hygiene, affect the lives of adolescent girls? By use of a variety of research and analysis methods, this study seeks to better understand this relationship and assess its public health significance.

Figure 1. Map of fieldwork location



Chapter 2: Literature Review

The World Health Organization (WHO) defines water security as "having sustained and reliable access to the amount of quality water necessary for daily life and activities." This definition of water security is further specified as "the availability of at least 20 liters per person per day within one kilometer (or 30-minute walk) of the users dwelling" (WHO 2008).

Many of the effects of water insecurity have been studied, especially diarrheal diseases as a result of unsafe water (Fewtrell 2005), but little has been studied on the effects of water insecurity on mental health, especially among women and girls in low-resource settings.

Currently, only two studies have focused on this topic, and both found water insecurity to greatly influence the mental health and well-being of the study population. In a study conducted in La Purificacion, Mexico, Ennis-McMillan (2001 and 2006) used ethnographic methods to show that community members described "suffering from water" as a cause of emotional distress, worry and body aches. However, further analysis suggested that it was not the lack of water in particular that caused the distress, but the inequalities surrounding water access in the community.

In addition, a recent study conducted by Wutich and Ragsdale (2008) found a significant association between water insecurity, being female and a poor mental health state in urban Bolivian squatter settlements. Water-related emotional distress was found to be common, and encompassed the emotions of fear, worry, anger and bother. Much like Ennis-McMillan, however, it was most often the social inequalities of the water distribution methods, and not necessarily the lack of water, that were found to be source

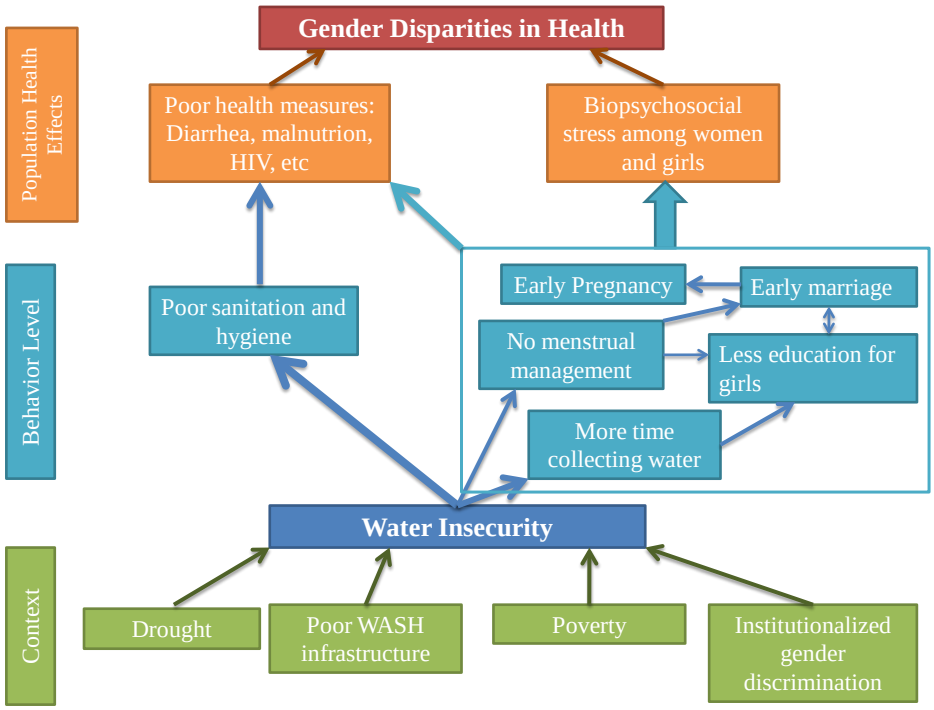
of the poor emotional states. The aspects that do not involved social negotiations – in adequate water supply and seasonal water variability - were not significantly associated with emotional distress. In the absence of clearly defined procedures or rights, the economic and social negotiations made by women were significantly associated with a negative emotional state (Wutich and Ragsdale 2008).

In a study on another form of resource security, food security, Hadley and Patil (2006) found a significant association between food insecurity and mental health among women in rural Tanzania. Looking at mothers from four different ethnic groups in two unique rural areas in the country, the study found a strong positive correlation ($p < 0.0001$) between women's score on the food insecurity instrument and women's results of the Hopkins Symptom Checklist, a common tool for measuring anxiety and depression, even when controlling for other characteristics (i.e. age, education, household size and marital status) (Hadley and Patil 2006). Many other studies have found similar results. In a meta analysis conducted by Coates et al. (2006), food insecurity was found to be associated with poor mental health outcomes in multiple cultural and geographic contexts. Due to the similarities between food and water security, these results are likely to remain similar when comparing water insecurity with mental health

To date, there are many sources citing associations between poor water insecurity, especially poor WASH-related factors, and health. In addition, there are studies reporting genderized issues related to WASH. However, there is currently no model linking all of these factors, demonstrating the effect water insecurity – including WASH – can have on not just population-level health, but on gender disparities in health. This research focuses on one potential mechanism in which water insecurity may lead to gender disparities in

health, by focusing on the gendered components of water insecurity, mainly menstrual management and water collection. This can be seen in Figure 2.

Figure 2. Theoretical model



This framework represents one mechanism in which water insecurity potentially leads to gender disparities in health. At the initial level, several contextual factors are involved that set the premise for water insecurity, including, but not limited to: drought, poverty, poor water, sanitation and hygiene (WASH) infrastructure and institutionalized gender discrimination.

These factors help contribute to water insecurity, which, in turn, effects individual behaviors. The individual health behaviors are divided into those that affect everyone (men, women and the young and old) – poor sanitation and hygiene – and those that specifically affect women and girls: increased time collecting water, no menstrual

management, less education for girls, early marriage and early pregnancy. It is these latter health behaviors that the rest of this research study will be focused.

These individual health behaviors lead to population-level health effects that cover a range of health outcomes that affect everyone. These are also the health outcomes that are most often studied in the WASH literature: diarrheal illnesses and malnutrition. However, certain health effects disproportionately affect women and girls, especially HIV/AIDS and the mental and physical effects of increased stress caused by the gender-specific behavioral factors. In turn, according to this model, it is the disproportionate level of health effects experienced by women and girls as a result of water insecurity that contributes to gender disparities in health.

2.1: Contextual Level

2.1.a: Drought

Ethiopia has a long history of drought, historically averaging one every three to five years (Little, et al 2008). The regular occurrence of droughts has lasting effects on the water security, food security and economic growth of the country, in addition to the well-being of those living in drought-prone areas. Particularly in regard to water security, Ethiopia lacks the infrastructure to hold water during times of plentiful rain that can then be used during a drought; per capita, the country has less than one percent of the reservoir water storage capacity of North America (Grey and Sadoff 2007).

Drought has been found to greatly impact the physical and mental health of those living in areas suffering from frequent droughts. For example, a literature review on hazards and mental health found that, across a variety of cultures and geographies,

multiple studies have found drought is responsible for both short- and long-term mental health outcomes, including stress, anger, fear, depression and vulnerability (Zamani, Gorgievski-Duijvesteijn and Zarafshani 2006).

However, potentially mediating the effects of drought on mental health is food insecurity. The absence of rain and water, especially in low-resource settings, greatly affects food production, leading to food insecurity (Hussein 1976). Food insecurity, in turn, can have devastating impacts on nutrition and health.

Additionally, according to a study conducted by Grey and Sadoff (2007), one drought within a 12-year period can diminish the average economic growth across the entire 12-year period by ten percent. Averaging two to four droughts within that specified timeframe, Ethiopia is in a constant battle for economic growth. The effects of these regular droughts are evident in the poverty statistics for Ethiopia.

2.1.b: Poverty

The effects of poverty on health are well established. Those living in poverty have less access to resources, are exposed to greater environmental hazards and are more likely to be malnourished. Conversely, poor health can increase the chances of falling into poverty (WHO 2004). In all countries, low, medium and high income alike, a gradient exists such that the lower an individual's socioeconomic status, the worse their health (WHO 2011).

Extreme poverty is Code Z59.5 in the International Classification of Diseases. As stated in the first World Health Report (1995), "Poverty is the main reason why babies are not vaccinated, why clean water and sanitation are not provided, why curative

drugs and other treatments are unavailable and why mothers die in childbirth. It is the underlying cause of reduced life expectancy, handicap, disability and starvation."

In 2010, Ethiopia ranked 157th of 169 countries in the Human Development Index, a ranking system that takes into account multiple socioeconomic indicators, especially poverty. According to World Bank indicators (2011), 77.57% of the Ethiopian population lives on less than $2.00 USD a day and 39.04% live on less than $1.25 USD a day. Additionally, in 2000, 44.20% of the population lived below the national poverty line (World Bank 2011).

In addition to a lack of income, many Ethiopians also lack basic commodities. According to the 2005 Demographic and Health Survey (DHS), 78.0% of rural Ethiopians do not have electricity. In addition, 70.6% live in homes where the floor is made of earth or sand, 0.1% have a non-mobile phone and 0.2% have a refrigerator.

2.1.c: Poor WASH Infrastructure

The importance of WASH infrastructure for health and hygiene is well documented. As stated by the UN Secretary-Genderal, Ban Ki-moon "Safe drinking water and adequate sanitation are crucial for poverty reduction, crucial for sustainable development and crucial for achieving every one of the Millennium Development Goals" (UNICEF 2011)

Globally, 1.1 billion people do not have access to an improved water source, and 2.6 billion do not have access to an improved sanitation facility (WHO 2005). According to the WHO (2008), an improved water source refers to either a household connection, a protected well, a borehole, a protected spring or rainwater; improved sanitation facilities

include a connection to a public sewer or septic tank, a pour-flush latrine or a ventilated pit latrine.

In Ethiopia, large portions of the population live without access to improved sources of water or sanitation. This is especially true in the rural areas, where 83% of the population lived in 2009 (World Bank 2011). The following graphs show the percentages of the population of Ethiopia with access to an improved water source or sanitation facility. Whereas there has been improvement in the past 20 years, there are still many living without these resources. In 2008, 24% of the rural population in Ethiopia did not have access to an improved water source, and eight percent of the rural population did not have access to an improved sanitation facility (World Bank 2011).

Figure 3. Percentage of Ethiopian population with access to an improved water source, 2008 (World Bank 2011)

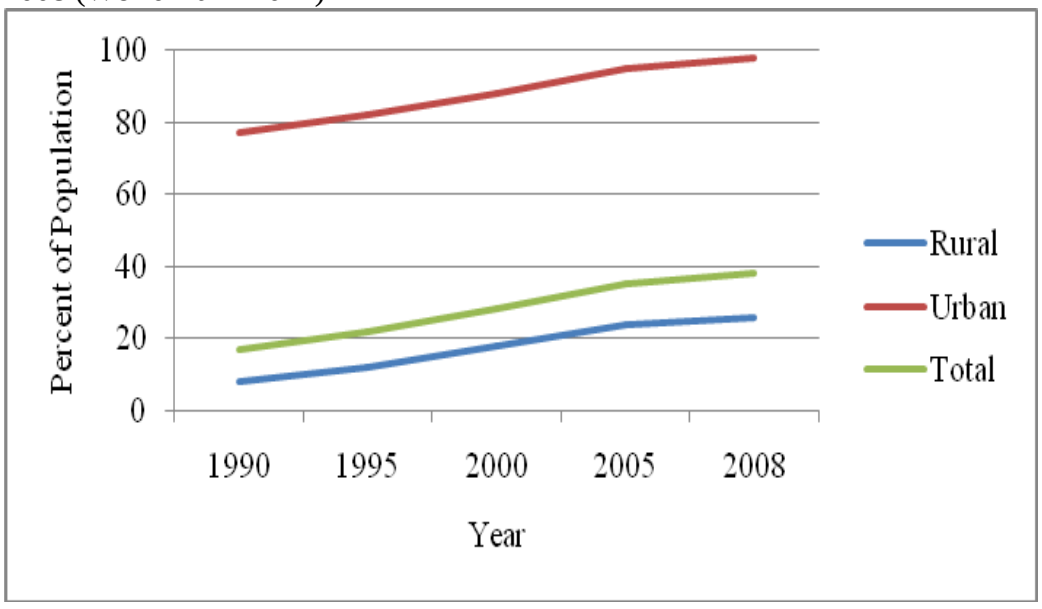
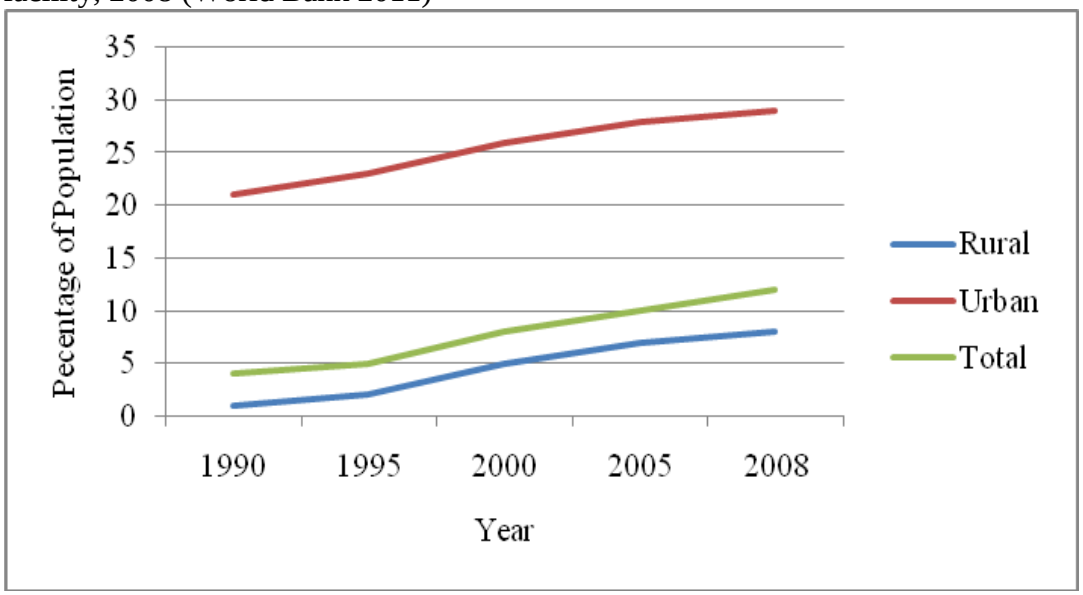


Figure 4. Percentage of Ethiopian population with access to an improved sanitation facility, 2008 (World Bank 2011)



It is estimated that 88% of diarrheal diseases are a result of poor WASH and that if, globally, everyone had access to regulated piped water and a sewage connection, 1863 million school absences would be spared (Adams et al. 2009). However, also affecting school attendance and vital to the health and well being of children and adolescents is school-based WASH infrastructure. This is especially true for adolescent girls who have reached menarche.

