

QUALITY WATER AS A PREVENTIVE MEASURE OF WATER BORNE DISEASES: A STUDY OF IBRAHIM BADAMASI BABANGIDA UNIVERSITY LAPAI WATER SUPPLY

ISMAILA ALIYU IBETO

Department of Sociology Ibrahim Badamasi Babangida University Lapai
Email ismailaaliyuibeto@gmail.com phone 07056143263

AISHA OBAJE

Email aishaobaje13@gmail.com phone 07017650240
Department of Sociology Ibrahim Badamasi Babangida University Lapai

Abstract

Water is integral component of life essential for human survival it's also borne some diseases, WHO, UNICEF reports have ascertained poor water access is associated with many water illness, food in security, lost productivity and poor school attendance especially for women and girls. The rapid urbanization and agricultural domestic needs of water supply in African Sub Sahara. In Nigeria most state, organizations and institutions could not meet up with provision of sanity quality portable water. The United Nation universal human right declaration of access to clean portable water remains unattainable to most State in Nigeria. The study is carry out in Ibrahim Badamasi Babangida University Lapai main campus to certain the access of quality water school supply to its users and especially the student, households and the relation to common ailment the study adopted a qualitative laboratory water analysis of the school bore hole the major source of water in the main campus in sample A (water drills from the ground) sample B (water from the Tank after drilling) and sample C (water collected from Tap ready for use) structured key informant interview was administer on the Director personal and planning, and the director school clinic. The findings reveals that the sample of water collected are unfit for human consumption, Borehole the major source of water supply have not been adequately flush to maintain the water quality to meet up the required standard, the connection between student common ailment and the water in uses. The study recommends the provision of an independent water treatment plan source, water treatment, and regular flushing of bore hole to meet the required standard water quality.

Key words; sanity water, unfit for consumption, underground water, common ailments, access to clean water, water borne Disease water sanitation.

Introduction

In the year 2013 WHO and UNICEF reports estimated the population of 768 million people in world who lack access to an improved water source, and more than 80 % of this population lives in the rural areas. The Poor water sanity and lack of its access is attributed to caustics water-related illnesses, food insecurity, lost productivity, and poor school attendance for women, and girls. The daily need for clean water is necessary for domestic uses i.e. drinking, cooking, washing, and bathing. In rural areas access to clean water is critical for livelihood and human activities, such as horticulture and crop irrigation, livestock-raising, brick-making, and small-scale commercial activities in semi urban areas. In the year 2010 Kurian Mac Carney observed that water enhance household's income and food security for livelihood due to rapid urbanization. In the year 1990 Amar Klemesu also estimated urban agriculture could provide 15-20% of world food produces. The formal recognition of water as a basic right by the United Nation and state in 2010 is a significant milestone to address the lack of sanity water and its provision in developing countries. The provision of sanity water for uses includes its hygiene and sufficiency for other domestic activities. This objective is not only in public health perspective but priority for domestic uses as enshrine in human rights law. This interpretation ignores the range of socio-economic human rights which the water plays. In general, terms the implementation of the human right to water could

achieved by providing water services that are planned and designed for domestic uses only.

The Right to water sanity.

In the year 2010 Gupta et al and Meier et al report stressed the United Nation General Assembly recognition of human right to sanity water as essential and basic for human right in the Resolution of article (64/29)UN 2010b,p.2.The article brought significant international political notion as an independent human right also the Article 25 of 1948 (UDHR) Universal Declaration of Human Rights and Articles 11 and 12 of the 1966 (ICESCR) International Covenant on Economic, Social, and Cultural Rights and the 1966 (ICCPR) International Covenant on Civil and Political Rights are all collectively known as the "International Bill of Human Rights. Which are enshrining as a normative basis for provision of sanity water and other water-related human rights evolved in international laws stipulated the state to oblige the objectives. The access to reliable and sanity water and its services are widely accepted as essential mechanism to realize a healthy productive life. In the years of 2006, 2011 and 2012 the UNDP, WHO and UNICEF respectively Prior to the UN General Assembly's formal recognition of human right to sanity water the trio considered it as a prerequisite for attainment of other human social development. In 1998 Gleick and in 2006 the UNDP attributed the lack of recognition of such rights to water to lack of political will and poor mobilization of resources compare to investment in other sectors. The United Nation General Assembly's Resolution UN (64/292), the UN Human Rights Council (2010, p. 3) called upon states to "develop appropriate tools and mechanisms to include legislation and comprehensive plans with financial strategies for the sectors to achieve the human rights obligations of sanity water and its services to include the current unsaved and underserved areas. This declaration oblige the states to acts and target sufficient quality water to public, investments and sanitation sector in the provision of quality water. The provision should be monitor and prioritized and other related human rights.

