

# Towards improving rural water supply and sanitation coverage in Caprivi, North-east Namibia

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## Abstract

Improving access to clean drinking water has been a major development goal of the Government of Namibia since independence. In particular, efforts were made to ensure that access to clean water for women and children who carry the responsibility of household maintenance and water provision in homesteads is improved. Women and children constitute a major part of the rural population and have traditionally relied on open water sources. By improving the supply of clean quality water, health risks can be reduced. This paper examines the progress done by the Government of Namibia in improving access to rural water supply through a case study of Caprivi region. A mixed methods approach is used. The results show that major improvements in rural water supply have been made, however this has not resulted in reduction of waterborne diseases.

## Introduction

The provision of safe drinking water contributes significantly to the reduction of waterborne diseases and to improving living conditions of people. Surface water however abundant, can be a major carrier of diseases such as bilharzia. Access to clean water is also important for women and children who shoulder the responsibility of household maintenance and provision of water in homesteads. Stagnant water bodies can be contaminated with chemicals or human and animal excreta. By improving the supply of clean quality water, health risks can be reduced. Caprivi region, the study area, is surrounded by four rivers namely Zambezi in the north, Chobe in the east, Linyati in the south and Kwando-Mashi in the west. In this part of the Namibia, gastroenteritis accounts for 26% of all deaths among children under 5 years and 19% of those older than 5 years (el Obeid et al. undated, 90). Bacterial diseases are the third major cause of death in Caprivi, following malaria and AIDS. The first cases of bilharzia were reported in 1967 (Geldenhuys et al., 1967) and have further been reported to affect 11% of Namibia's population (el Obeid, n.d). Nationally, rates of infections differ but are highest (up to 80%) in the far north and north-eastern parts of the country among people who reside close to perennial rivers of Kavango, Zambezi, Chobe and Mashi-Kwando watercourses. Presumably, these rivers are also their major source of water and fish. Bilharzia, like other waterborne diseases can be prevented through the provision of quality clean water and adopting appropriate hygienic practices. A 2000 survey of school children in Caprivi indicated that 3% had urinary and 19% had intestinal bilharzia. Against this background, this paper presents an account of

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efforts by the Namibian government to increase clean water supply coverage to rural communities who traditionally relied on surface water sources (dams and canals) as well as on rivers, swamps and on hand-dug water wells.

### **The Problem of Access to Water and Sanitation**

The American Environmental Protection Agency (EPA) defines sanitation as “the control of physical factors in the human environment that could harm development, health, or survival” (EPA, 2007). Similarly, sanitation can be defined as maintaining clean, hygienic conditions that help prevent disease through services such as garbage collection and appropriate wastewater disposal. As such, access to sanitation, can be construed as a development indicator that refers to the percentage of the population with adequate excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Suitable facilities range from simple but protected pit latrines to flush toilets with sewerage. To be effective, all facilities must be correctly constructed and maintained taking cognizant of the local environment. In other words, sanitation implies controlling possible factors in the environment that have the potential to threaten the health and well-being of people. Sanitation is therefore about promoting people’s health – it is about protecting individuals and groups of people from diseases or illnesses whether they are water-borne or not.