Perhaps one of the biggest factors affecting adolescent girls during menstruation is sanitation at school. According to the WHO (2009), the presence of adequate and clean water and hygiene at schools is essential for nearly all the Millennium Development Goals, but especially in achieving universal primary education, reducing child mortality and promoting gender equality. This is because poor sanitation at school greatly affects girls, especially menstruating girls, and further creates a girl-unfriendly school environment.

Many schools in rural communities throughout the developing world lack the infrastructure necessary to protect health, especially adequate latrines and safe water. As part of the Water, Sanitation, Hygiene Standards for Schools in Low-Resource Settings (2009), the "essential short-term measures required to protect health in schools" include separate and adequate sanitation facilities for boys and girls, water and soap for washing and drinking water. However, these guidelines are rarely met in Ethiopia, where the current state of WASH infrastructure at schools is abysmal. A 2003 study by UNESCO found that less than half of the surveyed schools had a larine, and only one of the schools had separate latrines for boys and girls (UNESCO 2003).

2.1.d: Institutionalized Gender Inequality

The CPIA Gender Equity rating analyzes the scope to which a country has implemented the necessary infrastructure to ensure that laws and policies promote equality among men and women in access to health and education, in addition to legal protection and economic opportunities. The score is based on a scale of one to six, with six indicating the highest level of gender equity. Ethiopia received a CPIA Gender Equity score of three from 2005 – 2009, the last year available. (World Bank 2011)

Ethiopia has ranked consistently in the middle of this scale. However, a mid-level rank does not imply a high level of enforcement of the laws and policies that do exist. For example, a 2008 study by Save the Children found that 81.1% of females in Amhara Region, Ethiopia have experienced female genital cutting (FGC). FGC is criminalized under the current Penal Code of Ethiopia, and anyone involved in the act is subject to a fine and jail time. Despite the existence of this law for several years, and the persistence

of FGC in Ethiopia, there has not been a single criminal procedure for FGC to date (OECD 2011).

These institutionalized gender inequalities can be seen in a variety of indicators, especially those related to rape and domestic violence, for example. According to a study conducted by the Population Council (2010), 15.9% of rural Ethiopian females between the ages of 12 – 24 had experienced rape or forced sex; the rate among urban girls was slightly lower, with 12.0% of girls reporting the same. For boys of the same age, 2.2% and 1.4% of rural and urban reported experiencing rape or forced sex, respectively. Additionally, 63.4% of girls and 68.1% of boys agreed with the statement "a wife should not be able to refuse her husband sex."

In regard to domestic violence, 12.5% of all married girls in the sample (10.9% rural and 16.6% urban) reported having at least one form of physical or emotional violent act towards them from their spouse. Furthermore, 65.0% of rural females and 51.6% of rural males believe that a man is justified in beating a woman for any of a list of circumstances (burning food, arguing with her husband, etc). The most common circumstance cited was if a woman argues with her husband (Population Council 2010).

Another example demonstrating the results of institutionalized gender discrimination is prioritizing the health of boy children over girl children. For example, 24.8% of boys under five years of age received medical treatment for diarrhea compared to 19.6% of girls in 2005 Ethiopian DHS. Institutionalized gender discrimination becomes evident within a context of water insecurity when analyzing the genderized individual-level effects, including those discussed later.

2.2: Individual Level

2.2.a: Universal Individual Behavioral Factors

Hygiene and sanitation behaviors are greatly impacted by water insecurity and WASH infrastructure, especially the behaviors of hand washing with soap, proper disposing of feces and safe water storage. These behaviors are especially important, as they can provide mechanisms for infection of fecal-oral diseases (Andargie et al. 2008). Of particular importance to health is open defecation. According to the WHO-UNICEF Joint Monitoring Program (2008), open defecation is widely practiced in rural Ethiopia. The prevalence of open defecation has declined in the past years, but in 2008, 71% of the rural population still used this method.

Many programs, such as the USAID Hygiene Improvement Program (HIP), are working to improve the health of Ethiopia through sanitation and hygiene education and behavior change. The HIP baseline study in Amhara Region, Ethiopia (2008) found that only 7.8% of households reported “contained” disposal of children’s feces, 14.4% had a hand washing station with soap near the latrine and that 19.1% of respondents knew to wash their hands after defecating. Sanitation and hygiene practices are in a poor state in Ethiopia, greatly affecting the health of the entire population.

2.2.b: Female-Specific Individual Behavioral Factors

On the individual behavioral level, many components of water insecurity directly affect girls and women, especially adolescent-aged girls. These factors include spending more time collecting water, no menstrual management, less education for girls, early marriage and early pregnancy. These different factors do not necessarily operate independently from one another, but as demonstrated in Figure 2, they are all interrelated.

2.2.b.i: Water Collection

In many countries and cultures, women and girls are responsible for collecting the water that will be used by the entire family for drinking, cooking, cleaning oneself and the home, tending to animals and planting food for consumption and profit (UN 2005). In Ethiopia and elsewhere, men and boys rarely engage in this activity. A World Bank study on time use among women in Africa found that women spent 106-400% more time collecting water than their male counterparts (Charmes 2006). In regard to adolescents, a multi-country study found that at any age, adolescent girls spend significantly more time than adolescent boys on nonpaid housework, of which water collection is a major component (Lloyd, Grant and Ritchie 2008).

This responsibility places great strain on women and girls and consumes a remarkable amount of their time that could otherwise be spent in school or earning an income. Because of this, the ability to improve gender equality – in addition to sustainable development and poverty reduction – is greatly enhanced by diminishing the amount of time spent collecting water (UN 2005).

In Ethiopia, 52.1% of the rural population travels more than 30 minutes to collect water; only 1.6% of people have a water source at their dwelling. Women and girls are the primary persons responsible for collecting the family's water. Women older than 15 comprise 80.5% of those responsible, and girls younger than 15 comprise 9.0% of those responsible for collecting water (DHS 2005). In addition, 18.0% of rural residents experienced a decline in access to safe water in the past year, compared to 17.5% who experienced an increase in access to safe water. The majority of rural residents, 63.3%, did not experience any change in access to water (Population Council 2010).

2.2.b.ii: Menstruation and Menstrual Management

For girls anywhere in the world, the onset of menstruation and puberty can be a time of confusion. This is especially true currently on a global scale, as age at menarche is declining and age at marriage is rising (Kirk and Sommer 2006). However, in Ethiopia, the age at menarche remains very similar to the age in which many rural girls are married. In Ethiopia, the mean age at menarche is approximately 15years of age (Tilson and Laron 2000), several years higher than in developed countries such as the United States and Europe where the mean age at menarche is approximately 12 years (Chumlea et al 2003). One potential explanation for this disparity in age at menarche is the non-equivocal body mass between the different populations.

Previous studies in the United States and Europe have found that age at first menstruation is significantly associated with an increased body mass index (BMI) (Wyshak and Frish 1982; Anderson, Dallal and Must 2003). Whereas the exact biological mechanisms are unknown, Wyschak and Frisch (1982) found a significant drop in age at menarche per decade from the late 1700s to the mid-twentieth century in Europe and the US. Coinciding with the drop in mean age at menarche was an increase in population BMI. On an individual scale as well, Anderson, Dallal and Must (2003) found individuals with higher BMIs were significantly more likely to have begun menstruating at a younger age. In a country with historically high levels of chronic food insecurity such as Ethiopia, it is logical that average age at menarche would be higher than in food-rich countries such as the United States and those in Europe.

Menstrual taboos are prevalent on a global scale, varying greatly among and within cultures. These taboos are often viewed as oppressive towards women, but many

are regarded within the society as celebrating menstruation and women. Regardless, the way cultures explain and perceive menstruation influences the menstrual-related actions of women and girls (Buckley and Gottlieb 1988). Many taboos focus on sexual maturation. For example, in Tanzania, girls are frequently scared to share their menstrual status with their mothers due to the misconceived notion that the onset of menarche is a result of pre-marital sexual activity (Sommer 2009a). Anecdotal evidence suggests that this same misunderstanding is prevalent in Ethiopia.

Associated with taboos, however, is the lack of knowledge often found regarding menstruation. This lack of knowledge is prevalent among women and girls, as well as boys and men, and aids in perpetuating negative stigmas regarding menstruation and menstruating women and girls (Kirk and Sommer 2006). A study conducted by the Forum of African Women Educationalists, Uganda (FAWEU) (2004), found that neither gender was well informed on the topic, and that men viewed menstruation as mysterious and a weakness of women, rather than as a normal biological process. Furthermore, the girls in the study explained that it was difficult to discuss menstruation with their families. This, concluded the study, likely furthered the belief that menstruation is something to hide and a shameful experience that is ignored by the community as a whole (FAWEU 2003; Kirk and Sommer 2006).

Further, a lack of knowledge of menstruation, puberty and reproductive health can increase the risk of sexually transmitted infections, such as HIV, and unwanted pregnancies (Beusang and Razor 2000). According the Population Council (2010), only 55.0% of rural Ethiopian girls knew of menstruation before reaching menarche. The study found that the younger age groups, 12-14, were more knowledgeable than the older

age groups, 20-22, suggesting perhaps an increase in discourse surrounding menstruation. The majority of girls learn of menstruation from their teachers (44.7%); only 7.2% of girls learn of menstruation from their mothers (Population Council 2010).

In regard to menstrual management, few girls in rural Ethiopia have access to modern sanitary production. The majority of girls, 61.4% use rags, 24.5% use nothing (typically implying that they isolate themselves) and 8.4% of girls wear additional clothing. Demonstrating the urban-rural disparity in access to products, 37.1% of urban Ethiopian girls use sanitary pads while only 1.6% of rural girls use this method (Population Council 2010). For many girls, not having sanitary pads is due to a lack of access, especially financially.

A study in Uganda, where modern menstrual managements are hard to come by, found that pads can cost one-tenth of the family's budget for just one girl. Additionally, men are most often in control of the family's budget and do not find sanitary pads a priority (FAWEU 2003). Similar results were found in Tanzania where adolescent girls listed cost as one of the main barriers to obtaining sanitary pads (Sommer 2009b).

Most studies regarding menstrual management and school have found that menstruation and a lack of sanitation and hygiene products and infrastructure greatly impact adolescent girls' school attendance. For example, a 2005 study by UNICEF found that one in 10 African girls drop out of school upon reaching puberty or do not attend school during menstruation (UNICEF 2005). In addition, a recent study in Ghana found that girls were missing up to five days a month of school due to menstruation, and that the provision of sanitary pads significantly decreased school absenteeism among post-menarcheal girls from 21% to 9% (SCOTT 2010).

The Population Council (2010) found that the type of menstrual management used by girls was correlated with the number of days missed due to menstruation. Girls who added extra clothing as a source of protection were most likely to miss school, followed by girls who did not use any method. Latrine privacy was found to not be associated with missing school during menstruation (Population Council 2010).

In opposition to these studies, a study in Nepal by Oster and Thornton (2010) found that only 0.35 days out of the 180-day school year were missed as a result of menstruation among seventh and eighth grade girls, and that cramps, not a lack of sanitary products, were the main reason for absence. The study then assessed the impact of providing sanitary protection – a menstrual cup – on school attendance. They found that the provision of the cup increased school attendance, but not significantly (Oster and Thornton 2010). Whereas this study provides interesting results, it is important to note that school absence was based on official records, leading to potential reporting bias, and that the uptake of the menstrual cup was only 60%.

The importance of the implications of the studies on menstrual management and school attendance, however, are only one component of understanding the lives of adolescent girls and the barriers they face in obtaining an education and reaching equality. Future research needs to also look at how the school and societal environment, both physical and social, affect the lives of adolescent girls.

