INTRA-HOUSEHOLD ACTIVITIES AND ATTITUDES REGARDING WATER, HEALTH AND SANITATION IN HAI EL TADAMON

A study for the Hai el Tadamon Water Project / Gedaref / Sudan by order of the Dutch University Assistance Programme

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BY ORDER OF THE DUTCH UNIVERSITY GEDAREF ASSISTANCE PROGRAMME

Annette Damen
July 1993

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PREFACE

In 1985 the Technical University of Eindhoven linked with the Gedaref Town Council. The Dutch University Gedaref Assistance Programme (DUGAP) is the local representative of this link. Each year a multidisciplinary student team goes to Gedaref to investigate problems, and together with local counterparts solutions are found and carried out. In 1992 I joined the Dutch University Team nr. 6 to do research for DUGAP from October 1992 till January 1993.

In April 1993 my research results of the 3 months study on intra-household activities and attitudes regarding water, health and sanitation for the Hai El Tadamon Water Project were published as volume 11 of the 'Gedaref Planning Studies' Series. This report, a more extended version, was written for the Agricultural University of Wageningen where I study Household Studies.

In Gedaref I learned a lot about the way women live in an islamic society. The negative idea we have in 'the west' has proved to be invalid. I learned that the women are fighting for change but don't want to give up some important values I wished we have in the Netherlands.

During my stay in Gedaref I was supported and helped by many people.
My colleague students and housemates Carola, Karin, Ester, Gonne and Jaap were indispensable. They took care of me when I had malaria, they listened to all my adventures and difficulties and were nice travelling-companions on the various trips we made through the Sudan. I realize my stay would have been rather boring without them.
I want to thank my counterpart Amal Abdul Rasoul for her cooperation, the translating and the background information she gave me about life in Sudan.
My stay and my research results could never have been what they are without the hospitality of the women of Hai El Tadamon. I especially want to thank Fatima, Aicha, Mary, Sa'adia and their families. I stayed a couple of days with each of these four Hai El Tadamon women. They treated me as a daughter and provided me with a lot of insight in their daily lives and household management.
I also want to thank:
. Johan te Velde, coordinator of DUGAP, for his hospitality and guidance;
. Piet Beekman, Technical University of Eindhoven, for offering me the opportunity to go to Sudan;
. Awad El Amin, employee of DUGAP;
. The neighbourhood committee of Hai El Tadamon;

Last but not least I want to thank Carja Butijn, my supervisor at the department Household Studies from the Agricultural University of Wageningen. I realize this report could never have been written without her advice. She always found some time to read and criticise my work. Next to that she knew how to motivate me in less productive days. Thanks!

Annette Damen
July 1993

SUMMARY

In 1990 most of the spontaneous settlement areas of Gedaref were destroyed. Part of the people who lost their houses were legally resettled in a new neighbourhood on the western outskirts of Gedaref, which is called Hai El Tadamon.
In March 1992 the Dutch Ministry of Development Cooperation agreed to subsidize a water supply project in Hai El Tadamon. The Dutch organisation SNV is responsible for the implementation of the water project. The Dutch University Gedaref Assistance Programme (DUGAP) - the local representative of a city-link between Gedaref and the Technical University of Eindhoven, the Netherlands - is involved in the execution. The objective of the water project is to supply Hai El Tadamon with safe and cheap water. The project will provide block the neighbourhood with a water supply system; a loop with a small distribution network (± eighteen standposts). After completion the National Urban Water Cooperation (NUWC) will be the owner of the water system and therefore responsible for operation and maintenance. The management and running of the standposts will be the responsibility of the to be established Hai el Tadamon water committee.

Before execution of the project it is required to pay more attention to the health and sanitation component of the project. Therefore, the research had the following objectives:
1. To provide information on household level into activities and attitudes regarding water, health and sanitation within the households of Hai El Tadamon.
2. To give recommendations on:
   a. The design of the hygiene education programme.
   b. The involvement of women in the water project.

The definition of the problem of this descriptive research was formulated as follows: What are the intra-household activities and attitudes regarding water, health and sanitation in Hai el Tadamon? And, in which way can women, who carry the prime responsibility for those matters, be involved in the Hai el Tadamon water project?

Qualitative research can capture actual behaviour with great accuracy, and can produce detailed information and insights in the investigated situation. Therefore, three qualitative research methods were used for obtaining data. Informal interviews and conversations (attitudes) on one hand and participant observation (practice) on the other were used for identifying real versus ideal behaviour. In this way the validity of the research was guaranteed. The reliability leaves some to be desired, the research is not statistical representative and was of short-duration. This resulted in a rather small investigation group on which the research results are based. Next to that the arabic language and seasonality proved to be constraining factors. Nevertheless this descriptive investigation can be seen as a reliable indication of the intra-household activities regarding water, health and sanitation performed in Hai el Tadamon.

Chosen is for a descriptive display of aspects regarding water handling, food handling, domestic hygiene, personal hygiene, health and diseases and women involvement. In this way the information on household level, aimed at in the research objectives, can be provided.
. Water handling; Nearly all the households make use of water vendors who bring the water on the plot. Nowadays the water costs between £s 10-20, depending on the season. In the future the water will be 3 or 4 times cheaper. On average a Hai el Tadamon household uses 22 jozz a week, which is approximately 15,5 litres per person per day.
The water is stored in barrels, jerrycans and zirs. In most households no real distinction is made between drinking water and water for other purposes. Water stored outside the guttia is usually covered. The water is drawn from the barrels and zirs with a cup or small vase. In this way the water gets easily contaminated (by dirty hands).
. Food handling; Most foods are immediately prepared after buying. All foods are washed and all women wash their hands before cooking (often without soap). It is remarkable that in most households the hands are washed before and after the meals, but that only after eating the hands are washed with soap.

. Domestic hygiene; Most waste water is dealt with on the plot.
There is no garbage collection scheme, non-organic solid waste is collected and burned outside once in two or three days. Organic waste is given to the animals or thrown on the street as food for goats.
The dishes are washed directly after eating and a lot of kitchen tools are washed before and after using, unfortunately most of the time without soap.
As for the water storage equipment in the group meetings nearly all women said they cleaned the storage equipment regularly. In practice the researcher never saw this happen, in fact most of the zirs and barrels looked rather dirty. The water drawing equipment was regularly cleaned, but hardly ever with soap.
. Personal hygiene; Most people wash themselves daily with soap.
Much of the public space of Hai el Tadamon is contaminated with human excreta. This environmental pollution causes serious health problems. Very few households own and use latrines or other sanitation facilities, the environmental conditions in Gedaref require high construction costs. Most people defecate outside the plot in the open (on public grounds or in seasonal rivers).
. Health and disease; A distinction can be made by diseases occurring in the rainy season (like malaria) or in the dry season. There are no update quantitative research data on disease occurrence for Hai El Tadamon. Nowadays people consult the health clinic in El Sofi or the hospital in the centre of Gedaref in case of serious illness, in the future people can obtain basic medical service in their own neighbourhood.
In Hai El Tadamon some male and female traditional doctors like faki's, malariaburners and ache scratchers are frequently consulted when people have health questions/problems. Considering that a lot of Sudanese people have malaria burn scarfs, ache scratches or koran amulets it can be said that these informal doctors are of major importance.
As in most societies, in Hai El Tadamon women are primarily responsible for taking care of matters regarding health and diseases. It is obvious that most women do not know exactly how diseases are biologically transmitted.
There are no adequate quantitative data available on health costs. This research indicates that in some households sometimes more than a quarter of the income is spent on health. More investigation on this topic is required.
. Women involvement; In general the involvement of women in organisation and decision making in the neighbourhood is low, while men think women are not very capable or do not want women to participate outside the house. In the neighbourhood committee (30 members) two young, inexperienced women are represented. All women are partaking in some kind of network based on friendship or family relations. In these groups (6-14 persons) all kind of information is exchanged and the women can rely on each other in case of illness, pregnancy and other difficulties. Next to that some women save in a sanduq, another informal women network. All these informal women networks are not involved in decision making at neighbourhood or block level, and it will be impossible to incorporate these networks in the formal project management, but they provide opportunities to communicate with women and can be a main source and destination of information and feedback regarding water, health and sanitation matters.
On suggestion of the Hai El Tadamon women, a women contact network is established in each block in relation to the water project so that women and the project management can be easily contacted about matters that are important for them. The future will show if this newly established women contact networks can provide for the needs, wants and wishes of the women.

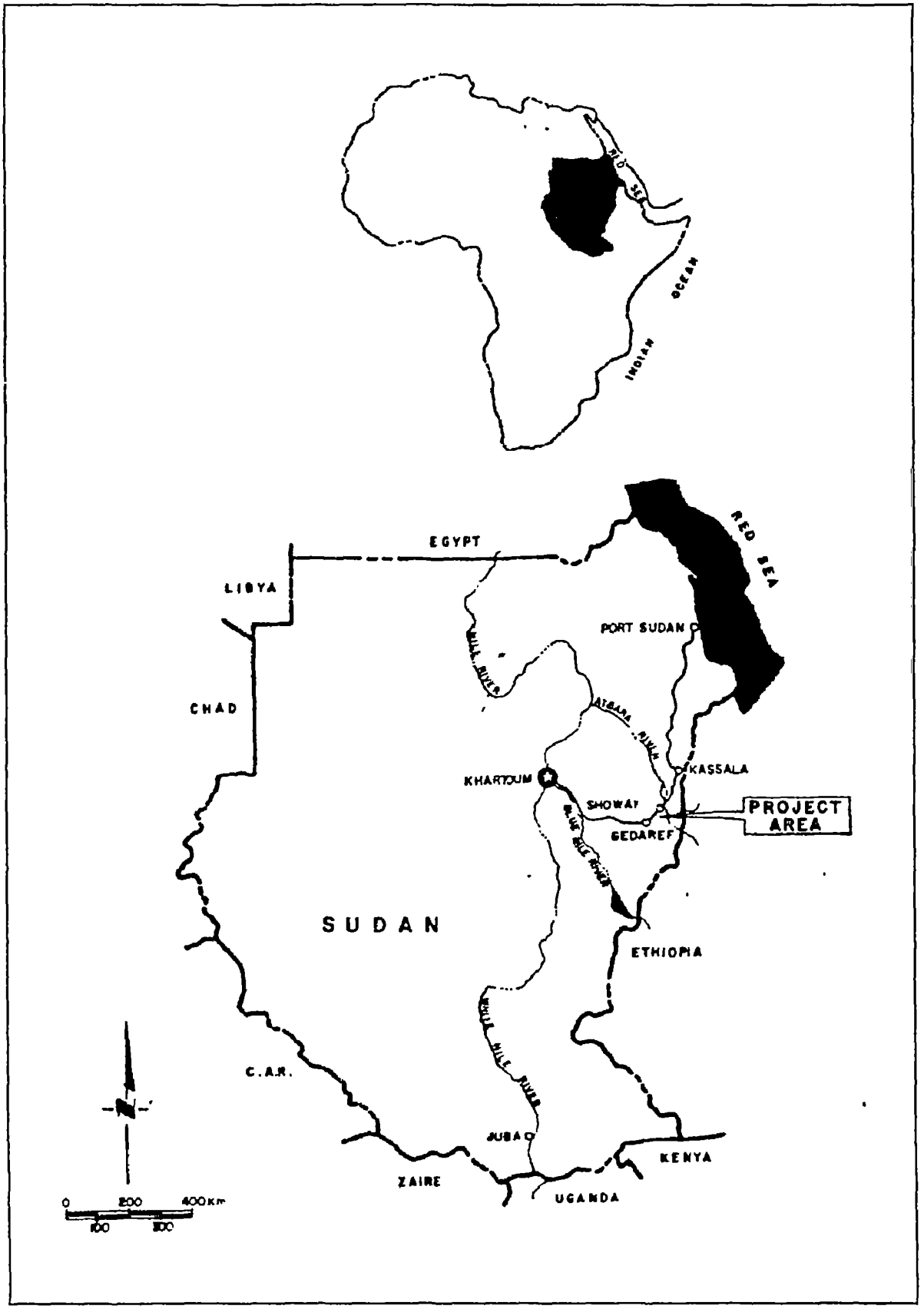
The Hai El Tadamon water project will change the daily life of the inhabitants. Until this moment, the water supply was purely a domestic concern since most of the water was brought on the doorstep by water vendors. In the future this will radically change. The workload of many women will increase, while collecting water in the future also means waiting and carrying. For women in the poorer households - who now already fetch their water at a certain distance - the workload will be less. Contrary to these disadvantageous changes in household resources (time and labour) there are some positive changes as well. In the future the water price at the standposts will be 3 to 4 times lower than the water bought from water vendors besides the possible improvements in water quality. Next to that the household control over the water provision can be increased. Nowadays the neighbourhood depends on water vendors and this gives the vendors a lot of power. In the future the neighbourhood is represented by a water committee which can negotiate with the National Urban Water Cooperation. The construction of the water distribution system is attended with a hygiene education programme. This might positively influence the household resources knowledge, skills and information.

The hygiene education will be attached to the water project and therefore must provide information on how to keep a high water quality during collecting, transporting, storing and drawing water.
Next to that the hygiene education should contain general information on diseases and disease transmission and give an insight in the existence and avoidance of water related diseases like malaria, giardiasis and hepatitis. Special attention should be paid to faecal-oral transmission, while this is a transmission route which can be eliminated within the household. In this regard the importance of safe handling of water, safe handling of food and safe excreta disposal must be shown. Nowadays some of these safety aspects are not dealt with in a proper way.

The hygiene education can be given in different ways, two levels can be distinguished:
1. Formal hygiene education; Hygiene education by professional persons given in special meetings, home visits, school lessons or advice when visiting the health centre. The hygiene education should not be organised for a mixed public, both men and women feel more at ease discussing health and sanitation matters without the other sexe.
2. Informal hygiene education; Hygiene education given by persons the Hai El Tadamon people already meet in their daily life (the female minder at the standpost, local doctors, the community worker etc.). Some people will not be able/allowed to attend special meetings, and others will not immediately change their hygienic behaviour after attending some meetings or after receiving advice or information. Behaviour changes might be achieved by repeating the new information in a confident environment and by discussing with persons the people already know.

The intention is to involve the neighbourhood in the management of the project, and in the operation and maintenance phase, by establishing a Hai El Tadamon water committee. Involvement of women in the water committee is desirable, for nowadays the Hai El Tadamon women are primarily responsible for taking care of water matters. It is still very difficult to give some clear outlines on how women can be actually involved in the water project, while the project still remains in the preliminary phase and no concrete activities can be conducted. The women must become more acquainted with DUGAP (the project executor) to inspire confidence before real involvement in the project can be obtained. By executing some small projects the women become acquainted with DUGAP and if these experiences are positive, they pay interest in other activities and will (automatically) get involve in the water project. It is advisable to involve the newly established women contact network in these DUGAP activities, otherwise this initiative might collapse before project execution. Women can be reached through some points of interest like health, income generating and adult education (Abderresoun, 1992). Small projects can be established on the area of vegetable gardening, goat breeding and selling milk, cloth repair or remake lessons, sheep breeding and spinning wool, first-aid lessons and 'cleaning the neighbourhood' actions.

Gedaref in the eastern region of Sudan.



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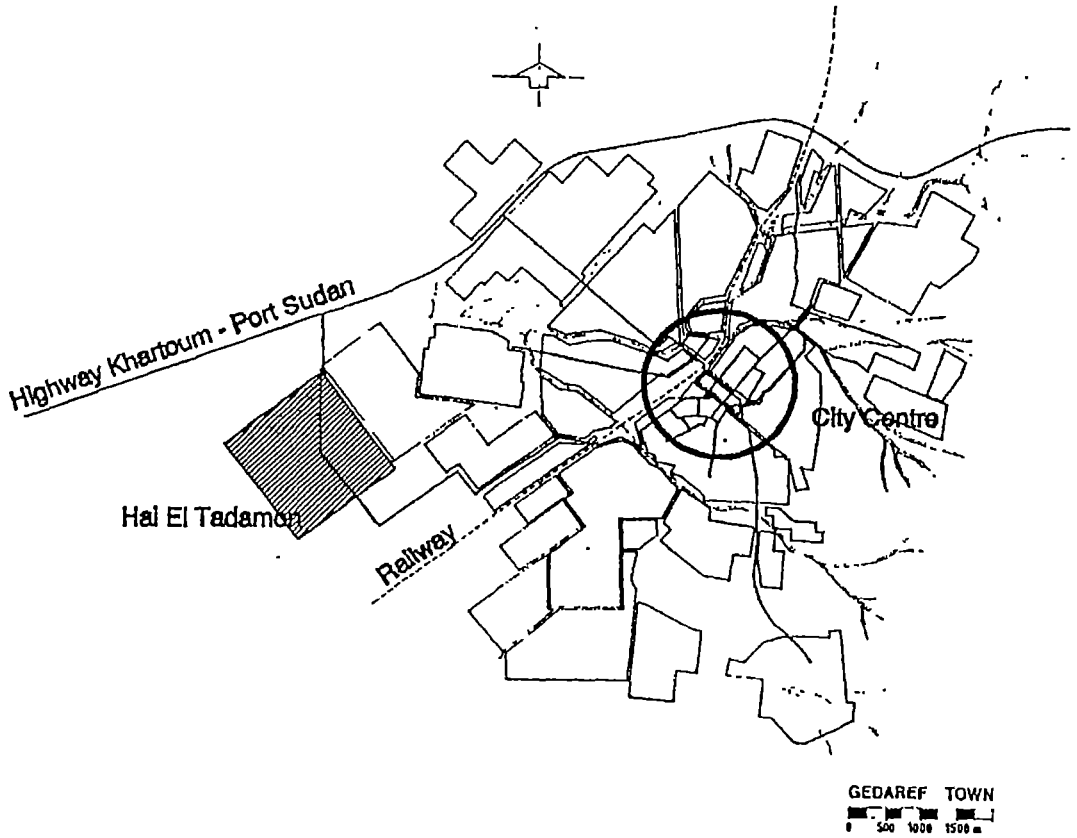
Hai El Tadamon on the western outskirts of Gedaref



1. INTRODUCTION

1.1. Gedaref

Gedaref is situated in the North-East of Sudan in the outer spurs of the Ethiopian Highlands, clay plains with gentle hills increasing in elevation towards the North-East. Climatological the weather is divided in a very hot dry season from October till June and a mild rainy season in the summer months. In the wet season most rain occurs in short, high intensity storms. The rainwater finds its way westwards through a number of seasonal rivers (khors) that run through the town (Vrolijks, 1986).
The vast clay plains surrounding the town provide a good base for growing sesame and sorghum, which makes Gedaref a major agricultural centre in Sudan.
Gedaref is connected on the highway Khartoum/Port Sudan and a railway intersects the town.