Based on the above, we can argue that sanitation and hygiene are related terms also influenced by the availability of water. Historically, improvements in hygiene led to reductions in water and food-borne diseases (Parker and Wilson, 2000). For this reason, among others, sanitation is part of the UN Millennium Declaration that set clear, time-bound goals for making real progress on the most pressing development issues faced by many people in several nations especially in developing countries. Among these is Millennium Development Goal (MDG) 7 that deals with ensuring environmental sustainability. Target 10 of MDG 7 aims to halve the proportion of people without sustainable access to safe drinking water in rural and urban areas and halve the proportion of people without sustainable access to basic sanitation by 2015. The proportion of the population with sustainable access to an improved water source and the proportion of the population with access to improved sanitation in urban and rural areas is the measure or indicator of progress towards the attainment of this goal (Vlugman, 2006). Evidently, MDG 7 reflects the fact that about 1.1 billion people worldwide still lack safe water and 2.6 billion people have no basic sanitation facilities (UNICEF, 2005). Despite this realization, lack of safe water, sanitation and hygiene awareness remains one of the world’s most urgent health issues (UNICEF/WHO, 2005). Consequently, each year more than 2.2 million persons in developing countries die from diseases attributed to lack of access to safe drinking water, inadequate sanitation and poor hygiene (Vlugman, 2006). The social, health and environmental costs of ignoring the need to address sanitation (including hygiene, wastewater collection and treatment) have been studied (Vlugman, 2006) concluding that of the 10.2 million child deaths each year 20% are due to diarrhea diseases. Over 90% of these diseases occur in developing countries among those under five years of age. 88% of the burden of diseases due to diarrhea is due to unsafe drinking water, inadequate sanitation and poor hygiene. Some researchers have argued that improvements in sanitation have been shown consistently to result in better health, as measured by less diarrhea, reductions in parasitic infections, increased child growth, and lower morbidity and mortality (Haffejee, Chopra and Sanders, 2007). Thus, when access to safe drinking water is increased, it is expected that reductions in mortality can be substantial, particularly in areas with low levels of education. Modest improvements in sanitation, such as pit latrines, will result in better health, but major improvements in sanitation such as flush toilets; will result in even larger health benefits (Mufune and

Matengu, 2009). While at a more sophisticated level, hygienic means of preventing human contact with waste may include engineering techniques such as sewerage and wastewater treatment, at community level simple practices and procedures such as pit latrines, septic tanks and personal hygiene measures like washing hands may be satisfactory to prevent communicable diseases. The latter are more appropriate and affordable in rural settings. Personal hygiene procedures such as washing hands are important because germs can stay alive on hands for up to three hours and in that time they can be spread to all the things people touch including food and other people (Foodlink, 2007).

While it is well known that the provision of safe quality water might result in good hygiene and cleanliness practices, there is reason to believe that provision of water does not result in good sanitation coverage in rural areas. Moreover, lack of access to safe drinking water is afflicting many in the world. Worldwide, according to Vlugman (2006), in 2002 about 1.2 billion people were using water from unimproved sources. The lowest drinking water coverage was in sub-Saharan Africa. Similarly, only 58% of the people in the world have access to improved sanitary facilities. Sanitation levels in Africa lag behind the rest of the world. According to UNICEF/WHO 2005 report entitled, “*Water for Life.*” Sub-Saharan Africa is the only region that is likely to miss Millennium Development Goal (MDG) targets on both safe water and basic sanitation, unless the world acts quickly to turn this around. It is therefore important to turn this examination on what Namibia has done to meet this goal.

One of the objectives identified by Namibia’s vision 2030 is “to achieve equitable access to potable water and freshwater resources by all” (GRN, 2004). Namibia defines “**Safe drinking water**” as water that is supplied from a pipe, borehole or closed tank that is treated and its chemical and biological properties are within the limits set in the water quality standards and guidelines. Namibia focuses on increasing access to water for all sectors of the Namibian population and especially for the rural communities. With a decision to reform the Water Sector soon after independence, access to clean water increased from 79.9 per cent in the 1990s to an estimated 90.9 per cent during the second National Development Plan period for the rural communities as a result of establishing 1,407 new water points. It currently stands at 95% (2012 estimate). Access to clean and safe water was maintained at a level of 98.4 per cent for the urban population. However, it should be noted that this information is drawn from data from the Ministry of Agriculture Water and Forestry and only relate to access to drinking water in rural and urban areas but not specifically on the quality of that water. The 2006 DHS preliminary figures are different in that they measure the proportion of the population with sustainable access to safe water (defined as improved source) in urban areas, which is equal to 97.0% while in rural areas 80.4% of the population has sustainable access to safe water (GRN, 2006).

## **Methodology**

Information on rural water supplied presented and discussed in this article was sourced from official national documents, including water sector papers and progress reports of the Ministry of Agriculture, Water and Forestry. Interviews were held with senior officials in Windhoek (3) and the regional office staff both from rural water supply extension and from the maintenance services (6) as well as the Caprivi Regional Council (2). In addition, the study involved field visits to various water points and villages to observe practices and to obtain first-hand accounts from people’s own experience of different technologies and the institutional structures used in providing rural water services. The analysis is limited to water supply programs from 1993, when the first Rural Water Supply and Sanitation Sector policy was adopted to 2003, when community-based water management paradigm got

its believers in government. In some cases, the study uses data extracted from the 2009 baseline survey, which was led by the author.