2.2.b.iii: Decreased Educational Opportunities

In contrast to the results of many studies in Ethiopia, the Population Council (2004) study found similar education rates between boys and girls. The following table

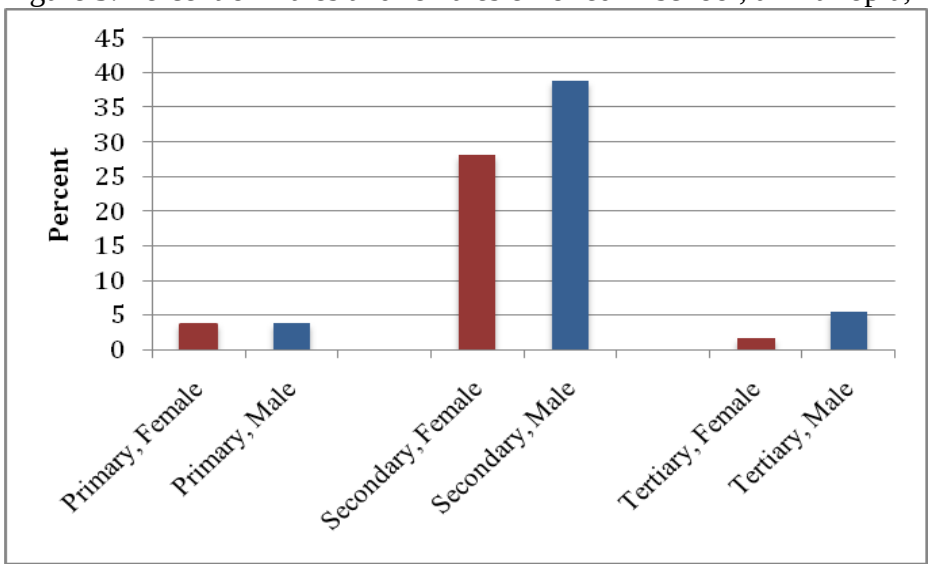
provides the level of educational attainment of boys and girls in Amhara Region, Ethiopia.

Table 1. Educational attainment among boys and girls 12-24 years of age in Amhara Region, Ethiopia, 2004

Educational Level	**Boys** (n=925)	**Girls** (n=940)
No education	45.0%	49.0%
1-4 Years	39.7%	34.9%
5-8 Years	14.3%	15.4%
9+ Years	1.0%	0.7%

This gender similarity in educational attainment may be a result of the Population Council surveys taking place in close proximity to schools, when many Ethiopian children do not live in such close proximity (Population Council 2004). The 2005 DHS for Ethiopia found that the gender parity index for primary school enrollment was 0.96. However, by secondary school, this value dropped to 0.75, demonstrating that relatively similar numbers of boys and girls attend school when young, but as they age and advance in grade level, more boys are enrolled in school than girls. Similar findings were reported by UNESCO (2003). They found that in primary school, the gender parity index was 0.78, but by the tertiary level, this value had dropped to 0.27. This can be seen in the following graph demonstrating the percent of males and females enrolled in school in all of Ethiopia, based on World Bank (2011) indicators.

Figure 5. Percent of males and females enrolled in school, all Ethiopia, 2008



Research on the impacts of girls' education on reducing poverty rates is growing. It is estimated that increasing the education of girls in the developing world reduces poverty through a number of mechanisms, including effects on fertility. Vavrus and Larsen (2003) found that past primary school, the number of years a girl is educated is inversely related to the number of children she has. This is potentially through both delayed marriage and increased autonomy within the household. The 2005 Ethiopian DHS found that women who completed at least secondary education were over four years older at first childbirth than women with less of an education (mean age 22.9 compared to 18.7).

Education plays a significant role in early pregnancy. In a Population Council survey (2010), young people without an education were significantly more likely to have children than young people with an education. Fifty seven percent of girls 12-24 surveyed without an education had a child, whereas 13% of girls with an education had a child.

In regard to health, more educated women have healthier babies. For example, women with at least a secondary education are significantly less likely to have a child

under five with diarrhea – a leading cause of death in Ethiopia (DHS 2005). These same correlations hold true for a variety of illnesses and in a variety of cultural and regional settings. The longer girls stay in school, the better their future lives and the better the future lives of their family (Lloyd and Young 2009 – new lessons).

2.2.b.iv: Early Marriage and Early Pregnancy

The Family Code of 2001 set the legal age of marriage in Ethiopia to 18 years of age, and the African Charter on the Right and Welfare of the Child also states that boys and girls must be of 18 years to marry. However, as many studies have found, this law is not enforced – especially in the rural areas. A recent study conducted by the Population Council (2010) found that 25.7% of rural girls are married before age 15 and 62.6% are married before the legal age of 18. Furthermore, 70.4% of these marriages were arranged. In Amhara Region, where this research is based, the rates are slightly higher than the national average: 39.1% of girls are married by age 15 and 63.3% of girls are married by age 18; 94.4% of marriages in the Amhara region are arranged (Population Council 2010).

Early marriage affects many aspects of a girl's life, including education and early pregnancy. In the same Population Council study (2010), 39.6% of girls claimed that marriage was the reason they had to leave school. A number of studies have found an association between early marriage and diminished educational attainment among girls. For example, a study by UNICEF found early marriage the cause of school absence for many adolescent girls in countries in Africa, Asia and the Middle East (UNICEF 2001).

Evidence has shown that in parts of rural Sub-Saharan Africa, early marriage increases during times of economic hardship. Seen as a potential source of wealth and

economic security for the family, girls are promised to men at younger ages, therefore increasing the likelihood of early pregnancy or dropping out of school at an earlier age (Kirk and Sommer 2006). In addition, a study by Pathfinder International found that the strongest reason for early marriage was to maintain the family's position in society (Alemu 2007).

Additionally, there is a significant inverse association found between age of marriage and likelihood of divorce. In Ethiopia, 45% of first marriages end in divorce. Early marriage, in addition to lack of a child for the couple, has been found to be a main contributor to this rate (Tilson and Larson 2000). Whereas divorce is not stigmatized in Ethiopia, women often experience a drop in socioeconomic status as their husbands maintain the majority of the family's wealth. This drop in economic status can lead to food insecurity and an inability to pay for medical care, especially when the woman is still responsible for the children, as is commonly the situation (Pankhurst 1992).

Early marriage also puts young girls at a greater risk of disease, including HIV/AIDS. A study in Kenya found that married adolescents had significantly higher rates of HIV than unmarried sexually active girls of the same age. Many factors contribute to this increased risk, including increased sexual activity after marriage and large discrepancies in age between the girls and their husbands (Clark 2004). In rural Ethiopia, male partners are on average 6.5 years older than females and 12% are more than 10 years older (Population Council 2004). Another reason for the increased risk in sexually transmitted diseases is the inability for young brides to negotiate terms of sexual activity with their much older spouses (Alemu 2007).

In addition, early marriage leads to early pregnancy. Along with its high rates of early marriage, the Amhara Region also experiences high rates of early pregnancy. In Ethiopia, the median age at first birth among 25-49 year olds is 19.2 years; in Amhara Region, it is 18.0 years. Nearly 30% of women in 25-49 had children by 18, and nearly half of women had a child by age. In Amhara Region, 20.3% of surveyed 15-19 year olds had already begun childbearing (DHS 2005).

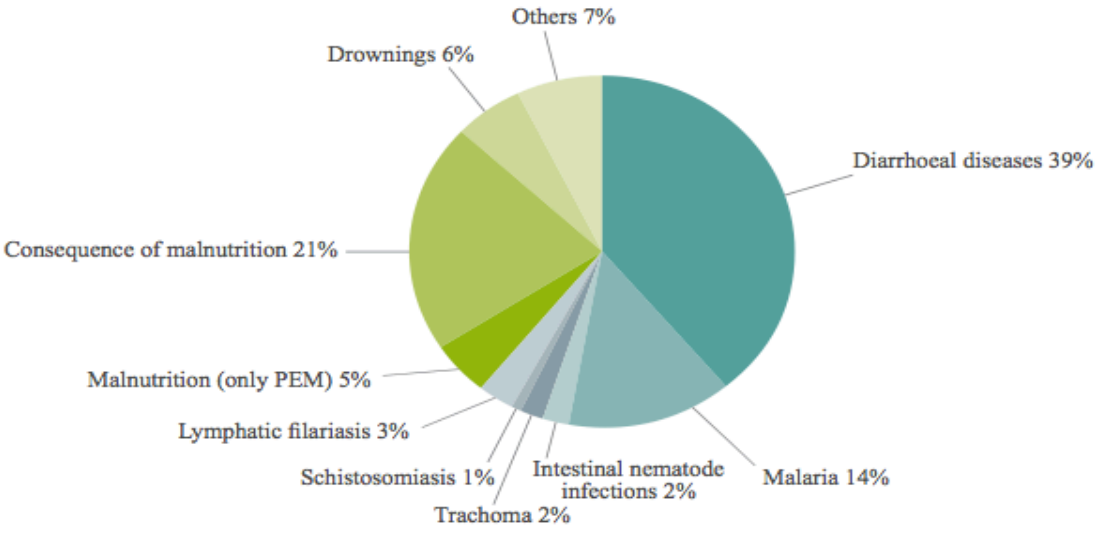
Many studies have demonstrated the potential dangers of giving birth at a young age. In Gondar, Ethiopia, Kumbi and Isehak (1999) compared birth outcomes between a group of teenage mothers and a group of older women, with mean ages of 17.6 and 28.6, respectively. Their results concluded that the younger group of mothers had significant differences in birth outcomes, including higher rates of low birth weight babies, lower rates of antenatal care attendance, higher rates of cephalo-pelvic-disproportion and higher rates of prolonged labor and preterm delivery.

2.3: Population Level

The health consequences of poor water, sanitation and hygiene can be felt by all: men and women, young and old. Diarrheal illnesses are the most common of the diseases caused by poor WASH, and globally account for upwards of two million deaths annually (WHO 2008). Diarrheal illnesses are extremely common in Ethiopia. The majority of deaths occur in children under-five, and diarrhea is the third most common cause of death for this demographic in Ethiopia (WHO 2006). In a 2006 study in Ethiopia, Marsch et al. (2003) found that over 30% of the children of mothers interviewed had a diarrheal illness in the two week preceding the study.

However, there are many more diseases resulting from poor WASH. The WHO (2008) estimates that one-tenth of the global disease burden is caused from a lack of safe water and poor sanitation and hygiene. The following figure depicts the proportion of other diseases caused by poor WASH.

Figure 6. Diseases resulting from poor water, sanitation and hygiene (from Pruss-Ustun et al. 2008)



PEM: protein–energy malnutrition
[a] In disability-adjusted life years, or DALYs.

Comprising a large portion of this graph is malnutrition and the consequences of malnutrition. Diarrhea has been shown to be a leading cause of malnutrition, especially among children (WHO 2011). Diarrheal infections cause malnutrition in a number of ways, mainly through a reduction in dietary intake and the intestines ability to absorb nutrients, along with increased catabolism and secretion of nutrients (Brown 2003), Further exacerbating the problem, there is a cycle of diarrhea and malnutrition, where diarrhea can cause malnutrition, and malnutrition may cause diarrhea, especially among children under 5 (Guerrant 1992).

Whereas these diseases, mostly diarrheal illnesses and malnutrition, affect everyone, there are certain diseases resulting from poor WASH that disproportionately affect women and girls, including HIV/AIDS and stress. Poor WASH puts women and girls at an increased risk for HIV/AIDS in at least two ways, the first of which is the risk of rape or sexual assault while collecting water. Women and girls who must travel to collect the family's water supply may fall victim to attack from men who are aware the women and girls must travel through the area, putting the water-collectors at risk of infection.

In the Population Council (2004) study in the Amhara Region, 56.2% of girls were often scared of being raped within their neighborhood (33.2% of boys reported the same concern). This sentiment is echoed by a 12 year-old girl who participated in the survey, "The place where we fetch water is far away and the boys hassle us on the way. Especially if there are no older people with us, they would chase us and break our pots."

Additionally, women and girls are a greater risk of infection caused from having sex for trade of resources. Multiple studies have found evidence in Sub-Saharan Africa of unequal gender dynamics leading girls to engage in sexual relationships with older men who can provide financial support and access to resources (Sommer 2009a). Additionally, many girls participate in income-generating activities in order to purchase water and hygiene supplies. These activities, such as delivering food to houses, put girls at an increase risk of being sexually assaulted (Kirk 2005). This is especially true when compounded with having less social support than male peers, girls and women are more likely to engage in such relationships out of necessity. The Population Council (2004) found that Ethiopian boys had a greater level of social support than girls.

As a result of water insecurity and poor WASH, women and girls experience a disproportionate level of stress. This stress is a biopsychosocial stress in that it affects every component of health and wellbeing: biological or physiological health, mental health, emotional health and social health and wellbeing.

The effects of stress on physical health are well documented, and evidence continues to grow on the number of physical health outcomes affected by increased stress. Increased levels of stress can impact immune function, increasing susceptibility to illness, as well as increase risk of heart disease, ulcers and depression (Hogue and Bremner 2005; Haritatos, Mahalingam and James 2006; Ursin and Eriksen 2004). If women and girls sustain disproportionate levels of stress as a result of water insecurity, than it stands to reason they experience an increase in adverse health outcomes as a result.

