

Participatory inspection and assessment of Otji-toilets in Grundorn South and Nico Noord, Hardap region

By the
E-CAP project



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Enhancing decision making for
sustainable development

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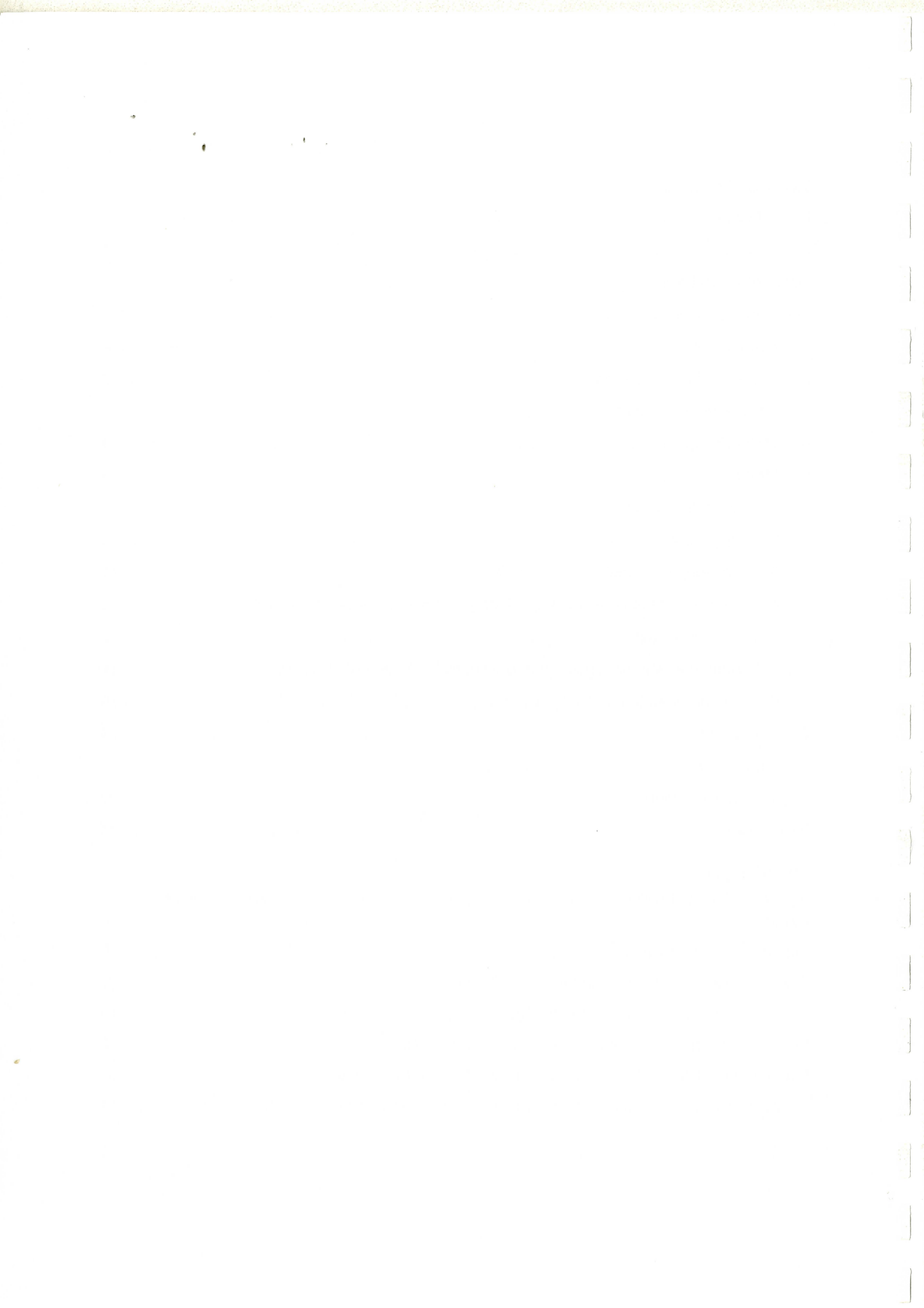


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List of Abbreviations

CoP	Code of Practice
GPS	Global Positioning System
DRFN	Desert Research Foundation of Namibia
E-CAP	Sustainable use of Namibia's natural resources contributing towards enhancing the capacity of future decision makers
MAWF	Ministry of Agriculture Water and Forestry
MDG	Millennium Development Goal
NSS	National Sanitation Strategy
UDS	Urine Diversion System

Acknowledgements

We would like to thank the communities of Grundorn South and Nico Noord for their participation, valuable contributions and support during the time^{of} the inspections and assessment^s of the Otji-toilets ~~was conducted~~.