### **The Study Area**

The Caprivi region, which has an area of approximately 19000km<sup>2</sup>, is the panhandle arm in the northeastern part of Namibia bordering Angola, Zambia, Zimbabwe and Botswana. It is characterised by perennial rivers with tributaries meandering into higher grounds. It has a large lake, the Liambezi, well known for its fish exports in the 1970s. During the month of February through April, the Zambezi River overflows when it reaches the 3.9m mark and almost every year results in floods displacing several thousands of the residents in the eastern part of the region. Many villages and schools are usually surrounded by flood waters, and the bush being the only form of toilet, it has been observed that many take dug-out trips to excrete in the rivers. Due to their perennial nature, Caprivi's rivers also form an important water resource throughout the year. They are not only a source for drinking water to humans and livestock but also serve as a source of food in the form of fish, water lilies and tubers. This also means that animals and humans share the same water sources. At the same time, Caprivi is also prone to droughts; the major ones were experienced in 1992 (Næraa et al., 1993) and in 2004 although every year some form of drought relief food aid is distributed by the government through the Disaster and Emergency Management Unit in the Office of the Prime Minister. During the annual dry spells, local residents walk long distances access drinking water and many farmers move their livestock to the floodplains where water and grazing is abundant. These water bodies provide permanent and regular access to fish and income to a great number of people residing along these rivers. However, this form of water supply, as it is known, is not always safe for human consumption and does not fit-for purpose in terms of the WHO standards and national requirements.

### **Population of Caprivi**

Caprivi is inhabited by *Bantu*-speaking communities namely the Masubiya, Mafwe, Mayeyi, Matotela, Mambalangwe, Mambukushu and Malozi, who practice subsistence crop farming and livestock husbandry. Inter-marriages are not uncommon. In the western parts of the region, Khoisan speakers, namely the Khwe can be found in Bwabwata National Park. Together, they make the total population of Caprivi to be approximately 91,000 (GRN, 2012a) a figure that some have interpreted to mean a negative growth when compared to 90422 people reported in the 1991 National Housing and Population Census (Harring and Odendaal, 2012). A closer examination however shows that there is no contradiction because the region's boundaries changed after the 1992 regional and 1998 constituency delimitation commissions, which meant that more than 20,000 inhabitants now became part of former western Caprivi and this population is now counted under the Kavango region. To be precise, in 1992, Caprivi had a total population of 71,027 (Næraa, Devereux, Frayne and Harnett, 1992, 35). HIV and AIDS, malaria and gastroenteritis are the major causes of death in the region. The prevalence rate of HIV was estimated at 43% among women who attended antenatal clinic in 2002 Sentinel Survey. This fell to 31.7% in the 2008 Sentinel Survey but has since risen to 37% in 2012 (GRN, 2012). Part of the reason has to do with the fact that the region borders several countries that are also heavily infected. The Trans-Caprivi highway connecting it to these countries has increased mobility among various nationals and thereby promoting sex work and related activities. These difficult circumstances make the case for appropriate sanitation and access to safe and sufficient drinking water, which if inadequate can exacerbate already bad living conditions particularly for those being treated for chronic sicknesses. It is against this background

that the Government of Namibia developed a Rural Water Supply and Sanitation Sector Coordination strategy in 1993 to increase coverage of sanitation and water supply in rural areas.