In a relative short period Gedaref transformed from a gathering of villages into a city with more than 300.000 inhabitants. The annual growth of 6 to 8 percent is caused by a high birth rate and an influx from refugees from Ethiopia and displaced people. The latter were pushed out of other regions in Sudan because of drought, famine or war. The explosive population growth has caused many problems concerning housing, sanitation, infrastructure and other services.

The town is characterized by a strong horizontal expansion. The clay texture of the ground necessitates expensive foundations for the construction of permanent (multi-storied) buildings, leaving round huts made from agricultural waste (guttia's) as the only cheap alternative. This strong horizontal expansion causes some problems, for Gedaref is only provided with one single centre containing nearly all urban facilities. There is hardly no hierarchy of sub-centres within the city (Vrolijks, 1986).
In Gedaref there are four living classes. The first class areas being most expensive and the most desirable to live in, the fourth class is the cheapest. Around the commercial and administrative centre the first and second class neighbourhoods are situated. In these neighbourhoods houses made of concrete and bricks dominate and most plots are provided with electricity and a connection to the city's water supply network. Further away third and fourth class neighbourhoods are located with higher population densities, smaller plot sizes and guttia's. These surroundings are not provided with tap water and electricity.

1.2. Hai El Tadamon

In 1990 most of the spontaneous settlement areas of Gedaref were destroyed. Part of the people who lost their houses were legally resettled in a new neighbourhood on the western outskirts of Gedaref, which is called Hai El Tadamon. This fourth class neighbourhood is divided in six blocks (see map annex A), which comprise a total of 4.543 plots for living, 26 plots for public facilities and 36 plots for open spaces. The size of the individual plots is 15x20 metres, smaller than the common plot size of 20x20 that is used in the rest of Gedaref. In June 1992 3.654 of the total of 4.543 blocks in Hai el Tadamon were occupied. The plots in blocks 1 to 4 are nearly all built upon, but in the blocks 5 and 6 almost half of the plots are still lying fallow. At this moment the planned area is not big enough to settle all people from the former spontaneous settlements. Probably the neighbourhood will be soon extended with block 7 and 8. It is not unthinkable that even more blocks will be added, the West side of Gedaref is seen as the only possible direction in which the town can expand.
Because Hai El Tadamon is a new neighbourhood public facilities still hardly exist. Only a small market and some koran schools are present, a school and a health centre are under construction. Public transportation to the town centre is available, but is expensive and irregular (Abderresoun, 1992).

The average number of people per plot is 6½, it should be taken into account that in the future this plot strength will increase because Hai El Tadamon is a relative new neighbourhood. In the older neighbourhoods the population densities are higher because often more households live on one plot (e.g. children get married and build an extra guttia on the plot of their parents).

In Hai El Tadamon the majority of plots is occupied by only one household, most of the time a nuclear family. In 22% of the households the male head of the household has more wives. Generally the women do not live on the same plot, either they live on different plots in Hai El Tadamon or in another neighbourhood. In 15% of the households a woman is the only or main income-earner, a female-headed household.
A lot of ethnic groups are represented in Hai el Tadamon, many displaced people had settled in the spontaneous settlements in the 1980's. The Messalite and Haussa are the largest ethnic groups, followed by smaller groups of Bornu, Fellata and Nuba. In the neighbourhood 97% is Muslim, 3% is Christian (Abderresoun, 1992).

In general there is a strong segregation between women's and men's jobs. The opportunities for uneducated women seems to be less than for men. A common pattern for the latter is to work in agricultural in the rainy season which is about four months from july to october. Compared to men, few women are working in agriculture.
The socio-economic research of Abderresoun et al. (1992) showed that 68% of the men and 25% of the women have a non-agricultural job. Most jobs are found outside Hai el Tadamon (75%). The economic activities within Hai el Tadamon are mainly limited to water vending and house construction, which is only done by men, and selling foods, tea or wood and charcoal which is mainly done by women.
The married women (who are not supposed to work according to islamic rules) mostly receive a daily household budget from their husbands for food and water. Those women decide how to divide this money. Part of the Haussa and Fellata men do all the shopping themselves.

1.3. Hai El Tadamon water project

In March 1992 the Dutch Ministry of Development Cooperation agreed to subsidize a water supply project in Hai El Tadamon. The Dutch organisation SNV is responsible for the implementation of the water project. The Dutch University Gedaref Assistance Programme (DUGAP) - the local representative of a city-link between Gedaref and the Technical University of Eindhoven, the Netherlands - is involved in the execution.

The objective of the water project is to supply Hai El Tadamon with safe and cheap water. Therefore, the project will provide block 1-6 with a water supply system; a loop with a small distribution network (± eighteen standposts). The design has reckoned with the possible extension of the system to block 7 and 8. The Hai El Tadamon water supply system will be connected on the Gedaref water supply system. This means Hai El Tadamon will be provided with water once in two days, just like the other neighbourhoods of Gedaref. After completion the National Urban Water Cooperation (NUWC) will be the owner of the whole system and therefore responsible for operation and maintenance till and including the water meters. The management and running of the standposts will be the responsibility of the to be established water committee, supposing it has the capacity to meet this responsibility.

The design of the project is based on the World Health Organization standard for minimum water need per person per day (pcd); 20 litres. According to Abderresoun et. al. (1992) the majority of the Tadamon households have less then 20 litres pcd, on average they use 22 jozz a week which is 15,5 litres pcd. The bulk of water in Hai el Tadamon is used for household purposes; drinking, washing and cleaning. Very few households use some water for cattle. The water is stored in barrels and earthen pots.

In the future eighteen women and eighteen men will be employed by the water project. At all standposts a male and a female minder will be appointed to sell the water, receive the money and takes care of the cleansing and maintenance of the standpost. The fees collected will be handed over to the water committee who pays the salary of the standpost minders, pays the water bills of the NUWC, saves money for operation and maintenance of the standposts and collects extra charges for financing other projects in the neighbourhood (this will preferably be sanitation or waste water projects).
In the future the price of the water at the standposts will be lower than the water supplied by water vendors. Part of the resulting surplus money (± 75%) will benefit the household budget, another part (± 25%) is going to be charged when buying water and will be divided over an operation and maintenance fund, an standpost minder salary fund and a fund for other projects in the neighbourhood.

The intention is to involve the neighbourhood in the management of the project, and in the operation and maintenance phase, by establishing a Hai El Tadamon water committee. The committee will prepare the project with DUGAP/NUWC and will be responsible for the supervision of the standposts, the financial management, the communication with the neighbourhood and the neighbourhood committee etc..
The water committee will consist of 15 members. Next to a chairman, there will be a treasurer and a secretary. From each block 2 persons, a male and a female, should be represented in the water committee. There will be an overlap with the neighbourhood committee to incorporate the knowledge and experience the neighbourhood committee already has with managerial affairs.

The project still remains in the preliminary phase. Some technical surveys and a socio-economic study (Abderresoun, 1992) have been made. In the latter quantitative data on socio-economic characteristics and water use can be found. Before execution it is required to pay more attention to the health and sanitation component of the project. In this regard it is useful to gain more insight into the intra-household activities and attitudes regarding water, health and sanitation (object of this study).

1.4. Contents

The contents of this report are as follows. In chapter 2 the research objectives, the definition of the problem, the research questions and some major terms used are given. In chapter 3 a brief theoretical framework can be found. In chapter 4 the used research methodology is discussed and in chapter 5 the research results are presented. In chapter 6 a discussion can be found and chapter 7 gives conclusions and recommendations.

In the text sometimes a * occurs behind a word. This means the word is written in arabic and the translation or explanation can be found in annex B.

2. RESEARCH OBJECTIVES

2.1. Aims, definition of the problem and research questions

The research had the following aims:
1. To provide information on household level into activities and attitudes regarding water, health and sanitation within the households of Hai El Tadamon.
2. To give recommendations on:
   a. The design of the hygiene education programme.
   b. The involvement of women in the water project.

The definition of the problem was formulated as follows:
What are the intra-household activities and attitudes regarding water, health and sanitation in Hai El Tadamon? And, in which way can women, who carry the prime responsibility for those matters, be involved in the Hai El Tadamon water project?

The next questions guided the research:
1. What activities and attitudes prevail by collecting, storing, drawing and using water?
2. What activities and attitudes prevail by storing, preparing, eating and preserving food.
3. How is liquid and solid waste disposal treated?
4. How do people deal with their domestic and personal hygiene?
5. What knowledge do people have and who is consulted regarding health and disease matters?
6. What networks and organisation structures of women exist in the neighbourhood?
7. Which of these women networks and structures can be incorporated in the project management?

2.4. Definitions

In this paragraph some major terms, used by drawing the research problem and research questions, are defined and operationalized.
Household; A lot of different definitions for the household concept are being used. In this research a household is defined as: "A rather fixed group of people performing household activities in an interdependent way" (free according to Spijkers-Zwart, 1980).
Household activities; Set of productive, consumptive and reproductive activities aimed at satisfying material needs of household members and aimed at the disposition of material conditions for the satisfaction of their immaterial needs (conform Spijkers-Zwart, 1980).
Household attitudes; The beliefs, ideas and the emotional feelings household members have regarding an object or certain behaviour (free according to Wrightsman, 198?).
Sanitation; Hygienic care, especially proper disposal of human waste and human excreta. Proper refers to a way of disposal which is safe for human health (conform Boot, 1990).
Hygiene education; All activities aimed at encouraging behaviour and conditions which help to prevent water and sanitation-related diseases (conform Boot, 1990).
Domestic hygiene; Refers to the use of water in keeping the home clean, as well as cleansing those components of the home environment that are related to disease transmission (e.g. clothes, floors, utensils, or towels) (conform Boot, 1990).
Personal hygiene; Refers to water (and soap or substitute) used for cleaning the body, including bathing and washing the eyes, face or hands (conform Boot, 1990).
Network; Social-interaction system with one or a small group of people as central ego. A network is characterized by the absence of clear group boundaries, people forming a network do not feel part of a whole and are not visible as a whole (free according to de Jager, 1983).
Organization structures; The whole of positions and relations of group members who regulate and coordinate activities to achieve a specific communal goal (free according to de Jager, 1983).

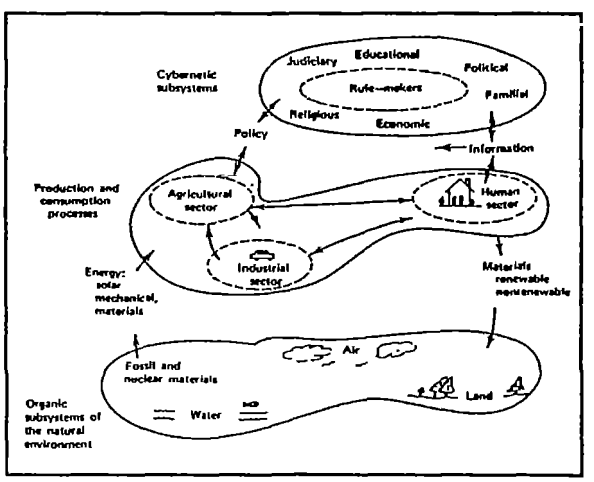
3. THEORETICAL FRAMEWORK

3.1. Habitat and Household Sciences

In 1986 the term habitat became a central issue in development cooperation. Habitat is a broad term and should not only refer to housing as such (space for household activities), but also to the physical environment as well as to the use made of it. Legislation, facilities and services are important to consider for they have impact on the well-being of people in their living environment (Muller, 1990). Habitat projects in developing countries do concern housing and services for water, energy, health, sanitation, employment and dwelling security (Hardon-Baars, 1989). A study on intra-household activities regarding water, health and sanitation therefore can be considered in context of the habitat concept.

The research object in Household Sciences is the intern and extern functioning of the household. Intern functioning is related to the interdependent productive, consumptive and reproductive activities of household members, considered as social actors. Extern functioning refers to the relationships between household activities on the one hand an the set of regulations, processes and policies of living in society and the immediate living environment on the other hand (Presvelou, 1980). Everyday life of individuals takes to a considerable extent place in a household and it is this household that is in various ways interrelated with the wider society, economically, socially, culturally and legally. In this household context decision making and the determination of priorities are important processes (Thomas-Lycklama à Nijeholt). The interrelationship between the household and the wider society is illustrated in figure 1 (Vakgroep Wonen, 1987).

Figure 1: Ecosystem of environmental systems influencing the household by König-Edens (Vakgroep Wonen, 1987).



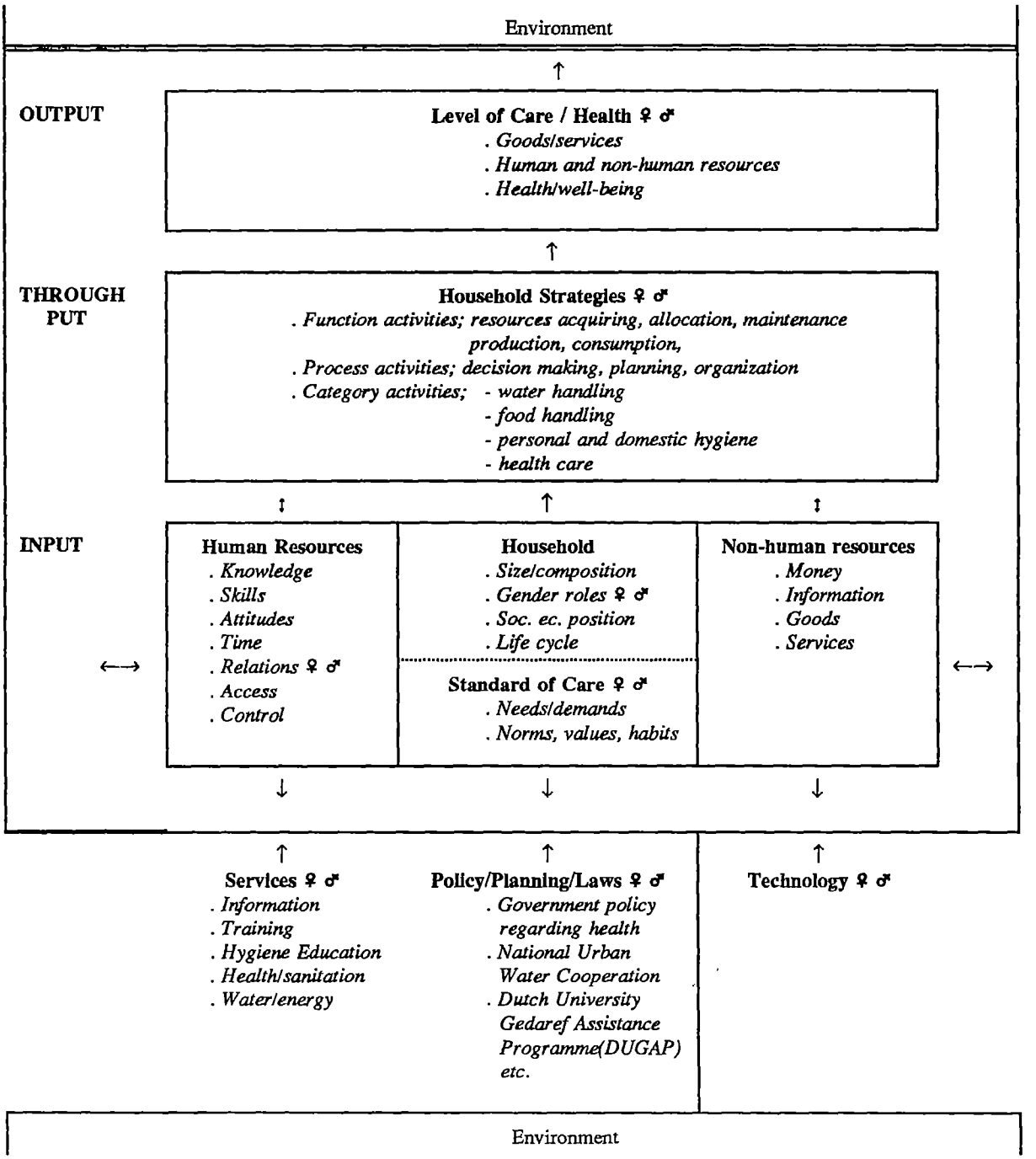
The analytical object in Household Sciences is household strategies for realization of needs and well-being, operationalized in household activities and differentiated for household members (Hardon-Baars, 1986). Accessibility and control over resources and the influence of the availability of resources on household activities are important research objects on this micro-level (Hardon-Baars, 1989).

An analytical framework for studying the relationship between habitat and the survival strategies of poor households in developing countries, might be relevant for studies which can be a basis for identification, planning, implementation and evaluation of habitat projects.
In this context Hardon-Baars (1988) developed a household ecological model (figure 2) in which factors influencing the habitat situation of households are brought into a systems approach. This model places knowledge, research data and external household interventions in a theoretical background which can be useful for understanding the household system and its interaction with the environment.

The systems approach of the household ecological model has the following components:
- Input; household characteristics, standard of care, human and non-human resources. The influence of the social environment is analyzed on the input side for policies, services and technology.
- Throughput; household strategies.
- Output; level of care (Hardon-Baars, 1989).

