The Benefits of Water Improvement Program To Women: A Literature Review

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Abstract

A review of the available literature shows that in developing countries the role of women in the water sector is often limited to collecting and managing water at the household level. Water improvement programs are found to provide women with enormous direct benefits in the form of reduced time and effort (women’s workload) required to complete water related activities, reduced adverse health impacts associated with traditional water sources, and improved socio-economic status. Also, such programs are found to provide women with a number of indirect benefits.
1. **Introduction**

In most of the developing world, women are the only suppliers and managers of water in the household. The daily collection of water as well as its allocation to different uses within the household is almost entirely the responsibility of women (UNESCO, 1996). The daily interaction of women with water within the household qualifies women to be the main beneficiaries from efforts that facilitate access to water sources and improve their quality.

The direct and indirect benefits from improved water service to women in developing countries are well supported in the literature. Direct benefits include savings of time and effort required to complete water related activities as well as improved health and socio-economic status associated with traditional sources (Bolt, 1994). Indirect benefits, although difficult to quantify, often extend to include a set of complex factors affecting most facets of women’s lives, their households, and the surrounding community.

This paper provides a review of the available literature focusing on the benefits that women derive from water improvement programs in developing countries.

2. **Women: Collectors and Managers of Water**

When it comes to domestic water, the household’s division of labor is well defined. In most cultures, fetching and supplying the household with water is a job for women and in some cultures fetching water is one of the few occasions when women can leave the immediate confines of their homes (UNESCO, 1996). This is true in both rural and urban areas. In many countries for a man to be even seen collecting water would
bring shame (Nadim et. al. 1980; Curtis, 1986, Rada 1994). In many communities the tradition of women fetching water begins at an early age when girls accompany their mothers on the daily routine walk to the water source. Girls start with a small container that increases in size as they grow (UNESCO, 1996). The mother and her female children divide this responsibility and as the girls in the family grow up, they assume total responsibility of this activity.

In Cairo 90% of the family water is delivered by females with more than 80% supplied by adults and 10% by female children (Nadim et al. 1980). In Ukunda, Kenya women haul 70% of the water used at home (Narrowe, 1989). In other parts of Kenya 89% of water collectors are women and girls (Lake Basin Development Authority, 1984). In some parts of Indonesia, mothers fetch water in 86% of the households and in around 40% of the cases they are the sole procurer of water (Sudjarow et. al, 1990).

Having collected the water needed, women are then in charge of its use in the household, and sometimes within the village community (Wijk-Sijbesma, 1985). Studies show that when men’s and women’s division of labor is broken down, in most societies women more than men use water for domestic chores and attend to family sanitation and hygiene (Herbert, 1990). They also use it for sanitation and waste disposal. In addition many women use water in food processing and craft making, as well as for vegetable gardens and domestic animals (Cleaver et. al. 1995).

Women’s traditional involvement and close relationship with water has two implications. First, as explained in the next section, it makes women the primary beneficiaries of water improvement programs (Wijk-Sijbesma, 1985; Fengshu et. al, 1986).

In the few instances when men collect water, they collect it for their own business and to sell. They also collect it for domestic use only if no females are available in the household, or when there exits some other
Second, by the virtue of their daily contact with water women acquire valuable knowledge specific to local water conditions. Women can compare water sources based on ease of access, time and effort required to collect water, water quality and availability, and source reliability (Wijk-Sijbesma, 1985). They can also judge water quality using criteria such as color and taste, know the consequences of using each quality, and associate certain water usage with certain water quality (Rada, 1994). Women’s detailed knowledge of water collection and management methods makes women’s involvement vital in all stages of water improvement programs, especially those targeting water for domestic use (Wijk-Sijbesma, 1985). Women are also the main passers of water related traditional and indigenous knowledge through generations (Ogana, 1991; Cleaver et al. 1995; Narrowe, 1989).

3. Direct Benefits

The direct benefits of water improvement programs to women can fall into one of three main categories: reduced time and effort (women’s workload) required to complete water related activities, reduced adverse health impacts associated with traditional sources, and improved socio-economic status. These three categories are closely interrelated.

3.1. Reduced Time and Effort (Workload)

Women in most developing countries have a disproportionate and substantially high share of the work that has to be done inside and outside the home (Curtis, 1986). A form of transport other than back-loading or head-loading (Curtis, 1986).
study in Burkina Faso found that on average women had 1.3 hours of free time in the first fifteen hours of waking (McSweeney, 1980). The same study showed that between the ages of 11 and 17 girls worked on average 5 to 8 hours per day while boys worked 3 hours a day at most. Another study in Kenya showed that women had to wake up an hour earlier than men, went to bed an hour later, and had only few hours of rest in between, when they would play with children (Curtis, 1986). Since water related activities constitute a major portion of this workload, improving water access reduces women’s water related work and hence their overall workload.