### **Rural water supply and sanitation technologies**

In an effort to increase the population's access to safe drinking water to within walking distance, the Government of Namibia through its Directorate of Water Supply and Sanitation Coordination (DWSSC) in the Ministry of Agriculture, Water and Forestry has made significant progress. With assistance from its development partners water infrastructure and rehabilitation of old ones with appropriate technologies has seen major investments. The objective of the strategy was to create an organization which can help all rural communities to develop a reliable and accessible source of safe drinking water on a sustainable and affordable basis (Mosimane, 2005). It was intended that the provision of rural water infrastructure to enable the supply of safe water to communities in rural communal areas of the country would remain the primary responsibility of government but that the strategy would also find mechanisms of empowering communities to own and exercise greater control over the operations and maintenance, as well as overall management of the rural water supply system in their areas. Overall, the objectives of the DWSSC are:

- Contribute towards improved public health
- Reduce the burden of collecting water
- Promote community based social development taking especially into account the role of women
- Support basic needs and,
- Stimulate economic development

In the years following independence, approximately 65% the rural population had access to clean water (MAWRD, 2005). In Caprivi, the number of people with access to safe water was estimated to be around 63%. Although the exact coverage of working water points proportionate to the population of Caprivi is not known, Mendelsohn, Jarvis, Roberts and Robertson (2002, 185) estimates that 20 – 60% of households in Caprivi have access to clean water. According to the 2001 National Population and Housing Census (GRN, 2003), this figure increased to 86% and most of the water points were within walking distance.

Effort was also made to ensure appropriate technologies were installed. In other words, installations that had high amounts of discharge volume could be upgraded from a hand pump to a diesel engine. Where the discharge was considered inadequate such WPs were not upgraded because they could lead to a situation where the borehole runs dry. Communities also reported that they normally requested for upgrading to different technologies and that they are accordingly advised with respect to the suitability of a technology.

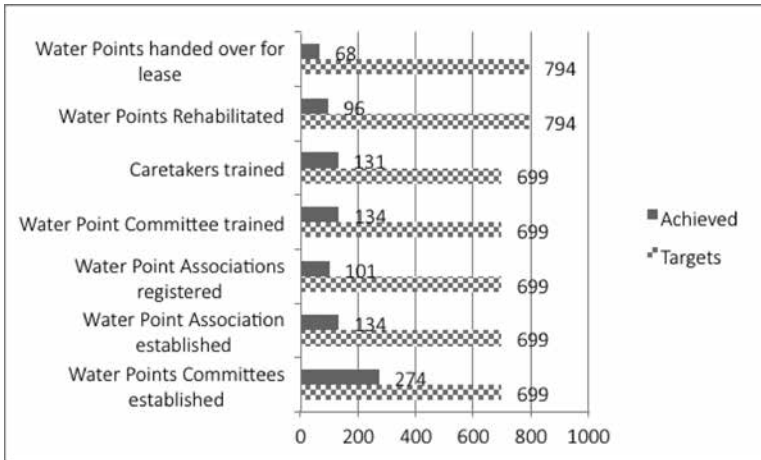


Fig.1: Expected and achieved management tasks in Caprivi 1993 – 2003

As shown in Fig.1, less than a third of each activity was achieved in Caprivi. It is possible that more resources and effort were dedicated to the drilling of new boreholes and dams as shown in Fig.2 below. In reality, the number of water points in the region was actually higher because several donor-funded projects were ongoing, which increased the coverage substantially. This included UNICEF’s latrines’ for hand pumps as well as US\$15,5million Northern Regions Livestock Development Project (NOLIDEP) which required beneficiaries (farmers) to contribute up to 30% of the infrastructure costs.