1. Introduction

The E-CAP project is funded by the Finnish Embassy in Windhoek and implemented by the Desert Research Foundation of Namibia (DRFN). This project is currently in its second year of implementation. One component of this project is ~~focused on~~ targeted support to rural decision makers to improve water and sanitation management. During the first year of implementation of the project, 17 Otji-toilets were piloted in Grundorn South and Nico Noord in the Gibeon district in Hardap region (Figure 1).

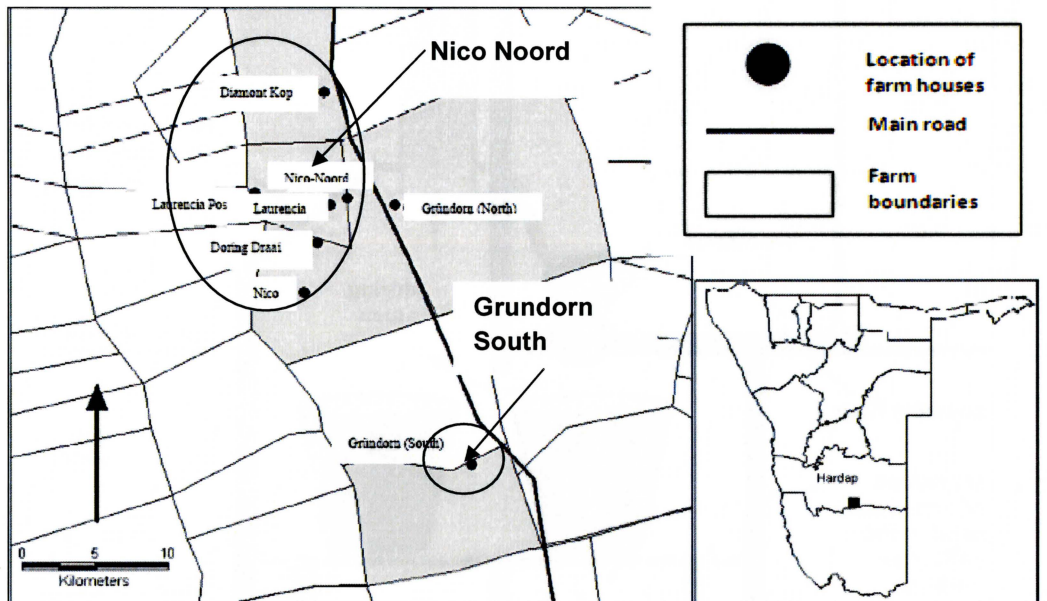


Figure 1: Map of Namibia indicating location of Nico Noord and Grundorn South in Hardap region

The Otji-toilet is a dry sanitation system, i.e. a toilet that does not require any water for its operation. The Otji-toilet has two waste buckets, ^{drum} one bucket is used for collection of human waste and the second bucket is the drying ^{drum} bucket. Once the collection ^{drum} bucket is full, it is shifted behind to dry and the second collection ^{drum} bucket is put under the toilet pot. In order to prevent odour and speed up the drying process, the Otji-toilet is fitted with a ventilation pipe. A black steel lid (which is facing north for maximum exposure to the sun) covers the drying ^{drums} buckets, resulting in increased temperature in the drying chamber which speeds the drying process. The Otji-toilet can either mix the urine with the waste or be fitted with a Urine Diversion System (UDS), which separates 95% of urine from the waste. The urine is collected ^{at pipe} in the pot and transferred from the toilet ^{by a pipe} into a French drain (a bed of gravel and stones) using ~~a pipe~~.

the urine is drained from the bottom of the collection ^{drum} bucket, penetrating through the holes of the drying plate and infiltrating into the soil (Figure 2).