In figure 2 the components of the household ecological model are displayed bold. The researcher represented the relevant topics for the study on intra-household activities and attitudes regarding water, health and sanitation in this model in italics. In this way the research results of chapter 5 are implemented in a theoretical framework.

Figure 2: Household ecological model (Hardon-Baars, 1988).



3.2. Water and Hygiene

The minimum human water requirement for survival ranges from about 1,8 to 3 litres per capita per day (pcd) depending on temperature, the amount of work the person is doing and the type of food consumed. Over and above that, water must be obtained for cooking and washing, for livestock and for irregular activities like construction activities (Curtis, 1986). Consumption rates vary widely; whilst refugees may be able to survive on a ration of 2 litres pcd, urban inhabitants with house connections sometimes use 150 litres pcd (IDRC, 1989).

Water plays an important role in disease transmission, a water-related disease is one which in some way is associated with water or impurities within water (Cairncross, 1985). The absence of pure drinking water and basic sanitary services in the direct living environment will especially effect women and children for they usually spend more time near the house than men do (APCWD, 1980). This also counts for Hai el Tadamon where women in general spend much more time near the house than men. Men spend most of their time outside the neighbourhood and are often away for longer periods during the agricultural season (Abderresoun, 1992). The risk of disease transmission related to water does not only occur by drinking. People can also come into contact with unsafe water by eating, by handling dirty water (washing, water collection etc.) and by spillage water in the living environment or near the water source (Butijn, 1987). In most societies women and children are most vulnerable for they are main water users because of their household activities and playing behaviour (Boot, 1984).

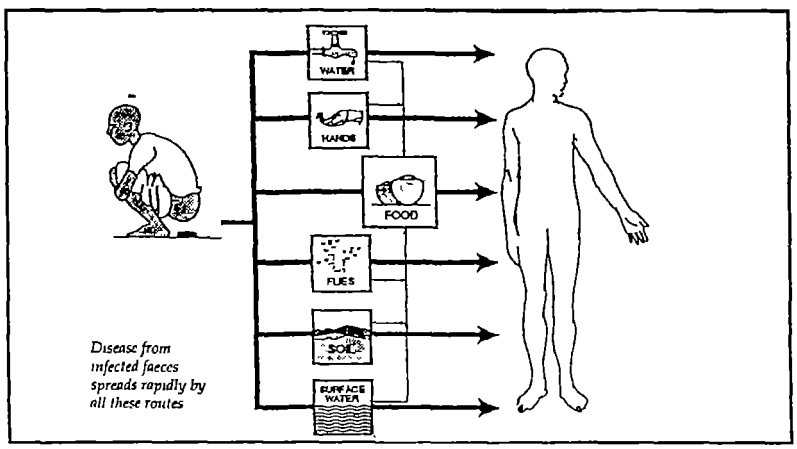
Cairncross et al. (1985) distinguish four main ways in which water supplies can affect disease transmission from one person to another:

1. Water-borne mechanism: the water functions as carrier and spreader of the pathogen (the disease causing organism). All water-borne diseases can also be transmitted by any route which permits faecal material to reach the mouth. This is the reason that, while many water-borne diseases cannot be controlled without safe water supplies, the provision of such supplies alone will not control them.
2. Water-washed mechanism: a shortage of water for domestic and personal hygiene furthers the occurrence of certain infections. Water-washed diseases depend on the quantity of water used rather than its quality. Improvements often hinge upon increased availability of water and the use for hygienic purposes of increased volumes of water.
3. Water-based mechanism: the pathogen spends a part of its life cycle in an intermediate aquatic host(s). All water-based diseases are due to parasitic worms which depend on aquatic intermediate hosts to complete their life cycles.
4. Insect-vector mechanism: insects which either breed in water or bite near water are responsible for spreading a disease.

The WHO estimates that more than 50% of all diseases in developing countries are to be 'water-related', and waterborne diseases are said to be the leading cause of mortality of infants and children (WHO, 1990:1).

Much diseases in low-income neighbourhoods are said to be caused by 'bad water'. But the water quality is unfairly blamed for all problems. Poor hygiene and sanitation practices may mean that water is contaminated, but - as mentioned in the classification of Cairncross et al. (1985) - the diseases can also be transferred in other ways.
The diagram shows some other ways in which diseases can spread from the faeces of an infected person to other people (Pickford, 1991).

Figure 3: Faecal-oral-transmission routes (Pickford, 1991)



Preventing infections from the faecal-oral-transmission-group acquires improvements in both water quality and quantity (Feachem, 1977). Any disease which is transmitted by the pathogen passing out of faeces of an infected person and subsequently reaches the mouth of another person, can either be transmitted in a truly water-borne route or by an almost infinite number of other faecal-oral routes. These other routes can largely be eliminated by improved hygiene and are therefore water-washed. Seasonality is particularly meaningful in examining the question whether or not the faecal-oral diseases in a community are primarily water-borne rather than water-washed (Cairncross, 1985).

Improvements of the public health is the strongest and most frequent argument put forward for expenditure on domestic water supplies. Better water is a necessary basis for disease control but not sufficient in its own (Cairncross, 1985). Hygiene and safe excreta disposal are most important interventions for several diseases and they affect a broad range of disease cautions. Thus hygiene, including the use of more water, and safe excreta disposal are important for maximizing health benefits (Boot, 1990). In this context it must be stressed upon that household activities regarding water, hygiene and safe excreta disposal largely depend on the availability of human and non-human resources like knowledge, attitudes, skill, access, time, services, money etc.. The extent to which households have the disposal of these resources is influenced by social and economic characteristics of the household (Vakgroep Wonen, 1987).

This means that the availability of household resources also influences the use made of water services. Access to water (human) and availability of money and services (non-human) largely determine the water usage of (safe) water sources. Nevertheless user payment for water and sanitation services are widely accepted and applied. Arguments for justifying user payment range from very practical to more complex developmental arguments, e.g. from pointing to basic problems of resource availability to the fact that payments increase a sense of value and commitment among users. Worries that people simply cannot afford to pay have been countered by arguments that millions of people in developing countries are already paying a high price for often sub-standard water and sanitation services. Improved services would mean that in many cases people would pay less than they are doing now, and receive a more effective service. Thus, improved services can lead to cash savings, for example when a system replaces water vending and delivers water at lower cost (Evans, 1992).

This counts for Hai el Tadamon which depends to a large extend on water vendors presently. The price of the water bought from the water vendor is several times higher than water from the town's distribution net. This means that the higher income households (living in first/second class neighbourhoods) with private connections pay much less for their water than the poorer households. Thus, in the future the price of the water at the standposts will be several times lower than the water supplied by water vendors (Abderresoun, 1992).

Generally, it has been said that people should not have to pay more than 3-5% of income for water and sanitation services. A lot of people are spending a much larger household income percentage on water and sanitation. Especially in crowded urban areas alternative cheap sources of supply are difficult to find. People who buy from vendors often have few other choices. Water must be bought at the expense of other things, which are likely to be basic needs themselves. It can be assumed that wherever people are already paying for water supplies they will always be happy to pay less (Evans, 1992).

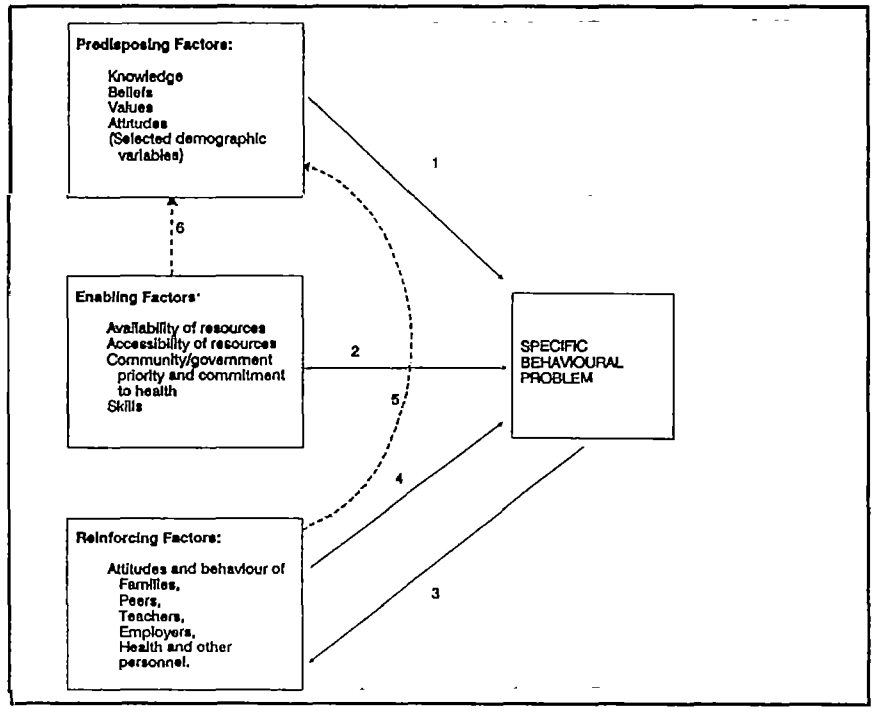
Improved water supply and sanitation facilities can have many direct benefits, such as reduction of drudgery of water collection and improvement in health, nutrition and food supply. Moreover, there can be indirect benefits in the form of improved potential for economic and social development, such as rise in productivity, incomes and improved standard of living (ISSCA, 1983). Therefore, access to enough safe (drinking) water and adequate sanitation facilities are basic human needs, fundamental to health and ability to work (Euroconsult, 1985). Additional changes in hygiene conditions and behaviour are also required to reduce the multiple transmission routes of water and sanitation related diseases. Hygiene education aims to address these changes and thus provides the essential link between improved facilities and practices (Burgers, 1988).

3.3. Hygiene Education

The assumption that provision of safe drinking water automatically leads to better health proved to be invalid (DGIS, 1985). Users need to understand and practice the protection of water quality within the household to benefit from improved water quality and to maintain facilities which provide it (WHO, 1990:2). To achieve this, water supply improvements are to be linked to improvements in sanitation, hygienic behaviour, drainage and management of waste disposal (DGIS, 1985). Hygiene education is used to promote the desired use of water and sanitation facilities and to obtain behavioural changes and health impacts.
It may be difficult to integrate the technical and educational components of a project, because education often requires a longer time period than technical implementation. Next to that technical activities are often given higher status and thus higher priority (Burgers, 1988).

The focus of hygiene education is establishing links between water and sanitation facilities on the one hand and human practices on the other hand, especially with regard to use, care and maintenance of the facilities; the preservation of water safety and its use in sufficient quantities; and the safe disposal of waste water, human and other solid waste (Burgers, 1988).
Hygiene education may be defined as all activities aimed to change attitudes and behaviour in order to break the chain of disease transmission associated with inadequate hygiene and sanitation. In figure 3 three categories of factors contributing to health behaviour are represented.

Figure 4: Three categories of factors contributing to health behaviour (Boot, 1990).



The definition of hygiene education indicates that hygiene education is not necessarily limited to water supply and sanitation programmes but also is an important component of primary health care and other such programmes. In fact hygiene education is part of wider health education which encourages behaviour that promotes health, prevents illness, cures diseases, and facilitates rehabilitation (Burgers, 1988).
The preconditions for effective hygiene education are that people must experience the need to change their habits, as well as have the resources, materials and skills required to improve their health behaviour and environment (Boot, 1990). This does not mean that incentives can not be used. Some incentives are; time and economic gains, status and rewards and punishments (Boot, 1990).

As there are many transmission routes of water and sanitation-related diseases, hygiene education may cover a wide range of action points which can be grouped as follows: Water source/collection/storage/drinking/use; Food handling; Excreta disposal; Waste water disposal (Burgers, 1988).
Another classification of studying patterns of water use and hygiene is: Transport, storage and drawing of water; Personal and domestic hygiene; Excreta disposal and food handling; Waste water disposal (Wijk-Sijbesma, 1985). The researcher adapted these classifications for describing the research results which are represented in chapter 5.

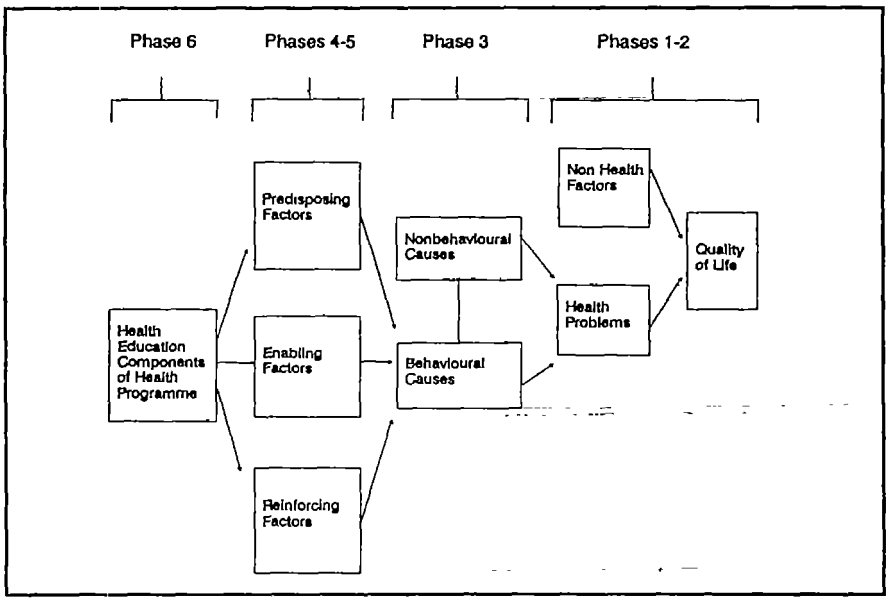
In developing a hygiene education programme a manner or method expected to lead to the desired results has to be selected. Boot (1991) and Burgers et al. (1988) distinguish three approaches to hygiene education:

1. Didactic or project based approach: the agency defines problems in water use and hygiene, and the solutions to be offered. The health education is largely determined by the project staff and people are simply recipients of what the project has to offer. In this way the programme is easy manageable, but the changes pursued must be simple because users need to be convinced to apply the proposed solutions.
2. Promotional or mixed approach: the agency defines problems and solutions but these are adapted to the needs and means of the target group. In this approach social marketing strategies are often used, they are suitable for promoting single facilities and practices to meet an immediate and urgent need of large user groups. In this approach only certain types of problems are solved, these might not be of high priority.
3. Participatory or community based approach: the agency assists the target group to achieve what they themselves want to achieve. The hygiene educator helps people to analyze their health problems and to define their own priorities for changing health conditions and practices. This approach, based on people's interests and needs, will achieve long lasting changes, but requires a lot of work and a flexible management.

Many hygiene education projects combine elements of these three general approaches to hygiene education.

In 1980 a framework for the relationship between health education and quality of life has been drawn (figure 4). In this framework health factors influencing the quality of life are derived (phase 1-5). Sorting out the factors contributing to health behaviour (represented in figure 3) comprises phase 4. When the framework is completed for a specific community the necessary health education components can be distracted (phase 6). This framework can be used for hygiene education planning (Boot, 1990).

Figure 5: Phases in health education planning (Boot, 1990).



Depending on the approach chosen for developing a hygiene education programme, the framework for health education planning will be completed by the project staff only or by joint problem analysis and problem solving by the community and the hygiene educator.

When a hygiene education programme is drafted it must be taken into account that programmes which use one-way information transfers have been found less effective in achieving behavioural change than programmes with active participation in discussions on health conditions and behaviour. Health discussions help people apply and increase their practical understanding of the relationship between water, sanitation and family health (table 1).

Next to that it is very important that the programme reaches those for whom the hygiene education is intended (time and opportunity to attend meetings) and that the programme builds on existing local knowledge and resources (Wijk-Sijbesma, 1985). People in all cultures, especially women through their daily life activities, experience and observation, have acquired basis and practical knowledge of water, sanitation and health/hygiene on which hygiene education programmes can be built. Unfortunately this specific knowledge, and the active role of women in spreading such knowledge, is often not used (Burgers, 1988).

Table 1: Prevention of transmission of water and sanitation related diseases (Wijk-Sijbesma, 1985)

Disease	Safe water	Safe excreta disposal	Personal and domestic hygiene	Safe handling of food	Safe wastewater disposal and drainage
Diarrhoea	++	++	++	++	−
Worm infestations					
roundworm	+	++	+	++	+
whipworm	+	++	+	++	+
pinworm	+	++	++	+	−
hookworm	+	++	+	−	−
guinea worm	++	−	+	−	−
schistosomiasis	+	++	−	−	+
Skin and eye infections, and louse-borne diseases	−	−	++	−	−
Fly-borne infections					
malaria	−	−	−	−	+
yellow fever/ dengue	−	++	−	−	+
filariasis	−	−	−	−	++
sleeping sickness	−	−	−	−	−
river blindness	−	−	−	−	−

++ = high + = medium − = low or negligible

Hygiene education must start with talking about daily life experiences which target groups will easily recognize. In discussing these daily life experiences new hygiene behaviour can be promoted (Boot, 1983). Health education media and messages should be varied, captivating, entertaining and accommodating to local cultural values (ISSCA, 1983). Key-points should be repeated in various ways (Boot 1983). Using real things or models facilitates learning in hygiene education. Demonstrations must be based on the use of local materials and familiar and realistic settings, otherwise there will be hardly any impact. Audiovisual tools are also suitable because target groups are often easier attracted and will better remember messages (Burgers, 1988). Audio-visual aids will fail to have much impact when they are not used in or followed by open discussions (Boot, 1983). Hygiene education in schools can reaffirm or help to modify attitudes and habits established at home. Besides that it is important to examine school hygiene, for diseases are easily spreaded in schools.

In the literature (Burgers, 1988) some important remarks can be found which should be taken care of in hygiene education.

. Most hygiene education programmes tend to focus on women because they are primarily responsible for the family and for water management and sanitation. Yet, the involvement of men is equally important, because women's programmes usually require their support. Improvements at home and at water sources is often the responsibility of men, and men have personal interest as husband and father for the well-being of the family.

