Water, Sanitation and Hygiene Household Survey Gaza

Palestinian Hydrology Group
For Water and Environmental Resources Development

unicef

Funded by

UKaid
from the Department for International Development

April, 2010

Acknowledgements:

We would like to express our gratitude to the team, all the families that cooperated with us, and the WASH Cluster.

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List of Abbreviations

AIDA	Association of International Development Agencies
CMWU	Coastal Municipalities Water Utility
EWASH	Emergency Water, Sanitation and Hygiene Group
GVC	Gruppo Di Volontariato Civile
NIS	New Israeli Shekels
PCBS	Palestinian Central Bureau of Statistics
PHG	Palestinian Hydrology Group
PWA	Palestinian Water Authority
RO	Reverse Osmosis
SPSS	Statistical Package for Social Sciences
UN HCT	United Nations Humanitarian Country Team
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
UNRWA	United Nations Relief and Works Agency
WASH	Water, Sanitation and Hygiene
WASH MP	Water, Sanitation and Hygiene Monitoring Programme
WHO	World Health Organization

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Executive Summary

Gaza's 1.5 million residents rely on the Coastal Aquifer to supply them with water but overuse and contaminants seeping into the ground are threatening this vital resource. UN agencies and the Coastal Municipal Water Utility (CMWU) estimate the aquifer's supply of water, suitable for human consumption, will disappear over the next five to 10 years.

Exacerbating the problem is the decrepit state of Gaza's sanitation services. Israel's blockade of Gaza since 2007 and its 23 day military operation in this tiny Palestinian territory during the 2008-09 winter has pushed Gaza's water and wastewater system to the edge of collapse.

Israel's operation "Cast Lead" destroyed large tracts of public infrastructure including the water and sewerage system. More than 30 kilometres of water networks, 11 groundwater wells, 6,000 roof tanks and 840 household connections were damaged, leaving around 500,000 people without clean water.

Deficient supplies of industrial fuel and the severe, almost non-existent, supplies of essential materials such as cement and pipes for repair and maintenance work have rendered the water and wastewater services unreliable and hazardous. Ninety eight per cent of Gazans are connected to the water network but access to a continuous supply of running water is much less widespread.

Supply is intermittent, with just 48 per cent of surveyed households reporting running water four to seven days a week and 39 per cent just two to three days a week. Despite the limited supply, 54 per cent say they are satisfied with the quantity of water, perhaps because most households store water in ground and roof top water tanks for use when there is no running water.

Most households do not use municipal water supplies for drinking, as 90 to 95 per cent of the aquifer, Gaza's only water source, is considered unfit for human consumption due to levels of chlorides and nitrates as high as six times the WHO guidelines. While there is no in-depth research or evidence yet on impact to public health, elevated levels of nitrates can lead to methemoglobinaemia, or "blue baby" syndrome among infants.[1] Risks of other water-borne disease including typhoid or

[1] Infants suffering from methemoglobinaemia may appear otherwise healthy but exhibit intermittent signs of blueness around the mouth, hands and feet. They may have episodes of breathing trouble, diarrhoea and vomiting. In some cases, infants with methemoglobinaemia have a peculiar lavender colour but show little distress. Blood samples appear chocolate brown and do not turn pink when exposed to air. When the methemoglobin level is high, infants express a marked lethargy, excessive salivation and loss of consciousness. Convulsions and death can occur when methemoglobin levels are extremely high.

hepatitis are also present because the water table is not deep and sewage infiltration is probable.

While households in Beit Lahiya and Tal el Hawa use water filters to purify water, 86.9 per cent of the households surveyed buy their drinking water from unregulated private vendors selling desalinated water for an average cost of NIS 35/ m^3 – rates unaffordable for poor households.

Eighty-six per cent of respondents rely on the network for water for domestic purposes such as cooking and washing. Although more than 47 per cent of the respondents say they are reluctant to use water from the network for cooking, many are forced to do so due to the high cost of privately-supplied water. Cooking heightens the concentration of nitrates and other salts even further.

More than 79 per cent of the surveyed households are connected to a wastewater network and the remainder have cesspits. Although sewage stagnation was expected due to the hydro-geologic condition of Gaza, no serious stagnation was reported primarily because the survey was conducted outside of the rainy season.