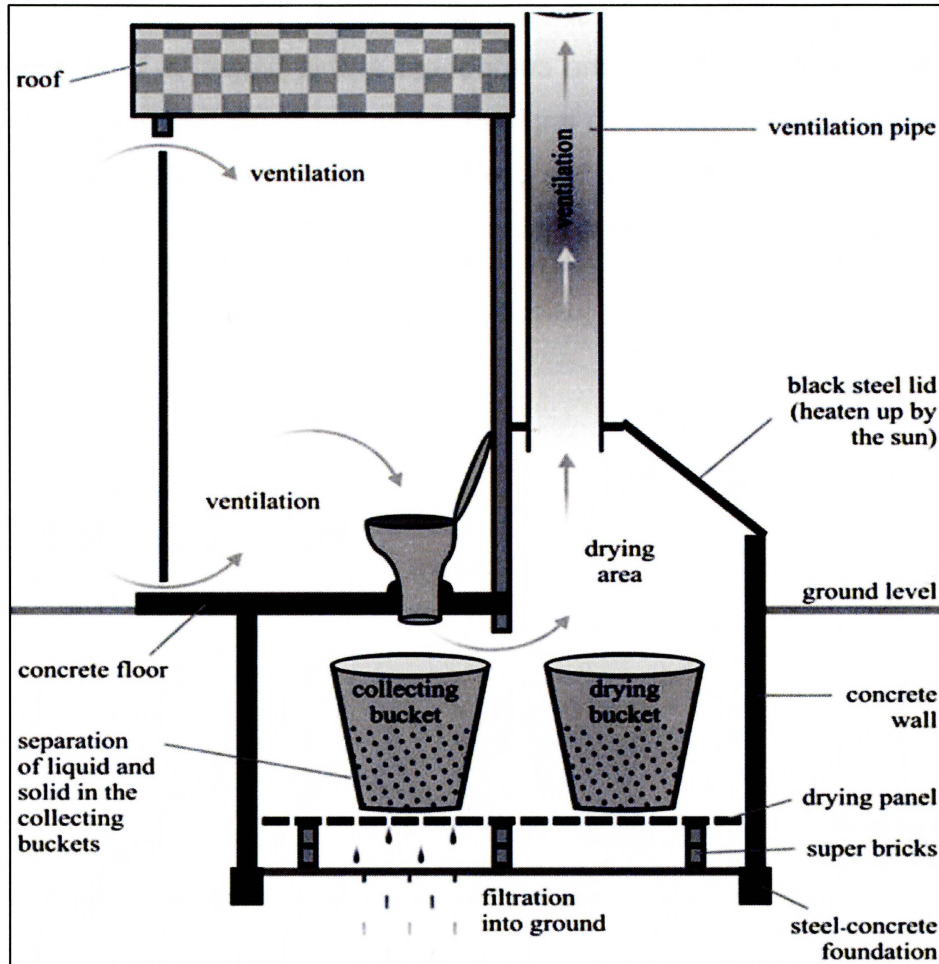


Figure 2: Sketch of Otji-toilet

The second year of E-CAP's rural support focuses on assessing viability and acceptance of different dry sanitation systems to be used in rural areas as per recommendation by the National Sanitation Strategy (NSS) ~~for~~ 2010/11-2014/15 and the Codes of Practice (CoP) for dry sanitation in rural areas, developed by the Ministry of Agriculture Water and Forestry (MAWF). These assessments are done in close cooperation with Directorate of Water Supply and Sanitation Coordination (DWSSC) of MAWF, which is the institution mandated to improve Namibia's current sanitation situation in line with target 7c of the Millennium Development Goals (MDG) that aims to half the proportion of people without sustainable access to safe drinking water and basic

sanitation by 2015. According to the NSS 2009, only 13% of the rural population in Namibia has access to improved sanitation while 61% of the urban population has access to improved ~~systems~~^{Sanitation}. This report presents findings from a participatory inspection of the physical structure of the 17 Otji-toilets built during the first year of the E-CAP project in 2011.

2. Purpose of the inspection

The inspection of the physical structure of the Otji-toilets was conducted to determine the durability of the physical structure and usability of the toilet. Further, an assessment of the current demand of additional toilets in the two areas was carried out as not all households were given their own dry sanitation toilet during the first phase of the project.

During the assessment of the dry sanitation toilets, willingness of the users of the toilets to re-use the human waste as compost was also investigated.

3. Objectives of the study

The objectives of the study were to:

- Assess if any parts of the toilet structure has been broken/damaged, and if so, what caused the damage
- Determine the current demand for additional Otji-toilets amongst households that are sharing toilets with other households
- Investigate how the users perceive the physical structure and user friendliness of the Otji-toilets
- Make a map showing the location of each of the 17 Otji-toilets constructed with assistance from the E-CAP project
- Find out what other sanitation systems that are used in the study area, e.g. flush toilet, bucket or bush, and to investigate if these comply with the NSS and CoP recommendations
- Increase awareness of the importance of health and hygiene amongst residents in the two project sites

4. Methodology

Interviews

Interviews were conducted in the two farms on a household level using a questionnaire designed to gather information not only from users of Otji-toilets, but also from respondents using other sanitation systems. The reason for including users of other sanitation systems was to find out how many different sanitation systems are in place and the demand of the Otji-toilet. The interviews were directed to the head of the household. In cases when the head of the household was not present, ~~then~~ any adult representative of the household was interviewed.

Inspection of Otji-toilets

As part of the questionnaires a sketch of the Otji toilet (Figure 2) was used. Broken parts of the toilet were marked on the sketch.

Mapping of toilets and households

A Global Position System (GPS) was used to determine the location and the distance between Otji-toilets and houses.

