**Key Words**

Child Mortality, Sanitation, Drinking-Water, Community, Health, Natural Resource

**Introduction**

The quality of life of billions of humans across the world is directly tied to their environment. The World Health Organization (2008) has stated the following:

Ensuring poor people’s access to safe drinking-water and adequate sanitation and encouraging personal, domestic and community hygiene will improve the quality of life of millions of individuals.

In this paper we will explore whether the improvement in quality of community resources, in particular the access to improved water and access to improved sanitation, will impact child mortality rates in a given country. We will be examining whether access to “at least basic services” for both sanitation conditions and water access will impact child mortality rates. For water access, this means households have access to an adequate water source with water collection times of no longer than 30 minutes round trip. For sanitation, this means households that are using adequate sanitation facilities that are not shared with other households. Additionally, we will use a categorical grouping variable for the type of economic region the country is a part of ranging from 1, (Developed Region - G7) to 7, (Least Developed Region). These metrics were used to predict the probability of an individual dying between ages 1 and 5.

The death of a child is a horrific event regardless of its impact on a community, society, or country. However, beyond the mental and emotional toll, the death of a child will have a profound societal impact. Kirigia’s (2013) study found that “The discounted value of future non-health GDP loss due to the deaths of children under 5 years old in 2013 will be in the order of Int$ 150.3 billion.” This is particularly impactful in Africa where there was a loss of “approximately 6 % of its non-health GDP from the future years of life lost among the 2,976,000 child deaths that occurred in 2013.” These findings make it clear that countries and policy makers should make providing resources to combat child mortality a top priority due to its economic impact in addition to its moral obligation.

Access to safe drinking water and sanitary conditions are some of the most impactful factors that lead to improved quality of life. So much so, the WHO made them key targets of their Millennium Development Goals. Eight Millennium Development Goals, which were set with a goal year of 2015, were established as the most important factors in meeting the needs of the world poorest communities and improving their quality of life. The World Health Organization (2008) stated that Millennium Development Goal 7, To Ensure environmental sustainability, had the following aspects:

Target 10: Reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation

Indicator 30: Proportion of the Population with Sustainable Access to an Improved Water Source Indicator 31: Proportion of the Population with Access to Improved Sanitation. (p. 5)

Relying on the World Health Organization’s expertise we will examine these key indicators and their impact on a specific aspect of a nation’s quality of life, child mortality.

**Literature Review**

The fourth goal of the 2000 Millennium Summit is to reduce child mortality. More specifically, to reduce the under-five mortality rate by two thirds by 2015. By 2015 the global under-five child mortality rate dropped from 90 deaths per 1000 live births, to 43 deaths per 1000 live births. While a stark improvement, this improvement still fell short of their goal of improving to 30 deaths per 1000 live births. Some factors that can lead to higher child mortality rates are: children in rural areas have a higher mortality rate than those in urban areas, children of mothers with secondary education or higher are more likely to survive (United Nations, 2015), and children are less likely to die when they have access to improved water and sanitation infrastructure (Lavy et al. 1996).

The link between access to an adequate water source and child mortality has been found by many other studies. For example, the prevalence and duration of diarrhea among young children in India was found to be much lower for families that had access to piped water (Jalan & Ravallion 2003). Both of these studies use logit regression models to predict the likelihood that a child would die and using that number and a threshold to predict a dichotomous result.

The link between sanitation and child mortality is also well established. In some studies, it has been found that sanitation has a higher impact on child mortality rates than access to water (Abou-Ali, 2003). Other studies have found that while access to improved water was not associated with non-infant child mortality, but sanitation was (Fink, 2011). Fink found that:

Access to improved sanitation was associated with lower mortality (OR = 0.77, 95% CI 0.68–0.86), a lower risk of child diarrhea (OR = 0.87, 95% CI 0.85–0.90) and a lower risk of mild or severe stunting (OR = 0.73, 95% CI 0.71–0.75). Access to improved water was associated with a lower risk of diarrhea (OR = 0.91, 95% CI 0.88–0.94) and a lower risk of mild or severe stunting (OR = 0.92, 95% CI 0.89–0.94), but did not show any association with non-infant child mortality (OR = 0.97, 95% CI 0.88–1.04).(p.1)

Despite this discrepancy Fink still found that there are “large health consequences of lacking access to water and sanitation for children aged <5 years in low- and middle-income countries.” Similarly, to Lavy and Jalan, Fink used a logit logistic regression model to produce a dichotomous outcome. Abou-Ali used a probit logistic regression model to predict child mortality which is similar to logit models in its attempt to predict a dichotomous result and only differs in the distribution it uses to make the prediction.

We used a linear regression model to predict the correct child mortality rate of a country rather than using that rate to predict if a death will occur. We made this decision because we had child mortality rates at a national level as well as other national level variables. We felt to predict the likelihood of a child dying would be difficult to test with these inputs, so we opted to focus on evaluating the accuracy of the child mortality rate at a national level.

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