

Impact of Water Scarcity and Drudgery of Water Collection on Women' Health in Ogun of Nigeria

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ABSTRACT . The study focused on impact of water scarcity and drudgery of water collection on women's health in Ogun state Nigeria. Simple random sampling technique was used to select 120 respondents (women) in the study areas. Data were analyzed using both descriptive statistics and Pearsons Product Moment Correlation Coefficient (PPMC). Finding showed that the mean age of the respondents was 35.09 years. The most striking risks of water scarcity on the health of respondents are waterborne diseases like cholera, typhoid fever, Guinea worm, hookworm, and bilharzia (19.81 percent). It affects farm work (17.39), tiredness (15.94), and low yield from farming activities (14.25 percent). The major source (27.46 percent) of water to the women in the study area is boreholes. Majority (79.2 percent) of the respondents opined that they feel tired after water collection. Correlation showed significant relationship between daily trip and duration of trekking to sources of water ($r = .24^*$; $N=115$ $P < 0.01$) and a very strong relationship of $P = 0.00$ ($P < 0.01$), and between duration of trekking and women's household size ($r = .26^*$, $N=115$, $P < 0.05$) and a very strong relationship of $P = 0.00$ ($P < 0.05$). Increased level of access of women to best sources of water supply would assist in the maximization of their potential; reduce stress and diseases that are a result of lack of potable water.

INTRODUCTION

Africa's agricultural sector faces pressing and daunting environmental, political, and economic challenges, often stemming from a few root causes, such as poor governance, lack of water resources management, inadequate infrastructure, limited access to markets and low funding. All of the above contribute to weaken agricultural development and heighten food insecurity across the continent (Ifpri 2005). Water shortages are among the most important global problems linking issues as diverse as food security, international diplomacy, poverty alleviation, public health, energy production, and ecosystem production (UNESCO 2004).

In many parts of arid, and semi-arid Africa, the shortage of water is already a critical limit to economic development, and water scarcity has been identified as source of political instability (Wolf and Ross 1992; Turton and Olilsson 2000). Even in the humid tropics, dry season water shortages have been identified by extreme weather events (Douglas et al. 2006). Water scarcity will lead to slower growth of food production and substantial shifts in where the world's food is grown (Ifpri 2002). A conservative estimate of the number of people living in countries with "absolute water scarcity" by 2005 is one billion (Musing 1999). Countries such as China, India,

Mexico, and Nigeria do not have sufficient annual water resources to meet reasonable per capita water needs for their rapidly expanding populations. A substantial portion of Africa is subjected to high seasonal variability in both its climate and water resources (Douglas et al. 2006). According to IRIN (2009), 62 percent of the population of Nigeria has access to improved water sources. However, it is the access to available water that defines water-related impact to human well-being (Douglas et al. 2006).

Inadequate access to safe water supply and lack of water infrastructure has been shown to exacerbate nutritional deficiencies (Cairncross and Cliff 1987). And this affects human health (UNESCO 2004).

Women spend more of their time searching and carrying water in Nigeria. According to Dankalelman (2002), women bear the highest cost of the environmental crisis because of their roles in providing water, food and energy at family and community level. Philip and Michael (1999) stated that one of the constraints facing rural women in Nigeria is the distance to portable water, in such a way that some women trek miles before getting potable water. The rural water supply situation constitutes the key constraint to rural development and poverty alleviation. Access to sufficient quantities and quality water is a hydra-headed and more time consuming problem for

many rural women and girls (World Bank 1993; Idachba 1994). According to Ajani et al. (2002), one of the constraints to women productivity and welfare in the agricultural sector is the lack of water and sanitation which result in morbidity and mortality in the developing world. They further said that the greatest symptom of marginalization and powerlessness of rural women is lack of time not only to perform their tasks, but to ensure sufficient leisure time to maintain their health. This invariably affects their level of productivity. The class gendered effects of environmental change are manifested as pressures on women's time, income, nutrition and health, social support networks, and knowledge. Ahmed (2002) stressed that there is widespread understanding of the impact of water scarcity on women's health, and the drudgery of water collection (for example, in terms of distance, time, water carrying burden) on girls education. She said further that women have a little voice in water resource planning.