Measuring temperature of the drying chamber

A mercury thermometer was used to record temperatures outside of the Otji-toilet and inside the drying chamber. Measurements were made in one Otji-toilet in Nico Noord. The recording was done from 06:00am-18:00pm with reading being made every 30 minutes. The thermometer was kept outside the Otji-toilet, recording the outside air temperature; it was read every 30 minutes and was then inserted into the chamber for exactly five minutes, after which it was read. A stopwatch was used to keep time.

5. Results

5.1 Sanitation systems used

In Grundorn South all 20 households were interviewed. The sanitation systems used by these households are: bucket and bush, ~~dry sanitation (Otji-toilet)~~ Otji-toilet and flush toilet. The numbers of interviewed households using these different types of sanitation systems are presented in Figure 3. ^{At least} 14 households indicated that they use the Otji-toilet, while there are only 11 Otji-toilets in Grundorn South. ^{and this was observed} Two of the Otji-toilets are shared amongst two and three households each, while individual households use nine of the Otji-toilets. ^{Grundorn} Four of the 11 Otji-toilets in Grundorn South have UDS. Five households use a combination of bush and buckets and one household has a flush toilet. The household with the flush toilet is experiencing problems with the septic tank as the septic tank is full and has started to overflow.

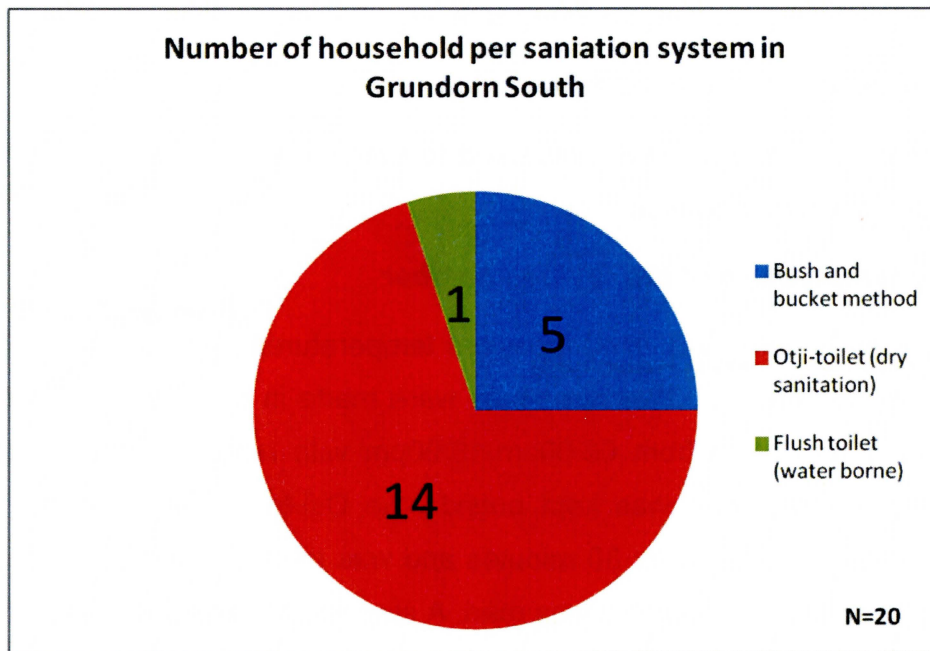


Figure 3: Sanitation systems in Grundorn South

In Nico Noord 12 households were interviewed. The existing sanitation systems used by these households are: bucket and bush, Otji-toilet and flush toilet. There are six Otji-toilets used by eight households. Two households share two of the toilets. The household that uses bucket and bush is currently constructing an Otji-toilet, provided by the E-CAP project. Currently that household is emptying the waste ^{from the bucket} into the nearby riverbed. ^{in Nico Noord} Two of the Otji-toilets have UDS.