A woman’s water related workload is a function of the time and effort spent completing such tasks. The time and effort spent completing water related activities are determined by the distance to the water source, terrain to be traversed, waiting time at the water source, method of transport, household water consumption rate, and the number of people available to help bring water home.

Field investigations confirmed that there is a wide variety in the distances and terrain that women have to travel to get water. Nevertheless studies agree that women living in poorer drier areas had the furthest to walk (Curtis, 1986). An earlier study considered the maximum possible distances to walk to water in terms of calories of food energy consumed in a day to be 18km on the flat, and 5km for a 12 degree slope (White et. al, 1972). In most of the developing world, the distances women walk to obtain water by far exceed the maximum distances proposed in the above study. In some parts of Kenya, women have to walk up to 22km on a slope and in other parts they walk up to

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2 For example, water of lesser quality is often used for washing clothes and cleaning the household and that of higher quality is used for drinking and cooking.

3 The workload can also vary with season. This is especially true in rural areas. In the dry season women might have to work more on the farm and walk further distances to collect water and firewood.
25km on the flat (Curtis, 1986). In some parts of Bangladesh, women claim that distance is the major constraint to water collection for daily use (Khair et al., 1990). In some parts of Thailand more than 80% of the households had distance to the water source as their main complaint against current water conditions (Khatikarn et al., 1990). In many parts of the developing world women spend up to 22 hours per week, and walk for 8km per round trip hauling water and make multiple trips (Chambers, 1983). The distance to the water source can be as much as twelve kilometers in one direction in some areas (Hollnsteiner, 1979). Due to the long distances women have to travel, it is not unusual in parts of Africa, for women to leave at dusk in order to escape the scorching sun, sleep overnight at the water source and return with water that is barely enough for the families’ survival at dawn (UN INSTRAW, 1982).

In some parts of India women have to walk for eight hours for one bucket of water (Bolt, 1994). The distance that women have to walk to a water source might change from season to season with the longest being in the dry season. In urban areas the walk may not be as long where there are multiple public water points and it might take more than 15 minutes or a kilometer to reach the nearest public tap (Nadim et al. 1980). The above reveals that improvement programs that reduce the distance to the water source bring substantial benefits to women.

In many communities the walk can be difficult, often along uneven, slippery paths (UNESCO, 1996). A study in Kenya found that women made walks to the water source that were often over unpaved and rough terrain (Ferguson, 1986). In some Cairo neighborhoods, women have to walk up the hill carrying their water containers or take water to upper floors. This increases the effort required to meet the household’s water
needs (Nadim et. al, 1980). Hence, programs that provide in home water connections, for example, can reduce women’s effort needed to collect water.

Waiting time at the traditional water source can be substantial, especially if too many women use the same source. In some squatter areas of the world, one stand pipe might serve more than 50 families. Under these circumstances, and to avoid standing in lines, women usually collect water at two or three in the morning and most often take their children with them (APDC, 1992). In Southern Sudan, for example, waiting time is one of the main reasons why women will not use a public hand pump if offered as an alternative (Russell, 1979). In some areas of Cairo it sometimes takes a woman an hour to gain access to a public tap ( Nadim et al. 1980; Rada, 1994). A water program that increases the number of available taps in congested areas can reduce the waiting time and free women to complete other tasks within and outside their homes.

The method of transporting water is a major determinant of the women’s workload needed to collect water. In most developing countries the method of water transportation is often gender-specific with women more specializing in carrying aids and men using wheelbarrows, handcarts, and animal transport. This is specially true if water is commercially sold by men (Curtis, 1986). In some cases introducing a new water transport mode will not be supported by the men in the community if it leads to a shift of work from women to men. Another determining factor of women’s water related workload is the household rate of water consumption. However, the heavier the workload required to collect water the more limited is the household usage (Nadim et. al, 1980). Also, the larger the number of household members (especially females) helping to bring water to the household, the lesser will be the workload per woman. Hence, water
programs that reduce the need to transport water, encourages a reduction in household consumption rates, or encourages more household members to share in hauling water are invaluable to women.