Only 25 per cent of respondents in Juhor ad Dik and Rafah area reported incidents of waste piling up on their streets. Community-generated solid wastes are collected at least once a week and 90 per cent of respondents said they are satisfied with the frequency of collection. Open burning and uncollected wastes piles were reported in some areas.

Forty-four per cent of respondents said they take daily showers and 65 per cent wash their hands before eating. Although appropriate hygienic supplies for menstruation are available, they are costly and public awareness of proper hygiene practices is low.

Due to poor water quality and hygiene practices, one in five households (20 per cent) had at least one child under the age of five who had been infected with diarrhea in the four weeks prior to being surveyed. The incidence of diarrhea was much higher in Beit Hanoun, with 38 per cent of households reporting at least one child affected by severe diarrhea symptoms during the survey period.

Two immediate priorities include a comprehensive survey on water quality and health indicators to correlate the incidence and prevalence of water borne diseases with water quality; and additional desalination units to expand access to safe water for drinking and home use.

1. Introduction

1.1 Background

The household survey was conducted to assess the extent to which households had benefitted from repairs implemented by CMWU and the humanitarian community to water and sewerage networks that were damaged during "Cast Lead". A second objective was to identify areas requiring critical intervention to avert potential public health outbreaks. Teams from the Palestinian Hydrology Group surveyed 1,250 households between August and December 2009.

1.2 Methodology

Indicators to measure the status of each of the six subsectors outlined: drinking water, domestic water, wastewater, solid wastes, hygiene and health, were defined. Workshops and discussions were held with stakeholders, experts in the sector and counterparts in Gaza (see Box 1).

Box1: WASH Indicators
Gaza Household Survey

Drinking water

Drinking water is water of acceptable quality complying with international standards used specifically for drinking purposes. Three main indictors were defined to describe the WASH situation in the surveyed communities in terms of drinking water including:

- Primary source of drinking water: mainly used to narrow down the percentage of people in the Strip that rely on water vendors/tankers or humanitarian aid which are both anticipated to be purchased from private water sources mainly being desalination units.
- Taste of drinking water: chosen since the taste of the water consumed is one of the most obvious indicators to the consumer that may reflect the quality and was reported to have been an issue in Gaza.
- Drinking water expenses: under the ongoing closure measures residents of the Strip are living very difficult economical conditions and due to the lack of fresh water sources people are forced to rely on "non-conventional" water resources that tend to be more expensive and further burden the households' financial status.

Domestic water

Domestic water is the water used by a household for purposes other than drinking including cleaning, cooking and personal hygiene. Several indicators have been chosen to measure the domestic water status in terms of:

- Primary source of domestic water: used to estimate the portion of households that rely on the municipal network for their supply.
- Primary source of cooking water: defined to reflect the portion of households that rely on drinking water purchased from vendors and not the municipal network for cooking.
- Frequency of running water supply (hours/day): chosen to measure how long the households are supplied with running water through the network.
- Frequency of running water supply (days/week): defined to indicate the level of water supply services offered to the residents.
- Sufficiency of water supply: used to measure the satisfaction with the sufficiency of the quantity of water supplied.

Wastewater

A considerable portion of the residents in Gaza are served by wastewater collection networks. During the attack earlier last year some of this infrastructure was damaged, in order to look into the collection service and the need for interventions addressing wastewater problems the following indicators were defined:

- Connectivity to wastewater network: reflecting the percentage of households that are connected to collection services especially intended to measure the change from one month to another indicating the level of interventions implemented in this area.
- Stagnant sewage: indicating the presence of wastewater in the vicinity of the households posing potential risk to public health through the creation of vector breeding sites (for mosquitoes, flies etc.)

Solid waste

Humanitarian crises may create situations where large quantities of waste are not managed, either because the waste management system is damaged or destroyed. In order to measure the status of solid waste collection services the following indicators were defined:

- Presence of solid waste piles: used to list areas where solid waste accumulation in the vicinity of households is a noticeable problem also posing as a potential threat to the health of the residents and the surrounding environment.
- Frequency of solid waste collection: measuring the level of services offered to the residents.

Hygiene

Although very challenging to measure due to the conservative context in Gaza hygiene was included as one of the indicators since inadequate hygiene practices are always a source of concern due to the adverse impact that it can have on the health of the residents. Thus the following indicators were defined:

Frequency of bathing/showering: could be used as an indicator reflecting the awareness of the households or the lack of water to do so.