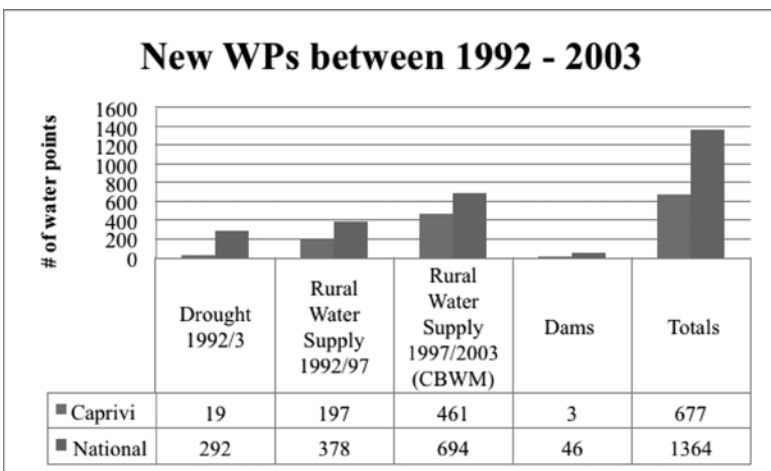


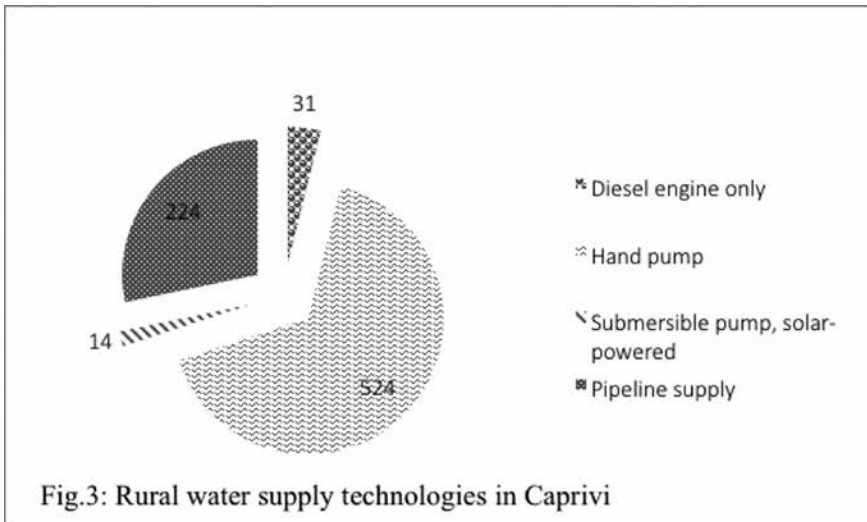
Fig.2: New drilled boreholes during 1992 - 2003 in Caprivi

By 2009, the total number of water points in Caprivi was 864 (Rudi du Plessis, Regional Head of Rural Water Supply, Personal communication). The condition of these water points was investigated in the general census as well as by an engineer in 2009. The census established that 73.1% of the water points were functioning (Matengu, van Rooy and Mosimane, 2009). The term “functioning” meant that water come out from the source

when turned on or pumped. Whereas 61% of the water points were in good condition and 24% were found to be in satisfactory condition, 14% of these had leaks and in bad state. Of the 815 water points visited, only 19% could be described as in excellent technical condition. From a technical point of view, 39% were in good condition, 27% satisfactory and 13% in appalling condition. Overall, even though the water points were in good working condition, the general condition for most water points was deplorable; the fencing and protection structures hardly existed and swamps of wasted water could be seen resulting from overflows.

### **Rural water technologies**

There are three types of water supply 'schemes' in Caprivi, which are the Katima-Kongola pipeline, dams and stand-alone micro systems. The stand-alone micro system comprises those points of water sources equipped with hand pumps, diesel-powered engines and electric submersible pumps powered with solar panels. As Fig.3 below indicates, hand-pumps and pipelines account for the majority of water points in Caprivi region – this is more than half of the total number of hand-pumps in the country (931).



There are also stand-alone tanks supplied by the directorate of rural water supply in communities where hand-pumps don't work or where boreholes have dried up. During field visits, it was found that in these same communities, more than 15 boreholes were drilled and sealed for which according to the communities we spoke, no explanations were given concerning why installations had not taken place. According to local DWSSC officials, situations like this may exist on account of lack of consensus between the community and the DWSSC regarding the choice of technology type to be used or it might purely be that water was found to be unfit for human consumption. Whatever the case, it appeared that communities were disillusioned and it is imperative that they are properly informed.