Water provision in African Sub-Saharan.

In the year 2006 WHO estimated 59% of African population in the world likely to face inadequate access to sanity water and its sanitation systems and 75% failure to achieve the Millennium Development Goal by 2015 with nearly half a billion people in the world population. The access to clean water and its sanitation in 2004 was critical especially in rural areas of Africa it is more than the previous statistics of WHO in (2006) which indicated that only 16% of people in the African sub-Saharan had access to sanity water through in door connection or tap in the yard. Water is only available in small towns with risks of contamination due to several factors. When wells are built and the facilities for water sanitation they are not properly maintain to due to limited financial resources. Water quality testing and treatment is not properly performed always and with the ignorance among the users who believe the source of the water is safe. When water is provided its quality is no longer given attention. In the year 2009 Awuah etal also reported the challenges of clean water provision in Africa which is characterized with limited sources of water to provide for the entire population. The Surface water sources are often highly polluted, and the infrastructure to pipe the clean sources to arid areas are often costly. The groundwater is the best resource to tap and provide especially for people in rural Africa, and the groundwater has a natural protection from bacterial contamination and it is reliable during droughts. The high costs are associated with the drills and the technical activities involve providing large sources enough for the population needs. The Groundwater is a safe resource when it comes to water sanity. Some contamination common in water are heavy metals, and bacteria's which may course leakage of septic systems or contamination of wells therefore require frequently monitored which may be costly it's also requires technical abilities that may not be present in rural areas. In 2006 Metwally etal, VanRooijen etal 2009 observed the consequence of contaminated water which may result to dehydration, malnutrition, diarrheal illnesses and cholera which could be prevented with clean water and good hygiene. The rampant spread of cholera is attributed to wet season.

The Women and young girls play the major role in search for water for use which often prevented them from income work or school and spent their day searching for water for daily uses in the process face great risk and threats of violence due to great distance and in security. Urban areas face different challenges in access to clean water and sanitation due to rapid growth of urban areas, especially in African sub-Sahara which has the large volumes of water extracted from the sources but could not be properly manage due to pollution of the natural water bodies. It is also compounded with the influx of population to urban centers in addition to waste water used in irrigation, irregular water supply, and the concerns for aquatic life. The urban slums and overcrowding make it difficult to control its sanitation and disease outbreaks due to exposure to raw sewage. In 2007 Fotso et al reported that the underprivileged populations in urban areas pay exorbitant amounts for water and often not suitable for consumption and those living in wealthy urban areas are heavily subsidized the wealthy pay less for clean sanitary water.

The Provision of water in Nigeria.

It is the responsibility which was shared between the three levels of government in Nigeria i.e. Federal Government, State Government and Local government. The federal government is in charge of water resources management the State governments are responsible for urban areas and Local governments are to provide for the communities and rural areas. The Water supply service and the cost for recovery are very low, water tariffs and the water users do not pay their bills regularly. The Service providers rely mostly on occasional subsidies to cover their operating costs.