3.2. Reduced Adverse Health Impacts

Adverse health impacts due to unimproved traditional water sources can result from increased energy requirements, injury from carrying water loads (as a function water transporting container’s weight and method of carrying), injury due to other accidents (at the water source or during transportation), possible reductions in water use for personal hygiene due to water unavailability, and possible close contact with contaminated water (physically or through intake). Water programs have a lot to offer in reducing these health risks.

Since making four to six trips a day to fetch water is not rare for women in the developing world, the daily physical toll of these trips on women’s energy is sever, especially when the woman is pregnant or breastfeeding. The pregnant woman burns 16% of her daily caloric intake on gathering water, while the breastfeeding woman burns
44%. When food and wood gathering and cultivation are added to water drawing, the cumulative percentages for the pregnant woman become 25% and for the breastfeeding woman, 53%. When the 30% required for metabolism is added, the breastfeeding woman is left with only 17% of her daily calories intake to expand on other tasks, and the pregnant woman is left with 45% (IWTC, 1990). Thus, if water improvement programs reduce the energy requirements of water collection, women would have more energy for other tasks and themselves, be able to bear a larger baby, breastfeed longer, and spend more time nurturing their children.

The substantial energy requirements to carry water has to come from metabolized food. When accompanied with food shortages, carrying water leads to the risk of malnutrition (anemia) which makes women far more susceptible to disease. When this is accompanied with pregnancy, growth of the fetus can be impaired. The quantity and quality of breast milk is also adversely affected (UNICEF, 1980; Curtis, 1986). The energy problem is even more severe during the dry season when food is scarcest, work planting in the fields is at its hardest, and the distance to the water source is at its longest (Wijk-Sijbesma, 1985).

Possibility of injury from carrying loads of water depends on the weight of the water load (which is a function of container size and material) and the method of carrying. In Kenya, a study found that on average women carry loads of water that are between 20-25 kg for distances of 3.5 kilometers 1.5 times a day (Ferguson, 1986). Other studies reported women carrying the same weight for 9 trips a day (Curtis, 1986). In Egypt women carry containers that usually hold 20 to 25 liters of water (Nadim et. al, 1980). A 20 liters container full of water weigh more than 20 kilograms (Hoehn et.al.,
In some cases women would carry larger and heavier loads in order to reduce the number of trips and save time. This occurs when women have a heavy work load in other activities that are not water related and are operating under severe time constraints (UNESCO, 1996).

Container type and material differs from country to country. Traditionally calabashes, goat skin bags (mainly used by professional water vendors), or clay pots has been the usual containers used in most developing countries, but now buckets or plastic jerry cans are widely used (Dufaut, 1988). In Thailand, buckets are the most popular when head-loading is practiced, but cement jars, galvanized and plastic cans, are used when pushcarts are utilized (Khatikarn et. al, 1990). In Egypt 98% of the women use a bastilla which is a cylindrical tin with two handles at the top, usually made of zinc or tin (Nadim et. al, 1980). Note that the heavier the container’s material, the lesser water a woman would carry per trip if she is cautious about her health. This might require more trips to the water source. Also, it might be the case that women have no control over the material of the containers they use as such material is determined by local environments and available resources and technologies.

Methods of water carrying require different energy expenditure and can result in different types of injury and deformity. Research carried out by the Medical Research Council of the United Kingdom compared the efficiency (as measured by Oxygen consumption per minute) of various methods of load carrying used by women and concluded that the shoulder, back, and head loading require the most energy expenditure (Bedale, 1924). Although this is the case, women in developing countries widely use these three methods to carry water to the home. Women who carry water on their backs
with a head strap are found to have a marked cranial depression which can result in headaches (Curtis, 1986). In some parts of Kenya, 10% of visits by women at rural health centers are for head pains resulting from carrying water. A large percentage of Massai women suffer from backaches and many are crippled by the age of 35 due to carrying heavy loads. Back-loading causes deformation of the spine which can result in obstruction of the birth canal, risking both the mother’s and child’s life (Curtis, 1986). Head-loading is no better alternative. The heavy jars that women balance on their heads may eventually cause pelvic disorders, complications at childbirth, headaches, and hair loss and bald spots (Hollnsteniner, 1979; Bolt, 1994; Hoehn et.al., 1996). In Kenya, a new method had to be developed to operate on the thyroid gland of women because the neck muscles become so enlarged from load carrying. Also, load carrying might cause knee problems and feet ache (Curtis, 1986; Rada, 1994). A water program (even with a simple health education component) can help explain these risks of carrying to women, introduce them to other methods of transporting water, and reduce their chances of injury in the long term.