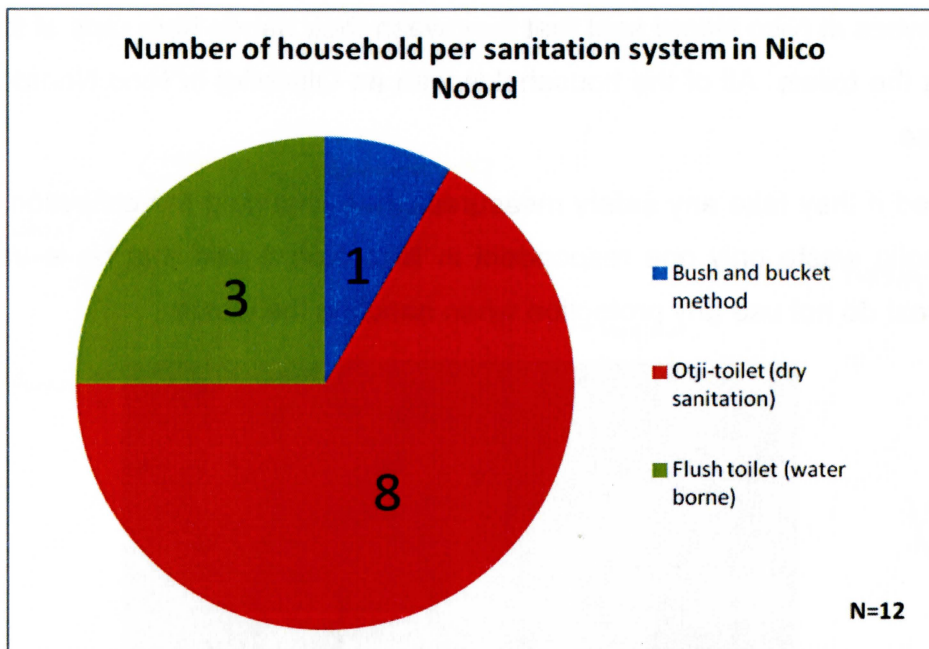


Figure 4: Sanitation systems in Nico Noord

In 2011 when the Otji-toilets were introduced for piloting in Grundorn South and Nico Noord, some households decided to share some of the toilets among households but this arrangement has ceased to exist resulting in usage of the bush and bucket system by some households. When asked why they stopped using these toilets, interviewees mentioned the distance from their houses to these toilets whilst the interviewees were worried about the decreased safety of women and children. *Another challenge is sharing* Therefore not everyone in the two farms has access to their own improved sanitation system thus requiring ten more Otji-toilets, eight and two for Grundorn South and Nico Noord respectively. *was disputes between sharing households*

5.2 Hygiene practices

According to the interviewees in Grundorn South, they all wash their hands after using the toilet. After using the toilet they wash with water from either taps behind or in front of their houses or in a bucket situated next to the house. One household has constructed a hand washing facility made out of a 25 litre plastic container ~~turned upside down and~~ *outside* fixed with a tap. The container is attached *to* the toilet (Figure 5). Even when used by the eight family members, the 25 litres of water can last as long as a month. The inspection of the toilets shows that the Otji-toilets are kept clean and in working order by the users.

All interviewees in Nico Noord said that they wash their hands from taps at their houses after using the toilets. All of the households with an Otji-toilet in Nico Noord have a tap at the house.

When asked if they take any safety measures when changing the collection ^{drums} ~~buckets~~ or handling solid waste only one respondent in Nico Noord said that he ^{uses} ~~is using~~ gloves while the rest do not use any protection when handling the waste.



Figure 5: Homemade hand washing facility ^{outside} at an Otji-toilet in Grundorn South

5.3 Challenges related to the Otji-toilet

In Grundorn South a majority of the interviewees, including old and physically challenged people, said that they didn't face any challenges when using the toilets. Two interviewees suggested that ³ ~~DREN~~ should install hand washing facilities on the toilets to make it more convenient for the users to wash their hands after using the toilet. One interviewee said that it was difficult to switch the full collection drum alone, and that it requires assistance.

The users in Nico Noord found the toilets easy to use. One interviewee found the use of the iron rods, which are used to switch the collection drums, difficult as they are said to be too long and soft.

5.4 Technical assessment of Otji-toilets in Grundorn South and Nico Noord

5.4.1 Inspection

The inspection of the 17 Otji-toilets revealed that the physical structures are still in good condition in both Grundorn South and Nico Noord. The most frequent problem is that the corners or the middle of the drying plates are cracking (Figure 6). Of the 17 Otji-toilets, 6 had cracked drying plates. Other observed damages of the Otji-toilets are presented in Table 1. Some households did not make any attempt to fix the damages on their toilets as they believed that it was the project's responsibility to do maintenance on the Otji-toilets even though when the toilets were handed over to the beneficiaries in 2011, it was clearly stated that the maintenance of these toilets is the responsibility of the beneficiaries/owners.



Figure 5: Broken drying plates in Grundorn and Nico Noord

Table 1: Damaged parts of different Otji-toilets in Grundorn South and Nico Noord

Place	Total number of toilets	Roof tiles	Drying plates	Black steel screws	Iron rods	Cracked wall	Door lock	Door hinges
Grundorn South	11	1	4	1	0	0	1	1
Nico Noord	6	0	2	3	1	1	1	0
TOTAL	17	1	6	4	1	1	2	1

The drying plate is placed at the bottom of the drying chamber, forming the floor on which the collection drums are placed. The black steel screws are used to screw/tighten the black lid that covers the chamber behind the toilet (Figure 2). The iron rods are used

to remove and switch the ~~waste~~^{collection} drums. Strong wind in the two farms is a problem that is often experienced resulting in roof tiles blowing off the roof thus during construction some of the households tied sticks and iron rods to their roofs to secure the tiles not to blow away.