According to Van wijk-Sijbesma (1998) and Coates (1999), water scarcity has tremendous impact on women health, and the drudgery of water collection has cascading impact on the education of girls, on the time available for productive work and on the coping strategies at the household and community level. According to Mafinisebi (2002), convenient sources of safe water are of enormous importance to improve human health, agricultural labour productivity, hence income generation by rural women. He further stressed that a major benefit from better access to safe water is that the time spent fetching water from distance sources and preparing such water for human use can be engaged instead in other productive activities, attending to farm, school, or technical training, tending children's health and education needs or simply rest and recuperation.

Problem Statement

The story of food security in the 21st century is likely to be closely linked to the story of water scarcity. In the coming decades the world's farmers will need to produce enough food to feed many millions more people, yet there are virtually no untapped cost effective sources of water for them to draw on as they face this challenge. In addition, farmers will face heavy competition for this water from households, industries, and

environmentalists (Rosegrant et al. 2002). Water as essential resources at the household level, industry, tourism and cultural purposes is under threat (Ifpri 2002).

Just about 20 percent of Nigeria's rural population, for instance, have convenient access to safe water (World Bank 1993). Sixty-two percent of the population of Nigeria has access to an improved water source (IRIN 2009). According to World Bank and DFID (1999) consultative qualitative poverty assessment, the ranking of problems by women and girls reveal that water is the most pressing need to both rural and urban communities sampled for study. This should be obvious because these groups of people are largely responsible for procuring and processing the water needed by the family. In the face of such water scarcity, the provision of reliable data on water supply, water resource and socio-economic indicators remain a critical but unmet challenge. As a result this study intends to find out the effect of drudgery of water scarcity on women's health in rural Nigeria. The specific objectives include among others: survey of demographic characteristics of women in the study area; identification of the productive water use activities in the study area; identification of various water sources available to women in the study area; estimation of the time spent by women to procure water in the study area; and exploration of the implications/risks of water scarcity on women health in the study area.

Hypotheses

This will be stated in null form.

Ho₁: There is no significant relationship between numbers of daily trips made by women to access sources of water and duration of trekking to the sources of water.

Ho₂: There is no significant relationship between women's household size and duration of trekking to access sources of water.

METHODOLOGY

The study covered Ijebu North local government area, Ijebu North East local government area and Odogbolu local government area. The local government areas are located within latitudes 6° 35'N- 7° N and longitudes 3° 55'E- 4°

45°E. The climate falls distinctly under the general hot and dry season (November to March) and warm and wet rainy season (April to October). The rains reach the peak months in the months of June and September, with a very short dry period in the month of August. Thus, it has the double maxima rainfall. The local areas experienced an annual rainfall of between 1523 and 2031 mm, with average temperature of 30° C throughout the year. The soil type of the study area is ferrasols. Agriculture is the major occupation of the people employing over 60 percent of the inhabitants (either directly or indirectly) who are mostly small scale farmers. The household was used as unit of analysis because it represents the basis of the socio-economic structure, water use pattern, and livelihood of respondents. Population of the study consisted of all the women in the study area. Simple random sampling technique was used to select one hundred and twenty respondents (women) in the study areas. The statistical tools that were used for analyzing the data include both descriptive statistics such as frequencies, mean, percentages to summarize information on respondent's demographic characteristics etceteras, and correlation between variables were determined using Pearson Products Moment Correlation Coefficient (PPMC).

RESULTS

Demographic Characteristics of the Respondents

Table 1 shows that the mean ages of the respondents to be 35.09 years, indicating that majority (44.2 percent) of the respondents were women in their prime age and were still energetic and active. According to Abiona (2010), the age bracket 30-40 years is another important age category with strength for mobility to tackle some task on the farm/rural household and they are mostly youth who have the capacity to explore and manage resources.