In 2015, WASH reported that 67% of the total population had access to basic water supply which was against 82% of the urban population and 54% of the rural population. In 2015, the population of 60 million people lacked access to "at least basic" water supply and sanitary water, only 33% of the population had access to basic sanitation. This accounts for only 39% of the urban population and 27% of the rural population. In 2017 WHO, UNICEF approximate 122 million people lacked water access and basic sanitation. In urban areas, access to standpipes to access water in adequate the available sanitation is typically in the form of septic tanks without central sewerage system, except in Abuja and some part of Lagos. In Nigeria Abuja the capital receives its drinking water from the lower Usuma dam which has the capacity to treat surface water from the dam's reservoir; it was in the process to increase its supply in 2012 to cater for the growing population. In 2012 also the Guarara dam, was under construction and it is expected to increase water supply to mitigate the risk of drought. The capacity of the Wastewater is 131,200 cubic meters per day and the plant at Wupa. It was also reported by USAID in 2007 that only 1% of Lagos households were connected to sewers. In the work of Gandy in 2006 Lagos has only four water waste treatment plants rehabilitated in the year 2010. In 2011 the state planned to build ten new "mega water treatment wastewater plants in five years with the help of water Corporation investors in Lagos has not been completed. There is no single sector monitoring the statistics on access to water which lead to conflicting statistics has a result of divergent definitions, indicators and methodologies applied by different agencies. The study carried out in 2006 by Gandy estimated only 1% of Lagos households were connected to sewers. The Amnesty International in September 2006 also reported that the Shell oil company and the Government of Rivers State, in the southern Nigeria are not pro active in provision of clean water in Areas. In Ogale, in Niger Delta the right to clean has long been violated. The residents are forced to buy water at exorbitant price due to the company's activities and state government neglect. One of the Nigerian largest city Lagos which is surrounded by sea water and lagoon its clean water provision is 81.32% but since lagoon water is polluted it channeled its supply from River Ogun and River Owo. The city's oldest water treatment plant was built since 1910, located at Iju River the plant was expanded to the capacity of 45m gallons per day. In Nigeria Abuja the capital receives its drinking water from the lower Usuma dam which has the capacity to treat surface water from the dam's reservoir; it was in the process to increase its supply in 2012 to cater for the growing

population. In 2012 also the Guarara dam, was under construction and it is expected to increase water supply to mitigate the risk of drought. The capacity of the Wastewater is 131,200 cubic meters per day and the plant at Wupa was completed in 2007. The Federal Capital Territory and the Abuja Environmental Protection Board, has contracted private operator to run the plant. Another smaller plant was built at Ishashi on the Owo River in 1970 and the biggest plant was commissioned in 1991 in Adiyon with the capacity of 70m gallons per day. It also channeled its supply from River Owo. There are seven mini-waterworks channeled from local sources with the combined capacity of 18m gallons per day. The Lagos Water Corporation also produced a plant meets with the standards supplies of sufficient and regular clean water quantity to over 12.5 million people in Lagos. The water supplied is often contaminated in the process of distribution and people distrust tap water quality. The Electricity supply interrupts the treatment plants frequently from operation although in 2012 12.15 MW power plants were under construction to supply power to Adiyon, Iju and Akute water treatment plants. In the year 2012 Stimson Global Health Security observed that Households rely on numerous private source of water such as shallow wells Or Street vendors, which create a thriving market for "sachet water" or purified water packaged in polyethylene pouches. In year 2012 also Vanguard reported that the Water vendors are popularly called *Mairuwa* who sells water from tanks and drums or on carts, some sell water to other vendors who carry buckets or jerry cans. The research of Kunniyi in the year 2014 observed that the supply of water by the state Water Corporation is 'metropocentric' i.e., centered on the metropolis while the rural areas lack access to sanity water. In the year 2012 PBS reported that 25-30% of the population in [Makurdi](#), Benue State, are under served with water and its inhabitants fetch raw water in buckets from the polluted River Benue. The plan to construct water treatment plant in 2008 was uncompleted and due to corrupt practices the officials could not account for the USD 6 million spent. According to Nat Apir, involving an independent water consultant in water provision, lack the modern distribution network which always leads to pipes burst and under utilizing the plant capacity. In Kano the supply of water is from the local rivers and the groundwater which is over-exploited. The Public water supply is deficient; to the extent the private water selling points are multiplies to generate profits for the private operators (Abubakar, 2012). The Kaduna state receives its drinking water from the River Kaduna. Ibadan receives its drinking water supply from Eleyele dam.

Water borne diseases

In the year 1973 Lucas and Gilles observed that Water borne diseases are one of the major causes of illness and deaths in developing countries. The global spatial distribution show that Africa and Asia account for a large percentage of water borne diseases, such as cholera, typhoid fever, paratyphoid, bacillary dysentery, amoebic dysentery, gastro-enteritis, and infective hepatitis. In the year 2005 USAID reported that water borne disease account for Children mortality of children of less than five years and 15-18% of such mortality is attributed to diarrhea, adults are not spared from the scourge of the same diseases. Generally, water-borne diseases are easily transmitted through the ingestion of water and food that are contaminated by faecal materials that carry infective dose of various pathogens. Some of these diseases that are acquired through the gastro-intestinal tract occur in epidemic form. The diseases tend to affect people who share common source of water supply in a wide area. The prevalence of these diseases is linked to the dearth of potable water in most parts of the developing countries. The diarrheal diseases are caused by contaminated water with inadequate sanitation or poor hygiene in human population. The availability of potable water in most developing countries is inadequate to meet the demand of the rapid growth of population. The population resulted to source water from questionable water points. The dry season coincides with dry public taps the urban dwellers utilize water collected from alternative sources such as boreholes, wells and streams for domestic uses. In the year 1994 Lyon reported that in Ibadan metropolis in Nigeria statistics shows that the inhabitants suffer from diarrhea, gastro-enteritis, malaria, measles,