- Appropriate material for menstruation: chosen to measure the availability of material necessary for women during menstruation. The resulting lack of access to appropriate materials may lead to situations of embarrassment and distress and, in some cases, increase the risk of infectious disease.
- Hand washing before eating and cooking: hand washing before contact with food is one of the most essential hygiene practices for protecting health, this could be used as an indicator reflecting the awareness of the households or the lack of water to do so.

Health

Persistent high levels of certain diseases and symptoms in a population indicate ongoing problems with access to WASH facilities and services or unhealthy environmental surrounding that may be generated as a result of stagnant wastewater or accumulation of solid waste piles.

- Diarrheal cases infecting children less than 5 years of age: chosen as an indicator since it is well-known to be one of the most obvious symptoms related to water-borne diseases especially to the more vulnerable age group such as children.

The questionnaire provided by the Global WASH Cluster was reviewed, modified and translated into Arabic (see Annex A). The Palestinian Central Bureau of Statistics (PCBS) designed the sample using the 2007 Palestinian Census which was disaggregated into 62 enumeration areas. The areas were stratified according to governorate (see Table 1 and Figure 1 below) and community type: urban, rural and camp (see Figure 2 for sample design steps). Fifty of these areas were randomly selected and households, within these areas were then randomly identified. A total of 1,250 were then selected so that a minimum response of 1,000 households could be achieved, based on a 3.5% margin of error. A household was defined as one person or a group of people living in the same housing unit, sharing meals and jointly providing food and other essentials for living.

TABLE1 : SAMPLE DESIGN FOR SURVEY

Community	Governorate	Number of	Number of
Beit Lahiya	North Gaza	2	50
Beit Hanun	North Gaza	1	25
Jabalya Camp	North Gaza	2	50
Jabalya	North Gaza	5	125
Total – North Gaza			**250**
Juhor ad Dik	Gaza	1	25
Old City	Gaza	1	25
Ash Shati' Camp	Gaza	1	25
Az Zaitoun	Gaza	2	50
Ad Darraj	Gaza	2	50
At Tuffah	Gaza	2	50
Ash Shuja'iyeh	Gaza	2	50
Northern Remal	Gaza	1	25
Tal El Hawa	Gaza	2	50
Southern Remal	Gaza	1	25
Ash Sheikh Radwan	Gaza	2	50
Total – Gaza			**425**
An Nuseirat Camp	Deir Al Balah	1	25
An Nuseirat	Deir Al Balah	2	50
Al Bureij Camp	Deir Al Balah	1	25
Al Maghazi Camp	Deir Al Balah	1	25
Al Maghazi	Deir Al Balah	1	25
Deir Al Balah	Deir Al Balah	2	50
Total – Deir Al Balah			**200**
Khan Yunis	Khan Yunis	6	150
Al Qarara	Khan Yunis	1	25
Khan Yunis Camp	Khan Yunis	1	25
Al Mawasi	Khan Yunis	1	25
Total – Khan Younis			**225**
Rafah	Rafah	3	75
Rafah Camp	Rafah	1	25
Tal al Sultan	Rafah	2	50
Total – Rafah			**150**