Considering the educational level of the sampled women in the study area, it was revealed that most of the women (75.9 percent) had tertiary and secondary education. The high level of education recorded in this study might be due to (i) the proximity of the study area to higher institution (Tai Solarin college of Education, Omu Ijebu) and the metropolitan nature of some the towns in the study area.

Table 1: Demographic characteristics of the women

	Mean	Frequency	Percentage
Age(Years)			
20-30		53	44.2
31-41		36	30.0
42-52		29	24.2
52 and above		2	1.6
Mean age	35.09		
Total		120	100
Education			
Tertiary education		62	51.7
Secondary education	29	24.2	
Primary education		10	8.3
No formal education	19	15.8	
Total		120	100
Religion			
Christianity		78	65.0
Islam		35	29.2
Traditional religion		7	5.8
Total		120	100
Years of Residence			
1-10		46	38.3
11-21		53	44.2
22-32		6	5
33-43		12	10
Above50		3	2.5
Mean year of residence	17		
Total		120	100
Household Size			
1-5		42	35
6-10		48	40
11-15		16	13.3
16-20		3	2.5
Above 21		11	9.2
Mean	7.21	120	100
Membership of Social Organization			
Self help organization		9	7.5
Church organization		53	44.2
Muslim organization		23	19.2
Club (local organization)		11	9.2
Cooperative societies		16	13.3
Traditional organization		12	10.0
Others		2	1.7
Total		120	105.1
Standard of Living			
Low		41	34.2
Medium		64	53.3
High		15	12.5
Total		120	105

Source: Field Survey 2010

Most of the women (65 percent) were Christian, while 29.2 percent of the respondents were of Islamic religion. This is because the study area is south- west geo-political zone of the country, where majority of the population is Christian. This was confirmed by IRIN (2007) that nearly 50 percent of the population is Muslim and 40 percent is Christian. Although all reli-

gions are practiced in every region, Islam is concentrated in the north and Christianity in the south.

The average year of residence is 17 years, 41.2 percent of the respondents had lived in the study area for 11-21 years. This implies that they may have enriched knowledge and assured accuracy of the changes in the situation of infrastructure in the study area.

Average household size in the study area was discovered to be 7, 40 percent of the women had 6-10 persons in their household. This corroborates the assertion of IRIN (2007) that women have an average of 5.8 children in Nigeria. This also indicates that women would embark on frequent trips daily to the source of water in order to satisfy their household water needs in the event of water scarcity or if water is not readily available in the area.

The importance of social group membership to the study is that the group will serve as means for women to voice out the challenges they face in term of access to water. Table 1 shows that 44.2 percent, 19.2 percent and 13.3 percent of the women belong to church organization, Muslim organization, co-operative societies respectively. Ahmed (2002) cited Government of Gujarat, India (2000) as maintaining that outreach to women should not be overlooked because women are the most interested and involved users in rural water supply, domestic urban water consumption, health and sanitation issues and are equally concerned as men in agricultural production. Social organizations also serve as avenues to train women to manage and maintain community water systems who often perform better than men because they are less likely to migrate, more accustomed to voluntary work, and better entrusted to administer funds honestly (World Bank Water Resources Management Policy 1993, cited in Green Joekes and Leach et al. 1998).

Table 1 reveals that average number of the women (53.3 percent) had medium standard living, while 34.2 percent of them had low standard living. The difference between the two categories is not much, in the sense that not all of them can afford their own water point.

People used water in many different roles within their livelihoods: drinking, washing, cooking, irrigating, manufacturing, worshipping. Sometimes they allocate specific sources to specific purposes; more often they use the same

source or sources for multiple uses. This is in line with the view expressed by Laban (2010) that everyone uses water in different ways, for example in growing of crop, drinking, cooking, and cooling. Water also plays key role in conserving nature: ecosystems depend on flows of water. From the study, 20.72 percent, 19.92 percent, 18.92 percent, 11.35 percent and 7.4 percent of women used water for cooking, bathing, washing, household chores, and farming respectively (Table 2). The low percent use for farming may be due to so many reasons, one of which is expressed by Ifpri (2002) that it now appears that one of the main factors limiting future food production will be water. This scarce resources is facing heavy and unsustainable demand from users of all kinds, and farmers increasingly have to compete for water with urban residents and industries. They also support the result of the findings on productive water use activities that water is essential for drinking and household uses and for industrial production.