tuberculosis, cholera and typhoid fever. In the early 1980s, Alagiah indicated that 500 million related diseases are of water borne diseases and 30,000 people die daily, half of these deaths are of infants and 50% of the of hospital beds are occupied by patient of these diseases. In the developing countries, 80% of human ill-ness is attributed to water contamination. In 1980 Lamka et al stressed the effort of the researchers to investigate the quality of water samples which was drawn from private wells and Oregun springs in Lagos the result shows that *Escherichia coli*, *Citrobacter freundii* and *Klebsilla pneumoniae* are frequently found from most of water samples tested and *Staphylococcus aureus* and *Aeromonas hydrophila* were isolated from total plate counts. Similarly, in 1996 Fagede and Osho conducted a research and identified *E. coli*, *Klebsilla aerogenes*, *K. edwardsii*, *K. rhhonsleromatic*, *K. stlantae*, *Entrobacter spp* and *Citrobacter spp*. Present in the collected samples from wells of Ago-lwoye town in Nigeria. All these isolated bacteria are indicators that water from these various sources are contaminated and therefore unfit for human consumption. In 19192 Swerdlow stressed on the observations made by Snow in 1894 of environmental factor causes water contamination which resulted water borne diseases such as diarrheal disease and or lack of personal hygiene. The diseases are in relation to the water quality and other factors that could assist in the apparent nature of these diseases spread in most cities in Nigeria. One major challenge is the inability for both rural and urban Africans to access a clean water supply.

Study locale.

The research was conducted in Ibrahim Badamasi Babangida University Lapai, Niger State. The University has seven Faculties of Natural Sciences and Social Sciences with the total population of fourteen thousands student.

Study Design. The study adopted interview technique and laboratory water analysis of the motorized bore-hole water supply in the University. In-depth interview technique with structured questions was administered on the Director personal and planning on the provision, treatment and distribution of potable water in the university community. The sample of bore hole water labeled A, B, and C from the under Ground water, the water from Tank and the Tap water respectively. The 3 samples were carefully fetch as early as possible in the morning and subjected to Test in Lower Usman Dam laboratory in Abuja. The samples for analysis must reach the laboratory within 24 hours of the day. The result obtained was interpreted by the laboratory specialist in the Dam. The domestic house hold water users and water user in the University were interview on the quality of the water .and the result was carefully analyzed

Theoretical frame work

The research adopted Behavioral construct 23 of Health Believe Model 23 with assumptions that an individual's motivation to taken actions results from their perceived susceptibility to severity of problem and perceptions outcome expectations. Modifying factors, such as internal and external cues to actions for example, mass media and individual confidence in ability to take action (self efficacy) further influence the likelihood of behavior exchange 14, 24, 25...

These construct can help us understand human behavior and in turn to address complex health issues such individual under saved with in sufficient quality water, and the need for water for survival and the alternative source of water in the mist of perceived threats of contracting water borne disease individual cues to actions the alternative source water for use which health implication

Data presentation and analysis

s/no	Parameters	SAMPLE (A) UNDER GROUND WATER	SAMPLE (B) WATER FROM THE TANK	SAMPLE (C) WATER FROM THE TAP
1	PH	7.0	4.0	6.9
2	TEMPERATURE	26	26	27
3	TURBIDITY (NTU)	8.36	4.23	2.87
4	CHLORIDE ION	8.52	15.62	12.78
5	TOTAL HARDNESS	58	56	44
6	TOTAL ALKALINITY		22	
7	PHOSPHATE	0.15		0.23
8	SULPHATE	3		2
9	IRON	0.22		0.03
10	CONDUCTIVITY	69.3	41.6	40.7
11	COLOUR	BR	BR	BR
12	BACTERIOLOGY			
(A)	MPN	>16.0		>16.0
(B)	E.COLI	+ve		
(C)	OTHER COLIFORMS	+ve		

NOTE

BR=Below ran
 +v=positive

Interpretation of results (June 2021)

- (1) All the physio-chemical parameters analyzed in the bore-hole water (A) were within the WHO guideline and Nigerian standard for drinking water quality except turbidity (8.36 NTU). The bacteriological analysis showed coliform contamination. The water is therefore not safe for human consumption.
- (2) All the physio-chemical parameters analyzed in the tank water (B) were within the WHO guideline and NSDWQ except PH (4.5) and iron (0.64mg/l) and the bacteriological analysis also indicates coliform contamination.
 Therefore the water is unfit for human consumption.
- (3) All the physio-chemical parameters analyzed in the tap water C where within the WHO guideline and NSDWQ but the bacteriological analysis showed coliform contamination. The water is therefore unsafe for human consumption.