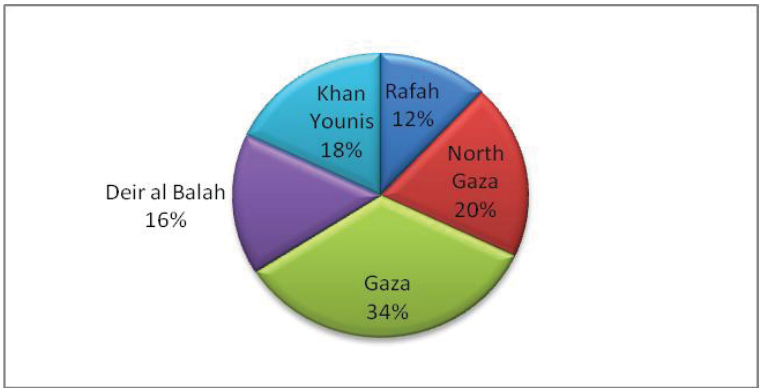
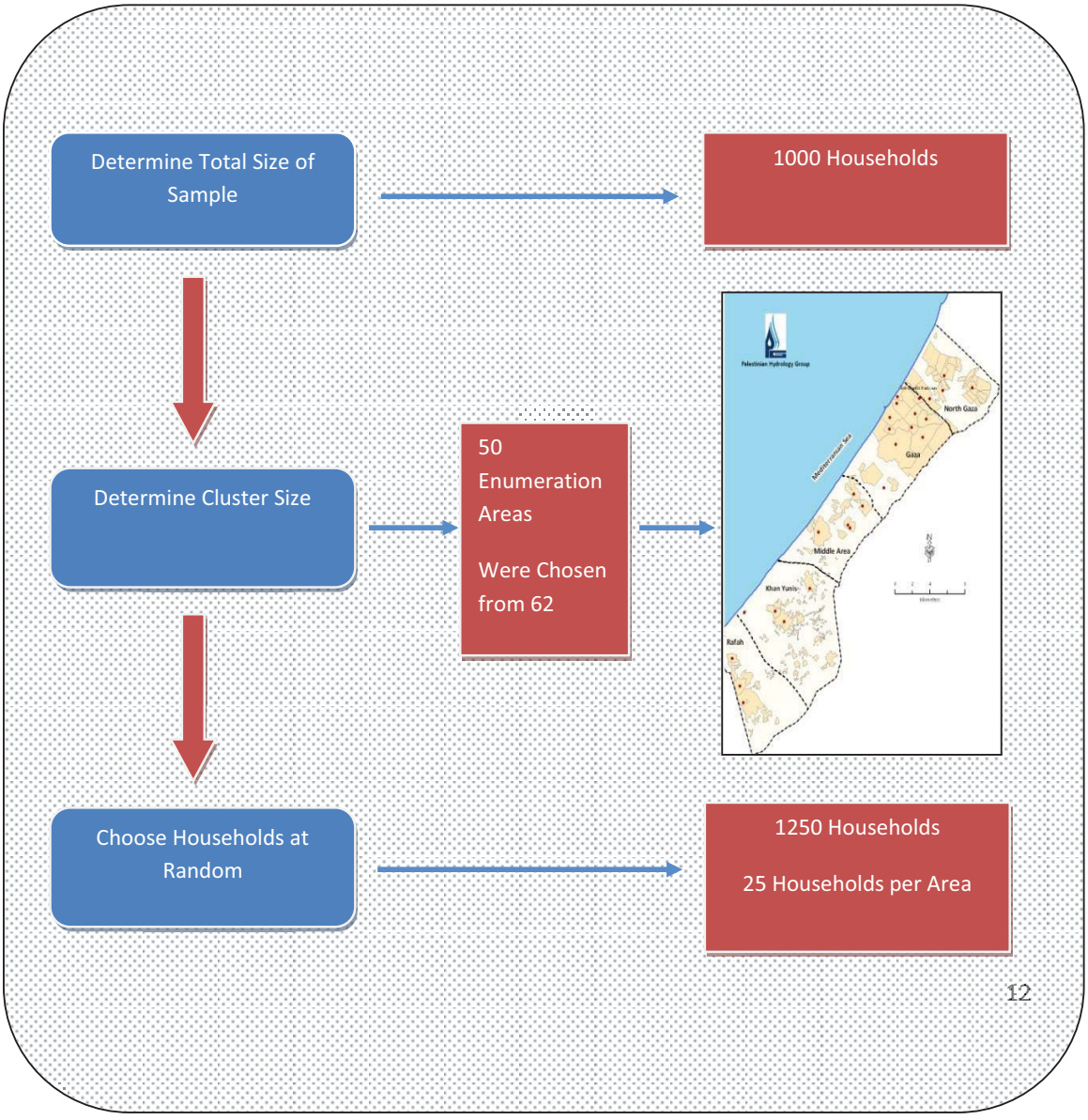


FIGURE 1: SAMPLE DESIGN FOR SURVEY

FIGURE 2: SAMPLE DESIGN STEPS



A total of 26 field surveyors, mostly female, to accommodate the conservative environment, and four data entry personnel were recruited. A two-day training workshop was organized for the team during which background information about the general WASH situation in Gaza, the purpose of the study and the survey process were presented. The questionnaire was then fine-tuned to incorporate feedback. PCBS was engaged to develop and prepare the instruction manual for the field surveyors.