Table 2: Productive water use activities

<i>Activities</i>	<i>Frequency</i>	<i>Percentage</i>
Cooking	104	20.72
Bathing	100	19.92
Washing	95	18.92
Household chores	57	11.35
Farming	37	7.4
Irrigation	13	2.59
Industrial production	9	1.79
Worshipping	5	0.10
Water for livestock	24	4.78
Sanitation	39	7.76
Cleaning	19	4.67
Total	506	100.00

Source: Field Survey 2010

Table 3: Risk of water scarcity on women's health

<i>Variables</i>	<i>Frequency</i>	<i>Percentage</i>
It affects farm work	72	17.39
It affects farm size cultivated by women	50	12.07
Tiredness	66	15.94
Waterborne diseases	82	19.81
Low yield	59	14.25
Loss income from farming activities	57	13.77
It affects women labour availability on the farm	28	6.77
Total	414	100.00

Source: Field Survey 2010

Access to safe drinking water and sanitation is critical to maintain health, particularly for women and children. Water is also needed by man for the sustenance of life and good health. The study indicated that the risk of water scarcity on respondents health ranged from its impact on farm work, farm size cultivated by women, tiredness, waterborne diseases, low yield, loss of income from farm activities and its impact on women labour availability on the farm (Table 3).

The most striking risks of water scarcity on the health of respondents are waterborne diseases like cholera, typhoid fever, Guinea worm, hookworm, and bilharzia (19.81 percent), it affects farm work (17.39), tiredness (15.94), low yield from farming activities (14.25). Inadequate accesses to safe water supply and lack of water infrastructure have been shown to exacerbate nutritional deficiencies (Cairncross and Cliff 1987). It also dramatically affects human health (UNESCO 2004). Water scarcity will lead to slower growth of food production and substantial shifts in world's food grown (Ifpri 2002). The amount of water available in a household also affected the frequency of hand washing (Sugita 2004). According to Agbelemoge (2001), water related diseases prevented people from participating in their daily farming activities in Ijebu North local government area of Ogun State in 2001.

Table 4: Water sources available to women in the study area

Water sources	Frequency	Percentage
Spring	30	12.88
Well	30	12.88
Rainwater	54	23.18
Piped water	19	8.15
Streams	36	15.45
Bore holes	64	27.46
Total	233	100.00

Source: Field Survey 2010

It is commonly established that there is a strong linkage among water supply (water sources), sanitation and health (Omotayo 2010). Table 4 shows the various sources of water supply available to women in the study: spring, well, rainwater, piped water, streams, boreholes. The major sources of water are boreholes (27.46 percent), rainwater (23.18 percent), streams (15.45 percent). The boreholes could be a veritable source of diseases like typhoid fever if not well

maintained and stress if not readily available in the vicinity of the respondents.

There are only seven to eight months of consistent rainfall annually in the study areas. Rainfall as a source of water is therefore not reliable year round (Omotayo 2010). Stream as a source of water implies the women may travel long distances, the stress involved in procurement of water, and exposure to schistosomiasis. Households that depend on stream as source of water are exposed to schistosomiasis (Omotayo 2010; Agbelemoge 2002).