Recommendations;

Regular treatment and flushing of the water drill from the ground for uses and consumption

Findings

The findings reveals that the sample of water collected from the bore hole underground water, water from the tank and the water from the tap are all laboratory tested and found unfit for human consumption. The study also revealed that the drilled Boreholes are the major source of water in the school and domestic consumption and other uses. The drilled bore hole in use has not been adequately maintained to provide quality water despite the natural quality of the water drilled from bore holes its gets contaminated due to some environmental factors such as surface ground running water after rain. The school water has no apparatus in place for water sanitation before uses. The management of the school has planned to channel water from the Dam to meet up with the users demand. There is also some linked between students in the campus, common ailment such as typhoid fever, malaria, dyhreria and other water related disease with the water in

uses. E students and the water users the school resulted to alternative source of water such as water sachets 'called (pure water) and bottled table water for consumption.

Conclusion and recommendations

The provision and supply of portable water in Ibrahim Badamasi Babangida University on the Preparation stage, Lapai town have no standard functional water board for alternative water supply. The university there fore needs to take more adequate measure to meet the ever increasing population of the school community. The study suggested the following, Provision of independent water treatment plan for only the school and its community for provision of adequate portable and quality water. There should be adequately flush treatment of the auxiliary borehole in the school in accordance with the required standard and maintenance practice. .With the resent accreditation of additional courses by National University Commission of Nigeria the University should give emphasis to provision of portable drinking water.

Reference

- ABDULMUTALIB ABUBAKAR A.(8 December 2009) Nigeria; *In Kano, Water, Water Every were “*. *allAfrican.com*. Retrieved 12 April 2012.
- Alagiah .D. R (1982) *The International Drinking Water Supply and Sanitation Decade (IDWSSA)* Harare, Zimbabwe.
- Armar- Khemesu M. Thematic paper 4 ; Urban agriculture & Food Security , Nutrition and health. In Bakker N, Dubbeling M, Guendol S. Sabel Koshella U, de Zeeuw 4 .editors *Growing food; Urban agriculture on the policy agenda ; A reader on Urban agriculture ; Feldafing DSE; 2000 pp99- 117.*
- Awuah E. Nyko KB, Owuso PA& Osei- Bonsu, K (2009) *Small town water quality Desalination , 2848*
- Beyond scarcity; Power, Poverty and global water crisis.* New York; United Nations Development Programme; 2006.
- COMMUNITY IN NIGERIA DRINKING POLLUTED WATER” Amnesty International.* Retrieved 27 September 2018.
- Fagade , O E and Osho, A.(1996) Preliminary Studies Into the micro biology quality of well water Samples In Ago – Iwoye Using the coli form group of organism. *Journal of Pure and Applied Sciences ,5156.* Fotso J., Ezeh, A.C. Madise,N;J.and Ciera, J. (2007) Progress toward the child Mortality Millenium development goal in urban Sub Sahara Africa ; they dynamics of population growth, Immunization and access to clean water .*BMC Public Health 7.218* Fotso J., Ezeh, A.C. Madise,N;J.and Ciera, J. (2007) Progress toward the child Mortality Millenium development goal in urban Sub Sahara Africa ; they dynamics of population growth, Immunization and access to clean water .*BMC Public Health 7.218*
- Fotso J., Ezeh, A.C. Madise,N;J.and Ciera, J. (2007) Progress toward the child Mortality Millenium development goal in urban Sub Sahara Africa ; they dynamics of population growth, Immunization and access to clean water .*BMC Public Health 7.218*
- Gleik PH. The human right to water .*Water Policy.* 1998; 487-503.doi;10. 1016/S1366-7017(99)00008-2.
- Iyaun, B.F.(1982) *The International Drinking Water Supply and Sanitation Decade (IDWSSA)* Harare, Zimbabwe.
- Kunnuji, Miceal O. N. (2014). Spatial variations in access to improved Sanitation and water in Lagos State. *Journal of water Sanitation and Hygiene for Development, 4 (4), 612-619.*