Out of the 11 Otji-toilets in Grundorn South, four toilets had filled up the first ~~waste~~^{collection} drum, which had been replaced with the empty drum. The contents of the full ~~drums~~^{collection} are left to dry in the drying chamber. The ~~waste~~^{collection} drums filled up within a period of 7 to 10 months. Only one of these four toilets has UDS. Out of the six Otji-toilets in Nico Noord four Otji-toilets have been switched whereby two are with UDS and the other two ~~are~~^{are} without UDS.

After the completion of each interview, each household in Grundorn South and Nico Noord was introduced to a 'user-driven' monitoring system based on two different forms, one for daily monitoring and one for monitoring of the physical structure ^{of the Otji-toilets}. The daily monitoring is done by the users of the toilets, recording temperature, odour and the presence of insects and other issues. The monitoring of the physical structure of the toilets focuses on identification and ~~description~~^{collection} of any breakage or problems detected on the physical structure of Otji-toilets. The monitoring system was introduced to allow more detailed information about the function of the toilets to be collected over time.

Most households have not made any improvements or adjustments to the toilets, except for two households in Grundorn South where floor tiles were added for decoration purposes and to prevent reptiles such as snakes. In Nico Noord a shower has been constructed next to an Otji-toilet (Figure 7). The respondents also raised concern about the spaces between the door frames which allowed access to reptiles because at one household in Nico Noord a live snake was found in the drying chamber of the Otji-toilet ~~and was killed on the spot.~~

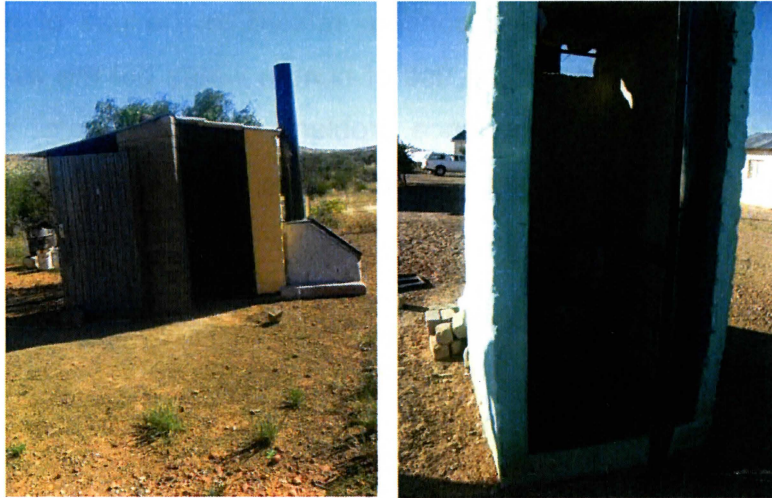


Figure 6: Left: Otji-toilet with a shower. Right: Otji-toilet with tiles

5.5 Human waste management in Grundorn South and Nico Noord

Of the 32 interviewees, ^{Grundorn & Nico} eight are willing to re-use the human waste from the Otji-toilets. The remaining households said they would prefer to burry or burn the waste together with the animal waste. Eight of the interviewees have not yet decided what to do with the human waste when both drums are full (Figure 9). One interviewee in Nico Noord is already using the waste as compost for his onion and tomato garden as well as for the plants. The human waste was mixed with animal waste.