. Although hygiene education must be accessible for everyone - communities are not homogenous - hygiene education tends to reach higher status households, while they easier get access to sources and information and they have more means for improvement.

. Hygiene education is often limited to project level. The impact is likely to continue somewhat limited until hygiene education is made national priority and receives political support. This means sectoral cooperation and commitment at all levels, national, provincial and local.

. Hygiene education can result in broader development effects when health is integrated with socio-economic aspects (e.g. linking water and sanitation to income generating activities). Linkage with economic activities can in turn also be of importance for additional health benefits since income generated or controlled by women is often spent on the prime needs of the family which include water and sanitation (Burgers, 1988).

. After execution an impact evaluation will be necessary to determine wether a hygiene education programme was sufficient to reach all households and to achieve the permanent changes in hygiene behaviour necessary for a public health impact (Wijk-Sijbesma, 1985).

3.4. Community Participation

Community participation refers to the active involvement of the men and women concerned in the major project decisions and activities. It is an important tool for maximizing the benefits of water supply and sanitation improvements (Boot, 1990). Thus, besides improvements in sanitation, hygienic behaviour and management of waste disposal it is necessary that the community (can) participate(s) in all phases of the project, otherwise it is unlikely that improvements are wholly accepted and understood (DGIS, 1989). Active community participation is also an instrument for creating a sense of self management while people learn how to analyze and solve their problems without an increasing dependency on outside assistance. The community can be motivated with activities conducted through the existing community organisation and when the project management structure fits into existing local institutional structures (WHO, 1990:2).

In this regard it is notable that the community should not be referred to in general terms. Communities are not homogenous, besides differences in age, ethnic background, religion, social status etc., it is required to pay attention to gender-specific needs, interests and responsibilities (Muller, 1990). Collection of drinking water and elementary health care are predominantly considered to be the task of women (DGIS, 1985). A socio-economic research of Hai El Tadamon shows that management of water is regarded as a women's job (Abderresoun, 1992). And women are the ones to improve domestic and personal hygiene when improved facilities have been installed (Wijk-Sijbesma, 1985). This makes women participation in water projects a must in order to incorporate the needs of the persons who carry the prime responsibility. In this respect it must be taken into account that women networks can be a main source and destination of information and feedback regarding water, health and sanitation matters (DGIS, 1989).

Since women are involved in all activities of rural and urban communities, their involvement in the planning and provision of safe water and sanitation programmes can help to facilitate the changes which inevitably accompany the introduction of new concepts, technologies and facilities into a community. By involving women, particularly in the planning, design and operation and maintenance stages, as well as in complementary health education, the water and sanitation programmes can be expected to be more effective in achieving their ultimate objectives of improved water quantity, quality and health. Moreover, the active participation of women can lead to other improvements in women's status and roles in development (ISSCA, 1983).

3.5. Conclusions

A study on intra-household activities regarding water, health and sanitation can be considered in context of the habitat concept. The household ecological model of Hardon-Baars in which factors influencing the habitat situation of households are brought into a systems approach, places knowledge, research data and external household interventions in a theoretical background which can be useful for understanding the household system and its interaction with the environment.
Regarding water and hygiene, four main mechanisms in which water supplies can effect disease transmission can be distinguished and should be reckoned with. Improved water supply and sanitation facilities can have many direct and indirect benefits. Nevertheless, additional changes in hygiene conditions and behaviour are also required and hygiene education aims to address these changes and thus provides the essential link between improved facilities and practices.

Community participation is an important tool for maximizing the benefits of water supply and sanitation improvements and creating a sense of self management while people learn how to analyze and solve their problems without an increasing dependency on outside assistance. In this regard it is notable that the community should not be referred to in general terms, differences in age, ethnic background, religion, social status and gender roles should be reckoned with. Especially women participation in water projects is a must in order to incorporate the needs of the persons who carry the prime responsibility regarding water, health and sanitation matters.
In habitat projects it is very important that the external intervention is based on existing strategies and organisation structures. Otherwise, there is a risk that existing networks collapse and survival strategies of poor households are ruined (Muller, 1990).

4. METHODOLOGY

4.1. Data Collection

The research builds on a socio-economic research (Abderresoun, 1992) which provides quantitative data on socio-economic characteristics and water use. The research objective was to provide information on household level into intra-household activities and attitudes regarding water, health and sanitation in Hai El Tadamon. For obtaining this, qualitative research methods were used. Qualitative research can capture actual behaviour with great accuracy, and can produce detailed information and insights in the investigated situation applicable to the interpretation of quantitative data (Rodgers, 1990).
In the research the main participants were women for they are responsible for water, health and sanitation matters, but men were also involved because they are important in e.g. decision making matters. The research has a descriptive character and observation was required to get insight in how women perform their everyday household activities and to analyze real from ideal behaviour. The possibility of observation and identifying attitudes from practice are some benefits of qualitative research methods (table 2).

Table 2: Plusses and minuses of qualitative and quantitative methods (Rodgers, 1990).

Qualitative	Quantitative
- Random sampling not possible	+ Random sampling possible
- Little statistical testing of data	+ Statistical analysis
+ Cross-checking (triangulation) used	- Little cross-checking
+ Possible to identify real v. ideal behaviour	- Survey questionnaires tend to get reporting of ideal behaviour
+ Sensitive topics can be explored in context: more time, rapport, etc.	- Difficulty in dealing with sensitive topics
+ Attitudes revealed	+ Attitudes may be revealed with careful research design
+ Observation possible	- Little time or rapport for much observation
- Problems in generalizing data to large proportion of the culture due to small samples	+ Large populations can be surveyed
- Takes time	+ Relatively rapid
- Problem of data-collector bias	+ Fewer problems with data-collector bias as more structure, but problem of structural bias
- Replaceability difficult	+ More easily replaceable
+ Patterning and interrelationships observable	- Must be specifically looked for: difficult if do not know they are there. Must have induction of interrelationships before questionnaire can be devised to survey them
+ Open-ended, i.e. any factors affecting a problem can be observed	- Closed: information usually limited to preselected question, may miss important items

Three qualitative research methods (Rodgers, 1990) were used for obtaining data (annex D-H):
1. Informal interview: Open-ended questions are asked on certain topics. The researcher follows a general outline, but additional subjects are incorporated as appropriate. Brief notes are taken on the responses, and the detailed notes are written down later.
   Six groups (in each neighbourhood block one group) of between 7 and 35 women were twice interviewed with a topic list, to gather information on water, health and sanitation aspects. The researcher asked questions or brought up attention calling topics which the women answered/discussed. After all twelve meetings the interviews were structured on various topics (annex D).

2. Participant observation: The researcher participates in and observes the socio-cultural context of a household or community and thus gains important insights into everyday life.
   After the twelve group interviews the researcher spent some time with four different households in Hai El Tadamon (in each household 2-3 days). During those days the researcher tried to gain information on how is practically dealt with water, health and sanitation matters within the household. The researcher watched and helped the women in the household in performing their everyday activities. The families were chosen on their ethnic diversity; a Bornu* household (annex E), a Messalite* household (annex F), a Shilluk* household (annex G) and a Haussa* household (annex H).
3. Conversation: Important data can also be obtained trough very informal conversations with individuals or small groups. Some people are more at ease in these settings and talk freely.
   When the researcher was staying in the various households she was visited by an interpreter. In these informal visits some important data were collected.

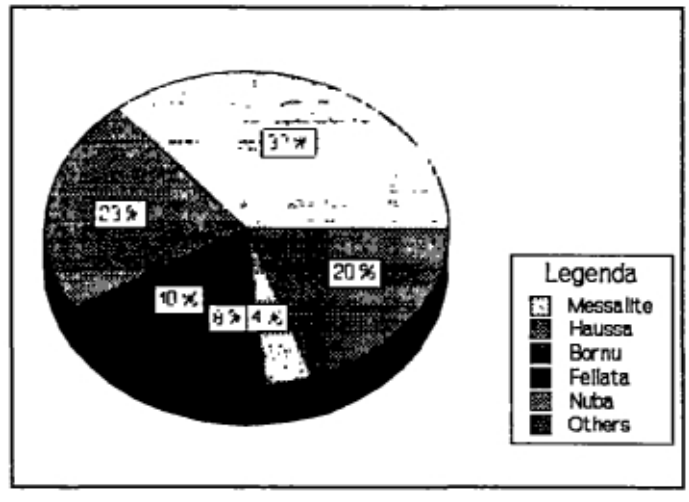
4.2. Validity and reliability

In general, qualitative research methods are acknowledged to be more accurate in terms of validity, the accuracy of the scientific measurement. Quantitative methods are considered to be better in terms of reliability or replaceability, the extent to which scientific observations can be repeated and obtain the same results (Rodgers, 1990). This also counts for this research. The validity is obtained by the women group meetings (attitudes) and the participant observation (practice). If a statistic representative survey would have been carried out, only the attitudes would have been collected.

The reliability or replaceability leaves some to be desired, for the research is not statistical representative, in the research the interviewed women were not selected at random. The researcher made use of the contacts that were established by a quantitative socio-economic research held in May and June 1992 (Abderresoun).

In Hai El Tadamon a lot of ethnic groups are represented (graphic 1), this cultural factor might influence the activities and attitudes regarding water, health and sanitation. In the informal interviews all ethnic groups were represented, although these were clustered in the various group meetings. In the participant observation the ethnic factor was taken into account; a Haussa, a Messalite, a Bornu and a Shilluk household (in the category 'others') were visited. Some women were approached on the women meetings, others were (to facilitate the entrance by the husband) approached by the neighbourhood committee. The households were thought to be representative for household composition and age. The researcher stayed with three nuclear families, two with young, one with older and one older couple without children.

Graphic 1: Ethnic groups (percentages) in Hai el Tadamon (Abderresoun, 1992)



The investigation period was of short-duration, which had consequences for the validity of the informal interviews and the reliability of the participant observation. The informal interviews were not structured, the researcher worked with a topic list. The women added new items during a meeting and the researcher added new topics during the investigation, this resulted in the fact that in some women groups not all topics represented in annex D were discussed. If the research period would have been longer, the researcher could have discussed all relevant topics in all women groups and the researcher would have gained more confidence so that more information could have been gathered on so-called taboo topics. The length of the research also influenced the reliability of the participant observation.

Only four households were involved in the investigation, from each main ethnic group only one household was represented, more households should have been visited to get more reliable data. On the other hand, differences in household activities between ethnic groups caused by household composition and age were not noticed, for these features differed within each ethnic group investigated.

4.3. Research constraints

The arabic language proved to be the greatest barrier during the research. Talking with an interpreter obstructs the spontaneity of the discussions. Not only the researcher does not speak arabic very well, also a lot of Hai El Tadamon women are no native arabic speakers. While staying in the different households the researcher noticed which families were used to foreigners. In these households conversation was much easier than in the other households. Next to the language problems, the researcher fell ill for two weeks during the investigation. In these weeks the counterpart interviewed the women groups and some information through non-verbal impressions got lost.
Another constraining factor was the period of stay. Not only the length influenced the research, seasonality might influence the household activities women perform. The researcher stayed in Hai El Tadamon in the beginning of the dry season. If the researcher would have come in the end of that period or in the rainy season some other information might have been gathered.

4.4. Conclusions

Qualitative research can capture actual behaviour with great accuracy, and can produce detailed information and insights in the investigated situation. Three qualitative research methods were used for obtaining data. Informal interviews and conversations (attitudes) on one hand and participant observation (practice) on the other were used for identifying real versus ideal behaviour. In this way the validity of the research was guaranteed. The reliability leaves some to be desired, the research is not statistical representative and was of short-duration. This resulted in a rather small investigation group on which the research results are based. Next to that the arabic language and seasonality proved to be constraining factors.
Nevertheless this descriptive investigation can be seen as a reliable indication of the intra-household activities regarding water, health and sanitation performed in Hai el Tadamon.

5. RESEARCH RESULTS

5.1. Introduction

In this chapter the research results, which are based on the data in annex D-H, are presented. Chosen is for a descriptive display of aspects regarding water handling, food handling, domestic hygiene, personal hygiene, health and diseases and women involvement. In this way the information on household level can be provided, and the research questions (paragraph 2.1.) can be answered.
This grouping of research results is partly based on the classifications used in literature (chapter 3).

5.2. Water handling

5.2.1. Water collection
Nearly all households make use of water vendors. The water vendors, all men, go around the neighbourhood with a double barrel of water on a cart pulled by a donkey. They sell fresh and salty water, fetched from private wells or the city's water distribution network. The quality of both is often bad (unfortunately test data on water quality were not available). The water gets contaminated by the dirty double barrel and jerrycans which are hardly ever cleaned. Often the hose, with which water is poured into the double barrel, is lying in the sludge at a tap point.
Hai el Tadamon is served by 150-200 water vendors. In the rainy season they make three trips a day (from the tap point to Hai el Tadamon), in the dry season when water is scarce only two.
The water vendors are called for when they pass, they draw attention by hitting a stick on the double barrel. One household visited was served by a regular water vendor, the others bought each time by someone else. The water vendors carry the water on the plot (in jerrycans) and pour it in the barrels or zirs*.
The way of providing the neighbourhood with water depending on water vendors gives the vendors a lot of power. In the period the researcher was doing the investigation the water vendors refused to lower the water price after the rainy season. A lot of women joined hands and started paying the price which is normal for the beginning of the dry season. Unfortunately this resulted in the water vendors not showing up for two days and it became clear that the women had to pay the 'high' price.
In 25% of the households part of the water is fetched by women from wells or tap points outside Hai El Tadamon (annex C). There are several shallow, hand dug private wells in the surroundings of Hai el Tadamon. The water of most of these wells is salty. The water from the town distribution system is of better quality, but because Hai el Tadamon lies on the outskirts of Gedaref the walking distance to the nearest tap point is rather far (Abderresoun, 1992).
The socio-economic research showed that the women prefer to collect water between 6 and 7 o'clock in the morning and around 4 o'clock in the afternoon (Abderresoun, 1992). In the studied households all women collected sufficient water for the whole day between 7 and 9 o'clock in the morning. Most water asking activities were done before the afternoon meal; washing, (personal)cleaning, making kisra*, cooking meals and making coffee etc.. None of the women collected water in the afternoon during the visiting period. This difference might be due to seasonality. This research was done in the beginning of the dry season when enough water is available. The socio-economic research was done in the end of the dry season water when water is scarce, and maybe then it is impossible for households to buy all the desired water at once.

5.2.2. Water use
On average a Hai el Tadamon household uses 22 jozz* a week, which is approximately 15,5 litres per person per day. The World Health Organization standard for minimum water need per person per day is 20 litres. In 1992 60% of the Hai el Tadamon people used less (Abderresoun, 1992).
The bulk of water In Hai el Tadamon is used for household purposes like drinking, washing, cleaning and personal hygiene. Few households use some water for cattle. If water is used for economic purposes (selling tea etc.) an extra jozz per day is needed.

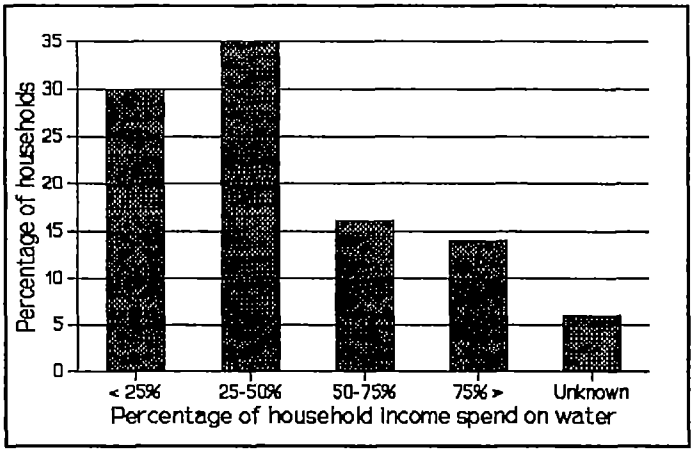
5.2.3. Water price

In the rainy season the water bought from water vendors is expensive (£s 15 a jozz) because the roads are nearly impassable. In the beginning of the dry season the water is cheaper (£s 10 a jozz) but in the end, when water is scarce, it is most expensive (£s 20 a jozz).

Water bought at wells and tap points outside Hai el Tadamon is sold for 4 or 5 pound a jozz. Most of the households (especially the poorest) use these alternatives irregularly depending on the financial situation of the households.

Graphic 2 shows the average percentage of income that is spend on water, according to the annual household income and a fixed water price of 10 pounds a jozz. Percentages higher than 75% can be explained by the fact that people buy water irregularly or obtain part of their water from the well or public tabs. Next to that it must be taken into account that most households do not have a regular monthly income, most money is made in the agricultural season (Abderresoun, 1992).

Graphic 2: Percentage of household income spent on water (Abderresoun, 1992).



In the households visited the decisions on money spending were made partly by men and partly by women. The women (who are not supposed to work for an income) mostly received a daily household budget from their husbands for food and water. In those households the men decided what proportion of the household income is spent on food and water, while the women decided how the money is actually spent. Most women were earning some money by selling tea, salt, spices or charcoal. This money was used for household expenditures or was put in a sanduq*. In one household the woman was the main income earner, while her husband did al the shopping.

5.2.4. Water storage

The water is stored in barrels, jerrycans and zirs*. In most households no real distinction is made between drinking water and water for other purposes. Drinking water is kept in zirs to keep the water cool. The zirs are often filled with water from barrels.

In most households zirs and barrels standing outside the guttia* are covered with an aluminium tray. Those which are kept inside are hardly ever covered, while people believe the roof protects the water against pollution. Water in jerrycans is stored uncovered.

5.2.5. Water drawing

The water is drawn from the barrels and zirs with a cup or small vase. In this way the water gets easily contaminated by dirty hands. In some visited households the water was drawn with used drinking cups.

5.2.6. Water re-use

Some water is re-used. In some households the zir stands in a support and then the water which is seeping through the earthen pot is collected and used for gardening or given to the animals. People often wash foods or hands, feet and face above some plants in order to re-use spillage water.