Table 5: Time spent by women to procure water in the study area

Variables	Frequency	Percentage
<i>Distance from Home to Water Source</i>		
100m	51	42.5
200m	39	32.5
500m	14	11.7
1km	10	8.3
2km	6	2.5
Total	120	100
<i>Duration of Trekking to Water Source</i>		
1-20 minutes	57	47.5
21-30minutes	21	17.5
31-40 minutes	24	20.0
41-50 minutes	4	3.3
51-1hr	10	8.3
Above 1hr	4	3.3
Total	120	100
<i>Duration Spent in Queuing for Water</i>		
1-30 minutes	79	66.5
31-40 minutes	21	17.5
41-50minutes	5	6.7
51-1hr	6	5
Above 1hr	5	6.7
Total	120	100
<i>Daily Number of Trips</i>		
1-2 trips	41	34.2
3-4 trips	42	35.0
5-6 trips	11	9.2
7-8 trips	9	7.5
9-10 trips	8	6.7
Above 10 trips	9	7.5
Total	120	100
<i>Time Spent Fetching Water</i>		
1-60 minutes	79	65.8
60mins-2hrs	31	25.8
2hrs-3hrs	8	6.7
Above 3hrs	2	1.7
Total	120	100

Source: Field Survey 2010

According to Sydney and Vincent (1999), the health of women and girls who fetch water from a source away from the household is threatened in three general ways: (i) by exposure to water-based diseases at the source (for exam-

ple, schistosomiasis) and diseases with insect vectors at or near the source (ii) by exposure to accidents, drowning, attack, and assault at and on the way to and from the water source; and (iii) by skeletal injuries caused by carrying heavy loads repeatedly over long periods of time. While these threats to women's and girls' health sound intuitively quite serious and widespread.

Women bear the highest costs of the environmental crisis because of their roles in providing water, food and energy at family and community levels (Environmental Liason Centre International (ELCI) 1985). There is also the recognition that poor women lack of access to water has a direct impact on their livelihood. According to Ahmed (2002) water scarcity has impact on women's health. The drudgery of water collection has also affected the education of girl child, time available for productive work and coping strategies adopted by women at the household and community level (Van Wijk – Sijebesma 1998; Coates 1999).

The results in Table 5 revealed that 42.5 percent of the respondents indicate that the distance from their home to water sources is 100m, duration of trekking to water source is 1-20 minutes (47.5 percent) of the respondents, duration spent in queuing for water is 1-30 minutes (66.5percent) by the respondents, daily number of trips to the source of water 3 – 4 trips (35percent) of the respondents, time spent fetching water is 1-60 minutes (65.8 percent).

The implication of the result is not in the distance to the source of water, but the stress involved in collecting water in the study area, which has considerable implication for women health. Ahmed (2002) inferred that poor women lack of access to water has a direct impact on their livelihoods in terms of time, income, and health.

Table 6: Container used to fetch water, and capacity

<i>Container</i>	<i>Frequency</i>	<i>Percentage</i>
Bucket	35	25.7
Keg	61	44.9
Basin	33	24.3
Paint bucket	7	5.1
	136	100.0
<i>Capacity of the Container</i>		
1-5 litres	5	4.2
6-10 litres	7	5.8
11-15 litres	12	10.0
16-20 litres	19	15.8
21-25 litres	77	64.2
Total	120	100.0

Source: Field Survey 2010

The daily requirement of water is determined by the household size, which will significantly affect the quantity of water procure by the women, type of container used to collect the water, number of trips to the source of water, distance travelled to the source of water, and time spent to meet the household's water needs.

Table 6 shows that 4.7 percent of the respondents used keg to collect water. 64.2 percent of the respondents used 21-25 litres of container to collect water, which implies that keg is commonly used to procure water in the study area. According to Thompson (2001), a "jerry can" is a hard plastic container with a capacity of approximately 20 L, which is used most commonly in Africa to fetch water and carry it back home.

Looking at the household size, which fall between 6 -10(40 percent) as noted above, it means the household with 20 litres of water requirement per person, (according to WHO estimates for Africa rural households, 20 liters of safe water per person per day is "the amount needed to satisfy metabolic, hygienic and domestic requirements"- World Health Organization1996), would require 120 -200 litres of water daily and the women or girls would make 6-10 trips to water sources daily in the study area. This further confirms that a lot of stress is involved in collecting water in the study areas.