## **Multiple Water Usage**

Rural water infrastructures in Caprivi serve both human and livestock; in most cases the water source is shared. The number of users differs per water point and varies significantly by season. A survey (Matengu, van Rooy, and Mosimane, 2009) indicated that on average a single water point will serve between 189 to 210 people. This could fluctuate from a minimum of 4 people to a maximum of 500. As expected, at all water points visited, communities used water for washing clothes (26.5%), cooking food (27%), drinking (27.4%), for livestock (8.3%) and for gardening (10.8%). Tending small vegetable gardens and nurseries was more prevalent at hand pumps. Why? Costs for diesel and the slow pace for solar to fill the tanks were some of the restrictions for growing vegetables at other infrastructure. The biggest gardens were observed in villages where the population was also small, generally under 100 residents. Very few gardens were observed at solar and diesel-engine-powered water points. These water points generally supplied large communities and water conflicts were prevalent. In some areas, particularly in the Linyanti and Katima Rural constituencies, some community members there were observed fetching water from swamps and ponds along the road. These same swamps were shared with elephants and cattle. In the whole region, approximately 20% of water points were used by both humans and their livestock, which often meant that large water ponds had formed and animal excreta exacerbated the chances of diarrhea resulting from salmonella.

With regard to livestock, the study found that a single WP can serve between 325 to 680 livestock daily. That is a minimum of 10 and a maximum of 6500 livestock. These high figures for livestock are not surprising, considering that in 2007, according to data drawn from the Head Quarters of the Directorate of Veterinary Services, Caprivi region has more than 156,000 cattle and over 90,000 goats. The proximity of communities to water points was also investigated. In this study, distance to a water point was expressed in terms of time rather than kilometers. The assumption was that it would take a healthy human being 25mins to walk (to and from) 2,5km to a water point. On this basis, caretakers were requested to estimate how much time it takes for communities furthest from the water point to walk to and from the source of water. According to the results, more than 80% of the respondents can access a water point within 25minutes of walking. About seven percent of the respondents reported to walk longer distances; more than 1hr before they reach a water point. In this sense, DWSSC is doing a commendable job. In terms of constituencies however, what is concerning is the low number of people who access water points within 25 minutes in Kongola (46%) when compared to those who do so within the same time period in Kabbe (100%), Katima Rural (89.6%), Linyanti (91.7%) and Sibbinda (73.9%) constituencies. Considering that 1 out of 10 households (GRN, 2003) get their water from rivers or other surface water sources, it is clear that poor access to good quality water in Kongola constituency will continue to have health implications for the residents who reside there, many of who are the Khwe.

## **Sanitation Coverage in Caprivi**

Poor sanitation and lack of access to safe water negatively affects human development in Caprivi. In fact, in the study area, gastroenteritis which is attributable to poor sanitation accounts for a high number of deaths among children under five years old. Fig.4 shows that sanitation is still a major issue in the study area. Overall, more than 80% of Caprivi's population has no access to toilet facility, except the bush (and open waters during floods). In some constituencies such as Linyati and Sibbinda up to 97% of the populations there have been reported to lack access to proper sanitation (GRN, 2003). Even in the region's only town, Katima Mulilo, more than 55% of the population has no toilet facilities. Several attempts have been made to address this problem already at independence in 1990. In July



2008, the National Water Supply and Sanitation Policy, which replaced the Water Supply and Sanitation Sector Strategy of 1993 was adopted. This decision removed sanitation from the Ministry of Health and Social Services and placed it under the Ministry of Agriculture, which in turn created the Directorate of Water Supply and Sanitation Coordination under which rural water supply is based.

Area	Number of house- holds	Per cent							
		Flush toilet not shared	Flush toilet shared	VIP	Pit long drop	Bucket/ pail	Bush	Other	Not stated
Caprivi	16 839	7.4	5.9	0.3	1.9	0.5	83.4	0.1	0.4
Urban	4 748	23.7	19.2	0.6	2.3	0.4	53.1	0.2	0.4
Rural	12 091	0.9	0.7	0.2	1.8	0.6	95.3	0.1	0.3
Kabe	2 924	0.8	0.4	0.1	2.3	0.2	95.7	0.1	0.4
Katima Mulilo Rural	2 999	1.3	1.2	0.2	3.7	0.6	92.7	0.1	0.1
Katima Mulilo Urban	4 947	22.8	18.5	0.6	2.4	0.4	54.7	0.2	0.4
Kongola	851	0.8	2.0	0.4	0.6	1.2	94.1	0.4	0.6
Linyanti	3 108	0.8	0.6	0.3	0.5	0.4	97.0	0.0	0.4
Sibinda	2 010	1.0	0.2	0.2	0.3	1.0	96.8	0.0	0.3