Water from washing or dish washing was not re-used in the households studied. This might be due to the season in which the researcher stayed in Hai El Tadamon. At the end of the dry season water is very scarce and then washing water might be re-used as well.

5.3. Food handling

5.3.1. Food storage

Most foods are prepared immediately after buying. Vegetables are kept outside in a plastic bag or basket, or inside in a covered pot.

5.3.2. Food preparation

In all the households studied, all foods and nearly all cooking utensils were washed before and after food preparation. In all these households women washed their hands before cooking, but only in one household this was done with soap.

Most women cook on charcoal stoves, this is done outside or in a matbach*. Especially by the making of kisra* there is a fire risk and some smoke problems can occur.

5.3.3. Eating

In Sudan people usually eat fatur* at 11-12 o'clock, an afternoon meal at 4 0'clock and an evening dinner around 8-9 o'clock. In Hai el Tadamon the evening meal is very sober and often skipped because of lack of money. The other meals mostly consist of kisra and/or bread with some sauces, and some uncooked vegetable salad. It is served in small dishes on a tray from where people eat with their right hand. In the households studied all members eat the same foods. The younger children eat separate from adults, and in some households men eat separate from women. It was remarkable that in most households the hands were washed before and after the meals, but that only after eating the hands were washed with soap.

5.3.4. Food preserving

Left-overs are said to be preserved by two different methods. In the first they are cooked twice: after the meal and again before eating. In the other the left-overs are stored in a small pot which is stored in a big pot filled with water (to keep it cool) and before eating the food is cooked again. The latter method was not practised in the investigated households.

5.4. Domestic hygiene

5.4.1. General impression

The first impressions of Hai el Tadamon considering hygienic circumstances are rather positive. The streets are clean, in other neighbourhoods of Gedaref a lot of plastic and other garbage is polluting the environment. The plots usually give a rather neat impression with fixed places for different activities. Wastewater and solid waste is dealt with properly.

The cleaning of household utensils and personal hygiene leaves some to be desired. In many households water collecting and storage equipment is hardly ever cleaned. Next to that soap is often not used when needed. Because latrine ownership is rare, much of the public space in the neighbourhood is contaminated with human excreta. This environmental pollution causes serious health problems.

5.4.2. Wastewater disposal

Most wastewater is dealt with on the plot. It is thrown away where it was used - e.g. dish washing or washing is often done on fixed places - or on the edges of the plot. If the plot is very small, large quantities of water are thrown on the street. In the dry season this water is immediately absorded by the black cotton soil. In the rainy season the absorbing capacity of the soil decreases enormously and then everywhere pools of stagnant wastewater and rainwater can be found.

Water used for washing foods is often re-used for watering plants.

5.4.3. Solid waste disposal

In Hai El Tadamon there is no garbage collection scheme. Women collect non-organic solid waste and burn it outside the plot once in two or three days when there is no wind. Organic waste is given to the animals or thrown on the street as food for goats. It must be taken into account that non-organic solid waste is hardly produced, most women reuse materials many times.

5.4.4. Cleaning
The plot, the guttia, the matbach and hamam* are swept daily.
Flies and other insects are dealt with with smoke (wood or incense), very few households use chemicals.
The dishes are washed directly after eating and a lot of kitchen tools are washed before and after using, unfortunately most of the time without soap. These utensils are dried by the sun and are stored either in a cupboard or on the ground (in the matbach or on a special place on the plot).
As for the water storage equipment, nearly all women in the group meetings said they cleaned the storage equipment regularly; the zirs were to be cleaned daily or at least twice a week, the barrels were to be cleaned once in one or two weeks. During the household visits the researcher never saw this happen, in fact most of the zirs and barrels looked rather dirty. The water drawing equipment was regularly cleaned, but hardly ever with soap.

5.4.5. Laundry
Clothes are washed once in two or three days. It is an expensive activity for it requires extra water. The women wash on a fixed spot on the plot. In some families the men wash their own laundry. Clothes are dried by hanging over the plot-fence, whereby it must be taken into account that women clothes are not supposed to be seen by men. Sometimes, the clothes are ironed after washing with charcoal flat-irons.

5.4.6. Animals
In all households studied chicken came in the guttia's, even when they were not allowed. In the older blocks animals (e.g. chicken, goats etc.) are kept in a special guttia or rakooba*. In the newer neighbourhoods - where most plots are not even fenced - the animals are kept in the guttia to protect them against theft.

5.5. Personal Hygiene

5.5.1. Bathing
Most people wash themselves daily with soap and some kind of dried seed-vessel from a tree to scrub the skin. Men use to wash very early before going to work. All the women visited washed themselves during the day. On most plots a special part of ± 4 m^2 is fenced for washing purposes, the hamam. When it is very cold people wash themselves in the matbach. In the households visited children were washed once in one or two days in the afternoon. Their mother washes them in the matbach one after another in an ankle-deep bowl filled with lukewarm water.
The muslim people wash their hands, head and feet several times a day before praying. This is often done above some plants.

5.5.2. Human excreta disposal
Considering human excreta disposal, much of the public space of Hai el Tadamon is seriously contaminated. Very few households own and use latrines or other sanitation facilities, the environmental conditions in Gedaref require high construction costs. Some people dig holes to use as a latrine, but these collapse in the rainy season. This means most people defecate outside the plot in the open, especially khors* and wastelands are used to defecate. In the islamic society it is very important that women are not seen when bathing or defecating. Thereforee, women who live on the edges of the neighbourhood are able to go to the toilet all day. Women who live in between guttia's can only go during darkness, otherwise they have to walk very far. Children defecate just outside the plot.

5.6. Health and diseases

5.6.1. Disease occurrence
In the group meetings the women were asked about disease occurrence, the answers can not be medically founded while an epidemiological survey has not been carried out yet. There are no update quantitative research data available on disease occurrence for Hai El Tadamon.

A distinction can be made by diseases primarily occurring in the rainy or in the dry season. In and after the rainy season there is an upswing of malaria, for the breeding places for malaria mosquito's are enlarged. In the dry season people are more often suffering from headache or eye irritations. This can be due to the heat, and the small amounts of water used for personal hygiene for in that season water is scarce. During the whole year diarrhoea, giardiasis and other stomach problems occur.

5.6.2. Formal medical service

In Gedaref the formal medical service is coordinated by the local Ministry of Health, this department is financed by the National Ministry of Health in Khartoum. The Gedaref Ministry has a curative and a preventive component. The latter consists of several departments such as Health Education, Diarrhoeal Diseases, Vaccination and Malaria Prevention. The existence of these departments does not automatically mean that a lot of preventive projects are performed in Hai el Tadamon. Until now the neighbourhood has only been sprayed with DDT in the struggle against malaria mosquito's. However, in the future the Ministry of Health will participate in the hygiene education programme of DUGAP by training home visitors, giving vaccinations etc. and by integrating the neighbourhood in the National Anti-Malaria Programme.
For curative formal medical service the Hai el Tadamon people consult the health clinic in El Sofi, or the hospital in the centre of Gedaref. Sometimes people visit doctors who have their practices in the town centre of Gedaref. In the future the people can obtain basic medical service (curative and preventive) in their own neighbourhood for there is a health centre under construction.
It can be hoped that in the future some Tadamon girls can attend the midwifery school for nowadays hardly any officially trained midwives are present in Hai El Tadamon. This gives a lot of problems especially for those women who are circumcised in a way that makes delivery very complicated.

5.6.3. Informal medical service

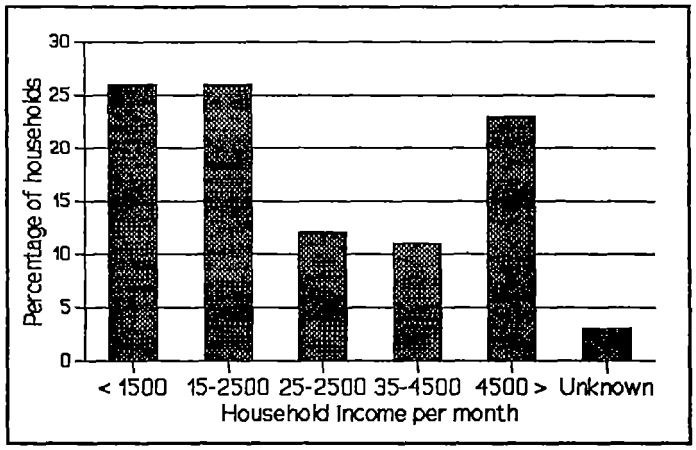
In Hai El Tadamon some male and female traditional doctors like faki's*, malaria burners and ache scratchers are frequently consulted when people have health questions/problems.
Faki's (koran-healers) practice two curative methods with special verses from the koran. In the first the verse is written with holy ink on a special writing-tablet. Afterwards the ink is sluiced down with water, the ill person drinks this solution as a medicine. In the second method the verse is written on a paper which is burned. The ill person inhales the smoke which has healing qualities. Next to these curative practices a faki writes charms - normally verses from the koran, to be carried on the upper arm or around the neck in a small wallet - as protection against various evils and diseases.
Malariaburners treat malaria by making small burns on the lower and upper arm or on the forehead. There are other persons who make scratches with a razor-blade on the sleeps or on the belly against eye, head and stomach ache. Small children are burned in the neck or on their gums when they have diarrhoea. When children do not want to eat because they have to cough all the time, a special doctor cuts a bit of flesh out of their throats.
Considering that a lot of Sudanese people have malaria burn scarfs, ache scratches or koran amulets it can be said that these informal doctors are of major importance. It is a widespread belief that these treatments from informal doctors have a positive effect on the patient. The medical science agitates against these practices, especially malaria burning and ache scratching can cause serious infections.

5.6.4. Responsibility, knowledge and finances

As in most societies, in Hai El Tadamon women are primarily responsible for taking care of matters regarding health and diseases. The researcher tried to gather information on the explanations that women have for disease transmission, but did not succeed and thus it seems as if women do not know how diseases are transmitted. This might be due to language problems, while this kind of information is difficult to obtain. In literature (Burgers, 1988 and Wijk-Sijbesma, 1985) it can be found that in most societies people have at least some (spiritual) explanations if they do not know biological how diseases are transmitted. All in all it is obvious that most women do not know exactly how diseases are biologically transmitted.
Women sometimes pass their knowledge about disease treatment and elementary health care to their daughters by special lessons. Children also learn by seeing, and by being ill.

In the group interviews some (not representative) information is gathered about health costs. In general the women said to spend £s 500-1500 a month on disease treatments and doctor consults (£s 300). It must be taken into account that in the dry season less money is spent then in or just after the rainy season, for in the latter period more malaria cases occur which require an expensive treatment.
When the above mentioned health costs are related with the household income (graphic 3) it can be said that in some households sometimes more than a quarter of the income is spent on health. There are no adequate quantitative data available on health costs.

Graphic 3: Household income per month in £s, current rate £s125 : $1 (Abderresoun, 1992).



5.7. Women involvement

5.7.1. Formal women organisation
In general the involvement of women in organisation and decision making in the neighbourhood is low, while men think women are not very capable or do not want women to participate outside the house. The uneducated women mainly do not have enough self-confidence to challenge those ideas.
In the neighbourhood committee (30 members) three young, inexperienced women were representatives of the women. Lately, one of these three has withdrawn and the other two hardly participate in important matters for they are not informed about meetings, or the meetings are held at inconvenient times.
In 1990 the national government initiated a women's secretary in the town council with the task of organising women committees in the neighbourhoods of Gedaref. In Hai El Tadamon a women committee was established but this committee merely exists in name, and no concrete activities have been organised.

5.7.2. Informal women networks
All women participate in some kind of network based on friendship or family relations. In these groups (6-14 persons) all kind of information is exchanged and the women can rely on each other in case of pregnancy, illness and other difficulties. Most women meet during the day while drinking coffee or sharing a meal.
In Hai El Tadamon also several informal saving groups (6-20 persons) exist, the so-called sanduqs*. The activities of these sanduq groups aim at the personal needs of the members (sometimes, hardly ever, a man participates). The members regularly put a fixed amount of money in a fund. This fund will be given to each member by turn, and the money is used for buying household equipment etc.. The sanduqs are in principal open to everyone who wants to join, but in practice they are formed among neighbours, relatives or trustworthy persons. (In some sanduq's also men participate).
All these informal women networks are not involved in decision making at neighbourhood or block level. It will be impossible to incorporate these informal women networks in the formal project management - they are too small-scale, and too informal - but they provide opportunities to communicate with women and can be a main source and destination of information and feedback regarding water, health and sanitation matters.
On the question "How can women best be reached about decisions regarding water made by the water committee?", all women groups answered "by organising special women meetings with a representative from the water committee. The women attending that meeting can tell the women not attending". On suggestion of the Hai El Tadamon women, a women contact network is established in each block in relation to the water project. In this way women can easily be contacted about matters that are important for them. On one hand the water committee (and DUGAP) can reach the women for decision making, participation and providing information. On the other hand the women can reach the water committee (and DUGAP) for complaints, information and initiatives. The future will show if these newly established women contact networks can prove themselves.

5.7.3. Project expectations

Most women in Hai El Tadamon are always in search for ways to generate income. The water project is thereforee warmly received, for in the future the neighbourhood will be provided with 3 to 4 times cheaper water. In the future it will be the women who have to fetch the water by a standpost - in the present situation the majority of water is brought on the plot by the water vendors - during the investigation the woman did not care that their workload will increase. The possibility of earning money by working at a standpost is less enthusiastically received. Most interviewed women have small children and this responsibility restrains them from working.

Repeated information on future water availability is given, the distribution network will only give water once in two days (just like in the rest of Gedaref) and maybe the standposts are not operating on the most desirable hours. In spite of that, most women still have the idea that in the future the water will flow abundantly.

During the group interviews the women indicated that water vendors should be involved in the project, for they will be important for the ill, old and pregnant women. Next to that some women will be prevented from fetching water by their husbands. If the water vendors are not integrated in the project, or are forbidden to fetch water at the standposts, these women cannot take advantage of the cheap water offered to the neighbourhood.

6. ANALYSIS AND DISCUSSION

6.1. Analysis of the research results in context of the household ecological framework

The Hai El Tadamon water project will change the daily life of the inhabitants. Until this moment, the water supply was purely a domestic concern since most of the water was brought on the doorstep by water vendors. In the future this will radically change. The workload of many women will increase, while collecting water in the future also means waiting and carrying. For women in the poorer households - who now already fetch their water at a certain distance - the workload will be less. Contrary to these disadvantageous changes in household resources (time and labour) there are some positive changes as well. In the future the water price at the standposts will be 3 to 4 times lower than the water bought from water vendors besides the possible improvements in water quality. Next to that the household control over the water provision can be increased. Nowadays the neighbourhood depends on water vendors and this gives the vendors a lot of power. In the future the neighbourhood is represented by a water committee which can negotiate with the National Urban Water Cooperation. The construction of the water distribution system is attended with a hygiene education programme. This might positively influence the household resources knowledge, skills and information.
All these changing household resources influence the willingness and capability of the households to change their hygienic behaviour. In the household ecological model (figure 2 / chapter 3) this coherence is outlined in a diagram.

A changing input of household resources by the introduction of the distribution network effects the water and health strategies within the household. In the research the women preferred to collect water between 7 and 9 o'clock in the morning. Usually there were enough water vendors to fulfil this demand. In the future people have to collect water at the standposts and if everybody comes between 7 and 9 in the morning this will result in long queue's. And maybe the standposts might not even be operating at these most desirable hours. These two facts have consequences for the way of performing household activities, the present time-table used for doing all activities will have to change. Next to that the distribution network will only give water once in two days, this means storage capacity and fetching capacity will become limiting factors for obtaining all the water from the distribution network. In the future the households will have to change their household strategies in order to be able to provide themselves with sufficient water.
The hygiene education programme aims at changing hygienic behaviour. If this programme succeeds the Hai el Tadamon people might perform more proper hygienic activities even if they are rather annoying and if they require an investment in time and energy. Thus, hygiene education might also cause transformation of household strategies.

The level of care of the Hai el Tadamon households will be influenced by changing household strategies. When the water distribution network is put into use a lot of time and energy will be required from women (and children) for collecting water, and this time and energy can not be used for other purposes. However, the water price will be 3 to 4 times lower and the benefit money can be used for financing other goods which can increase the level of care. Unfortunately it happens frequently that financial benefits only favour men (and not women), and men often do not spent the surplus money on household purposes. If that happens in Hai el Tadamon the workload of women increases whereas there is no profit for women and households. Then the level of care might even decrease while valuable time and energy can not be spend on other household activities.
On the other hand the health and well-being of the household members might increase because the adjoining hygiene education project might cause changes in hygienic activities. The willingness and capability of household members to change their hygienic behaviour might increase.

6.2. Future water supply

In the future water vendors will also be needed. Not only for ill, pregnant and old women, but also in addition to the system, while it will be hardly possible for big families to collect all the water for two days in one day. But the water project does not involve water vendors because it can hardly be controlled that water vendors do not sell their cheap water outside Hai El Tadamon. For this reason, and to avoid sludge creation, it will be forbidden for water vendors to obtain water from the standposts.

Thus, in the future the strange situation will arise that the cheapest water is the cleanest. When the hygiene education succeeds and the water is not polluted before consumption (after transport, storing and drawing) it can only be hoped that people use this cheap high quality water for drinking and the additional expensive water vendor water for other purposes, to generate any health impact. Nowadays there is no distinction made between drinking water and water for other purposes.

