

Cairncross S, Valdmanis V. "Water Supply, Sanitation, and Hygiene Promotion". In: Jamison DT, Breman JG, Measham AR, et al., editors. *Disease Control Priorities in Developing Countries*. 2nd edition. Washington (DC): World Bank; 2006. Chapter 41.

This article was particularly helpful in terms of learning about the health effects that are related to water. It lists the different kinds of diseases that can be contracted and categorizes them based on how they are transmitted. It also defines and differentiates between the different ways diseases can be contracted through water, laying out the primary ways as waterborne, water-washed, water-based, or water-related. It states, importantly "many public health workers unfamiliar with the water sector assume that the most important characteristic of water supply is its improved *quality*. However, most of the benefit is attributable to improved convenience in access to water in *quantity*" (771-2; italics in original). It also distinguishes between "improved" water sources and sources that supply "safe" water. It defines reasonable access (20L/capita/day from source within 1km of home). It discusses the value of time-saving and argues for convenient local water sources for all. This is relevant to my project because I am assessing maternal health impacts in relation to distance from a source. However, this only talks about diseases transmitted through water and not about maternal health directly.

Cheng, June J., Newbold, Bruce K, Schuster-Wallace, Corinne J., Watt, Susan, & Mente, Andrew. "An Ecological Quantification of the Relationships Between Water, Sanitation, and Infant, Child, and Maternal Mortality." In *Environmental Health* 2012, 11:4, 1-8.

This study discusses the negative impacts of dangerous water on maternal and neonatal health. Specifically, it talks about the burden that falls disproportionately on women and children as the carriers and most frequent users of domestic water. It defines which types of sources are improved, and finds statistically significant relationships between water and maternal, infant, and child mortality. Though the study notes, "better water quality and sanitation reduce physical burdens of carrying water, which translates into improvement in the expectant mothers; health," it makes the important point that "the associations between water and sanitation and health outcomes need to be further elucidated... although links have been made between water and sanitation and newborn, child, and maternal health, there have not been studies quantifying these relationships globally using country-level data" (2, 7). This indicates a gap in the literature where my research would fit: by examining the maternal and neonatal health effects of convenient water access in a hands-on manner I would be adding to the country-level data this particular field of knowledge.

Moen, Bente E. "Our Work and Its Effects on Our Children." *Oxford Journals: Occupational Medicine*, Volume 57, Issue 6 (2007): 293-295.

This study indicated the link between a mother's heavy labor and the decreased birth weight of her child. It also states that there are several reproductive problems associated with heavy labor during pregnancy, including miscarriages, premature births, low birth weights, and stillbirths and malformations. This paper is not water related specifically, but rather focuses on the effects of pesticides and chemical exposure. However, it does indicate that heavy physical workload has adverse effects on pregnancies. This is relevant to my project because I am hoping to examine the link between heavy physical labor and maternal/neonatal health in a water-specific setting.

Montgomery, Maggie A. and Elimelech, Menachem. "Water and Sanitation in Developing Countries: Including Health in the Equation." *Environmental Science and Technology*. Yale University, 2007 Jan 1;41(1):17-24.

This source also outlines the different ways in which diseases can be transmitted through water. It also makes the important point that "improved access' to water and sanitation may, but does not necessarily, represent access to water or sanitation that meet engineering health standards... 'improved access' usually represents households that obtain water from sources that are superior to traditional, unprotected ones" (18). It states that water collection is primarily the task of women, and sometimes children, in developing countries, causing them to spend less time in school or in pursuing business endeavors. The vast majority of household technologies do not operate in rural areas, creating a large divide between urban and rural water access and a huge disadvantage to rural dwellers. Improved water supply access and cleaner water is beneficial to women and children's health and their overall quality of life. This is significant for my research because I am examining these links in specific relation to maternal health. Additionally, I am looking specifically at rural areas water supply, and, if we build the well, I will be able to see the immediate effects of a rural area having improved water supplies.

POLICY Project. "Maternal and Neonatal Program Effort Index: Cambodia." The Maternal Health Study (MNPI). Published 2002.

This paper mostly consists of graphs and serves to evaluate the health centers in Cambodia based on their capacity to provide basic healthcare services. It states that their emergency obstetric care services are particularly poor, receiving a rating of only 36 out of 100. It additionally notes that rural dwellers have significantly lower access to most healthcare services, including obstetric care and emergency health services. Finally, it notes that certain cultural and societal factors must be overcome if women's

health is to be improved, as these factors may serve to further limit women's access to care. It states the importance of women to their communities and families, stating that the "loss of women during their most productive years also means a loss of resources for the entire society" (2). This is relevant to my work because it shows the overall lacking of the Cambodian healthcare system, and indicates where it is weak, specifically in terms of quality of care and healthcare supplies. It also notes that women do hold an important role in their society, and that they could serve their society better if they had access to better healthcare.

Rosen, Sydney and Vincent, Jeffrey R. "Household Water Resources and Rural Productivity in Sub-Saharan Africa: A Review of the Evidence." Harvard Institute for International Development, Harvard University (1999).