Table 7: Feel tired to do other economic activities

<i>Dichotomy</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	95	79.2
No	25	20.8
Total	120	100.0

Source: Field Survey 2010

It has been observed from Table 7 that majority (79.2 percent) of the respondents opined that they feel tired after water collection. This implies that the stress involve in water collection affect women participation or engagement in other economic activities in the study areas. According to Khosla and Pearl (2004), because men's work is considered a part of the productive economy of paid labour, it is generally seen as more worthy of infrastructure investments.

As a result, there may be infrastructure for irrigation, but not for safe drinking water within cartage distance for other activities considered

part of the care economy. This limits women's engagement in a range of economic activities that depend on access to safe water, such as the preparation of food and other products for local markets.

Test of Relationship

Hypotheses

Ho1: There is no significant relationship between number of daily trips made by women to access sources of water and duration of trekking to the sources of water.

Table 8: Relationship between daily trip and duration of trekking of women

Variables	Duration of trekking	
Daily trip, Pearson Correlation	1	.242**
Sig.(2 tailed)		.000
N	115	115

**Correlation is significant at the 0.01 level (2 tailed)

The correlation between daily trip and duration of trekking to sources of water indicated a weak positive correlation of ($r = .242^{**}$; $N=115$ $P < 0.01$) and a very strong relationship of $P = 0.00$ ($P < 0.01$) (Table 8). This means that the women's daily trips to sources of water to procure water for domestic/household needs involves a lot of stress which has significant implication for their health and engagement in other economic activities thereafter. With clean water access increasingly scarce, the burden of securing a daily water supply has become a daunting task for women and young children in rural sub-Saharan Africa- threatening an ancient way of life. In sub-Saharan Africa, UNICEF 2004 estimates 40 billion hours of labor are wasted each year carrying water over long distances. The tragedy is that the water they work so hard to collect is often dirty, polluted and unsafe to drink. Women trapped in this situation have little time for other activities, such as childcare, rest or productive work (Sprenkle 2010).

HO2: There is no significant relationship between duration of trekking and women's household size to access sources of water.

Table 9: Relationship between duration of trekking and women's household size

Variables	Women's household size	
Duration of trekking, Pearson Correlation	1	.264*
Sig.(2 tailed)		.000
N	115	115

*Correlation is significant at 0.05 levels (2 tailed)

The correlation between duration of trekking and women's household size indicated a weak positive correlation of ($r = .264^{*}$, $N=115$, $P < 0.05$) and a very strong relationship of $P = 0.00$ ($P < 0.05$) (Table 9). This implies that as the women's household size increased, they would frequent sources of water more in order to satisfy their household water needs, particularly during the period of acute water scarcity. This may become burdensome, tiring as well as stressful, thus, impacting on their health and economic activities. One young mother said in Bugobero in Uganda, "Carrying water makes my body hurt. And if you fetch water like this, you feel you shouldn't miss even a drop." Because of this fact, water carried into a household requires so much effort, as a result it is used carefully (Sugita 2006). According to Rosen and Vincent (1999), when water for the household use are collected from a source away from the household, women and girls incurred three kinds of costs: health damages resulting from the physical process of carrying water; the expenditure of energy of carrying the water; and the opportunity cost of the time spent fetching water. Dufaut (1988) provided a qualitative description of a range of injuries that can result from carrying water on the head or back. Limitation of flexion and increased incidence of arthrosis (degenerative rheumatism) appear to be the most common injuries from carrying water on the head. More severe injuries, including injuries to the vertebral column among adults and scoliosis among children, can result from carrying water on the back or hip, which is done in some parts of the region.

CONCLUSION

The study revealed that majority of the women are in their prime age, energetic, Christians, had tertiary and secondary education, average household size is quite above the recommended

standard in the country, most of them had lived in the study area for a long time, as a result they are knowledgeable about the water situation in the study area, medium living standard, and use water for cooking. The most striking risks of water scarcity on the health of respondents are waterborne diseases like cholera, typhoid fever, Guinea worm, hookworm, and bilharzia, it affects farm work, tiredness, and low yield from farming activities. The major source of water to the women in the study area are boreholes, which could be a veritable source of diseases like typhoid fever if not well maintained and stress if it is not readily available in the vicinity. The results revealed that it is not the distance to the source of water, but the stress involved in collecting water in the study area, which has considerable implication for women health. The women used keg to collect water, the women feel tired after water collection. This means water for domestic/household needs involves a lot of stress which has significant implication for women's health and engagement in other economic activities.