6.2. Hygiene education

Providing hygiene education is a purposed intervention in household activities, and before doing so it is desirable to consider if it is meaningful.
Hygiene education is used to promote the desired use of water and sanitation facilities and to obtain behavioural changes and health impacts. Behavioural changes largely depend on human and non-human household resources like knowledge, attitudes, skill, time, money etc.. Before providing hygiene education it is necessary to investigate whether the households dispose of sufficient household resources needed for behavioural changes.
Means and money are important non-human resources which are available to a certain extent in Hai el Tadamon. Soap is widely available in the neighbourhood shops. Notwithstanding the rather low household incomes people will be able to buy soap, especially when is shown that safer hygienic behaviour can lead to lower health costs.
Knowledge, attitudes, skill, energy and time are some human resources which should be reckoned with. The Hai el Tadamon know the importance of some hygienic activities but do not fully understand those practices. They do not know how diseases are actually transmitted. This sometimes results in unhygienic behaviour while some activities (e.g. cleaning water storage equipment) are rather annoying and time/energy consuming. Hygiene education can increase the knowledge on health aspects and disease transmission. During the investigation it became clear that the Hai el Tadamon women are eager to learn and are willing to improve their health situation, even if this requires an investment in time and energy.

In chapter 3 (figure 3) three categories of factors contributing to health behaviour were given. In this context it can be said that predisposing factors such as knowledge and beliefs are the most constraining factor for health improvements in Hai el Tadamon. People know the importance of some hygienic behaviour but do not act like that because they do not fully understand those practices. The opinion that their actual behaviour is not so bad is strengthened by reinforcing factors, family and friends behave in the same way. The capability of households to display proper hygienic behaviour is influenced by enabling factors. Most Hai el Tadamon households can dispose of sufficient resources if they want to, but unfortunately they lack of sufficient skills to change their hygienic behaviour.

Hygiene education can be considered meaningful in Hai el Tadamon. People are eager to learn, and it is important to provide health information with the changing water supply to prevent water pollution before consumption. If the hygiene education coincides with the wishes, needs and possibilities of the Hai el Tadamon people some health improvements can be obtained.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Introduction

The research had the following aims:
1. To provide information on household level into water handling and sanitation activities within the households of Hai El Tadamon.
2. To give recommendations on:
   a. The design of the hygiene education programme.
   b. The involvement of women in the water project.

The insight information on water handling and sanitation activities within the households of Hai El Tadamon was given in chapter 5 and in annex D-H. The answers on the research questions formulated in paragraph 2.1. are given in paragraph 7.2. This summary of the research results can be seen as the conclusions, while the investigation had a discriptive character. In the paragraphs 7.3. and 7.4. the recommendations are presented. Some suggestions on further research can be found in paragraph 7.5..

7.2. Conclusions

7.2.1. Water handling (Research question; What activities and attitudes prevail by collecting, storing, drawing and using water?)

Nearly all the households make use of water vendors who bring the water on the plot. Nowadays the water costs between £s 10-20, depending on the season. In the future the water will be 3 or 4 times cheaper.
The socio-economic research showed that the women prefer to get water between 6 and 7 o'clock in the morning and around 4 o'clock in the afternoon (Abderresoun, 1992). In the households studied all women collected water between 7 and 9 o'clock in the morning. This difference might be due to seasonality.
On average a Hai el Tadamon household uses 22 jozz a week, which is approximately 15,5 litres per person per day.
The water is stored in barrels, jerrycans and zirs. In most households no real distinction is made between drinking water and water for other purposes. Water stored outside the guttia is usually covered. The water is drawn from the barrels and zirs with a cup or small vase. In this way the water gets easily contaminated (by dirty hands).
Water re-use is not very important in Hai El Tadamon.

7.2.2. Food handling (Research question; What activities and attitudes prevail by storing, preparing, eating and preserving food?)

Most foods are immediately prepared after buying. All foods are washed and all women wash their hands before cooking (often without soap). It is remarkable that in most households the hands are washed before and after the meals, but that only after eating the hands are washed with soap.

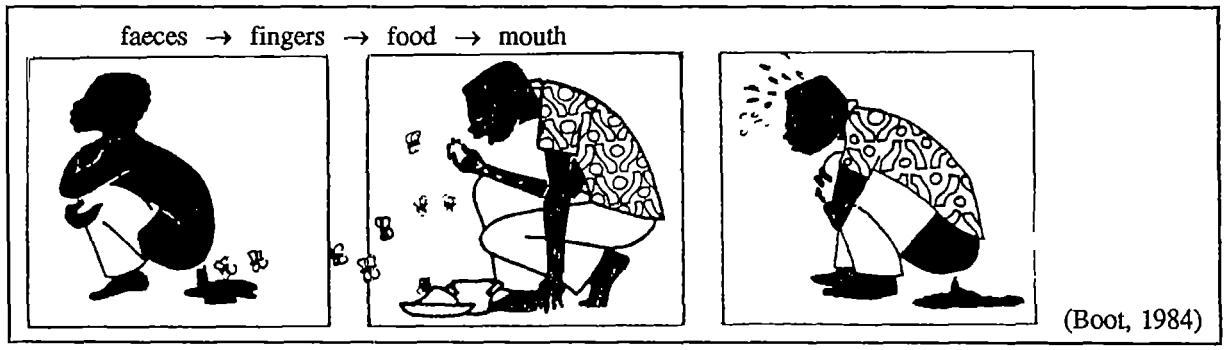
7.2.3. Domestic hygiene (Research questions; How is liquid and solid waste disposal treated? and How do people deal with their domestic hygiene?)

Most waste water is dealt with on the plot.
There is no garbage collection scheme, non-organic solid waste is collected and burned outside once in two or three days. Organic waste is given to the animals or thrown on the street as food for goats.
The dishes are washed directly after eating and a lot of kitchen tools are washed before and after using, unfortunately most of the time without soap.
As for the water storage equipment in the group meetings nearly all women said they cleaned the storage equipment regularly. In practice the researcher never saw this happen, in fact most of the zirs and barrels looked rather dirty. The water drawing equipment was regularly cleaned, but hardly ever with soap.

7.2.4. Personal hygiene (Research question; How do people deal with their personal hygiene?)
Most people wash themselves daily with soap.
Much of the public space of Hai el Tadamon is contaminated with human excreta. This environmental pollution causes serious health problems. Very few households own and use latrines or other sanitation facilities, the environmental conditions in Gedaref require high construction costs. Most people defecate outside the plot in the open (on public grounds or in a khor).

7.2.5. Health and disease (Research question; What knowledge do people have and who is consulted regarding health and disease matters?)
A distinction can be made by diseases occurring in the rainy season (like malaria) or in the dry season.
There are no update quantitative research data on disease occurrence for Hai El Tadamon.
Nowadays people consult the health clinic in El Sofi or the hospital in the centre of Gedaref in case of serious illness, in the future people can obtain basic medical service in their own neighbourhood.
In Hai El Tadamon some male and female traditional doctors like faki's, malariaburners and ache scratchers are frequently consulted when people have health questions/problems. Considering that a lot of Sudanese people have malaria burn scarfs, ache scratches or koran amulets it can be said that these informal doctors are of major importance.
As in most societies, in Hai El Tadamon women are primarily responsible for taking care of matters regarding health and diseases. It is obvious that most women do not know exactly how diseases are biologically transmitted.
There are no adequate quantitative data available on health costs. This research indicates that in some households sometimes more than a quarter of the income is spent on health. More investigation on this topic is required.

7.2.6. Women involvement (Research questions; What networks and organisation structures of women exist in the neighbourhood? and Which of these women networks and structures can be incorporated in the project management?)
In general the involvement of women in organisation and decision making in the neighbourhood is low, while men think women are not very capable or do not want women to participate outside the house. In the neighbourhood committee (30 members) two young, inexperienced women are represented.
All women are partaking in some kind of network based on friendship or family relations. In these groups (6-14 persons) all kind of information is exchanged and the women can rely on each other in case of illness, pregnancy and other difficulties. Next to that some women save in a sanduq, another informal women network. All these informal women networks are not involved in decision making at neighbourhood or block level, and it will be impossible to incorporate these networks in the formal project management, but they provide opportunities to communicate with women and can be a main source and destination of information and feedback regarding water, health and sanitation matters.
On suggestion of the Hai El Tadamon women, a women contact network is established in each block in relation to the water project so that women and the project management can be easily contacted about matters that are important for them. The future will show if this newly established women contact networks can provide for the needs, wants and wishes of the women.



(Boot, 1984)

7.3. Recommendations on the hygiene education programme

The hygiene education will be attached to the water project and therefore must provide information on how to keep a high water quality during collecting, transporting, storing and drawing water.
Next to that the hygiene education should contain general information on diseases and disease transmission and give an insight in the existence and avoidance of water related diseases like malaria, giardiasis and hepatitis.
Special attention should be paid to faecal-oral transmission, while this is a transmission route which can be eliminated within the household. In this regard the importance of safe handling of water, safe handling of food and safe excreta disposal must be shown. Nowadays some of these safety aspects are not dealt with in a proper way. E.g. women have methods for preserving food in an hygienic way, but many women only wash their hands with soap after eating and not before cooking and eating. Something like this also counts for water storage. Most women cover the s for keeping dirt etc. out, but the water in it is touched by dirty hands or used cups.
When the hygiene education programme is drafted it must be taken into account that programmes which use one-way information transfer have been found less effective in achieving behavioural change than programmes with active participation in discussions on health conditions and behaviour. Health discussions help people apply and increase their practical understanding of the relationship between water, sanitation and family health (Wijk-Sijbesma, 1990).

The hygiene education can be given in different ways, two levels can be distinguished:
1. Formal hygiene education; Hygiene education by professional persons given in special meetings, home visits, school lessons or advice when visiting the health centre.
2. Informal hygiene education; Hygiene education given by persons the Hai El Tadamon people already meet in their daily life. Behaviour changes might be achieved by repeating the new information in a confident environment and by discussing with persons the people already know.

Special discussion meetings, separate for men and women, can be organised in the school and in the health centre (which is being built). These meetings should not be organised for a mixed public, both men and women feel more at ease discussing health and sanitation matters without the other sexe. In these meetings the discussions should be audio-visually supported by a movie, slides, theatre etc.. Most Tadamon people are uneducated and are not able to pay attention to verbal communication all the time. It must be taken into account that men an women must be reached in different ways. Women can be contacted personally by home visits or a megaphone-car. Men can be reached through the neighbourhood committee.

It might be useful to hold some additional small-scale group meetings with women, for then discussions can deepen and more intimate questions can be asked/answered. For these additional meetings the tupper-ware method can be used to reach the women. This means some households are selected in which the woman invites friends and neighbours (the informal network they are all participating in) for a group meeting. In this method incentives are used to attract the women to join (or organise) the meeting. Short term incentives can be small useful presents like a piece of soap, a spoon with a long arm for drawing water etc.. In the Hai el Tadamon case long term incentives can be lower health costs, less illness among children or other advantages of improved hygienic behaviour. Another idea is to reach the women through the women contact network which is established in each block in relation to the water project.
It will be clear that these options are a rather time consuming way of giving hygiene education, but it should be taken into account that the women must be reached to obtain changes in hygienic behaviour. For giving appropriate hygiene education the Dutch University Gedaref Assistance Programme (DUGAP) should employ one or more female Sudanese health workers.

By all these women meetings, special attention for men must not be forgotten, otherwise they will not accept the changes women want to carry through. Men must be notified about why and what their women learn in the hygiene education meetings, to accept and encourage and support (financial) the behavioural changes. In the information for men it can be emphasized that women are primarily responsible for health and disease matters within the household. This means men must give women right and possibility of say in planning the hygiene education programme, and men must not forbid women to attend hygiene education (for then they seclude their families and themselves from health improvements).

Formal hygiene education can also be given at school and in the health centre. Children can learn about diseases and hygienic behaviour in special health lessons, the same counts for grown-ups who attend adult education. The health centre can play an important role in providing hygiene education. People are visiting this centre for health reasons and during those visits hygienic behaviour can be discussed. This has an advantage because people with health complaints are more open for advice and information on this subject. The school and the health centre might also be suitable locations for building model sanitation facilities (latrines e.g.). Before building them, it must be investigated which sanitation technologies are appropriate for Hai el Tadamon considering technical and environmental conditions, availability of materials, organisational facilities, finances and socio-cultural factors. Such a research should be part of the sanitation component of the Hai el Tadamon water project.

Some people will not be able/allowed to attend special meetings, and others will not immediately change their hygienic behaviour after attending some meetings or after receiving advice or information. Behaviour changes might be achieved by repeating the new information in a confident environment and by discussing with persons the people already know.
These persons can be the female minder at the standpost, the woman community worker and of course the local doctors. In Hai El Tadamon some traditional doctors like faki's, malariaburners and head-ache scratchers are frequently consulted when people have health questions/problems. It might be useful to investigate if, and how, these local doctors can participate in providing hygiene education.

In the hygiene education it must be taken into account that the Hai El Tadamon women are especially interested in income generating. Women must be shown that safer hygienic behaviour can lead to lower health costs.

7.4. Recommendations on the involvement of women

The intention is to involve the neighbourhood in the management of the project, and in the operation and maintenance phase, by establishing a Hai El Tadamon water committee.
Involvement of women in the water committee is desirable, for nowadays the Hai El Tadamon women are primarily responsible for taking care of water matters.
It is still very difficult to give some clear outlines on how women can be actually involved in the water project, while the project still remains in the preliminary phase and no concrete activities can be conducted.

On suggestion of the Hai El Tadamon women, a women contact network is established in each block in relation to the water project. In the future this network might be able to participate in the project management. If the six female members in the water committee participate in the women contact network in their blocks, they can be supported by these networks and the women can be reached about decisions the water committee made. It is advisable to involve the women contact network in other DUGAP activities, otherwise this initiative might collapse before project execution.

The women must become more acquainted with DUGAP (the project executor) to inspire confidence before real involvement in the project can be obtained. By executing some small projects the women become acquainted with DUGAP and if these experiences are positive, they pay interest in other activities and will (automatically) get involve in the water project. Women can be reached through some points of interest like health, income generating and adult education (Abderresoun, 1992). Small projects might be established on the area of vegetable gardening, goat breeding and selling milk, cloth repair or remake lessons, sheep breeding and spinning wool, first-aid lessons and 'cleaning the neighbourhood' actions.

Recently, the female community worker started organising a vaccination campaign for children in Hai El Tadamon. In this small project the women contact network in each block takes part. An effort will be made to integrate the neighbourhood in the National Anti-Malaria Programme of the Ministry of Health by way of the Gedaref Health Office.

7.5. Suggestions on further research

7.5.1. Health costs
In the hygiene education it must be taken into account that the Hai El Tadamon women are especially interested in income generating. Women must be shown that safer hygienic behaviour can lead to lower health costs. There are no adequate quantitative data available on how much money and for what reason money is spent on health. This research indicates that in some households sometimes more than a quarter of the income is spent on health. More investigation on this topic is required.

7.5.2. Involvement of local doctors in hygiene education
In Hai El Tadamon some traditional doctors like faki's, malariaburners and ache scratchers are frequently consulted when people have health questions/problems. It might be useful to investigate if, and how, these local doctors can participate in providing hygiene education.

7.5.3. Women knowledge on disease transmission
As in most societies, in Hai El Tadamon women are primarily responsible for taking care of matters regarding health and diseases. During the investigation it appeared that most women do not know how diseases are transmitted. This finding might be due to language problems, while this kind of information is difficult to obtain. In literature it can be found that in most societies people have at least some (spiritual) explanations if they do not know biological how diseases are transmitted.
More information on this aspect can be of value for the connection of the hygiene education to the local knowledge.

7.5.4. Disease occurrence
In the group meetings the women were asked about disease occurrence, the answers could not be medically founded while there are no update quantitative research data available on disease occurrence for Hai El Tadamon. It might be useful to carry out an epidemiological survey to be able to measure the extent of diseases occurring in Hai el Tadamon.

7.5.5. Women involvement
It is still very difficult to give some clear outlines on how women can be actually involved in the water project. Women can be reached through some points of interest like health, income generating and adult education (Abderresoun, 1992). A sound investigation among the Hai el Tadamon women on these topics might bring above some concrete points of contact for women involvement by DUGAP and the water project. In such a research the newly established women contact networks can/must be involved.

7.5.6. Household activities in the dry season
One of the constraints of this research is that is was carried out in the beginning of the dry season. Seasonality might influence the household activities women perform (e.g. through availability of water). Household activities and strategies in other seasons, which might be of major importance, are not taken into account in the project. Thereforee it might be useful to investigate the intra-household activities regarding water health and sanitation in other seasons as well.