Injury due to accidents during transportation include slipped discs, paralysis, injury to carried children, and broken backs (Curtis, 1986). Injuries due to accidents at the water source can occur due to violence. Violence and fights at the water source are a frequent happening, especially in congested areas. In Southern Sudan, for example, fights are reported by women who used hand pumps and were some of the reasons why women shied away from using them (Russell, 1979). In some areas of Cairo women using public taps reported fights to be one of their main concerns (Hoehn et.al., 1996). These fights often become heated and involve the men in the area, who come to the
rescue of their female relatives. In the progress of getting water, women are exposed to pushing, stepping on each other’s feet, spilling water on one another, and receiving insults from the tap guard. To avoid congestion times, women sometimes adapt by obtaining water very late at night (Nadim et al. 1980; Rada, 1994). In Cairo, several women reported that they had suffered miscarriages (due to being pushed by other women), bruises, deep cuts, and wounds (Nadim et al. 1980). Efforts in water improvement programs that increase the number of available water sources are vital to reduce violence and its accompanying health and emotional impacts.

Other health impacts of unimproved water supplies might occur because of the reductions in water use for personal hygiene and other needs. Studies found that when water is abundant people will use more of it for personal hygiene, but if it is scarce, distant, or expensive, people will use it only for other essential needs such as drinking (IWTC, 1990). Improving water supplies allows more water to be consumed, this might have more impact on health status than improving only water’s quality. A study in India shows that the quantity of water (and not its quality) to be the main determinant of good health for children over three years of age. Most infection was found to come by other routes such as dirty hands or utensils (Hebert, 1984). Family hand pumps were highly advocated in some parts of Asia for their health improvement potential because they allow more water to be used for washing and bathing and household hygiene (Herbert, 1990). According to the World Health Organization, 80% of all disease in developing countries is related to unsafe drinking water and inadequate hygiene (IWTC, 1990). Making water supplies more accessible and improving their quality can help reduce these health risks.
Other health impacts might result from getting in close contact (either through physical contact or intake) with contaminated water for long duration. Exhausted by hard work, weakened by poor nutrition, and in constant touch with water which is often polluted, women are particularly vulnerable to water related diseases (UN INSTRAW, 1982). Women are also exposed to health risks by venturing into the environments where water is collected. A traditional source may be where mosquitoes breed exposing the woman or child to Malaria. Hookworm and jigger parasites were also found to develop in damp environments (Curtis, 1986). Other diseases related to water include diarrhea, guinea worm, cholera, and eye diseases such as trachoma. Programs that are concerned with improving water quality and finding better water sources can be invaluable to women.

3.3. Improved Socio-Economic Status

Improved water supplies help reduce women’s workload and provide extra time that can be used in education and income generating activities such as farming and trading. This improves women’s economic status. In addition improved water supplies can reduce the amount of resources women spend to adapt to the lack of water. Such spending includes payments for water from vendors and other sources, and for illness treatment. Also, in some cases improved water projects bring about financial rewards to encourage women’s participation. The following section provides few examples.

In Botswana women’s beer-brewing activities increased after water shortages were reduced and in Zimbabwe, women established a Laundromat and vegetable plots at the end of a newly provided drainage canal. In Kenya and Honduras, water kiosks run by
women’s organizations were a source of salaries and bought the group’s independence from private vendors who dictated water selling rates (IWTC, 1990). When evaluating a water project in Swaziland researchers found that the production of handicrafts doubled when women were saved the trouble of carrying water (O.D.A, 1983). In Bangladesh, improved water sources and technological innovations created ways to increase women farmers’ profits by providing more time, irrigation water, and higher production. It also provided means of selling the excess water to others (Koppen et.al, 1996). In Kenya, women were provided with technical training to repair and maintain hand pumps. Women expanded the use of their acquired skills by engaging in related income generating activities such as establishing bicycle repair shops, and block making machines (Development, 1988).

In Ethiopia, a water project aimed at providing water such that women were not forced to walk for three and four hours to obtain it and trained women to operate, maintain and manage the water project. Since women were hired to do these responsibilities, the project provided cash income, increased local awareness and appreciation of training and for the general competence of women to manage and operate the water system. This gave the women participating a new role from housewives to salaried workers and employees of the public water system (Narowe, 1989).

In India, a water improvement project was established in connection with dairy farming. Women in the project were encouraged to use the time saved from improved water to engage in dairy activities to increase their income (Bolt, 1994). In Indonesia, a community dug canal provided enough extra water for a dry season source of irrigation.
Women farmers could farm highly priced rice as opposed to cheap cassava and sweet potatoes on their small farms. This helped increase their income (IWTC, 1990).