RECOMMENDATIONS

To provide better access to safe water supply for women in order to generate a wide range of potential benefits to individuals, households, and communities. For instance, to prevent transmission of diseases, and saving women's time for productive activities.

An institutional framework that reaches the grass-roots level can be set up to promote investment in water infrastructure to ease the burden of the stress involved in the procurement of water by the women, for example, through micro-finance schemes, improved access to water could be achieved by including credit schemes and micro-enterprise that supply water tank to households, help individual to finance water project, at a low interest rate.

Gender issues need to be considered in the planning of water project in the study area in such a way that, it will not only increase the quantity of water available to households, but save time and energy that women and girls use to collect water from water sources.

Government or foreign donors should examining the local context from the grassroots level, by including very low-tech options in the policy tool kit, to identify the best water sources, and

distribution to alleviate the burden of carrying water and increase the quantity of water to people.

REFERENCES

- Abiona B 2010. *Comparative Analysis of Integrated and Non-integrated Fish Farming in Ogun State Nigeria*. Ph.D. Post Data Presentation. Department of Agricultural Extension and Rural Development. University of Agriculture. Abeokuta (UNAAB).
- Ajani OIY, Adeoti AI, Adenegan KO.2002. Women in agriculture and poverty reduction. In: F Okunmadewa (Ed.): *Poverty Reduction and the Nigeria Agricultural Sector. A Book of Reading*. Ibadan: Elshhadai Global Ventures Ltd., pp. 127-143.
- Agbelemoge A 2002. Incidence of in water-borne diseases among the rural dwellers Ijebu- North area of Ogun State, Nigeria. *Ogun Journal of Agricultural Sciences*, 1: 60-67.
- Ahmed S 2002. *Mainstreaming Gender Equity in Water Management: Institutions, Policy and Practice in Gujarat India*. Great Britain: Oxfam Publishers.
- Cairncross Cliff JL1987. Water use and health in Mueda, Mozambique. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 81: 51-54.
- Coates SA 1999. Gender and Development Approach to Water, Sanitation and Hygiene Programmes. *Water Aid Briefing Paper* 1999.
- DFID 1999. Conflicts Affecting Water Resources in Tanzania.From <www.dfid.gov.uk/rd/PDF/Output/Wat...> (Retrieved June 18, 2012).
- Douglas EM, Githui FW, Mtafya AR, Green PS, Glidden SJ, Vörösmarty CJ 2006. Characterizing water scarcity in Africa at different scales. *Journal of Environmental Management* (in press).
- Dankelman I 2002 *Gender, Environment and Sustainable Development: Understanding the Linkages*. Great Britain: Oxfam Publishers.
- Dufaut A 1988. Women carrying water: How it affects their health. *Waterlines*, 6(3): 23-25.
- Green C, Joekes S and Leach M 1998. "Questionable links: Approaches to gender in environmental research and policy." *Feminist Visions of Development. Gender Analysis and Policy*. London and New York: Routledge, pp.259-283.
- Environment Liaison Centre 1985. *Women and the Environmental Crisis. A Report of the Proceeding of the Workshops on Women, Environment, and Development*, Nairobi: ELC.
- Idachaba FS 1994. *Rural Infrastructure in Nigeria: Basic Needs of the Rural Majority (First and Second Updates)*.Department of Agricultural Economics, University of Ibadan, Nigeria.
- IFPRI 2002.*World Water and Food to 2025 Dealing with Scarcity*. Washington: International Food Policy Research Institute.NW.
- International Food Policy Research (IFPRI) 2005.The Future of the Small Farms. *Proceeding of a Research Workshop. Washington DC: IFPRI* From <HTTP://wwwIFPRI.ORG/EVENTS/SEM>. (Retrieved on April12, 2010).