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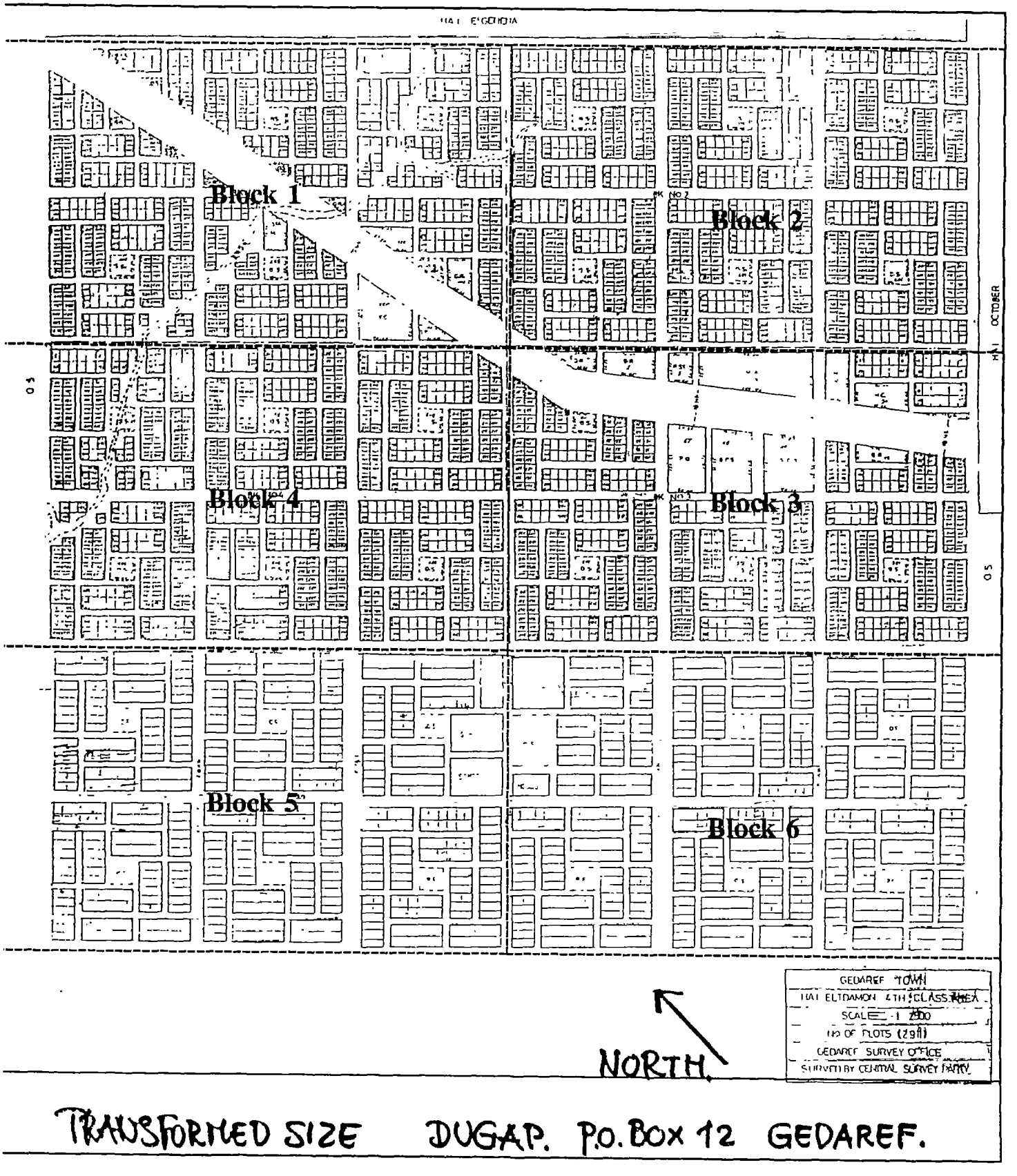
ANNEX A: MAP OF HAI EL TADAMON

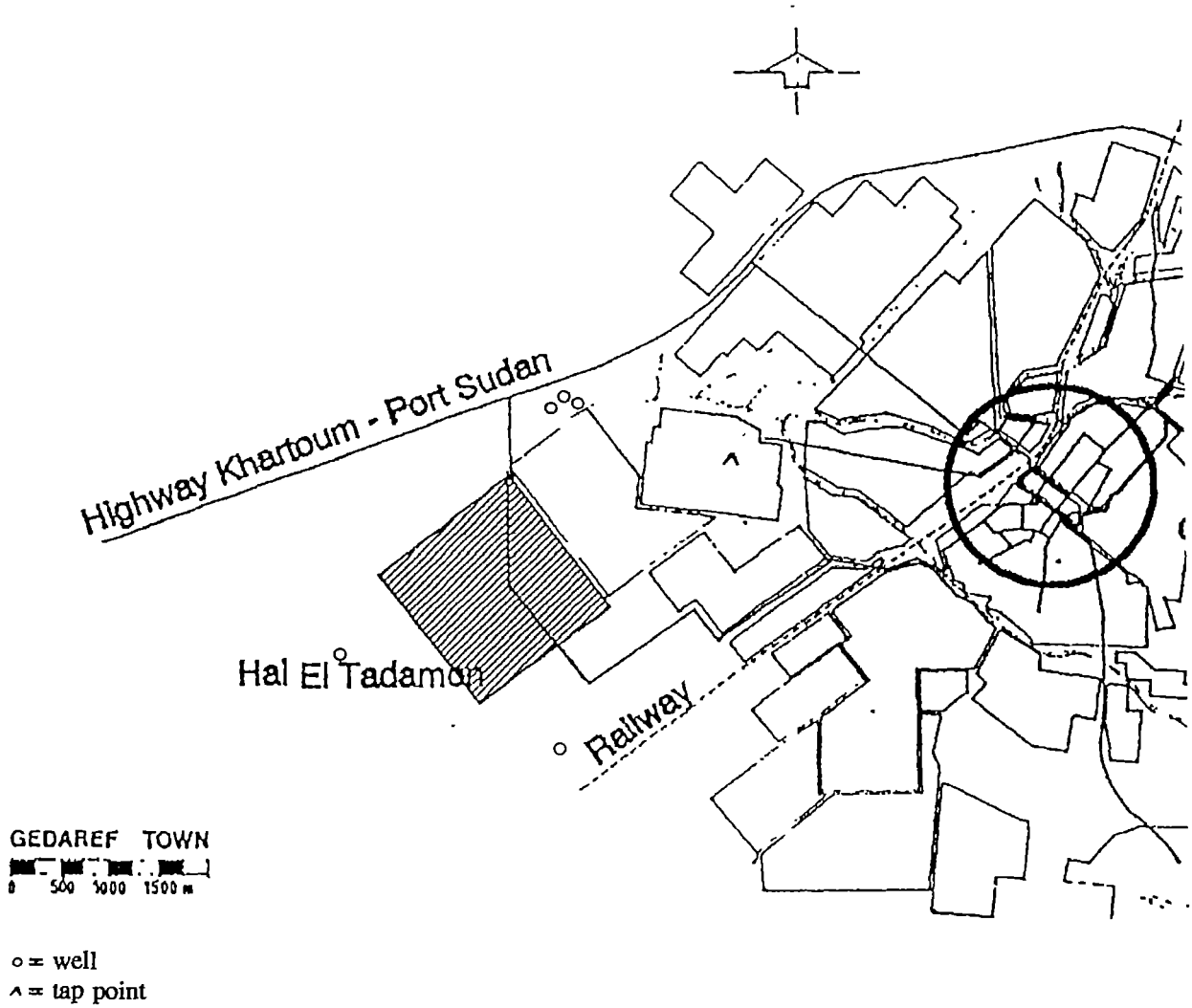


TRANSFORMED SIZE DUGAP. P.O.BOX 12 GEDAREF.

ANNEX B: ARABIC TERMINOLOGY

Bornu:	Term used to denote people from West Africa, mainly used for people coming from Chad.
Faki:	A holy man, koran teacher and koran-healer. A faki writes charms as protection from various evils. He is also consulted to cure diseases (Ismail, 1986).
Fatur:	Breakfast, between 9-11 o'clock
Fellata:	Term used to denote people from West Africa, mainly used for people coming from Northern Nigeria.
Goerasa:	Wheat with oil.
Guttia:	Round huts for living made of agricultural waste.
Hamam:	A fenced part on the plot of ± 4 m^2 used as bathroom.
Haussa:	Term used to denote people from West Africa, mainly used for people coming Niger and Mali.
Jozz:	Two jerrycans, ± 32 litres.
Kisra:	A kind of unleavened bread. Preparation: millet paste is spread thinly on a hot circular or square metal, making very thin sheets of bread (Ismail, 1986).
Khor:	Seasonal river.
Lubia:	White beans.
Matbach:	Kitchen, most of the time a special rakooba or guttia.
Messalite:	Tribe from the West of Sudan.
Nuba:	Tribe from Southern Kordofan.
Medida:	Wheat porridge.
Sanduq:	Informal rotating savings and credit association. The members put a fixed amount of money regularly in a fund. This fund will be given to each member regularly by turn.
Shilluk:	Tribe from the South of Sudan.
Souk:	Market area.
Rakooba:	Small square building made from agricultural waste. Used as kitchen or for keeping animals. Rakooba's with only two or three walls are used as shade providers.
Zir:	A earthenware water-pot, either round or conically shaped in which water has a pleasant cool temperature. The zir is porous so that water slowly seeps through.

ANNEX C: WELLS AND TAP POINTS IN THE SURROUNDINGS OF HAI EL TADAMON



o = well
^ = tap point

ANNEX D: DATA COLLECTED ON WOMEN MEETINGS

In each block two group meetings with women were held to gather information on water, sanitation and health aspects. The researcher asked questions or brought up attention calling topics which the women answered/discussed. Besides that the women were involved in the determination of the location of the standposts and the choice between two standpost models.
After all twelve meetings the interviews were structured on various topics which were discussed in the meetings. The following list gives the data collected, the remarks made in each block are written down (1; = block 1, 2; = block 2 etc.). Sometimes a '-' can be found behind a block number, this means the topic is not discussed in that particular block. It must be taken into account that the women sometimes talked about their ideal behaviour instead of their real behaviour (attitudes versus practice).

How may women did attend the meetings?

1; first meeting: 7,	second meeting: 7-12
2; first meeting: 16-18,	second meeting: 30
3; first meeting: 23-31,	second meeting: 17
4; first meeting: 32,	second meeting: 15-35
5; first meeting: 10-15,	second meeting: 22
6; first meeting: 16-20,	second meeting: 16-22

What types of water are being used?

1; Fresh, salt and sometimes brackish water.
2; Fresh and salt water. In the rainy season fresh water is more often available.
3; Fresh and salt water.
4; Fresh, salt or brackish water.
5; Fresh and salt water.
6; Fresh and salt water.

What types of water are used for what activities?

1; All the water is used for all purposes.
2; -
3; Fresh water is used for drinking and personal hygiene. In case of shortage, salt water is used for personal hygiene.
4; -
5; Salt water is not used for drinking water (if possible).
6; All the water is used for all purposes.

How do women measure water quality?

1; By taste: salt water is very clean but is not potable.
2; By taste: salt water has a good quality.
3; By taste: salt water is clean/clear, fresh water is dirty.
4; By taste and by asking the water vendors (sometimes they do not tell the truth).
5; -
6; By taste and by asking the water vendor where he fetched the water. Salt water is clean, fresh water is dirty.

How is water obtained?

1; Water is taken from water vendors. Women used to go to a well called 'bir Hussein' but now that water is given away for free and the women feel ashamed to fetch their water without paying.
2; Most women buy water from water vendors, some go to the wells.
3; Most women buy water from water vendors.
4; Most women buy water from water vendors, some go to the wells ('bir Hussein' is a fresh water well, but cannot give enough water).
5; Most women buy from water vendors, some go to the wells.
6; Water is fetched by wells or by water vendors.

How much time is spent on obtaining water (daily)?
1; Not much time, the water vendor passes the house.
2; Not much time, water vendors pass often and fill the barrels and zirs* on the plots.
3; -
4; -
5; -
6; If the water is fetched from the wells ± half an hour. If water obtained from water vendors hardly no time is spent. "You just call a vendor when he passes the house. In the dry season, when there is a shortage of water, it takes more time because then you have to search for a vendor".

How is water stored?
1; Drinking water: zirs, rest of the water: barrels/jerrycans.
2; Drinking water: zirs, rest of the water: barrels/jerrycans.
3; Drinking water: zirs, rest of the water: barrels/jerrycans.
4; Drinking water: zirs, rest of the water: barrels/jerrycans.
5; Drinking water: zirs, rest of the water: barrels/jerrycans.
6; Drinking water: zirs, rest of the water: barrels/jerrycans.

Is there a distinction made in storage between drinking water and water used for other purposes?
1; No, all water is used for all purposes. Water from the barrels is poured into the zirs.
2; -
3; Drinking water is stored in zirs, but the zirs are filled out of barrels.
4; -
5; -
6; No, the zirs are filled out of the barrels.

Is the transport equipment for fetching water cleaned?
1; -
2; Sometimes.
3; Sometimes, if it is dirty.
4; -
5; Once in 3 or 4 days.
6; Hardly ever.

Is the equipment in which water is stored cleaned?
1; The zirs daily (empty in one day). The barrels every 2 or 3 days.
2; The zirs every three days, the barrel twice a week.
3; The barrels once in 2 weeks, the zirs more often.
4; The zirs daily (empty in the evening). The barrels every 3 days.
5; The once in 3 or 4 days, the barrel once in 7 or 10 days.
6; Hardly ever.

Is storage water covered?
1; Barrels and zirs are covered. One woman notices it is also very important to cover milk.
2; Barrels and zirs are covered.
3; The zirs are covered.
4; Most women cover the zirs, few women cover the barrels.
5; The zirs are covered, barrels/jerrycans are not covered.
6; Hardly ever.

Do women have problems in water storage?
1; The women attending the meeting do not have problems. They say very poor families have problems because they do not have barrels and have to store all the water in jerrycans.
2; No, water vendors pass the house two or three times a day. So if water is needed it can be obtained.
3; Some women cannot afford buying barrels and do not have enough storage capacity.
4; Not every family has a barrel for storing water.
5; No
6; No

How much water is used for economic purposes (daily)?
1; ± One jozz a day.
2; -
3; ± One jozz a day.
4; ± One jerrycan a day.
5; -
6; -

What products are made and where are they sold?
1; Kisra* and lemon juice, sold on the Tadamon souk*.
2; Some women in the block do make products, but no one is attending the meeting.
3; Tea and prepared food, sold on souk Tadamon or Gedaref (or in the neighbourhood if women have small children).
4; Some women use one jerrycan a day to make 'medida◆' which they sell on the central souk.
5; -
6; -

Is wastewater reused?
1; -
2; If s are standing in a support, the water seeping through is collected and given to the chicken or used for gardening.
3; If s are standing in a support, the water seeping through is collected and used for watering the plants on the plot.
4; Some wastewater is used for gardening.
5; -
6; If s are standing in a support, the water seeping through is collected and used for gardening or given to the chicken.

Where do people leave their liquid waste production?
1; On the edges of the plot.
2; On the edges of the plot.
3; In the plot on the ground, if it is much water on the street.
4; On the edges of the plot.
5; -
6; Outside the guttia*.

Where do people leave their solid waste production?
1; The waste is thrown into the khor* or gathered for 2 or 3 days and burned outside.
2; Garbage from 2 or 3 days is collected and burned outside.
3; Garbage from 2 or 3 days is collected and burned outside.
4; Garbage from 2 or 3 days is collected outside and then burned.
5; -
6; Garbage from 2 or 3 days is collected and burned outside, when there is no wind.

Do people have latrines?
1; Few women have latrines.
2; Few women had latrines.
3; Few women have latrines.
4; Few women have latrines.
5; No.
6; No.

How are the latrines constructed?
1; Most are holes 3 or 4 metres deep which collapse in the rainy season. One women had a latrine of tires which does not collapse.
2; Few women had hole latrines which are fallen down now.
3; Holes dug in the ground which fall down in the rainy season and few women have a tire latrine (3 barrels deep).
4; Hole latrines, which fall down in the rainy season.
5; -
6; -

Where do people who do not have a latrine go to the toilet?
1; Outside the plots area, in the open.
2; Outside the plots area, in the open.
3; Outside the plots area, in the open.
4; Outside the plots area, in the open.
5; Outside the plots area, in the open.
6; Outside the plots area, in the open.

Do they always use the same spot?
1; No, they go to the khor or in the open.
2; No, if there are men they use another spot.
3; No, but never near guttia's.
4; -
5; Yes
6; Not exactly.

Do they have special hours for going to the toilet?
1; Most women go in the dark, some go also during the day.
2; Most women go in the dark with 2 or 3 other women.
3; Most women go in the dark with 2 or 3 other women.
4; -
5; No
6; In the evening the women go in groups, during the day they go alone.

What are the main foods people eat?
1; Fatur*: lubia* or kisra with water. Afternoon: depends on money given by husband, if enough dried meat and vegetables, if not enough just like fatur.
2; Fatur: lubia. Afternoon: dried meat/onions/tomato-sauce.
3; Fatur: lubia. Afternoon: dried meat/onions/tomato-sauce.
4; Fatur: kisra with oil/vegetables. Afternoon: kisra and bread with meat/vegetable-sauce. Evening: 'goerasa*'. All depends on how much money they have.
5; Fatur: lubia. Afternoon: dried meat/onions/tomato-sauce.
6; Fatur: lubia or dried okra. Afternoon: kisra with sauce.

How much time is spent on cooking (daily)?
1; ± Two hours a day.
2; -
3; -
4; ± Two hours a day.
5; -
6; ± One hour daily.

Who decides about food matters?
1; Women are responsible and make decisions regarding food.
2; Women.
3; Women.
4; Women are responsible for preparing food, they make the decisions.
5; -
6; Women.

Who buys food?
1; Women.
2; Men and women.
3; -
4; Men are responsible for buying food. If the man works, he gives money to his wife to buy food.
5; -
6; Women, they spent £s 300 a day.

Where and how is food stored?

1; Food is cooked immediately after buying. Left overs are stored in a small pot which is stored in a big pot filled with water (to keep it cool) and before eating the food is boiled again.
2; Food is prepared when bought, food which remains is kept good by boiling after and before eating. The food is covered.
3; Everybody covers food pots and keeps the food fresh by boiling.
4; Food is covered, and boiled before and after storage.
5; Everybody covers food pots and keeps the food fresh by boiling.
6; Food is kept covered on the table, and boiled before eating.

Are women who are having their period allowed to touch food?

1; Nuba and rizayaad women are not allowed to touch food when having their period. They eat with a spoon and their husband buys prepared food or the food is prepared by neighbours/sisters etc..
2; -
3; -
4; Nuba women are not allowed to touch food when having their period.
5; -
6; -

Do people have problems with insects (in the guttia) and how do people try to control these problems?

1; Flies and other insects are a problem, the latter demolish the guttia. Chemicals are used as well as incense and smoke from wood.
2; Flies are a problem. They try to control the problem with smoke.
3; Flies are a problem. They try to control the problem with smoke.
4; Flies and fleas are controlled by smoke (wood or incense).
5; -
6; There are a lot of flies, smoke is used for keeping them away.

What animals (are allowed to) come in the guttia?

1; Animals are not allowed to come in the guttia. The are kept on a specific part of the plot in a small guttia or rakooba*.
2; -
3; One woman has sheep. At night she keeps them in her guttia against theft.
4; Animals are not allowed in the guttia, they are kept in special rakooba's or guttia's.
5; Some women heave sheep. At night they are kept in the guttia against theft.
6; Chicken and some women have goats or sheep which they keep in the guttia at night.