This study provides a framework incorporating the multiple associations of WASH and health to demonstrate a potential mechanism in which water insecurity leads to gender disparities in health. On the contextual level, water insecurity is effected by and genderized by drought, poverty, poor WASH infrastructure at home and at school and institutionalized gender discrimination. This leads to individual behavior in which everyone participates, including poor sanitation and hygiene practices, and those that are female-specific. Women and girls must bare the burden of water collection, diminished educational opportunities, a lack of menstrual management and early marriage and pregnancy.

As demonstrated by a multitude of studies, poor WASH behaviors affect health in many ways, especially through diarrheal illnesses and malnutrition. Women and girls are affected by these health outcomes, as well as men and boys. But women and girls are also greatly affected by other diseases as a result of water insecurity and WASH. For example, women and girls are at an increased risk of HIV or other sexually transmitted infections due to rape and sexual assault occurring during water collection.

Another way in which women and girls are disproportionately affected by WASH is through unequal levels of stress. Stress greatly influences many mental and physical health outcomes, including depression, immune function, cardiovascular disease and others. This increased level of stress among women and girls increases the number of morbidities they experience and furthers gender disparities in health.

2.4: Cultural Consensus

This study utilizes the method of cultural consensus. Cultural consensus is the degree to which individuals agree on the shared beliefs and behaviors of their cultural group (Dressler et al 2007). The cultural consensus theory incorporates a variety of theoretical and analytical methods that can be used to determine the overall beliefs and practices of a specific group. In addition, these methods can provide the extent to which an individual agrees with the proposed beliefs or practices (Weller 2009).

Past research has shown the effects that culture can have on disease risk, especially stress and blood pressure (Dressler 2004). Dressler and colleagues have studied the effects of cultural consonance on a variety of health outcomes, particularly psychological distress. Studies based in both the United States and Brazil found a

significant association between cultural consonance and psychological distress, after controlling for age, gender and socioeconomic status. Those who were in greater agreement with the overall cultural model were less likely to report experiences of psychological distress (Dressler et al 2007).

In this study, cultural consensus is used to determine to what extent issues of WASH, particularly water insecurity and menstrual management, are a source of stress and barrier to education among adolescent girls in South Gondar, Ethiopia. These methods will demonstrate the overall importance of various factors and to what extent the individual participants agree. Results of cultural consensus can be used to prioritize interventions and to conclude whether or not this particular demographic agrees on stressors and reasons for school absence.

Chapter 3: Manuscript

3.1: Introduction

Water security, "having sustained and reliable access to the amount of quality water necessary for daily life and activities," or, specifically, having available at least 20 liters per person per day within on kilometer (or 30-minute walk) of the user's dwelling, is a growing concern for the world's poor and disproportionately affects women and girls (WHO 2008). In Ethiopia, several factors interact with water insecurity to make it a national problem, including: a long history of drought, poverty, poor water, sanitation and hygiene (WASH) infrastructure and institutionalized gender discrimination. However, several of these factors are also involved in creating gender disparities within the context of water insecurity.

Ethiopia has a long history of drought, historically averaging one every three to five years (Little et al. 2008). The regular occurrence of droughts has lasting effects on the water security, food security and economic growth of the country. Affecting water security further, Ethiopia has less than one percent of the water storage capacity of North America (Grey and Sadoff 2007), making water reserves near impossible to maintain, and increasing the country's susceptibility to water insecurity. In addition, according to a study by Grey and Sadoff (2007), one drought within a 12-year period can diminish the average economic growth by 10%. Averaging two to four droughts within this timeframe, Ethiopia is in a constant battle for economic growth.

This is particularly evident when looking at the poverty statistics of Ethiopia. With a 2010 Human Development Index ranking of 157, Ethiopia is one of the poorest

countries in the world. In 2005, 77.57% of the population lived on less than $2.00 USD a day, and 39.04% lived on less than $1.25 USD a day.

Globally, 1.1 billion people do not have access to an improved water source, and 2.6 billion people do have access to an improved sanitation facility (WHO 2005). At the current rate of progress, the Millennium Development Goal to halve the number of people living without access to an improved sanitation facility will fall short of one billion people in 2015 (JMP 2010). The water and sanitation situation in Ethiopia is critical and demonstrates large disparities between the urban and rural populations; 83% of the population lives in a rural area (World Bank 2011). In 2008, 24% of the rural population had access to an improved water source and only 8% had access to an improved sanitation facility (World Bank 2011).

The CPIA Gender Equity rating, used to assess the extent to which a country has laws and programs in place to promote, and protect by law, gender equity in education, health and economy, for Ethiopia remained a three (out of six) from 2005-2009. However, this does not imply that a high level of enforcement of these laws. For example, Female genital cutting has been outlawed in Ethiopia under the current penal code. However, a study conducted by Save the Children (2008) found that 81.0% of the female population remains at risk of FGC. There has not been a single criminal procedure against FGC to date (OECD 2011).

Results of institutionalized gender discrimination can be seen in a number of indicators, including education rates and preferences for seeking medication. Indicators from the World Bank (2011) demonstrate that more boys than girls are enrolled at every level of education, and this disparity only increases from primary to secondary and

tertiary levels. In addition, DHS (2005) data showed that boys are more likely to receive medical care for a variety of illnesses, including diarrhea.

These contextual factors lead to gender disparities within WASH, especially in regard to water collection, menstrual management and poor school hygiene. In Ethiopia, as elsewhere in Africa, women and girls bear the burden of collecting the family's water supply. This time collecting water limits the amount of time girls can spend focusing on school, homework and other household chores. Additionally, the travel itself puts women and girls at an increase risk of being attacked (Population Council 2004). In a 2004 study, the Population Council found that well over half of the girls in the study region were afraid of being raped in their neighborhoods, especially while collecting water.

Poor water and sanitation infrastructure at schools is especially a problem for Ethiopian youth, and poses a particular challenge for adolescent girls who may have reached menarche (Adams et al. 2009). WASH infrastructure at schools in Ethiopia in a poor state. A 2003 UNESCO study found that fewer than half the schools in the country had latrines, and of these, only one had separate latrines for boys and girls.

Another problem facing adolescent girls is menstrual management. Only 1.6% of rural Ethiopian girls use sanitary pads (Population Council 2010). A major prohibitory factor is cost, especially when family budgets are controlled by the father of the house who is not likely to prioritize sanitary items (Kirk and Sommer 2006). When coupled with poor WASH at school, and the shame and fear associated with others learning of their menstrual status, many young girls throughout Africa are likely to skip school during menstruation (Sommer 2009).

This study is a collaborative effort between Emory University and CARE Ethiopia. Fieldwork was conducted during the summer of 2010 and took place in three rural kebeles (villages or towns) outside Debre Tabor, Ethiopia in South Gondar Region. All three kebeles were comprised of farming populations no larger than 8,500 people. The focus of the study was to examine the effects of water security, particularly water collection and menstrual management, on stress and school attendance of adolescent girls.

3.2: Methods

Institutional Review Board permission was granted by the Emory IRB. Informants were unmarried girls between the ages of 13 and18 and were selected with help from the CARE Ethiopia staff at the Debre Tabor office. They selected three kebeles (communities) in which data collection would take place: Kollydengores, Burokatona and Awuzet ; all three kebeles were in the Farta Woreda in the South Gondar Region. Selection of the kebeles was based on CARE having some level of presence in the kebele, for either a past or present project. Once in the kebele, selection of the informants was conducted by random convenience sampling. No more than one individual per household was interviewed. Both the informant and a parent gave oral consent for participation.

Research was conducted with a variety of methods, including a survey, a free listing or ranking activity that took place in conjunction with the survey, and two focus group discussions (FGDs). The survey focused on demographic information, WASH conditions at home and at school and menstrual management. A free-listing activity was administered prior to the survey for the first 24 participants. Items generated by the free-listing questions were analyzed in Microsoft Excel, and the top eight to10 were chosen

for use in the ranking activity completed by the remaining study participants. In two of the questions, one or two items were added for the sake of the study. For the ranking activity, items were written in Amharic and placed on index cards that were then ordered according to the question. The questions used in the free-listing and ranking activity were:

1. What are the most important items for a girl in your community to have a happy and good life? (Happy/Good Life)
2. What are the biggest causes of stress for a girl in your community? (Stress)
3. What are the most common reasons a girl may be absent from school? (School)

The survey and free listing/ranking activities were conducted by one of six data collectors, young women selected from the local university and trained prior to survey implementation. Pilot testing was completed in a community near the CARE Debre Tabor office prior to data collection. All survey tools were conducted in Amharic, the language of the region. The items generated from this analysis and activity can be found in Table 2.

Table 2. Items generated from free-listing activity and used in ranking activity (not listed in any order)

Happy/Good Life	Stress	School
Education	Early marriage	High work load at home
Holidays	High work load at home	Caring for a sick family member
Playing with friends	Sickness, family or self	Early marriage
Education materials	Abduction	School is too far away
Clothes and shoes	Drought/not enough water	Not interested in school
Good family income	Not having school materials	Girls' education is not important to family/community
Love from family	Bad marks at school	Family poverty
Food security	No clothes/shoes	Parents are absent/gone
Time to study	Death in family	No latrines or water at school*
Good hygiene	Menstruation*	Menstruation*

*Item not frequently nominated by informants, but added to the list for the ranking exercise in order to examine the research question related to water, sanitation, and hygiene.

In addition to the surveys activities, two focus group discussions were also conducted in two of the kebeles. In each case, a kebele leader was informed of the FGD on the first day of data collection in that kebele. They were told to randomly select eight – 10 “normal” girls between the ages of 13-18 to participate in the FGD the next day. All informants and at least one parent or guardian gave oral consent to participate and to be recorded. The FGD was moderated by a female CARE staff member form the Debre Tabor office, and notes were taken by a local female social worker.

Questions focused on basic hygiene practices and preferences, and why the items used for the ranking question regarding causes of stress were considered stressful. The participants were also asked to design and draw their ideal latrine for girls. In addition, they were asked to prioritize the most important components of these latrines and discuss ways that they themselves, and their communities, could work together to make these latrines a reality.

Consensus analysis was used to determine the extent to which girls agree about what is necessary for a happy and good life, which items are more stressful than others and causes for school absence. Consensus was considered achieved if there was an Eigenvalue ratio greater than 3.00 for the given question. In addition, Pearson’s test of correlation and regression analysis were conducted to determine any correlations or associations between overall competency score (linear regression) or having a negative competency score (logistic regression) and demographic characteristics, including: age, menarcheal status, kebele and having enough water at home. All analysis was conducted

with Excel, EpiInfo, SAS and UCINET software, and was conducted for all the informants at once, as well as stratified by menarcheal status.

3.3: Results

Informant Demographics

In total, 156 surveys were completed. Table . depicts the basic demographic information of the survey population. The mean age of the informants was 14.97 (SD 1.71) and 95% were currently enrolled in school, between grades 2nd-11th,. Nearly 43% of the informants had reached menarche with a mean age of 15.07 (SD 1.14) at first menstruation. As demonstrated by the table, the three kebeles did not significantly differ in any characteristic, with the exception of mean age at menarche; Kebele 3 had a higher mean age at menarche than Kebeles 1 and 2.

Table 3. Demographic information by kebele

Characteristic	**Kollydengores n = 42**	**Burokatona n = 43**	**Awuzet n = 48**	**Total n = 133***	**p-value**
Age, Mean (SD)	15.02 (1.49)	14.98 (1.85)	14.96 (1.76)	14.97 ((1.71)	0.6380
Grade, Mean (SD)*	7.05 (1.72)	6.66 (2.25)	6.73 (1.80)	6.81 (1.92)	0.5425
Reached Menarche (%)	20 (47.62)	20 (46.51)	17 (35.42)	57 (42.86)	0.4256
Mean Age at Menarche (SD)	14.95 (0.83)	14.68 (1.53)	15.65 (0.70)	15.07 (1.14)	0.0007
Have Enough Water at Home (%)	17 (40.48)	16 (37.21)	16 (33.33)	49 (36.84)	0.7808
Have Home latrine (%)	33 (78.57)	35 (81.40)	44 (91.67)	112 (84.21)	0.1952
Is Family's Primary Water Collector (%)	24 (57.14)	25 (58.14)	35 (72.92)	84 (63.16)	0.1881
Late to School due to Water Collection (%)	15 (35.71)	16 (37.21)	16 (33.33)	47 (35.33)	0.9586
Negative Competency Score (%)	5 (11.90)	5 (11.63)	5 (10.42	15 (11.28)	0.9717

*Does not include free-listing participants

Water access conditions

Out of the 156 girls surveyed, only 3 were not involved in the collection of their family's water supply. Of these, 99% were involved in water collection and 63.16% of the informants were the primary person responsible for collecting their family's water; nine percent of the informants' sisters and 27% of the informants' mothers were the primary person responsible for collecting the family's water supply. Importantly, none of the respondents listed a male family member as involved in water collection.

Distance to the primary water source was measured in the amount of time spent traveling roundtrip, to the source and back. This distance varied greatly among the informants, and was oftentimes different for the rainy and dry seasons. The following bar graphs depict the amount of time spent traveling to the primary water source by kebele, during the dry and rainy seasons. There was no association found between kebele and distance to primary water source in either the dry (chi-squared = 12.05; p = 0.6022) or rainy season (chi-squared = 21.05; p = 0.1004).