**Fig.4 Access to sanitation facilities in Caprivi (Source: NPC, 2003)**

As shown in Fig.5, sanitation remains a big problem countrywide, with 79% of the rural population using the 'bush' as the toilet (GRN, 2002). Access to flush toilet is concentrated around commercial regions of Erongo and Khomas, which also happen to be the regions where poverty is least pronounced. Although the 2011 National Population and Housing Census data is not yet available, officials working on the report predict a slight improvement of up to 74%. The idea of combining rural water supply with provision of sanitation made sense in that if implemented could lead to improved health and quality of life, promotion of hygienic environment as well as preventing water sources from being contaminated with human and animal excreta. However, seven years after the official launch of the Sanitation policy, actual strategies are yet to be put in place to ensure implementation of the policy. Moreover, Water Supply and Sanitation Action Plans, which should quantify the strategies in terms of resources needed, usage, manpower requirements, timeframes, costs and monitoring and evaluation mechanisms, have not even been drafted.

## Discussion

The argument for combining and increasing rural water supply and sanitation has its origins in the argument often made by public health practitioners; adequate access to clean water eliminates 80% of communicable diseases. And indeed as shown in this study, access to drinking water has increased tremendously after independence to approximately 98% (2012 estimate). These government figures are based on the number of people reporting to have access to drinking water and not necessarily on the quality of that water. As such access should be reported with caution as it says very little or nothing about quality. In fact, a regional survey and a successive workshop (Matengu, 2009) reported that less than 75% of all rural water supply beneficiaries were satisfied with the quality of the water. Field teams in the survey observed that even though community members reported that the water was drinkable, they were dissatisfied with the quality because water changed color after exposure to air and often it was saline and had a silver-film when stored overnight.

At some water points brackish-orange color of water was allegedly destroying water containers through rusting. In the future, it will be important to take samples and analyze such in order to determine the concentration of solids and other chemicals and advise the community accordingly.

In regard to sanitation, why is access to appropriate sanitation still so low? In Namibia, use of traditional pit latrines is not common when compared to 'bush toilets', even in urban areas. This is probably related to the fact that population density is so low (2.2 inhabitants per km<sup>2</sup>), the third lowest in Africa after Western Sahara and Botswana. But according to the National Sanitation Strategy and the National Rural Water Supply and Sanitation policy, VIP latrines are considered an adequate form of excreta disposal provided that they are 'ecological and dry'. The private sector has responded to this with several designs including the *Otji-toilet* product, which has an added advantage of being a bioenergy source and potential manure. And, with the high costs of constructing a modern sewage system in areas without electricity, ecological toilets are an ideal option for rural areas. The disadvantage is that investment capital is very high, currently estimated to cost US\$810 per unit. In a country where poverty affects more than 27% of the population, the cost is prohibitive. And in locales like Caprivi, ecological toilets should be considered with the reality of flooding in mind. Nonetheless, this form of sanitation has obvious benefits. First, Namibia is a dry country and these toilets would save already scarce water. Second, due to the innovative design, they also provide a potential form of fertiliser (decomposed materials) to crops while effectively and safely containing human excreta from contaminating water sources (Ingle, Berdau, Kleemann and Arndt, 2012). Third, they are also equipped with hand washing facilities. Fourth, the cost though high, is a once off. Despite these benefits, ecological toilets are not yet widely adopted. Since 2009, only 384 units were sold (Ingle, Berdau, Kleemann and Arndt, 2012, 4). The essential problem to overcome about the idea of dry toilets is people's attitude. People distaste the thought of using their own excreta as fertiliser for their crops. Even among the acceptors of dry toilets, only 51% indicated that they can imagine eating crops fertilised by excreta but no household actually reported to reuse the dehydrated faecal material as fertiliser in their gardens (Ingle, Berdau, Kleemann and Arndt, 2012). Ecological dry toilets were actually discussed at a workshop (12 – 13 February 2009) organised by Lux-Development Project NAM/345 for communities and rural water supply officials to discuss and agree roles and responsibilities for sanitation in rural areas. At that workshops, which was attended by 46 participants including representatives of traditional authorities and this author, it was clear that people are uncomfortable with the option of having to deal with human waste and possibly generating income out of it (Matengu, 2009). Rural communities in the study area are also uncomfortable with the idea of sharing the same ecological toilet facility with their children. Paradoxically, participants reported that they do not have a problem with sharing toilets with their children if the disposal mechanism would be a flush toilet. Among the community, excreta is not an issue to talk about. As one participant put it, '*when you go to the bush, you tell your family that you are going to look for some firewood, you will collect some. Even if it is just one or two pieces of firewood just so that no one thinks of what you had gone to do*'. UNICEF in Namibia tried to break this by introducing what they called *water for sanitation scheme* – to make the connection between water and health or between sicknesses and poor sanitation – that is between bilharzia and contaminated water. For every VIP latrine built, a borehole or hand pump was constructed. Leaflets on hygiene and good practices were also distributed. According to baseline survey in Caprivi (Matengu, 2009), these latrines were never used and health inspectors at the Ministry of Health in Katima Mulilo reported that under their own scheme, which provided free building