The lack of energy and poor health caused by the heavy workload reduces women’s efficiency in any paid work that is undertaken, thus reducing their earning power at the present and in the future. Many development workers express the concern that women should not be trained in income generating projects and skills because their domestic workload is too high to allow them time to participate. In this case the work of hauling water has a high economic penalty (Curtis, 1986). Also, better water sources can enhance women’s current and future earnings by providing more time to engage in education. In Yemen Arab Republic, reducing the time rural women in the average household spend fetching water and fuel wood from 11.5 hours to 1.7 hours/day through providing improved water was found to increase women’s agricultural productivity and provide girls time to attend school and become future teachers (Blumberg, 1989).

In many developing countries, it is customary for girls to be kept home from school to help, among other things, with carrying water. This reduced education opportunity is known to be a major factor in perpetuating women’s low socio-economic status (UN INSTRAW, 1982). For those who try to combine school and water responsibilities, academic achievement is a major concern. In Cairo girls who go to school usually supply the house with water after finishing their school day. Complaints about not having time to do school work and failing classes are reported (Nadim et al. 1980).

Economic benefits resulting from water improvement programs might exceed those directly accruing to women to those accruing to the community as a whole. In
China, for example, the time that became available to women after water improvement programs was seen as promoting agro-based small industries, improving women’s production in rural areas, and helping women, their households, and the community as a whole to increase their income. For example after setting up drinking water wells in one rural area, some 17% of women villagers were encouraged to start business ventures like raising ducks, pigs, sheep and chicken. The per-capita annual income in the area increased by more than 200% (Fengshu et. al. 1990).

4. **Indirect Benefits**

Water improvement programs can also indirectly affect women through a complex set of relationships. One area in which this can be seen clearly is when unimproved water service affects children. As part of their domestic role, women are the main care providers for their families, especially when it comes to child health care. Children get affected by unimproved water sources in two ways: through intake of contaminated water and through the lack of their mother’s time and care (in terms of quantity and quality). Due to the absence of an adequate, reliable water supply and sanitation services more than 15 million children aged 0 to 4 die each year. When a mother loses her child she gets emotionally affected. Diarrhea diseases, arising mainly from the lack of clean drinking water and sanitary conditions, account for nearly 1/3 of all child deaths (UNICEF, 1980). The treatment of diseases such as diarrhea cost time and money (Hoehn et al., 1996).

The ability of women to provide adequate childcare is often hindered by the lack of water. In the Sahel region of Africa the workload and time related with water leaves
women with little time to perform other domestic functions including childcare. If women are no longer spending time fetching and hauling water from traditional sources; they may reallocate the saved time to different activities such as food preparation and childcare. The time saving reallocated to childcare and food preparation may reduce child mortality and morbidity (MacRae et al., 1988; Blumberg, 1989). On the other hand, more time can be spent learning about care and personal hygiene such that the quality of childcare improves.

Another indirect effect of water improvement programs would be the reduced number of times a woman gives birth. This can occur due to many factors. The desire to have children for their labor capacities might be reduced if water sources are improved (Curtis, 1986; Blumberg, 1989). Also, women can get more formal and informal education due to time savings from improved water sources. Studies found a negative relationship between fertility and education. Education indirectly affects women’s fertility by reducing the biological supply of children (by raising the women age of marriage and hence reduce exposure to pregnancy), and by increasing the knowledge of contraception (Cochrane, 1979).

Women are also indirectly affected (along with other members of their households) when the general community income and standard of living is increased. This effect is the highest when women are largely engaged in income generating activities such as agriculture or trading (Curtis, 1986). In China it is found that in rural areas water collection draws away one third of labor from agriculture which substantially reduce agricultural production (Fengshu et al., 1990). Releasing this labor back to
agriculture by improving water resources, will increase the community’s income substantially specially if the region is specialized in highly valued cash crops.

5. Conclusions

A review of the available literature shows that in developing countries, women are assumed as having the prime role in the maintenance of the household unit (El Katsha et.al., 1993). This includes the caring for children and other family members as well as performing the domestic work of the household. In playing this role women are not only the prime users of water in the household but also the only suppliers and managers. Water improvement programs that provide water that is of adequate quality and quantity dramatically affects women’s lives. Such programs are found to provide women with enormous direct benefits in the form of reduced time and effort allocated to water related activities, reduced adverse health impacts associated with traditional sources, and improved socio-economic status. In addition, such programs are found to provide women with a set of indirect benefits.
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