Field workers were introduced to their assigned areas and shown the exact boundaries as identified by the maps. Beginning points were selected and plotted for repetitive surveying over the five month timeframe. To analyse the survey results, a colour coding system was designed using a "traffic light" system where green means "very good" and red means "very poor" (refer to Annex B). The data collected and entered onto Excel spreadsheets, validated, crosschecked and weighted in case of non-response. For quality control, all data entry records were checked manually against the original questionnaires and internal consistency checks were carried out.

The evaluation method used is based on the method which was developed by UNESCO (1988). The values of these basic indicators are standardized to values between 0 and 1; zero and one corresponding to the best and worst values of the basic indicators respectively (see Equation 1).

$$Normalized\ value = \frac{\text{Ideal value} - \text{Actual value}}{\text{Ideal value} - \text{Worst value}} \qquad \text{Equation 1}$$

The next step is to group the basic indicators to a second level, the values of these indicators are calculated based on the values of standardized basic indicators with the weight applied to each indicated group. A tool was developed for the purpose data integration and evaluation of the scores (Figure 3).

ID	First Level Indicator	Normalized Values	Weights	Second Level Indicators	
Drnk1	Primary source of drinking water (Answers to b & c)		0.50	Drinking water	
Drnk2	Drinking water taste (Answers to a &b)		0.25		
Drnk3	Price of drinking water		0.25		
Dom1	Primary source of domestic water (Answers to a)		0.20	Domestic water	
Dom2	Primary source of cooking water (Answers to b)		0.40		
Dom3	Frequency of running water from network, hours/day (Answers to c & d)		0.10		
Dom4	Frequency of running water from network, days/week (Answers to b & c)		0.20		
Dom5	Satisfaction with quantity of supply		0.10		
WW1	Stagnant sewage water near house (Answers to Yes)		0.50	Sanitation	
WW2	Connectivity to wastewater network		0.50		
SW1	Solid waste piles near house (Answers to Yes)		0.75	Solid wastes	
SW2	Frequency of solid waste collection (Answers to a)		0.25		
PC2	Washing hands with soap		0.30	Hygiene	
PC3	Frequency of bathing/showering (Answers to a)		0.30		
PC4	Appropriate materials for menstruation (Answers to Yes)		0.40		
H1	Unusual diarrheal symptoms < 5 years of age (Answers Yes)		1.00	Health	

Figure 3: Evaluation tool template

2. Analysis of Results

A total of five survey cycles were conducted between August and December 2009. The preliminary analysis of the results shows that no specific trends in the defined indicators can be found over this period of time. The reason could be the time gap between the inception and actual survey, which took place months after the Gaza crisis, when urgent repairs that resulted in improvements in the water and sanitation situation were already completed.

The analysis below includes a description of some of the main findings; detailed results by community are presented in Annex C.

2.1 Drinking water

Although 98 per cent of Gaza's 1.5 million residents are connected to the water network, supply is intermittent, with just 48 per cent of households having running water four to seven days a week and 39 per cent of households having water just two to three days in a week.

In Al Mawasi no household has running water and in Khan Younis camp 52 per cent do not have running water. Al Maghazi camp is the only area where all households have running water the majority of the time, four to seven days a week. In some places like Rafah and Ash Shati' Camp it runs just once a week.

Even with intermittent supply, 64 per cent of the respondents say water supply is adequate perhaps because households have ground and roof top water tanks. However, the majority of the population does not use the municipal water supply for drinking as around 90 to 95 per cent is not suitable according to WHO guidelines, and is contaminated with salt and nitrates far exceeding permissible levels.

To purify water for drinking, residents in areas such as Beit Lahiya and Tal El Hawa use home filters, (34 and 33 per cent usage, respectively), although most people (86.9%) rely on locally desalinated water for drinking, either supplied by the CMWU through networks or communal filling stations, or purchased from private water vendors.