materials for communities to build VIP latrines with own labor, individuals used cement and zinc materials subsidised by government to construct kiosks for themselves instead. This was reported in Kavango region as well. They simply prefer septic tanks and flush toilets as these are connected to being 'modern'. In summary, this means that although drinking water coverage has increased, people's attitudes towards sanitation have not changed.

One way to alter this attitude is through engaging schools. Teachers hold high status in this society and they can help motivate families to engage in behavior change such as washing hands, keeping drinking water clean and personal cleanliness. They can also spark interest in sanitation activities, like construction and use of family ecological toilets. Moreover, school children who learn about sanitation and hygiene at schools have the potential to develop new behavior, which they will continue in their lives as they grow up. Children who change their sanitation and hygiene behavior can act as positive role models to their families and communities. Thus, they can be a useful vehicle for behavior change that promotes good sanitation and hygiene.

## **Conclusion**

From the account in this paper, it is clear that when questions of water quality are set aside, rural water supply coverage has increased tremendously. But there is very little impact on water-borne disease resulting from poor sanitation. According to a recent study (Noden, and van de Colf, 2012) water-borne disease, especially Schistosomiasis still affects between 8 – 10% of the population of Caprivi. It was reported to affect 4% of school children in 1987 (Schutte and van de Venter, 1987) and 6 – 10% of households dependent on rivers and swamps as sources of water supply in 1967 (Geldenhuys et al., 1967). In some way, bilharzia cases seem to remain the same as it was in the 1960s and 1980s. Therefore, it should be remembered that even if water supply and sanitation would increase to 100% coverage, it does not mean that it will result in a reduction of people's contact with Schistosomiasis-infested water sources. Many communities in Caprivi actually spend a lot of time in water for several reasons. They fish using the trap technique – often water level being above the knee and just under the shoulder-height, for several hours. Many of those who live along the rivers and big swamps also swim, tend cattle and wash clothes in these rivers. Caprivi also floods every year, with significant interruptions to livelihoods and good habits. Thus, the effort to decrease or even eliminate water-borne diseases will require going beyond provision of drinking water and sanitation facilities only, to that of addressing poverty, prioritising rural development and increasing people's knowledge of communicable diseases and how they could be prevented. Moreover, rural water supply management structures at the local level should be structured to strengthen components of hygiene. For the future, in addition to a Knowledge, Attitude and Practice (KAP) study on knowledge levels and on how water-borne diseases can be prevented, the call for mapping disease risk areas for the purpose of planning and interventions is urgent. Since people consider access to flush toilets as 'modern' the appropriate rural water supply and sanitation strategy will be one that deals broadly with rural development and poverty reduction NOT sanitation in the narrow sense of it. Beyond this, the final overriding questions of cultural shifts or stagnation, and that of why people still maintain contact with contaminated water should still be explored. Is it access, affordability or is it culturally defined roles that prevent progress from being made in the arena of sanitation and hygiene? I do not have the answers and it is for other researchers to investigate.

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