Though this study is based in Sub-Saharan Africa, the discussion of water in relation to health it engages in is generalizable. It discusses the detrimental effects of lacking a nearby water supply, including time loss, injuries, decreased nutrition, and increased contact with unsafe water. People with a nearby water supply use almost three times as much water as those without convenient water supplies; they have more water for drinking, cleaning, cooking, and other domestic activities. Women use nearly one-tenth of their daily calorie intake on hauling water, but they did not find quantitative estimates of the health impacts of that; additionally they could not evaluate the time spent collecting water from a productivity standpoint. Finally, the study states "collecting water from a distant source appears to impose a number of health costs on women and girls, but we found no studies that quantified these costs" (39). This is relevant to my research because I will be looking at people with a local source and comparing their maternal and neonatal health outcomes with those who do not. My study would help fill a gap in the knowledge that this article puts forth as needing filling.

Shordt, Kathleen and Eefje, Smet. "Getting It Right: Improving Maternal Health Through Water, Sanitation, and Hygiene." Reviewed by Kathy Herschderfer. Prepared by Simavi. 2011.

This literature review highlights the need for women's health to be more rigorously addressed. Inequity exists between the rich and the poor, as well as between urban and rural dwellers, in terms of maternal mortality, water access, and access to healthcare services. Lack of clean water also effects antenatal, maternal and neonatal healthcare, as water is used during all stages of pregnancy. The health threat to mothers they note, however, are based on inferences rather than proven health statistics. Despite all that it has found, the review states, "it should be noted, however, that relatively few high quality studies were found on the basis of which generalizations can be made about the specific linkages between water, sanitation, and hygiene on the one hand and maternal health on the other" (ii). This literature is

extremely relevant to my research, as it connects many of the negative health effects of unsafe water and poor water access to maternal health, while recognizing that more needs to be done. My research provides exactly the in-depth, high quality, local, rural study about the effects of water access on maternal health they are calling for.

The World Bank. "Economic Impacts of Sanitation in Cambodia: A Five Country Study Conducted in Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam under the Economics of Sanitation Initiative." Printed in 2008.

This study talked about the economic and financial impacts of poor water resources in Cambodia. It illustrates the degree to which many of the lakes and surrounding bodies of water are polluted, and evaluates the time spent collecting and treating water in monetary terms. It also suggests that women be more productive in their societies if they were not hauling water from distant sources. It highlights the significant disadvantages that rural dwellers and the poor face in terms of water acquisition. Even though the MDG for access to improved drinking water may have been globally met, there are still areas very much in need. This is relevant to my study because it notes that rural Cambodia is one of those areas which needs more conveniently located, reliable water, and it quantifies the extent to which the lack of this is hurting the society, financially (short-term costs) and economically (long-term, lifestyle patterns). As my study is located in rural Cambodia, I will be able to examine the effects of having improved water on the lifestyle of rural Cambodians, both in villages where they have had a convenient supply for nearly two years and in one in which they recently gained one.

WASH. "WASH: Strengthening Maternal, Newborn, and Child Health." WASH Facts. www.washadvocates.org/learn/wash-facts/strengthening-maternal-newborn-and-child-health-through-wash/. Accessed September 22, 2013.

This source links infection, potentially caused by bad hygienic practices (unclean water or lack of water in general) to maternal complications and poor neonatal health. It notes the important role of water in obstetric care as well as the adverse effects hauling heavy loads of water may have on mothers and newborns.

World Vision. "Water, Sanitation, and Hygiene: Sector Case Statement." October 2011.

This study states that WASH (Water/Sanitation/Hygiene) needs to be integrated into other fields of development, as several of them are interrelated. It also states that, "access to clean water is a prerequisite to maximize the health impacts of sanitation, and effective sanitation is a prerequisite to maximize the health impacts of safe water" (5). It argues for improved access to nearby safe water to improve the health, education, and

livelihoods of women and girls. It notes the status of women as second-class-citizens in traditional societies, and states that if women spend less time hauling water and are given greater control over the improved resources, then women will be more economically productive and invest more time and money in health and education.

UNFPA. "Maternal and Neonatal Health in East and South-East Asia." Prepared by UNFPA Country Technical Services Team for East and South-East Asia, Bangkok, Thailand. March 2006.

This study looks at the state of maternal and neonatal health in South-East Asia, and contains many statistics specifically about Cambodia's healthcare systems and mortality rates. It looks at the development of the countries over ten years, from 199-2005, tracing the maternal mortality rates, the neonatal mortality rates, the percentages of births attended by a skilled health official vs. traditional birth attendants, and many other factors. It additionally examines these between rural and urban areas, and poor and rich sectors. It serves to highlight differences and inequalities, arguing for greater obstetric and general healthcare accessibility for the poor and for rural dwellers. It talks about general challenges to women's health and neonatal health by locating weaknesses in the existing healthcare systems. This resource was particularly useful for me because it indicated several causes of maternal death that can be linked to water access and unsafe water (however, this study does not link them, rather I cross-referenced it with other articles I had read). It also taught me more about the healthcare system in general in Cambodia, and the particular issues that rural and poor women face in the pregnancy process, including access (geographically and financially) to professional healthcare.

UNICEF. "Water and Sanitation: The Right Investments in Children." Prepared for the Public Finance of Children Conference by UNICEF East Asia & Pacific. September 2012.

This resource indicates the large disparities that exist between rural and urban coverage in water access and sanitation. It states that Cambodia has high levels of arsenic in its water, and that most people in rural areas do not have access to piped water, though many urban dwellers do. It also states that Cambodia is losing nearly 7% of its annual GDP by not investing in improved sanitation and water resources. It notes that there are health ramifications that are specifically linked to water that are being felt as a result of Cambodia's lack of clean, safe water from a protected or improved source.