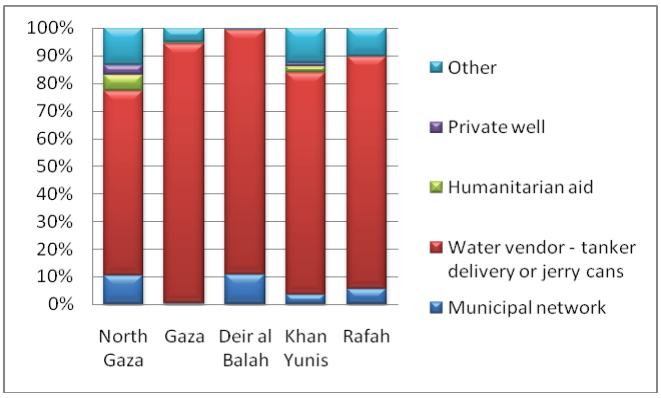


FIGURE 4A: PRIMARY SOURCE OF DRINKING WATER

The vast majority, 82.7 per cent, rely on private water vendors, either with tankers or jerry cans, for drinking water. Households report paying an average of 35 NIS/m^3 to private vendors, spending up to one-third of their income on water. Because of the high cost, communities such as Al Qarara consume as little as 2.6 l/c/d for both drinking and domestic purposes, which is less than minimum quantities recommended by the Sphere standards for emergencies.

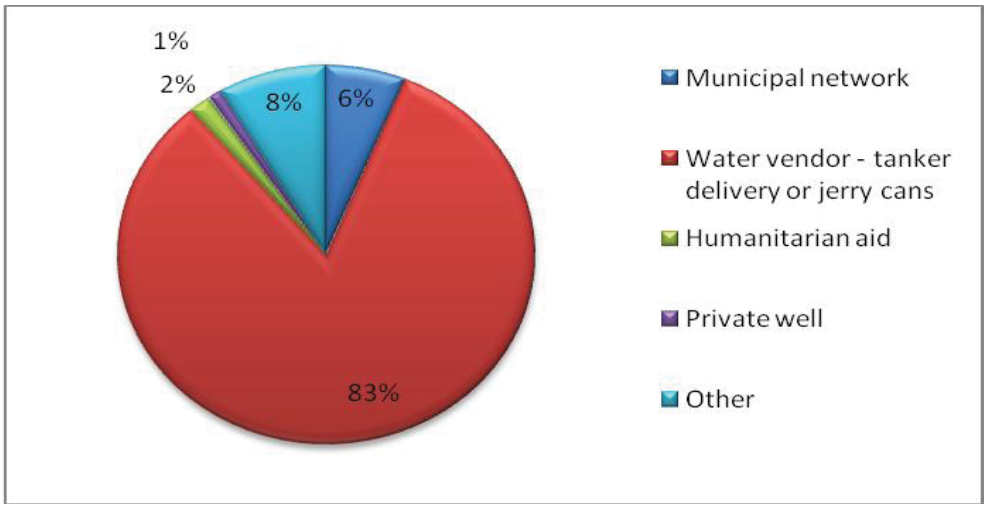


FIGURE 4B: PRIMARY SOURCE OF DRINKING WATER

Rising poverty has forced many people to drink water drawn from private and agricultural wells that are polluted from farming and wastewater seepage. In Al Mawasi, where there is no water network and only 58 per cent of households are able to buy water from vendors, 47 per cent say agricultural wells are their primary source of drinking water. It's a similar story in Beit Lahiya and Tal El Hawa, where very few or no households are connected to the municipal network and where the number of families able to purchase water from vendors is less than Gaza's household average.

FIGURE 5: DRINKING WATER STATUS IN GAZA

2.2 Domestic water

Domestic water includes water for cleaning, cooking and personal hygiene. In general, 89 per cent of the respondents report receiving water from the network at least 2 days/week with overall results indicating that 64 per cent of the respondents say they receive an adequate quantity of water. However, some areas such as Ash Shati' Camp report an 80 per cent dissatisfaction rate, and areas such as Farata/Beit Hanun and Khan Younis Camp have less than four hours per day of running water supply (see Figure 6).