Figure 7. Dry season: Number of minutes spent traveling to primary water source in three kebeles

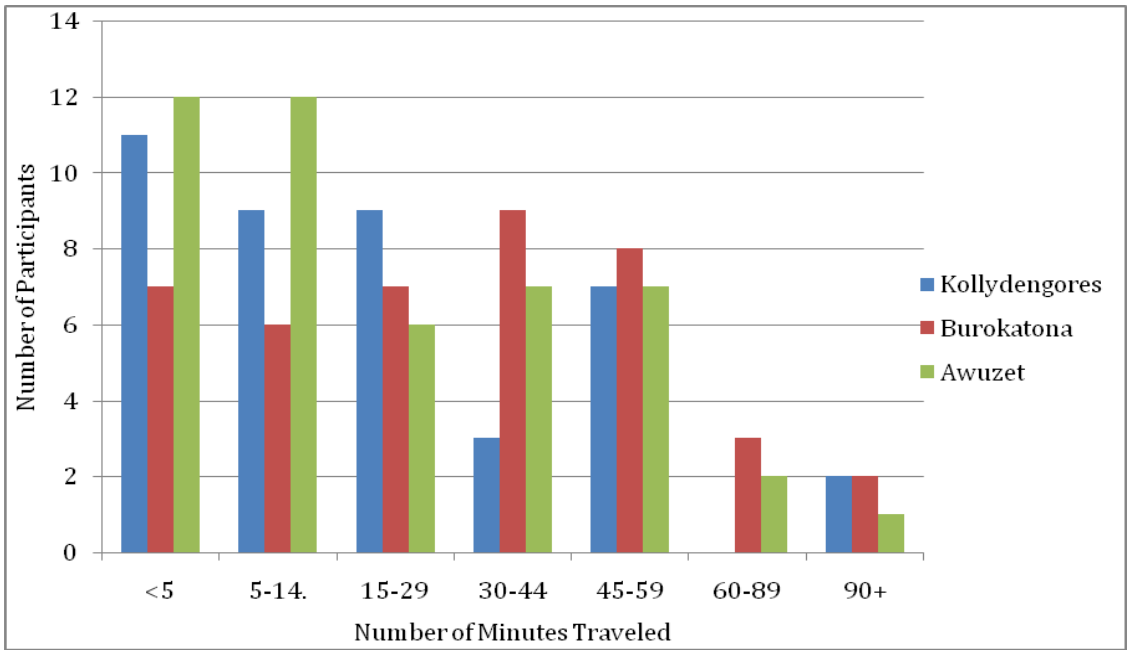
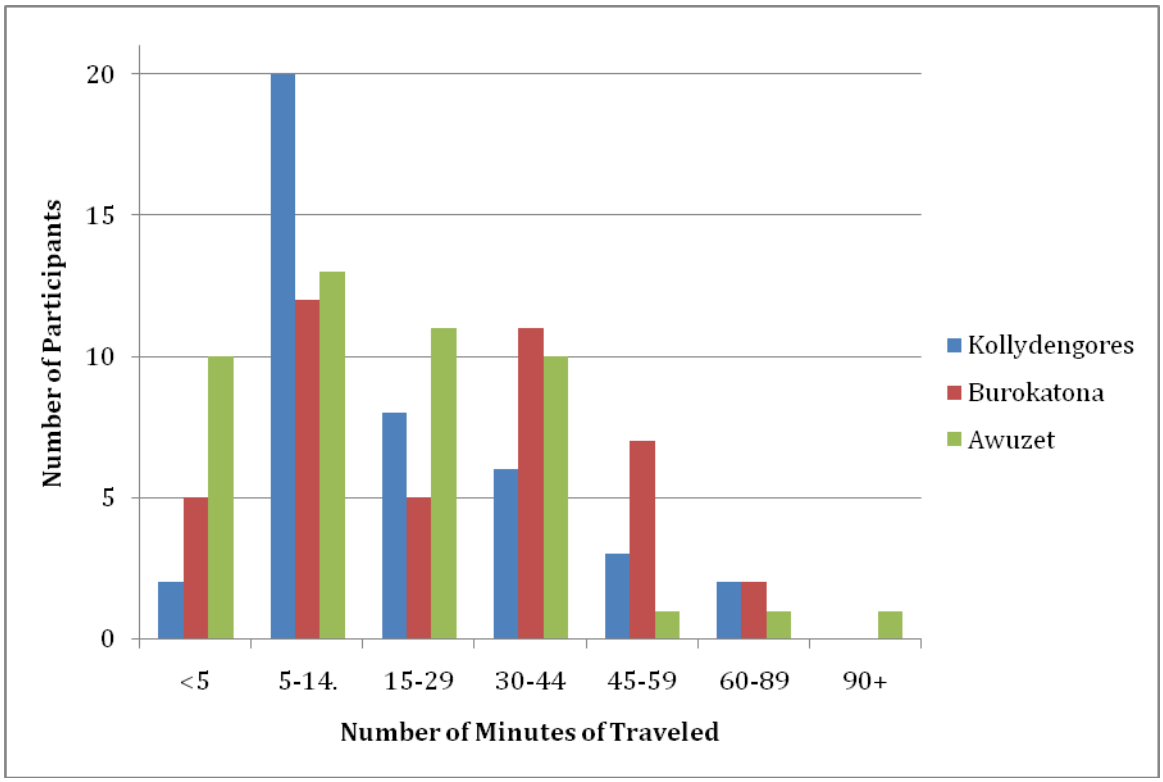


Figure 8. Rainy season: Number of minutes spent traveling to primary water source in three kebeles



Due to the amount of time required, 35.33% of girls involved in water collection had been late for school in the last 30 days. Among these girls, 35% said it was a "large problem."

Menstruation

As previously stated, only 42.86% of the informants had reached menarche at the time of the survey. Information about menstruation came from a number of sources, with few girls learning of menstruation from their mothers (17%). Nearly half the girls (44%) learned about menstruation from their friends; 33% learned from a teacher or at school and 6% learned from their sisters.

In regard to the products that girls commonly use for managing menstruation, 61.5% of those who had reached menarche stated that they only used underwear. Thirty-one percent of informants said they used reusable cloth, while the rest stated that they either did not use any products, or that they would wear long pants under their skirts for management. The majority of respondents purchased these items themselves at the market (61.3%).

When asked what they would *prefer* to use for managing menstruation, only underwear was listed 65 times as the most common preferred method, representing 74.7% of the responses (respondents were able to choose more than one answer). Reusable cloth was listed 18 times, making it 20.7% of the responses, and disposable pads were listed only 4 times, as 4.6% of the responses.

School Hygiene Conditions

In general, school hygiene in the selected kebeles is in a poor state. The majority of the informants in school, approximately 94%, claimed that their school had a latrine that girls could use. However, 45% of those surveyed did not feel comfortable using the latrine. In addition to the problems with the latrine, 78% of those surveyed said that there was no washbasin present at their school. Only 24% of the girls surveyed said they always use the latrine at school when necessary.

Of those who had reached menarche, 90% of girls said that their school did not have a place to adequately maintain their hygiene while menstruating. Results also showed that at least 43% of informants who had reached menarche had missed school due to menstruation.

Consensus Analysis and Average Ranks

The results of all the consensus analyses can be found in Table 5, with all the Eigenvalue ratios (ERs) found in Table 6. There was only consensus among post-menarche informants for the first question, “What are the most important items for a girl to have a happy and good life?” (ER = 3.026) Cleanliness, as the WASH-related item, was ranked as the sixth most important item by the total group, ranking fifth for the pre-menarche girls and seventh for the post-menarche. All three ranking analyses showed similar results in the order of importance of these items; yet, based on the results of the analysis, there was no general agreement among the informants for this particular order.

No consensus was reached for causes of stress. Drought was ranked as third for the pre-menarche girls and fifth by the post-menarche. Menstruation was also ranked higher among the pre-menarche girls (seventh) than the post-menarche girls (ninth); it was ranked eighth when considering all informants.

Reasons why a girl may miss school also lacked consensus. Alarmingly, early marriage is at the top of this list, in addition to being the second listed for causes of stress. Menstruation and no water at school, the two items added to the ranking activity for the purpose of the study, were ranked very low - ninth and tenth, respectively.

The following table represents the consensus results for all three questions, using the responses of all the informants, and then stratified by menarcheal status.

Table 5. Consensus analysis results

Happy/Good Life					
Pre-Menarche		**Post-Menarche**		**All**	
#	**Item (Consensus Rank)**	**#**	**Item (Consensus Rank)**	**#**	**Item (Consensus Rank)**
1	Love from family (2.22)	1	Love from family (2.92)	1	Love from family (2.54)
2	Health (3.45)	2	Health (2.98)	2	Health (3.21)
3	An education (3.66)	3	An education (3.58)	3	An education (3.66)
4	Time to study (4.07)	4	Income (4.16)	4	Time to study (4.56)
5	Good hygiene (4.29)	5	Food (4.61)	5	Food (4.80)
6	Food (4.98)	6	Time to study (5.06)	6	Good hygiene (4.95)
7	Income (6.04)	7	Good hygiene (5.69)	7	Income (5.11)
8	Clothes (8.44)	8	Holidays (8.42)	8	Clothes (8.52)
9	Play with friends (8.78)	9	Clothes (8.61)	9	Holidays (8.76)
10	Holidays (9.11)	10	Play with friends (8.95)	10	Play with friends (8.90)
Stress					
Pre-Menarche		**Post-Menarche**		**All**	
#	**Item (Consensus Rank)**	**#**	**Item (Consensus Rank)**	**#**	**Item (Consensus Rank)**
1	Death in family (1.74)	1	Death in family (1.12)	1	Death in family (1.55)
2	Early Marriage (2.57)	2	Early Marriage (2.97)	2	Early Marriage (2.74)
3	Drought (3.31)	3	Abduction (3.44)	3	Abduction (3.60)
4	Abduction (3.57)	4	Sickness (3.64)	4	Drought (3.72)
5	Sickness (4.84)	5	Drought (3.88)	5	Sickness (4.27)
6	Grades (6.86)	6	School materials (6.07)	6	School materials (6.62)
7	Menstruation (7.06)*	7	Grades (7.66)	7	Grades (7.18)
8	School materials (7.26)	8	Work load (7.82)	8	Menstruation (7.69)*
9	Work load (7.73)	9	Menstruation (8.42)*	9	Work load (7.69)
10	Having clothes 10.10)	10	Having clothes (9.97)	10	Having clothes (9.97)
School					
Pre-Menarche		**Post-Menarche**		**All**	
#	**Item (Consensus Rank)**	**#**	**Item (Consensus Rank)**	**#**	**Item (Consensus Rank)**
1	Early Marriage (2.45)	1	Early Marriage (2.23)	1	Early Marriage (2.32)
2	Work load (2.67)	2	Absent parents (3.44)	2	Absent parents (3.36)
3	Absent parents (3.24)	3	Family poverty (3.48)	3	Work load (3.51)
4	Family poverty (3.66)	4	Work load (4.20)	4	Family poverty (3.56)
5	Not important (4.29)	5	Not important (4.50)	5	Not important (4.36)
6	Not interested (5.77)	6	Not interested (6.62)	6	Not interested (6.28)
7	Care for others (6.34)	7	Care for others (6.73)	7	Care for others (6.51)
8	Far away (8.32)	8	Far away (7.38)	8	Far away (7.85)
9	Menstruation (8.66)*	9	Menstruation (7.39)*	9	Menstruation (7.95)*
10	No water (9.61)*	10	No Water (9.03)*	10	No Water (9.30)*

*Items added to study

Table 6. Eigenvalue ratios and number of negative competency scores for all consensus analyses

	Happy/Good Life	Stress	School	All
Pre-Menarche				
Eigenvalue Ratio	2.336	1.991	2.195	3.215
Negative Scores	14	16	15	8
Post-Menarche				
Eigenvalue Ratio	3.026	2.650	2.576	4.430
Negative Scores	8	14	6	7
All				
Eigenvalue Ratio	2.613	2.447	2.432	4.208
Negative Scores	21	28	22	15

Results of the Pearson's test for correlation found that only age was correlated with the respondent's competency score ($r = 0.24$; $p = 0.0061$) and marginally insignficantly correlated with having a negative competency score ($r = -0.17$; $p = 0.0568$). Linear regression analysis also found that only age was associated the respondent's competency score. In the model competency score = $B_0 + B_1$(age) + B_2(menarcheal status) + B_3(has enough water at home) +B_4(kebele), age had an F-value of 2.77 ($p = 0.0209$). No other variables were significant. In regard to having a negative competency score (dichotomous, yes or no), logistic analysis revealed that no variables were significantly associated (model F-value = 1.16; $p = 0.3253$).

Focus Group Discussions

Done in groups of two or three within the FGDs, the drawn pictures of latrines all shared many similarities. As can be expected, it was emphasized that all of these latrines are separate from the boys' latrines. All contain water, paper, a trashcan and washbasin with soap for hand washing. Many of the latrines also contain a fetching cup and windows for ventilation; one group specifically wanted a shower connected to the latrines to further their personal hygiene.