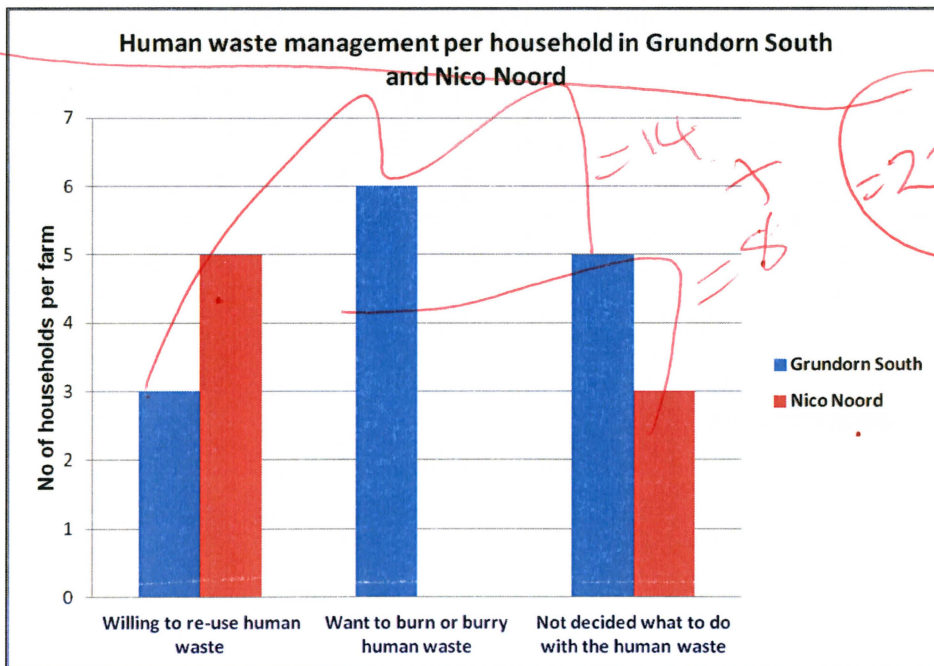


Figure 7: Human waste management decisions in Grundorn South and Nico Noord

Some of the interviewees raised a concern related to the use of human waste for gardening. Their concern was not the use of human waste but the availability of water for gardening. Currently they experience problems with their water supply, not even being sufficient to cover their water demand for both household usage and livestock consumption.

5.6 Temperature in the drying chamber

The reason for the recording of the temperature was to be able to compare the temperature inside the Otji-toilet chamber where the drying drums are kept and the outside temperature.

in order to see how quickly the waste dry out before disposal. Figure 8 depicts the difference in waste and outside temperature of the chamber.

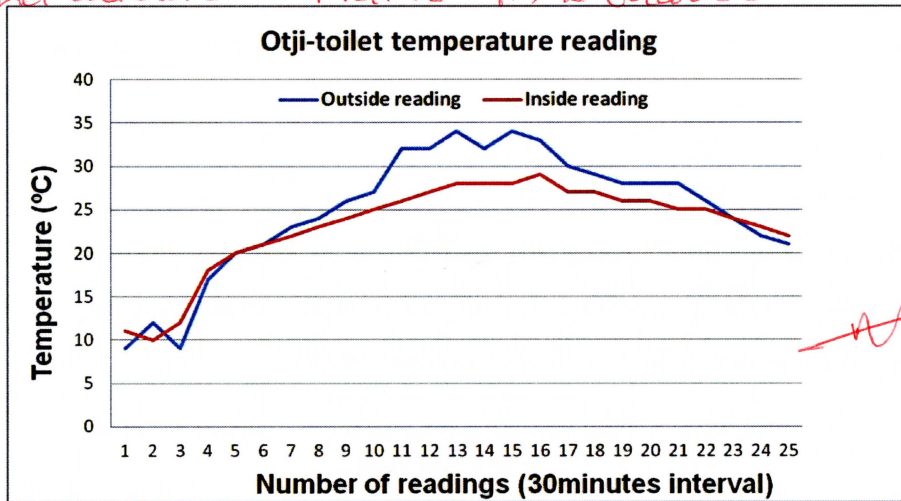


Figure 8: Otji-toilet temperature reading in Nico Noord

6. Discussion

During inspection of all the 17 dry sanitation systems most toilets were in good condition with slight or no smell and were kept clean by the owners. The biggest problem was the breakage of the drying plates on which the ~~waste~~^{collection} drums stand. According to the interviewees the drying plates broke when switching the full drums. In response to this problem two households of the total eight ~~waste~~^{collection} drums that have filled in both Grundorn South and Nico Noord have decided to now switch the drums before they are full.

Even though a majority of the interviewees indicated satisfaction of the physical structure of their Otji-toilets, three respondents indicated that they find it difficult to switch the waste drums and therefore needed assistance doing it. The physically challenged as well as old people are not able to switch the drums on their own. If no assistance is available then a solution might be to switch the drums before they are full and too heavy to be handled.

The community members that already switched their ~~waste~~^{collection} drums were concerned about the iron rods that are used to switch the ~~waste~~^{collection} drums, as they found them to be too long and soft, making them bend when they are used. None of the users of the toilets have made major improvements on the toilet structure, as they are satisfied with the original construction. However, the tiling and other small changes are encouraging as that indicates that the users have taken ownership of the facilities.

As part of the interviews and discussions held with the community members ~~and~~ emphasis was put on raising awareness about the importance of hygiene and its relation to health. The importance of hand washing after using the toilet and risks associated with unhygienic handling of waste were discussed. All the interviewed respondents ~~said~~^{limited} that they do wash their hands after using their Otji-toilets however there was a ~~lack~~^{limited} of safety measures taken during handling of ~~other~~^{collection} waste especially during switching of the ~~waste~~^{collection} drums ~~people did this~~^{which has done} without wearing protective clothing such as gloves and masks for their mouth except one household in Nico Noord.

Households that don't have access to a tap in their yard use buckets for washing their hands. The initiative taken by one of the interviewees to construct a hand washing

facility at the Otji-toilet is very innovative and something that should be replicated wherever there is a need for improved hand-washing facilities.