- IRIN 2007. Future without Water, Forests, Wildlife, and Clean Air. Reconstructing Afghanistan Requires Many Forms. From <www.eli.org/Batson.Afghanistan.pdf> (Retrieved June 18, 2012).
- Khosla P, Pearl R 2003. Untapped Connections: Gender, Water and Poverty: Key Issues, Government, Commitments, and Actions for Sustainable Development. New York, Women's Environment and Development Organization. From <<http://www.wedo.org/susdev/untapped/htm>> (Retrieved on June 7, 2012).
- Laban P 2010. *Water is Everybody's Business. Farming Matters*, Ileia. The Centre for Learning on Sustainable Agriculture, September 2010, pp. 8-9.
- Mafimisebi TE 2002 Rural infrastructure and poverty reduction in Nigeria. In: F Okunmadewa (Ed): *Poverty Reduction and the Nigeria Agricultural Sector: A Book of Readings*. Ibadan: Elshaddai Global Ventures Ltd., pp. 91-109.
- Omotayo A M 2010. *The Nigerian Farmer and the Elusive Crown*. 30th Inaugural Lecture. University of Agriculture, Abeokuta, Nigeria, pp. 4-84.
- Philip B, Michael H 1999. Women as veritable tool for poverty alleviation. In: YL Fabiyi, EO Idowu (Eds.): *Poverty Alleviation and Food Security in Nigeria*. Ibadan: NAAE, pp. 92 – 95.
- Rosen Sydney, Vincent Jeffrey R 1999. *Household Water Resources and Rural Productivity in Sub-Saharan Africa: A Review of the Evidence*. Cambridge, MA: Harvard Institute for International Development.
- Sprenkle S 2010. Africa Water Crisis Africa Stories. 2010. Web. 30 Apr 2010 From <<http://www.africas-tories.org/africawater-crisis/world-water-facts>> (Retrieved June 19, 2012).
- Sugita EW 2004. *Domestic Water Use, Hygiene Behavior, and Children's Diarrhea in Rural Uganda*. PhD Dissertation, Unpublished. Gainesville Florida: University of Florida.
- Sugita EW 2006. Increasing quantity of water: Perspectives from rural households in Uganda. *Water Policy*, 8: 529-537.
- Thompson J 2001. *Drawers of Water II: 30 Years of Change in Domestic Water use and Environmental Health in East Africa. Summary*. London: International Institute for Environment and Development.
- Turton AR, Ohlsson L 2000. Water Scarcity and Social Stability: Towards a Deeper Understanding of the Key Concepts Needed to Manage Water Scarcity in developing Countries, *Occasional paper, African Water Issues Research Unit (AWIRU)*, Center for International Political Studies, Pretoria University, South Africa
- UNESCO 2004. *The UN World Water Development Report Water for People, Water for Life, United Nations Educational, Scientific and Cultural Organization World Water Assessment Programme*. Paris: UNESCO.
- UNICEF 2004. *Meeting the MDG Drinking Water and Sanitation Target: A Mid-term Assessment of progress*, World Health Organization and United Nations Children's Fund.
- Van Wijk Sijbesman C 1998. Gender in Water Resources Management, Water Supply, and Situation: Roles and Realities Revisited; *Technical Series 33-E*. The Hague, International References Centre on Water.
- Wolf A, Ross J 1992. The impact of scarce water-resources on the Arab-Israeli conflict. *Natural Resources Journal*, 32(4): 919-958.
- World Bank 1993. A Strategy to Development of Agriculture in Sub-Saharan Africa and a Focus for the World Bank. *Paper No. 203*, Africa Technical Department Series: WORLD BANK.
- World Health Organization 1996a. Global Health-for-All Indicators. From <<http://www.who.ch/hst/hsp/a/globindi.htm>> (Retrieved August 10 2010)
- World Health Organization 1996b. "Water and Sanitation." Facts sheet No. 112. From <<http://www.who.org/inf/fs/fact112.html>> (Retrieved August 10 2010).