3.4: Discussion

Through use of a survey, free listing and ranking activities, and focus group discussions, this study was able to better understand the degree to which water, sanitation or hygiene is a source of stress for girls, as well as some of the sources of stress within WASH-related issues. Nearly all of the study participants are involved in collecting water for their families, and many of those are the primary person responsible. The distance to the primary source of water varies greatly, but this daily chore has caused nearly 40% of the informants to be late or absent from school in the 30 days preceding the survey.

The data can be deceiving, however, since this is only for the primary water source. When the primary source is insufficient, due to a lack of water or lack of safe water, those responsible for water collection must travel further to a different water source, adding to the time and burden already spent.

In addition to the time burden, the informants experienced other social and water-related problems while collecting water. These problems can be divided into two primary categories: physical problems and social problems. Physical problems included a shortage of water, long lines (increasing the amount of time required to gather water and leading to missed school or other activities), unsafe and dirty water and broken pots. Social problems included fighting with others, harassment from boys and dogs, fatigue and bad and painful roads (exacerbated by the fact the participants were most often barefoot).

Harassment from men and boys is particularly problematic. Besides the emotional strain this places on those collecting water, this can also lead to a heightened risk of diseases, especially HIV, and unwanted pregnancy. In a Population Council study in this

same region of Ethiopia, 56.2% of girls stated they were afraid of being raped in their neighborhood, especially while collecting water (Population Council 2004). The results from the FGDs support this fear in this study population.

Not having enough water was found to occur among 36% of those surveyed. When there was not enough water available, a variety of methods were utilized to help alleviate the problem, namely: limiting water use for drinking, hygiene and household activities, borrowing from a neighbor or the community, using water from a stream or river (even though it was recognized this water may not be safe or clean) or fetching water from an even further source.

Something that did not often come up from the surveys, but did so in the FGDs, was the issue of latrine use during the day. The girls mentioned that there is currently a paradigm shift, in which it is becoming more acceptable for them to use the latrine during the day. However, many of the girls still stated that their parents, especially their mothers, and male peers would yell at them or mock them if they went to use the latrine during the day. Others mentioned that their mothers continued to ask them not to use the latrine during the day, justifying the request by saying it is not appropriate for girls or women to be seen using the latrine during the day time. This generational shift in female latrine use behaviors was also confirmed in FGDs with older women in South Gondar, which were conducted in November 2009.

Data from both the survey and FGDs demonstrate clearly that menstruation is a cause of stress for the girls interviewed in South Gondar. For many, menstruation was associated with fear, stress and shame; oftentimes, this constant source of stress was so great that it interrupted learning, or caused the girl to miss school all together. However,

when asked to rank the most important causes of stress and reasons to miss school for girls in South Gondar, menstruation was not highly ranked. Girls in this region are faced with other more stressful events, and face other barriers to attending school, including early marriage and poverty.

In addition, it is apparent that school hygiene needs to be drastically improved. A large proportion of informants stated that, for various reasons, they did not feel comfortable using the latrines at school. Many reasons were cited for this discomfort, mainly: they were not used to using the type of latrine at school, it was too dirty, it smelled bad, there were too many people and there was no privacy. Over 90% said that there was no washbasin present to wash their hands at school. For girls who had reached menarche, 90% said that their school did not have a place to adequately maintain hygiene while menstruating.

Based on these results, it is safe to conclude that WASH-related issues, especially pertaining to menstrual management, are a cause of stress and barrier to attending school for adolescent girls, but there are many other causes of stress and barriers to education facing girls in South Gondar, Ethiopia.

A troubling finding in this data is the persistence of early marriage at the top of the consensus analysis results for causes of stress and reasons for school absence. This study did not delve into this topic, but future research needs to address the relationship between menstruation and early marriage. In Ethiopia, the legal age of marriage is 18. However, a recent study conducted by the Population Council (2010) found that 63.3% of girls in the Amhara Region, where this study took place, are married by the legal age. Nearly 40% of girls are married by 15.

The data show that there are a number of issues potentially preventing adolescent girls in South Gondar from attending school or living the life that they would prefer. Many of these issues, such as the importance of early marriage and low priority of girls' education, are large, culturally engrained issues that have developed over generations or as a result of severe economic depravity and structural violence. However, there is still room for public health interventions to act in a meaningful way.

Working to provide improved private spaces and materials for hygiene and sanitation at school would be a welcomed intervention opportunity. As expressed in both the surveys and the FGDs, privacy is of utmost importance for the latrines at schools; there is a need to separate the boys' and girls' latrines. When asked how to improve the latrines at school, one of the FGD groups proposed the idea of tea and hygiene clubs to be started at the school. The tea club was proposed as an idea to generate funding (other ideas included a school-run garden) so that a hygiene club would have the necessary funds to keep the latrines stocked with necessary supplies (listed as water, paper and female sanitary products) and to have someone responsible for the latrine's upkeep and cleanliness.

Another responsibility of the hygiene club, or a specific and qualified individual, would be to provide education and educational materials on puberty, especially menarche, to both the boys and girls at school. The girls in the FGDs articulated a belief that harassment from male students would decline if they were better educated on menstruation and puberty in general. Since only 17% of the girls learned about menstruation from their mothers, it could be beneficial for girls to have a system of emotional and physical support during puberty and adolescence.

Further supporting the need for separate latrines and a party responsible for the maintenance of the latrines, other groups suggested that the community build the latrines for the schools, and that the students were responsible for keeping them clean. To avoid stigma and unfair treatment, however, it is important that the individual, or group of individuals, responsible, rotates among the students and includes everyone.

3.5: Conclusion

Adolescent girls in South Gondar Ethiopia, as in much of the world, are faced with a multitude of stressors and barriers to education. Of these, menstruation and menstrual management are important factors. However, there are other components, especially early marriage, that prevent girls from seeking an education and cause stress. Future studies need to focus on the relationship of reaching menarche with early marriage, and determine whether or not this potential correlation is a part of why menstruation is stressful to adolescents.

In addition, the WASH infrastructure of schools needs to be improved. Importantly, the physical infrastructure is about more than providing latrines and sanitation facilities, it is about making the school environment more girl-friendly. Future public health interventions focusing on school WASH need to take into account more than the physical components of the school environment on girls, and incorporate other components that may help reduce the great number of stressors and barriers to girls' education.

Chapter 4: Discussion and Public Health Implications

This study sought to determine the effects of water security on adolescent girls. Water security, having enough water for daily needs, is a broad term that encompasses many water, sanitation and hygiene related factors. The components of WASH that greatly influence the lives and well-being of adolescent girls include water collection, menstrual management and school hygiene; these are the components this study chose to focus on. Through use of a survey, free listing and ranking activities, and focus group discussions, this study was able to better understand the degree to which water, sanitation or hygiene is a source of stress for girls, as well as some of the sources of stress within WASH-related issues.

As discussed in the results, nearly all of the study participants were involved in collecting water for their families, and many of them were the primary person responsible. The distance traveled by the participants to the primary source of water varies greatly, but many of the participants traveled beyond WHO's recommended "acceptable" amount of 30 minutes (42.21% during the dry season and 38.16% during the rainy season). Due to the amount of time required, this daily chore caused nearly 40% of the informants to be late or absent from school in the 30 days preceding the survey.

Important to keep in mind, however, is that the distance specified in this survey is only for the primary source of water. Oftentimes, the primary water source is insufficient due to a lack of water or lack of safe water, and those responsible for water collection must travel further to a different water source, adding to the time and burden already spent.

In addition to the amount of time, the informants experienced other social and water-related problems while collecting water. These problems can be divided into two primary categories: physical water problems and more personal and social problems. Some of the physical water problems experienced were: a shortage of water, long lines once arriving at the water source, unsafe or dirty water (informants would mention mud and bugs in their water as a frequent problem) and broken pots. Some of the social problems face by the informants were: fighting with others, especially while in line for water and when water was in short supply, fatigue, stress, difficult and painful roads (especially since many of the informants often were barefoot) and harassment from young men, boys and dogs while en route to the water.

Harassment from men and boys is particularly problematic. Besides the emotional strain this places on those collecting water, this can also lead to a heightened risk of diseases, especially HIV, and unwanted pregnancy. In a Population Council study in this same region of Ethiopia, 56.2% of girls stated they were afraid of being raped in their neighborhood, especially while they were collecting water (Population Council 2004). The results from the FGDs support this Population Council finding. Although specific incidences were not spoken about, participants mentioned the fear of assault while collecting water and the shame it would bring to them if it were to occur.

Not having enough water was found to occur among 36% of those surveyed. When there was not enough water available, a variety of methods were utilized to help alleviate the problem, namely: limiting water use for drinking, hygiene and household activities, borrowing from a neighbor or the community, using water from a stream or

river (even though it was recognized this water may not be safe or clean) or fetching water from an even further source.

Something that did not often come up from the surveys, but did so in the FGDs, was the issue of latrine use during the day. The girls mentioned that there is currently a paradigm shift, in which they do not find using the latrine during the day shameful. However, many of the girls still stated that their parents, especially their mothers, and male peers would yell at them or mock them if they went to use the latrine during the day. Others mentioned that their mothers continued to ask them not to use the latrine during the day, justifying the request by saying it is not appropriate for girls or women to be seen using the latrine during the day time.

According to the FGDs, the boys at school still followed the same line of belief as the mothers and thought girls should not use the latrines during the day. The girls' latrine and the boys' latrine at the schools were only separated by a partition that did not reach from the floor the ceiling. Girls in the FGDs expressed stress and shame caused by male peers looking in the girls' latrine and following them out, harassing them for anything that may have occurred. This generational shift in female latrine use behaviors was also confirmed in FGDs with older women in South Gondar, which were conducted in November 2009 as part of the Water, Women and Development project.

Data from both the survey and FGDs demonstrate clearly that menstruation is a cause of stress for the girls interviewed in South Gondar. For many, menstruation was associated with fear, stress and shame; oftentimes, this constant source of stress was so great that it interrupted learning, or caused the girl to miss school all together. Girls were

particularly stressed about the appearance of blood, further exacerbated by the lack of menstrual management options.

However, when asked to rank the most important causes of stress and reasons to miss school for girls in South Gondar, menstruation was not highly ranked. Girls in this region are faced with other more stressful events, and face other barriers to attending school, including early marriage and poverty, in addition to heavy workloads in the home.

In addition, it is apparent that school hygiene needs to be drastically improved. A large proportion of informants stated that, for various reasons, they did not feel comfortable using the latrines at school. Many reasons were cited for this discomfort, mainly: they were not used to using the type of latrine at school, it was too dirty, it smelled bad, there were too many people, they were ashamed to use the latrine and there was no privacy. The lack of privacy was discussed in the FGDs as the most important reason why girls did not feel comfortable using the latrines.

Furthermore, over 90% said that there was no washbasin present to wash their hands at school. For girls who had reached menarche, 90% said that their school did not have a place to adequately maintain hygiene while menstruating. Latrines were described as lacking in water, soap, paper and feminine hygiene products.

One of the activities in the FGDs was to draw the ideal latrine for girls and then to list the most important components of that latrine. Four separate drawings were completed and can found in the appendix. The drawings of the latrines all include several of the same components, mainly: privacy, water, soap, toilet paper and ventilation. Others included decorative flowers and a separate shower for the girls. When asked what the

most important component of the latrines was, all four groups listed privacy and separation. Water and soap were also always listed.

Based on these results, it is safe to conclude that WASH-related issues, especially pertaining to water collection, menstrual management and school hygiene, are causes of stress and barriers to attending school for adolescent girls, but there are many other causes of stress and barriers to education facing girls in South Gondar, Ethiopia. The mostly commonly sighted of these is early marriage and pregnancy, heavy workload at home (especially chores such as cooking, cleaning and caring for other family members), family poverty and a lack of recognition of the importance of girls' education.

A troubling finding in this data is the persistence of early marriage at the top of the consensus analysis results for causes of stress and reasons for school absence. This study did not delve into this topic, but future research needs to address the relationship between menstruation and early marriage. In Ethiopia, the legal age of marriage is 18. However, a recent study conducted by the Population Council (2010) found that 63.3% of girls in the Amhara Region, where this study took place, are married by the legal age. Nearly 40% of girls are married by the age of 15.

When asked to describe why early marriage was stressful in the FGDs, participants mentioned complications during (an expected and unavoidable) pregnancy. Other reasons included not liking their husband, as it was assumed he would be much older (the same Population Council study found that the mean age difference between girls under 18 and their husbands was approximately seven years and that 90% of these marriages were arranged). Also emphasized as very important was the disruption early marriage would cause in schooling. Girls expressed that once they were married, they

would have to take on the responsibilities of being a wife and mother, and would not be able to continue their education.

The data show that there are a number of issues potentially preventing adolescent girls in South Gondar from attending school or living the life that they would prefer. Many of these issues, such as the importance of early marriage and low priority of girls' education, are large, culturally engrained issues that have developed over generations or as a result of severe economic depravity and structural violence. However, in the spirit of pragmatic idealism, there are plenty of opportunities for public health interventions to make a meaningful impact.

Working to provide improved private spaces and materials for hygiene and sanitation at school would be a welcomed intervention opportunity. As expressed in both the surveys and the FGDs, privacy and a separation of the boys' and girls' latrines are of utmost importance for adolescent girls. When asked how to improve the latrines at school, all of the small groups in the FGDs wanted to utilize the community in the construction and provision of materials.