What are common diseases of animals (and how are they treated)?

1; In winter time all the chicken die with red corners of the mouth (untreated).
2; Sometimes the sheep are weak, they are given salt water.
3; -
4; Sheep and goats can suffer from stomach-ache. One women sometimes goes to a veterinary (£s 100-300).
5; -
6; Sometimes the sheep or goats have a stomach-ache (untreated).

Do these diseases affect people's health?

1; No idea.
2; The sheep owner thinks there is no health effect on people.
3; -
4; The women do not know if animal diseases effect people.
5; -
6; No idea.

Who know most about health and diseases, men or women?

1; Women.
2; Women.
3; Women, they treat the ill while men are working.
4; Women, they are always at home.
5; Women and old people (women and men).
6; Women.

Who gives health information when people need it?
1; The women go to a local doctor.
2; The clinic in El Sofi, or the hospital in Gedaref.
3; No special person.
4; Nobody.
5; Nobody
6; -

In case of serious illness where do people go?
1; To the hospital or to a faki (a koran-healer).
2; To the clinic in El Sofi or the hospital in Gedaref.
3; To the hospital in El Sofi or Gedaref
4; To the hospital.
5; To the hospital in El Sofi or Gedaref, or to a doctor.
6; To the hospital in the centre of Gedaref.

Are there local doctors in block 1-6?
1; Hawa Gammers and Maria Mabdullah are malariaburners. Abrahim and Abakr are faki's*.
2; Meriam Omer treats stomach-ache with boiled leaves.
3; Tuma is a malaria burner. There are other people who make scratches against eye and stomach-ache. Small children are burned in the neck or on their gums when they have diarrhoea. When children don't want to eat because they have to cough all the time, a special doctors cuts a bit of flesh out of the throat.
4; A man called Osman is a malaria burner.
5; No.
6; Only Fellata people have local doctors (£s 100 a consult) in block 6. No Fellata women are attending the meeting.

Who knows most about health and diseases block 1-6?
1; Hawa Gammers, a malaria burner.
2; No particular woman.
3; The woman who is malaria burner, Tuma.
4; Aicha Abdrachman, a midwife.
5; No special person.
6; -

Do people know how diseases are transmitted?
1; No.
2; No.
3; Malaria is transmitted by mosquitos. One woman says diseases are spread when you don't clean your house.
4; No.
5; No.
6; Human excreta can contain disease-germs.

Do people know which diseases are related to water?
1; No.
2; No
3; Giardiasissis, bilharzia.
4; Drinking water causes diarrhoea.
5; No
6; No

How do children learn about health and diseases?
1; -
2; Mothers teach their daughters, and children learn by seeing.
3; They learn by helping and being ill.
4; Children learn about disease from being ill, daughters are given special lessons.
5; Watching their mothers and fathers.
6; They learn by seeing. Sometimes girls get lessons/advice.

What kind of diseases occur in the rainy season?
1; Malaria.
2; Malaria, giardiasissis and diarrhoea (also caused by malaria).
3; Malaria.
4; -
5; Malaria.
6; Malaria.

What kind of diseases occur in the dry season?
1; Hepatitis and stomach-ache.
2; Head-ache caused by heath, stomach-ache, diarrhoea.
3; Eye diseases (red eyes).
4; -
5; Eye diseases, stomach and head-ache.
6; Heat stroke, giardiasissis and dysentery.

What is the main cause of death by babies?
1; Diarrhoea, fever, vomiting, malaria and hepatitis.
2; Haboeba; fever with diarrhoea. The children will not eat or drink. The disease can be cured by scratching the forehead with a razor-blade or by throwing the child on the roof of the guttia and catching him/her.
3; Diarrhoea and malaria.
4; -
5; Diarrhoea and fever.
6; Fever, diarrhoea and vomiting.

What is the main cause of death by children?
1; Diarrhoea, fever, vomiting, malaria and hepatitis.
2; Diarrhoea and malaria.
3; Diarrhoea and malaria.
4; -
5; Stomach ache, diarrhoea and malaria.
6; Fever, diarrhoea and vomiting.

What is the main cause of death by adults?
1; Fever, head-ache, stomach-ache, pregnancy, malaria and hepatitis.
2; Malaria.
3; Malaria.
4; -
5; -
6; Hart attack.

How much money is spent on diseases (monthly rainy season)?
1; £s 1000.
2; £s 1500-2000.
3; ± £s 2000. There are always more children ill.
4; -
5; £s 200-900.
6; If women have children ± £s 1000

How much money is spent on diseases (monthly, dry season)?
1; Less than in the rainy season, depends on how much money they have.
2; £s 300-1000.
3; ± £s 1000.
4; -
5; Less than in the rainy season.
6; -

When do woman see each other during the day?

1; -
2; All the neighbours have a special greeting ceremony. In the morning neighbours drink coffee. Some women go to the souk together, or meet other women there.
3; Neighbours drink coffee, on social happenings the whole block gathers. Some women go to the souk together, and four women have a take turns system for going to the souk.
4; Neighbours drink coffee together, sometimes some women go to the souk together.
5; Neighbours from 3 or 4 plots drink coffee in the morning. On special occasions (death, birth) a lot of women gather.
6; Neighbours drink coffee in the morning.

Who takes care of the children if the woman leaves the plot?

1; -
2; The neighbours.
3; The neighbours.
4; The neighbours.
5; Nobody in particular.
6; The neighbours.

Do all the women attending the meeting know each other?

1; Yes.
2; Yes.
3; Yes, they all come from the spontaneous settlements in Geneina.
4; No.
5; -
6; No, but they all attend adult education.

How long do the women attending the meeting live in Tadamon?

1; Three years.
2; Two years.
3; Two or three years.
4; -
5; -
6; One year.

Where do the women attending the meeting originally come from?

1; Most come from the west, some from Gedaref.
2; Most of them are Messalite*, originally coming from the west.
3; Most come from the west, they all speak arabic very well.
4; Most of them are Messalite, originally coming from the west.
5; Mixture of Haussa*, Fellata* and Nuba* women.
6; From the south and the west (most women speak little arabic).

In the future the workload of many women will increase, how will that effect the daily activities?

1; -
2; Some activities will be done later on the day. The most important thing is that cheap water is coming to Tadamon.
3; If it is real far the water will still be taken from the water vendors for a cheaper price than now. "The tap points can not be forbidden for water vendors. We need them in case of illness or pregnancy".
4; The women first will do all the activities they have to do, after that they will go to fetch water.
5; -
6; It does not matter if the workload increases. The women are always in search for cheap water. Water vendors are still needed, "if you are ill for a long time nobody will fetch water for you".

Will men or children help carrying water?

1; Children will help.
2; Men will not help, children have to help.
3; Men will not help, children have to help.
4; Children have to help. Men have to fetch water if their wife is ill or if he prevents her from fetching water.
5; Children will help carrying water.
6; Men will not help, children have to help.

How can women best be reached about decisions regarding water (made by the water committee)?

1; By meetings. The women who will not attend the meeting can be told by their neighbours. The block can be divided into divisions.

2; Special women meetings must be held with a representative to/from the water committee

3; In each neighbourhood three women must form a small committee with a representative in the water committee.

4; By a special meeting. The women attending the meeting can tell the women not attending.

5; By holding a special meeting for the women in the block.

6; A female representative of the WC must call for a women meeting.

ANNEX E: A BORNU HOUSEHOLD

The researcher spent some time with four different households in Hai El Tadamon (in each household 2-3 days). During those days the researcher tried to gain information on how is practically dealt with water, health and sanitation matters within the households. The researcher watched and helped the women in the household in performing their everyday activities. The families were chosen because of their ethnic background.

Household composition

- ♀; 41	wife (married before: 1 son, 3 grown-up daughters)
- ♂; ?	husband
- ♀; 11/14/16	three daughters
- ♂; 6	son of son

Household structure

Nuclear family & ±foster son.
Sometimes family going to or coming from farms stay some days in the household.

Seasonal changes in household

All, except little boy, go working as wage labourer in agricultural season.
Husband was still working out of town during the investigation.

Eating unit/meal patterns

All household members present eat together.
Three meals a day; fatur, afternoon, evening.
Often neighbours eat together, food from two households is shared.

Household income and labour

- ♀; 16 sells tea in the evening outside the house (informal sector, unreliable income).
- ♀; 11 sells beans on the main road (informal sector, unreliable income).
- ♂; main income generator in agricultural sector, unreliable income, gives household money to his wife daily.
- All women work in harvesting time, unreliable income in cash or in kind.

Assets and wealth

- Housing; 2 guttia's, a hamam* and a matbach* under construction.
- Utilities; none.
- Saving system: sanduq*, £s 250/3 days/10 members.

Animals

- Chicken.

Household task allocation/time

- Cooking;	♀ 41	two and a half hours daily.
- Preparing kisra;	♀ 16	one and a half hour in two or three days.
- Washing;	♀ 14/16	two hours once in two or three days.
- Cleaning;	♀ 11/14	one hour daily.
- Shopping; mainly	♀ 41	one hour daily on spontaneous souk Tadamon.

Knowledge/skills/education

- ♀ 11 & ♂ 6	attending school
- ♀ 14/16	adult education (just started)

Water handling

- Collection: water vendor, every day early in the morning.
- Storing: 2 covered zirs and some uncovered jerrycans (outside).
- Drawing: no special equipment used.
- Reuse: water used for washing vegetables used for gardening.

Food handling
- Storage: most foods are immediately prepared, some are stored in bags outside.
- Preparation: outside, foods washed, hands washed (not with soap).
- Eating: all together from the same plate, right hand washed before eating, both hands washed after dinner (sometimes with soap).
- Preservation: boiling after and before eating.

Domestic hygiene
- Wastewater disposal: thrown in the edges of the plot.
- Solid waste disposal: organic rests given to the chicken, non-organic rests are burnt on charcoal fire when making coffee.
- Cleaning: guttia's and plot are swept daily, dishes and kitchen tools are washed after and before using (without soap). Water storage equipment was not cleaned.
- Laundry: clothes are washed every two or three days, no ironing.

Personal hygiene
- Bathing: in the afternoon the women wash themselves in the hamam.
- Human excreta disposal: the plot is on the edge of Tadamon. During the day women go to the khor (± 20 minutes), in the evening the open field behind the house is used as toilet.

Health and diseases
A faki was consulted for some vague complaints.

Period of stay researcher and remarks
The researcher spent three and a half day in the household.
A lot of neighbours were visited.
Neighbours use to drink coffee together in the morning or afternoon.
The woman was used to communicate with foreigners.

ANNEX F: A MESSALITE HOUSEHOLD

Household composition
- ♀; 51 wife, four grown-up children living elsewhere
- ♂; 58 husband

Household structure
Couple.

Seasonal changes in household
Sometimes family going to or coming from farms stay some days in the household.

Eating unit/meal patterns
Men and women eat separate.
Two meals a day; fatur and afternoon.

Household income and labour
- ♀; midwife, also gives injections and sells salt and other spices.
- ♂; a retired soldier, sells soap and cigarettes in front of the house to generate some extra household income (informal sector, unreliable income).

Assets and wealth
- Housing; one guttia, two hamams and a matbach.
- Utilities; a bicycle.

Animals
- Chicken; kept in a special guttia.

Task allocation/time
- Cooking; ♀ one and a half hour daily.
- Washing; ♀ & ♂ ?
- Cleaning; ♀ half an our daily.
- Shopping; ♂ one and a half hour, central souk Gedaref.

Knowledge/skills/education
- ♀; midwife school and a yearly refreshing course.
- ♂; military academy.

Water handling
- Collection: water vendor, once in two days.
- Storage: one covered (outside) and a covered barrel (inside).
- Drawing: with special equipment.
- Reuse: some wastewater reused for gardening.

Food handling
- Storage: most foods are immediately prepared some stored inside.
- Preparation: inside the guttia, foods washed, hands washed with soap.
- Eating: man and woman eat separate, both was hands with soap before and after dinner.
- Preservation: no food was preserved.

Domestic hygiene
- Wastewater disposal: thrown in the edges of the plot.
- Solid waste disposal: organic rests given to the chicken, non-organic rests are collected and burnt outside.
- Cleaning: guttia's and plot are swept daily, dishes and kitchen tools are washed after and before using with soap. Water storage equipment was not cleaned in researchers presence but looked rather clean. Water drawing equipment was washed with soap.
- Laundry: clothes are washed and ironed every two or three days by man and woman themselves.

Personal hygiene

- Bathing: the woman washes herself in the afternoon in the hamam or in the evening in the kitchen.
- Human excreta disposal: the plot is in the centre of a block. The woman goes to the toilet out in the open on an open space near the plot early in the morning and late in the evening.

Health and diseases

As a midwife the woman knows a lot about diseases and disease transmission, her plot and hygienic behaviour are very proper.
The woman lives in Hai El Tadamon while she got very ill in her former village from a faki charm and is afraid to go back.

Period of stay researcher and remarks

The researcher spent two and a half day in the household and only once left the plot for visiting the neighbours.
The woman hardly ever leaves the plot.
Neighbours use to drink coffee together in the morning or afternoon.

ANNEX G: A SHILLUK HOUSEHOLD

Household composition
- ♀; 23 wife (originally Nuba)
- ♂; ? husband
- ♂; ? grandfather
- ♀; 16 sister of husband
- ♀; 5/6 daughter and daughter of family member
- ♂; 1/4 two sons

Household structure
Extended family

Seasonal changes in household
None

Eating unit/meal patterns
Children, man and women eat separate.
Two meals a day; fatur and afternoon.

Household income and labour
- ♂; formal administrative labour (reliable income) and land owner. Member of the Town Council and of the neighbourhood committee. Gives household money to his wife daily.
- ♂; grandfather sells charcoal and wood outside the house (informal sector, unreliable income).

Assets and wealth
- Housing; one guttia, a hamam, a matbach (also used for sleeping) and a rakooba.
- Utilities; radio, motor-cycle and farm-land.

Task allocation/time
- Cooking; ♀ 23 three and a half hour daily.
- Washing; ? ?
- Cleaning; ♀ 16 half an our daily.
- Shopping; ♀ 23 two and a half hour, central souk Gedaref.

Water handling
- Collection: water vendor, every day in the morning.
- Storage: a special water tank for drinking water and a covered barrel (outside). The special water tank is filled out of the barrel.
- Drawing: water is drawn from the barrel with special equipment, but the water is regularly touched by children etc.. The drinking water is obtained from the tank by pushing a button, the water cannot be touched.
- Reuse: none.

Food handling
- Storage: most foods are immediately prepared, some are stored in the kitchen.
- Preparation: inside matbach, foods washed, hands washed without soap.
- Eating: children, men and women eat separate, all was hands without soap before and after dinner.
- Preservation: boiling after and before eating.

Domestic hygiene
- Wastewater disposal: thrown in the edges of the plot.
- Solid waste disposal: organic rests are thrown on the street for animals, non-organic rests are collected and burnt outside.
- Cleaning: guttia's and plot are swept daily, dishes and kitchen tools are washed after and before using without soap. Water storage equipment was not cleaned. Water drawing equipment was cleaned without soap.
- Laundry: clothes were washed and ironed by a nephew.

Personal hygiene
- Bathing: the man washes himself in the morning, the women wash themselves in the afternoon in the hamam. The

children were washed in the matbach.
- Human excreta disposal: the plot is on the edge of Tadamon. In the evening and early morning the women go to the khor (± 15 minutes). Children defecate just outside the plot.

Health and diseases
One son had giardiasis.

Period of stay researcher and remarks
The researcher spent two and a half day in the household.
The research might be influenced by the fact that christmas was coming and some special activities were conducted.
The man spoke english very well, the women knew how to communicate with foreigners.

ANNEX H: A HAUSSA HOUSEHOLD

Household composition
- ♀; 25 wife
- ♂; 28 husband
- ♂; 2/4 two sons

Household structure
Nuclear family

Seasonal changes in household
None

Eating unit/meal patterns
Children, man and women eat separate.

Household income and labour
- ♂; formal administrative labour in agricultural season, during that season reliable income. Member of the neighbourhood committee. Gives household money to his wife daily.

Assets and wealth
- Housing; one guttia and a hamam.
- Utilities; none

Animals
- Chicken.
- Three sheep in a special rakooba.

Task allocation/time
- Cooking; ♀ 25 two and a half hour daily.
- Washing; ? ?
- Cleaning; ♀ 25 half an our daily.
- Shopping; ♀ & ♂ one and a half hour, spontaneous souk Tadamon or souk by crop market (travelling by bus).

Knowledge/skills/education
- ♂; primary school and some years secondary school.

Water handling
- Collection: water vendor, every day in the morning.
- Storage: an uncovered barrel inside the guttia.
- Drawing: water is drawn from the barrel with used cups, the water is regularly touched by children etc..
- Reuse: none.

Food handling
- Storage: most foods are immediately prepared, some are stored in the guttia.
- Preparation: outside, foods washed, hands washed without soap.
- Eating: children, man and woman eat separate, all was hands without soap before and after dinner.
- Preservation: boiling after and before eating.

Domestic hygiene
- Wastewater disposal: thrown in the edges of the plot or on the street.
- Solid waste disposal: organic rests are given to the animals, non-organic rests are collected and burnt outside.
- Cleaning: guttia and kitchen area on the plot are swept daily, dishes and kitchen tools are washed after and before using without soap. Water storage equipment was not cleaned.
- Laundry: clothes were washed and ironed by a family and neighbours for the woman was pregnant.

Personal hygiene

- Bathing: the man washes himself in the morning, the woman washes herself in the afternoon in the hamam. The children were washed outside.
- Human excreta disposal: the plot is in the centre of a block. In the evening and early morning the woman goes to the toilet or in the open on a field near the plot. Children defecate just outside the plot.

Health and diseases

The woman was pregnant and therefore was helped by neighbours/family.

Period of stay researcher and remarks

The researcher spent two and a half day in the household.
Neighbours use to drink coffee together in the morning or afternoon.
The woman was not used to communicate with foreigners, the man spoke english some english.