Strong wind is a problem in the project area, resulting in roof tiles blowing off the roof. Some of the interviewees have tied sticks and iron rods to their roofs to secure the tiles from being blown away.

At the beginning of the process of introducing and piloting the Otji-toilets in Grundorn South and Nico Noord, some households decided to share their Otji-toilets with other households. Therefore only 17 Otji-toilets ^{were} constructed. Now these households are not willing to share their toilet any longer, resulting in some of these households not regularly making use of the Otji-toilet. The reason was said to be the distance from their houses to the toilet, ^{and disputes} Instead they resort to using the bush even though they are concerned with the safety of women and children. Therefore there is a strong demand from the community members currently sharing their toilet, ~~asking DRFN to provide more Otji-toilets to ensure that each household in Grundorn South and Nico Noord has access to its own improved dry sanitation toilet.~~

This ~~request~~ is in line with both the CoP and NSS, stating that it is not advisable for households to share sanitation facilities with other households and recommending that every household have access to its own improved sanitation facility at an affordable rate.

For each household in Grundorn South and Nico Noord to have access to its own improved sanitation system, more toilets have to be ^{provided} constructed. According to the respondents from the households without improved sanitation systems, including those that are sharing they will not be able to afford to buy the toilets on their own.

Some of the respondents are concerned about the space between the doorframe and the roof as it allows reptiles to enter the toilet. The users feel that this is a danger to them, especially at night since the toilets do not have any lights inside.

At households where some of the physical structures were broken the owners did not fix the damages as they believed it was the project's responsibility to do maintenance on the toilets. This is alarming as it was made clear in 2011 that the toilets belong to the

beneficiaries and that maintenance is the responsibility of the owners, not the DRFN. The community representatives from Grundorn South and Nico Noord were asked whether they have the capacity to fix the toilets when they break or if they need assistance. Currently there is no one in these communities that feels capable of fixing the toilets if they break.

Temperature readings taken in one Otji-toilet in Nico Noord, indicated that the outside of the Otji-toilet chamber was warmer compared to the inside of the chamber even though from the beginning the inside was warmer but dropped during the day. The Otji-toilet black steel lid is designed in a way that it should direct more heat inside the chamber where the drying ^{drum} bucket is kept to speed up the drying process of the human waste in the drying bucket but this was observed otherwise according to the temperature readings conducted. The reason for the lower temperature in the chamber compared to the outside air might be the time of the year, with cold nights and warm days. It is likely that the temperature in the chamber is more even, varying less than the outside air temperature during the colder months. On the other hand, during the warm summer months the situation might be reversed. It is likely that the waste takes longer to dry during the cold winter months compared to the warmer summer months. This still has to be further investigated.

7. Conclusions

The two communities socially and culturally accept the Otji-toilet and are happy with it compared to the bush and bucket system they used before. They find the Otji-toilet safer and nearer to their homes which saves them time. The people have taken responsibility and have taken good care of the toilets that were built in 2011. However, the issue of ownership is still not clear to all households that have got access to the Otji-toilets, as some still expect DRFN to maintain the toilets. The Otji-toilets were found to be user friendly to all users, including old and physically challenged people as well as children.

Some of the community representatives have also showed willingness to re-use the human waste generated from the Otji-toilet for compost for gardening. This is something that will be further explored and piloted.

8. Recommendations

- It is recommended that the households without improved sanitation systems/sharing should be given Otji-toilets in both areas provided they are involved in the implementation through labour in order to instil sense of ownership.
- Hand washing facilities should be installed on these toilets as a way to promote health and hygiene and
- Awareness about health and hygiene should be created in these farms through participatory community meetings, and development of brochures and posters.
- Training of re-use of human waste as compost for gardening should be introduced as most of them said they did not have knowledge to do so and thorough research is conducted on re-use of human waste for compost.
- Temperature (thermometer) readings should be done for different seasons on more than one Otji-toilet on each farm to get representative results.
- To avoid drying plates breaking the plates should be made stronger or alternatively more bricks could be put under the plate.
- The iron rods used to switch the waste drums must be shortened and made stronger.
- The roof tiles should be installed in a way that they get support from the wall to prevent them from being blown away by the wind. Alternatively zinc roof could be used instead of the current roofing material as it is expensive for the local people to replace the roof tiles when they are blown away by the wind.
- The gap between the door frame and roof as well as the floor should be closed. The toilets should instead be fitted with windows that can be opened and closed by the users.
- The ventilation pipes should be fitted with covers and thin mesh wire in order to prevent rainwater and insects from getting into the drying chamber.

References

1. Code of Practice Volume 8 Dry sanitation systems general guideline, MAWF, 2011
2. Namibia National Sanitation Strategy 2010/11 – 2014/15, MAWF, 2009
3. United Nations Millennium Development, retrieved 2012