Taking it even further, one of the FGD groups proposed the idea of tea and hygiene clubs to be started at the school. The tea club was proposed as an idea to generate funding (other ideas included a school-run garden) so that a hygiene club would have the necessary funds to keep the latrines stocked with necessary supplies (listed as water, soap, paper and female sanitary products) and to have someone responsible for the latrine's upkeep and cleanliness. Other groups mentioned that the students themselves would be responsible for the upkeep of the latrines. To avoid stigma and unfair treatment,

however, it is important that the individual, or group of individuals, responsible, rotates among the students and includes everyone.

Another responsibility of the hygiene club, or a specific and qualified individual, would be to provide education and educational materials on puberty, especially menarche, to both the boys and girls at school. The girls in the FGDs articulated a belief that harassment from male students would decline if they were better educated on menstruation, and puberty in general. As part of this, a woman from the kebele would work part-time to not only maintain the latrines, but to educate both the boys and girls. Since only 17% of the girls learned about menstruation from their mothers, this woman could be a beneficial system of emotional and physical support for girls during puberty and adolescence.

This study has a number of strengths and limitations. Importantly, this study begins to fill the gaps in many areas within the literature, including the effects of water security on mental health and the effects of water security on adolescents, an oft neglected demographic in public health research. In addition, the use of multiple quantitative and qualitative methods has provided a variety of data on this topic.

Another strength of this study was the use of consensus analysis. The results of the surveys and FGDs alone demonstrated the importance of menstruation and menstrual management to adolescent girls in South Gondar. However, it was the use of consensus analysis that showed, in comparison, there are other, potentially more important, factors leading to stress and school absence among this study population – especially early marriage.

Not commonly used as a method of analysis, public health research can benefit from continued use of cultural consensus in many ways. One way is that it helps in prioritizing the needs and wants of the community receiving an intervention in a way a survey cannot. In addition, the results of cultural consensus give the "true" rank or belief of a community and how much the community, as a whole, agrees with that rank or belief. This can help public health practitioners better understand the community at large and know how to focus the intervention. Further, additional analysis can reveal characteristics of community members that may or may not be associated with how much they agree on the community's overall model, helping to identify commonalities among subgroups within the population.

A weakness of this study is that the selection process lacked true randomization. The households were chosen at random by the data collectors, but starting in the center of kebele likely left out those living in the outskirts. Since the kebeles did not statistically differ from one another, it is unlike there are significant differences between those closer to the center of the kebele and those living further away, but future studies should incorporate other selection methods, such as block randomization, to ensure a greater variety of participants are chosen.

Another limitation is the lack of in-depth interviews. Future studies regarding this topic should delve more deeply into issues of menstruation, stress and early marriage. As this data is not available from a survey, studies would benefit from the detailed data of in-depth interviews.

In conclusion, adolescent girls in South Gondar Ethiopia, as in much of the world, are faced with a multitude of stressors and barriers to education. Of these, menstruation

and menstrual management are important factors, but others, especially early marriage, are potentially more important to adolescent girls. Future studies need to focus on the relationship of reaching menarche with early marriage, and determine whether or not this potential correlation is a part of why menstruation is stressful to adolescents.

In addition, the WASH infrastructure of schools needs to be improved in South Gondar, Ethiopia. Importantly, the physical infrastructure is about more than providing latrines and sanitation facilities, it is about making the school environment more girl-friendly. Future public health interventions focusing on school WASH need to take into account more than the physical components of the school environment on girls, and incorporate other components that may help reduce the great number of stressors and barriers to girls' education.

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Appendix 1: Survey

Part B: Demographic and Household Water Condition Information

Now I would like to know a little bit about you and your household.

B.1. How old are you? _____ years *(Probe: Get approximate age if she does not know)*

B.2. Who is the person who collects the water in your household most often?

a. Self → **Skip to B.4.**
b. Mother
c. Father
d. Sister
e. Brother
f. Other girl:_____
g. Other boy:_____
h. Other:_____

B.3. Do you ever help to collect water for your family?

1. No → **Skip to B.6.**
2. Yes

B.4. When you collect water, approximately how much total time does it take you **to travel to your main source of water, collect it, and come back** in the rainy season**?** And in the dry season?

B.4a. SUMMER (rainy) season? *[PROBE: Is it more or less than:]*	B.4b WINTER (dry) season? *[PROBE: Is it more or less than:]*
1. Less than 5 minutes 2. 5-14 minutes 3. 15-29 minutes 4. 30-44 minutes 5. 45-59 minutes 6. 1 hour to 1 hour & 29 minutes 7. 1 hour & 30 minutes and more	1. Less than 5 minutes 2. 5-14 minutes 3. 15-29 minutes 4. 30-44 minutes 5. 45-59 minutes 6. 1 hour to 1 hour & 29 minutes 7. 1 hour & 30 minutes and more

B.5. Can you tell me any problems or challenges you face when you are collecting water?

_____ _____

_____ _____

_____ _____

B.6. Are there ever times when you do not have enough water to meet all your needs in your household?

0. No → **Skip to B.9.**
1. Yes

B.7. Can you tell me all the different things you do to cope at times when there is not enough water?

_____ _____

_____ _____

_____ _____

B.8. If water was plentiful, can you tell me all of the things that you would do differently during those times?

_____ _____

_____ _____

_____ _____

B.9. Do you have latrine at your home?

0. No. → **Skip to B.12**
1. Yes

B.10. Do you usually use it?

1. Always uses it
2. Does not use it much
3. Never use it

Instruction: Now I am going to ask you questions about your family experiences on sanitation and water utilization conditions. For many of these questions I want you to answer me weather these conditions are a small problem, a medium problem, a large problem, or it is not a problem at all

Number	Question	Did not answer	No	Yes	Don't know	Does not apply	Small problem	Medium problem	Large problem	NO problem
B.11.	In the past 30 days, did you want to use this latrine but could not because… *(ask the question by inserting the alternatives from B11a-B11f at the end, multiple answers possible)*	99								
B.11a.	It was too far away?	99	0	1	77	88				
B.11	It was too risky / dangerous?	9	0	1	7	8				

Number	Question	Did not answer	No	Yes	Don't know	Does not apply	Small problem	Medium problem	Large problem	NO problem
b.		9			7	8				
B.11 c.	It was too dirty or smelly?	9 9	0	1	7 7	8 8				
B.11 d.	Fear that someone would see you?	9 9	0	1	7 7	8 8				
B.11 e.	It was full	9 9	0	1	7 7	8 8				
B.11 f.	Some other reason: *(specify):* _____ _____	9 9	0	1	7 7	8 8				
B.11 g.	*If the answer is yes to any of the questions from B11a-B11f, how big of a problem was it for you/that person? Was it a small, medium, large problem, or not a problem at all?*	9 9					1	2	3	4
B.12 .	In the past 30 days, did you postpone urinating/defecating because there was not a convenient place to do so?	9 9	0	1	7 7					
B12a .	*If yes: How big of a problem was it?*	9 9					1	2	3	4

Part C: School Questions

C.1. What is the highest grade in school that you have completed? _____ → **If 98 or 99, skip to C.3.**

(98 = only informal education/literate; 99 = no education/ illiterate)

C.2. Are you currently in school?

0. No
1. Yes → **Skip to C.4.**

C.3. Can you tell me why do you not attend/ stop attending school? *(Circle all that apply. Do NOT read options. Simply listen and circle all choices that relate to what she said)*

1. Too much work at home/ help with chores at home
2. Cannot afford (fees, uniforms, or materials)
3. No latrines/ no place to wash
4. Missed too many days (could not catch up)
5. School is not important/ not necessary **Any response → Skip to Section D**

6. Do not like school
7. Too far away
8. Don't want to say/ No answer
9. Other: *(please explain):* _____

_____

NOTE to enumerator: The rest of the questions in Section C are only for girls currently attending school…

C.4. Is your teacher a man or a woman?
1. Man
2. Woman

C.5. Does your school have latrines that girls can use?
0. No → If no, skip to Question D.6.
1. Yes

C.6. How comfortable do you feel using the latrine at school? Do you feel comfortable, or is there anything that makes you feel uncomfortable?

1. Feel comfortable using the latrine → **Skip to C8.**
2. Feel uncomfortable

C.7. What are the reasons that you do not feel comfortable using the latrine?
(Circle all responses that apply. Do NOT read the choices. Simply listen and circle all choices that relate to what she said.
PROBE if she gives a vague answer like "I don't like it". Get specific reasons.
PROBE to ask, "Is there any other reason?" until she is done.)
0. Not used to using
1. Latrine is full or locked
2. Latrine is unstable/ Fear falling inside
3. Smells bad
4. Dirty
5. Flies
6. Scary / too dark
7. Fear getting sick
8. Too many people/ long lines
9. Lack of privacy
10. Person may hurt me when I go to use it
11. Far from school
12. No water
13. No toilet paper
14. Other
15. Don't know

C.8. When you need to either urinate or defecate while at school, do you use the latrine at school: always, sometimes, never?
1. Always

2. Sometimes
3. Never

		No answer	No	Yes	Don't know	Not applicable	Small problem	Medium	Large problem	Not a problem
C.9.	In the past 30 days, did you **go to school late or stay home** from school because you had to help with water collection at home?	99	0	1	77	88				
C.9a.	*If yes: How big of a problem was it?*	99					1	2	3	4
C.10.	In the past 30 days, did you **go to school late or stay home** from school because there was not an adequate private place to defecate or urinate at school?	99	0	1	77	88				
C.10a.	*If yes: How big of a problem was it?*	99					1	2	3	4

Part D: Menstruation Questions

D.1. Have you started menstruating yet?
0. No → **Skip to next section**
1. Yes
2. Don't know/ won't answer → **Skip to next section**

D.2. How old were you when you first began menstruating? _____

D.3. What materials/items/supplies do you use to manage your menstruation? *(Multiple responses possible)*
0. Nothing
1. Only underwear
2. Reusable cloth
3. Disposable pad (purchased in market)
4. Other *(specify):* _____

D.4. Where do you obtain these materials/items/supplies? *(Note: may choose more than one)*
1. Made at home/ found at home
2. Purchased at the market by self
3. Purchased at the market by parent
4. Get at school
5. Other:_____

D.5. What material/item would you most like to use? *(Note: choose only one)*
0. Prefers to use nothing
1. Only underwear
2. Reusable cloth

3. Disposable pad (purchased in market)
4. Tampon/ other inserted item
5. Other *(specify):* _____

D.6. If there are any barriers to obtaining these materials, what are they? *(Multiple choices possible. Probe: Are they priced so that you can afford them? Are they easy to purchase?)*

1. There are no barriers/they are easy to obtain
2. They are hard to find/not available
3. They are expensive
4. Not used traditionally
5. Embarrassed to buy them
6. Parent will not buy for her

D.7. Have you learned about your period from anyone? If so, who? *(Probe: Did your mother teach you? Did you learn about it at school or from a friend? Do NOT read options)*

1. Mother
2. Father
3. Sister
4. Aunt or other family member
5. At school/from a teacher
6. From friends
7. Other:_____

D.8. How has beginning menstruation affected your life at home?

NOTE to enumerator: If she does not attend school, → skip to next section.

D.9. How has beginning menstruation affected your life in school?

D.10. At times when you are menstruating, is there a place at school where you can adequately maintain your personal hygiene?

0. No
1. Yes

D.11.	The last time that you had your menstrual cycle, did you ever stay home from school because there was no place to take care of your menstruation at school?	99	0	1	77	88				
D.11a.	*If yes: How big of a problem was it?*	99					1	2	3	4

Part H: Semantic Differentials

Alright, we are almost done! For this last part, I am going to show you a line that has a word on each side. These words are going be opposites from one another and ways that you may feel. The line represents where between these two words you feel. I want you to look at the line, and pick the spot you think best represents how you feel. Do you understand?

Probe: Do sample one to ensure concept is understood. For example, "The weather today is: Hot _____/_____/_____/_____/_____/_____/_____Cold

Probe: Make sure informant knows this is how they feel

H.1. Happy _____/_____/_____/_____/_____/_____/_____ Sad

H.2. Strong _____/_____/_____/_____/_____/_____/_____ Weak

H.3. Educated _____/_____/_____/_____/_____/_____/_____ Uneducated

H.4. Poor _____/_____/_____/_____/_____/_____/_____ Rich

H.5. Free _____/_____/_____/_____/_____/_____/_____ Restricted

H.6. Dumb _____/_____/_____/_____/_____/_____/_____ Smart

H.7. Useless _____/_____/_____/_____/_____/_____/_____ Useful

H.8. Calm _____/_____/_____/_____/_____/_____/_____ Anxious

Closing

Ok, fantastic! Thank you for all your help and thank you for your time!

Appendix 2. Free-listing section

Part A: Free-listing Exercise

For the types of questions I will ask first, I am going to ask you questions that pertain to all girls in your community, not just yourself. Rather than discussing you, answers the questions more generally, thinking about all the girls your age you know here. It is important to remember that we are interested in your experiences and opinions, so there are no wrong answers. I will not share your answers with your teachers, so you should feel free to express your opinion freely.

