Summary Analysis
Quantifying Water Supply, Sanitation and the Millennium Development Goals
Ensuring access to water and sanitation plays a crucial role in ensuring environmental sustainability, as identified in the Millennium Development Goal 7, which includes a target to half the proportion of the population without sustainable access to water and sanitation by 2015.

Goal 7: Ensure environmental sustainability

Nearly 1 billion people worldwide lack access to safe drinking water, and another 2.6 billion do not have access to adequate sanitation, putting the world on track to miss the MDG target related to sanitation. The improvement of water quality, in part through the expansion of improved sanitation, is essential to protecting environmental resources, and reducing land degradation. Better water resources management decreases pollution and improves water conservation, which improves overall ecosystem health. The achievement of this goal is dependent upon safe water provisioning and improved sanitation.

Water and sanitation are an integral aspect of ensuring environmentally sustainability; however, their availability also influences health, education, gender issues and the economy, making them also central to achieving several of the Millennium Development Goals (MDGs). The project, upon which this summary is based, attempts to quantify the role of water and sanitation in achieving the other MDGs. As the MDGs were created as a global vision for the world by 2015, they provide a useful tool for assessing the role of water and sanitation in development. Country level data from 193 different countries provided the basis to assess the influence of water and sanitation against indicators associated with MDGs 1 – 6 through linear and ordinal logistic regression models.

The analysis found statistically significant relationships between access to an improved water source and Goals 1, 3, 4, 5 and 6. Significant relationships were also found between access to improved sanitation and Goals 4, and 5.

Goal 1: Eradicate extreme poverty and hunger

Water availability, quality, and quantity are closely linked with poverty. Water quality and quantity is central to agricultural productivity and thus hunger, particularly in subsistence farming. Water management is important in ensuring adequate access to safe food. Health problems associated with poor water quality and sanitation can often lead to malnutrition.

These effects were demonstrated in the data, showing that the prevalence of underweight children under five years of age is related to increasing water access ($p = 0.028$). However, the relationship between access to improved sanitation and the prevalence of underweight children under five was not found to be statistically significant ($p = 0.436$).

Goal 2: Achieve universal primary education

Women and children primarily carry the responsibility for water collection. In cases where children need to spend hours every day collecting water, they may not have the opportunity to attend school as a
result. Safe and separate sanitation facilities can also prevent girls dropping out of school after puberty. Children who are suffering from water-related diseases may be unable to attend school or may be unproductive in their studies.

Despite these influences, a statistically significant relationship was not found between access to improved water and net enrollment in primary school (p = 0.098), nor was a significant relationship found in the case of sanitation (p = 0.469).

Goal 3: Promote gender equality and empower women

Women are primarily responsible for water collection. Without sustainable access to an improved water source, women may need to spend hours daily traveling to collect water for domestic use. This time limits their ability to participate in other economic activity and continue their education. Similarly, lack of sanitation facilities may force women to wait until night fall to search for a place to relieve themselves, often compromising their safety.

The ratio of girls to boys in primary education was found to be related to access to an improved water source (p = 0.006). However, a relationship between primary education and access to sanitation was not found to be statistically significant (p = 0.45).

Goal 4: Reduce child mortality

Children are the most vulnerable to water-related diseases. Diarrhoea, caused by unclean water, is a leading cause of child mortality. Although diarrhoea mortality has declined in recent years, it still remains the second leading cause of death for children under five, after pneumonia, accounting for one fifth of child deaths. This death toll is greater than that caused by AIDS, malaria and measles combined.

Decreased under-five mortality was found to be related to increased water access (p<0.001) and improved sanitation (p<0.001). Similarly, increased access to an improved water source has also been found to be related to infant mortality rate (p<0.001). This relationship retains its significance with improved sanitation (p<0.001).

Goal 5: Improve maternal health

Improved health and nutrition, caused in part by access to improved water and sanitation, can reduce susceptibility to other health risks that influence maternal mortality. Pregnant women are particularly vulnerable to water related diseases such as vitamin deficiency, trachoma and hepatitis, thus improvements in access to clean water is likely to also improve maternal health. Clean water and sanitation, especially in medical facilities, are also important for preventing infection in pregnant women. Measures to help reduce pregnant women’s physical burdens, particularly in relation to collecting water, will result in safer pregnancies.

Increased water access was found to be significantly associated with decreased maternal mortality ratio (p = 0.008). A similar relationship was found in the case of improved sanitation (p = 0.009).
Goal 6: Combat HIV/AIDS, malaria and other diseases

Safe water and improved sanitation lower the risk of many diseases. Improved health outcomes due to water and sanitation also increase people’s capacity to combat HIV/AIDS, malaria and other diseases. People weakened by HIV/AIDS are more likely to be affected by a lack of safe water and sanitation; access to safe water can help to keep HIV positive people healthy.

**Increased access to water was found to be significantly associated with decreased percentage of under 5 mortality due to diarrhoeal diseases (p<0.001).** However, the relationship is not statistically significant for sanitation (p = 0.08).

Goal 8: Develop a global partnership for development

The provision of safe water and sanitation must be considered as an important part of a global development agenda. In areas which face significant challenges in relation to water and sanitation, these issues will create major obstacles to sustainable development.

The data are not appropriate to measure against this goal.

This study has shown that changes in access to safe water and improved sanitation influence the indicators used to measure the MDGs. Water and sanitation are clearly cross-cutting issues not only affecting the targets in Goal 7, but also affecting targets related to health, poverty, education and gender equity. These findings demonstrate the necessity to make improvements in drinking water and sanitation a priority in order to achieve the MDGs by the 2015 deadline.
Acknowledgements

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