- Kurian M, McCarney P, editors Peri-urban water and sanitation services; Policy, planning and metod , New York; Springer;2010.
- Lamka, K.G. Lecevallier, M.W. and Seidler ,R.J. (1980) Bacteria contamination of drinking water supplies in a modern rural neighborhood. *Journal of Applied and Environment Microbiology* 39,734-738
- Lucas, A.C.and Gilles, H.M.(1973) *A Short Textbook of Preventive Medicine for the Tropics*. Hodder and Stoughton, London. Sedney.Auckland.Toronto.
- Lagos Water Corporation. 'Lagos woos investors in water' Retrieved 12 April 2012.
- Lagos Water Corporation. "Organization History". Retrieved 12 April 2012.
- Lagos State Water Corporation. "Welcome to the Official Website of the LSWC""Lagos Wastewater Management Office". Retrieved 12 April 2012.
- Matthew Gandy:Water, Sanitation, and the Modern City: Colonial and post-colonial experiences in Lagos and Mumbai, , Human Development Report Office Occasional Paper, 2006
- Metwally, A.M., Ibrahim, N.A., Saad, A., & Abu El-Ela, M.H. (2006). Improving the roles of rural women in health and environmental issues. *International Journal of Environmental Health Research*, 16(2), 133-144.
- Meier, B. M., Kayser, G., Amjad, U., & Bartram, J. (2012). Implementing an evolving human right through water and sanitation policy. Available at SSRN: <http://ssrn.com/abstract=2015424>.
- "Nigeria". WASHWatch. Retrieved 21 March 2017
- OOSKAnews: Abuja Faces Wastewater Challenge After Treatment Plant Contractor Walks Off, 19 October 2012
- PBS / Pulitzer Center on Crisis Reporting (15 March 2012). "What's Causing Water Shortages in Ghana, Nigeria?". pp. Minutes 1–4 of the video. Retrieved 1 August 2012
- Snow, N. D. (1894) The pathology and mode of communication of Cholera. *London Medical Gazette* 9,745–753.
- Swerdlow, D.S. (1992) Water-borne transmission of epidemic cholera in Trujillo, Peru: lessons for a continent at risk. *Lancet* 340, 28-33.
- United Nations (UN) (2010a). Human rights obligations related to access to safe drinking water and sanitation. Note by the secretary-general. A/65/254. New York: United Nations.
- United Nations (UN) (2010b). Resolution adopted by the general assembly. 64/292. The human right to water and sanitation. A/RES/64/292. New York: United Nations.
- United Nations Development Programme (UNDP) Human development report. 2006. Beyond scarcity: Power, poverty and the global water crisis. New York: United Nations Development Programme; 2006.
- USAID: Nigeria Water and Sanitation Profile, ca. 2007
- USAID (2005) *USAID Health: Environmental Health, Overview*. Available at www.usaid.gov/oe_work/goal_health/eh.
- Vanguard. "Lagos: Water everywhere but none to drink". pp. 3 April 2012. Retrieved 12 April 2012.
- Van Rooijen, D.J., Biggs, T.W., Smout, I., & Drechsel, P. (2009). Urban growth, wastewater production and use in irrigated agriculture: a comparative study of Accra, Addis Ababa and Hyderabad. *Irrigation Drainage Systems*, 24, 53-64

- World Bank/Federal Republic of Nigeria: Water Supply & Sanitation Interim Strategy Note, November 2000, retrieved on April 11, 2012
- World Bank/Federal Republic of Nigeria: Water Supply & Sanitation Interim Strategy Note, November 2000, retrieved on April 11, 2012
- World Health Organization. (2006). Meeting the MDG drinking water and sanitation target: the urban and rural challenge of the decade. Retrieved from http://www.who.int/water_sanitation_health/monitoring/jmpfinal.pdf
- World Health Organisation (WHO) and United Nation Children's Fund (UNICEF) Progress on sanitation and drinking-water. 2013 update. New York: WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation; 2013.
- Zeeza A, Tasciotti L. Urban agriculture, poverty, and food security; Empirical evidence from a sample of developing countries. Food Policy, Available at '2010;35:265-273. Doi:10.1016/j.foodpol.2010.04.007