Now I am going to ask you some questions about different aspects of the life of most girls in your community. I will ask you to list as many things as you can think of that relate to each question. I'll give a simple example. If I asked you to name all the animals a girl might see during a day, you may say: "cattle, goats, donkeys, dogs" and so on. Do you understand what I mean?

Ok, let's get started…

[Note to interviewer: PROBE to understand the meaning and to get specific answers rather than generalities!]

X1. Thinking of most girls your age in this community, what kinds of activities do they do every day?

X2. During these days (whether a school day, market day, or holiday) what kinds of emotions might they experience? *[PROBE: Remember to think of girls in this community]*

A.1. What are things that make their lives happy and enjoyable?

A.2. What are the things that may cause them to experience stress?

A.3. What are things that they want so that they can have a good life? *PROBE:* What are things that would help them experience progress or good changes in life?

A.4. What are the things that prevent girls in your community from having the kind of life they want?

A.5. What are things that would cause a girl to be liked or respected by other people her peers (boys and girls who are the same age)

A.6. Why do you think some girls in your community do not enroll in school?

A.7. What are all the reasons that girls are sometimes absent from school?

Appendix 3. Focus Group Discussion Guide

Focus Group Discussion Guide

Interviewer name:_____ Voice recorder number:_____

Date:_____ Audio file number:_____

Woreda:_____ Kebele:_____ Village:_____

Introduction

I would like to ask some questions about girls in this community, and I invite you to share your opinions with me. You are the expert on this, and we want to learn from you, so any opinions are welcome. In addition, please feel free to say exactly what it is you think on the topic; there are no right or wrong answers. We will not go in order, so please speak when you have something to say, but do still be respectful of others. On that note, please be respectful of other's views on the topics, and keep them confidential outside this discussion. Also, because we are recording this discussion, I will ask that only one person speak at a time.

Does anybody have any questions so far?

To begin, I would like everyone to go around the circle and say your name – first name only – your age, and your favorite color.

Part A: Water, sanitation

A.1. Which kinds of chores do girls have to do at home?

How do girls feel about doing these chores?

A.2. Are girls ever absent from school or late because they have to do chores at home such as collecting water?

How do girls feel about missing school for this reason?

Probe: Is this a problem for them?

A.3. Where do most girls go to defecate and urinate when they are at home?

Is this preferred place?

A.4. Can girls freely go whenever they want, or are there only certain times of day that they can do this?

A.5. Tell me about the sanitation facilities available at school.

Probe: Do girls use them? Do they like them?

A.6. Is there anything you worry about related to using latrines or going in an open field?

Probe: what happens if someone can see you? Any dangers on the way?

Part B: Stress

Thank you for your answers so far. Now I'm going to ask you a couple of questions about stress and what that means to you.

B.1. So that I better understand, please describe what it feels like to be stressed.

Probe: Do you feel a certain way? Do you act a certain way?

B.2. We recently asked girls in your community about some things that cause them stress, and some of them said __[Add issue that arose related to WASH]__. Why do you think they said this is stressful?

B.3. We recently asked girls in your community about some things that prevent them from getting ahead in life, and some of them said __[Add issue that arose related to WASH]__. Why do you think they said this?

Part C: Menstrual Management

Great, thank you. You all are doing a really good job so far. The next thing I want to talk to you about is menstruation and menstrual management. Remember, your opinions and experiences are really important, and there are no wrong answers. Please remember to also show respect to the other girls, even if their opinion is different from yours.

C.1. How do girls in your community learn about menstruation and growing up?

Probe: Do they learn about it from their mother, a sister, a teacher, an aunt, a friend?

C.2. I really want to understand what it's like for girls your age during this time. Is there anything stressful about menstruation?

Note: Have girls explain why these things are stressful.

C.3. Does a girl's menstrual cycle ever interfere with anything she wants to do? How?

C.4. How does beginning menstruation affect a girl's life at home?

C.5. How does a girl's menstrual cycle affect her life at school?

C.6. Pease tell me about your school's resources for girls dealing with their menstrual cycles.

Probe: Are there latrines? How are they? Are there products available?

C.7. Are there any problems or barriers to dealing with you menstrual period at school?

Probe: Are the latrines clean? Do you have privacy? Do you feel comfortable using the latrines? Make sure to have girls elaborate on why.

C.8. How could these problems be fixed? Who would be involved?

Part D: Activities

Great, thank you. Now we're going to do a couple of short activities. For the first activity, I want you to break up into group of two or three. It doesn't matter who is in which group, but please include everyone in a group. I'm going to hand you some paper and pens, and with that, I want you to brainstorm and write everything down for the following:

D.1. If you had all the money, supplies and help you needed, how would you improve your school to make it meet the needs that are special to girls? Which of these things are most important?

Note: allow 8 – 10 minutes for brainstorming/writing, but if the groups are all finished, you may stop the activity earlier. Allow some time for groups to share their ideas.

D.2 Ok, next I'm going to hand your group some more paper. On this paper, I want your group to draw the perfect latrine for girls. Think about everything you would want, pretending you had all the money and supplies available. Make sure to include all group members' ideas.

Note: allow 10 – 15 minutes for brainstorming/drawing, but if the groups are all finished, you may stop the activity earlier. Allow time for the groups to share their drawings.

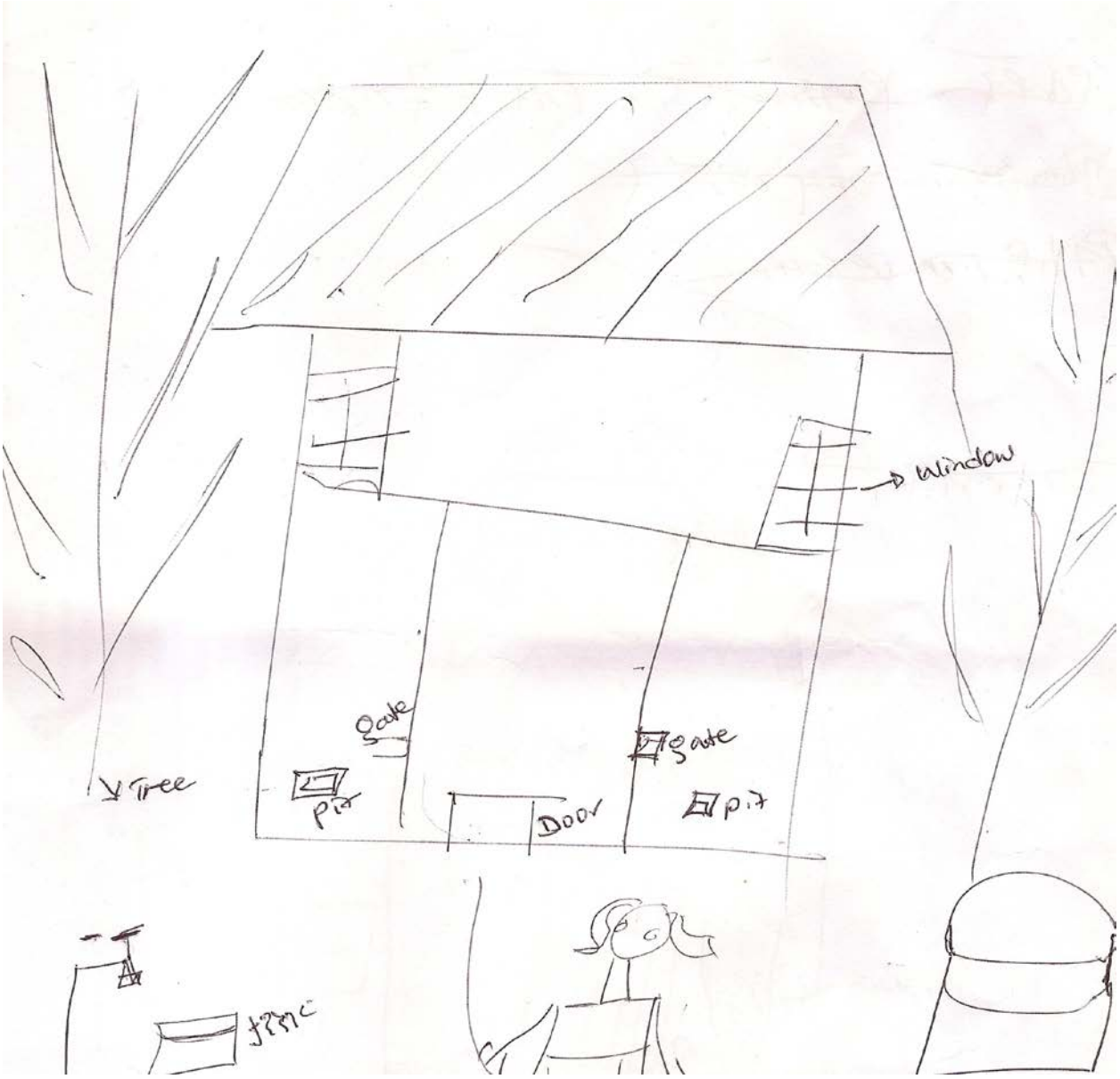
Conclusion

So, we have now reached the end of our discussion. Does anybody have any comments they would like to add or questions for me? If you think of something you would like to add or ask later, please just let me know. I want to thank you all again for your time and your opinions. We have really learned a lot, and this discussion will be really helpful and beneficial to our research. So, thank you once again for contributing!

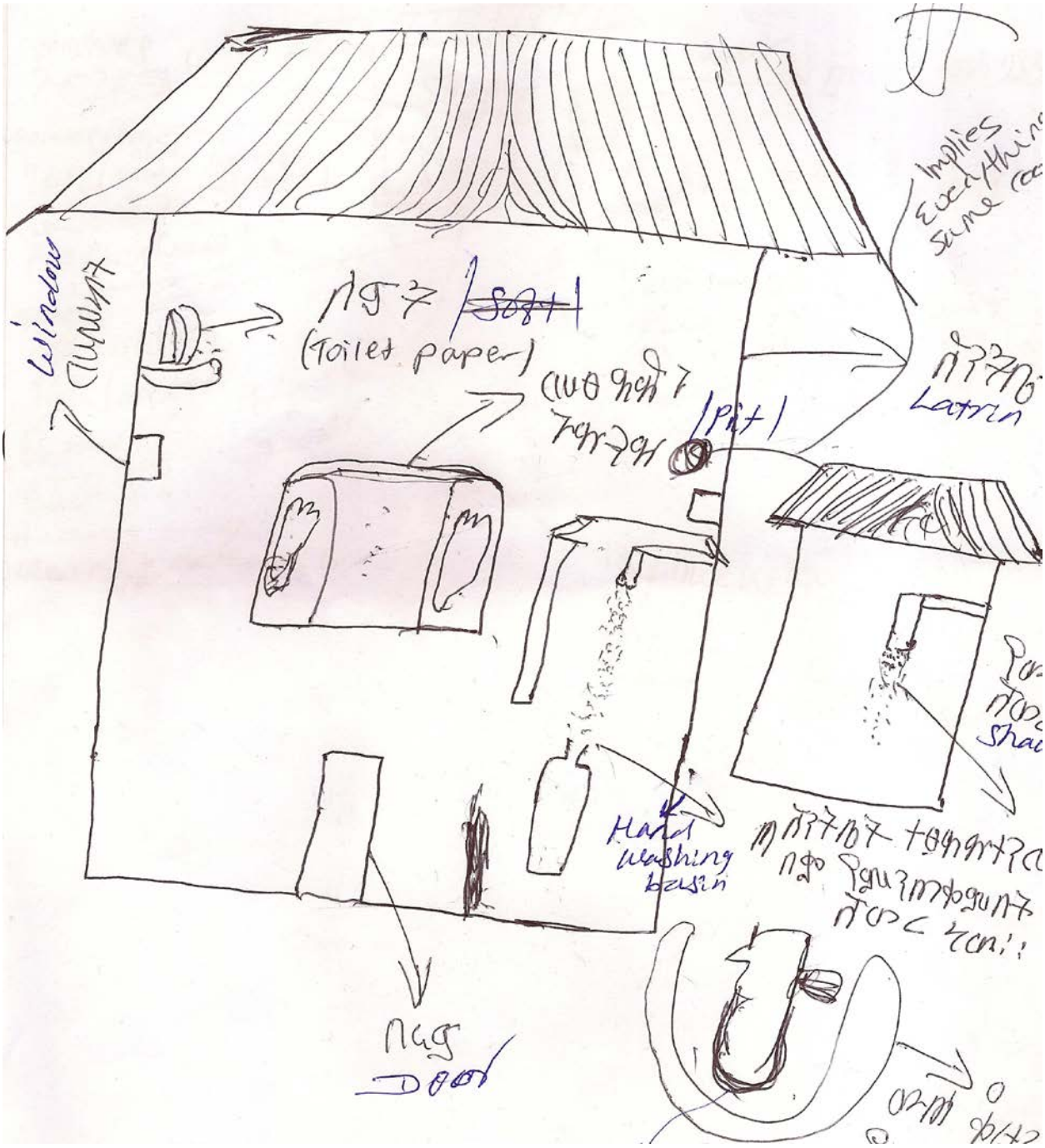
Appendix 4. FGD Drawings, Ideal Latrine

Picture 1

Picture 2



Picture 3


Implies everything
Window
(Toilet paper)
Latrin
Hand washing basin
Door