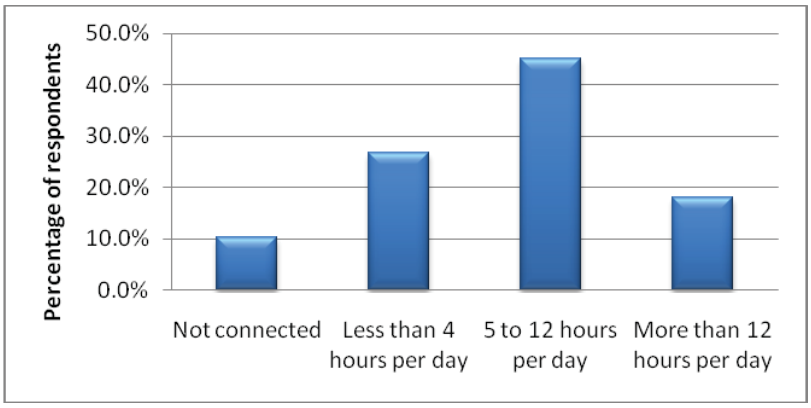


FIGURE 6: FREQUENCY OF RUNNING WATER SUPPLY

In the Khan Yunis refugee camp 57 per cent source their domestic water from the network and 43 per cent from humanitarian aid. Also in areas such as Al Mawasi, as few as 1.4 per cent of households receive domestic water from the municipal network while 98.7 per cent draw it from private wells. In Jabalya refugee camp, just 13 per cent source their domestic water from the network, 29 per cent buy it from water vendors, 45 per cent receive it through aid and 13 per cent rely on private wells.

Although 86 per cent of the respondents generally rely on the network for domestic water (see Figure 8) more than 47 per cent are reluctant to use water from network for cooking purposes, due to water quality concerns.

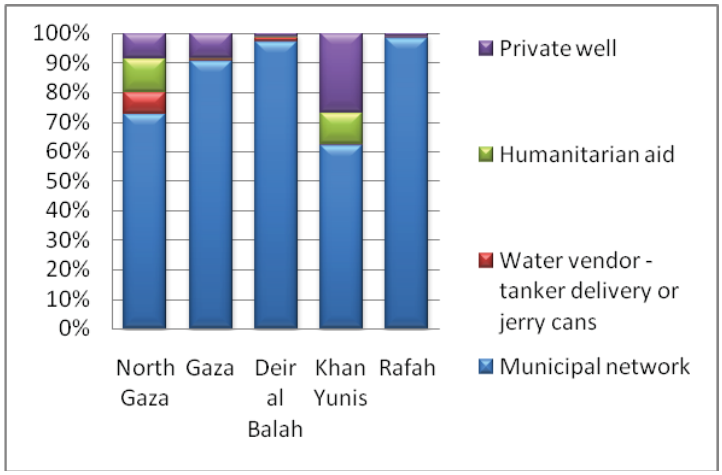


FIGURE 7: PRIMARY SOURCE OF DOMESTIC WATER

Across Gaza, 32 per cent of households use their drinking water to cook. Beit Hanun has the highest incidence of households (64 per cent) using their drinking water for cooking. The percentage of people using drinking water for cooking goes as high as 83 per cent in Al Qarara.

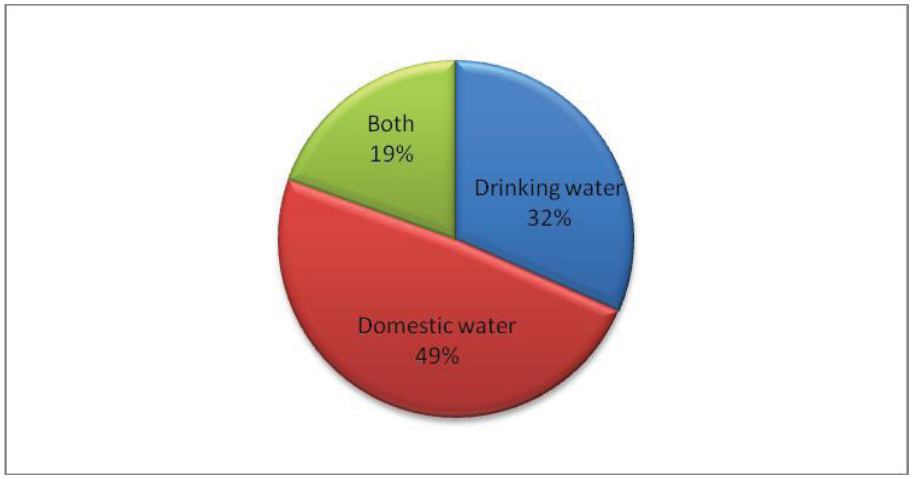


FIGURE 8: PRIMARY SOURCE OF COOKING WATER

Because privately purchased water is expensive, many households use the municipal water supply for cooking, further concentrating already high levels of nitrates and other salts in the water.

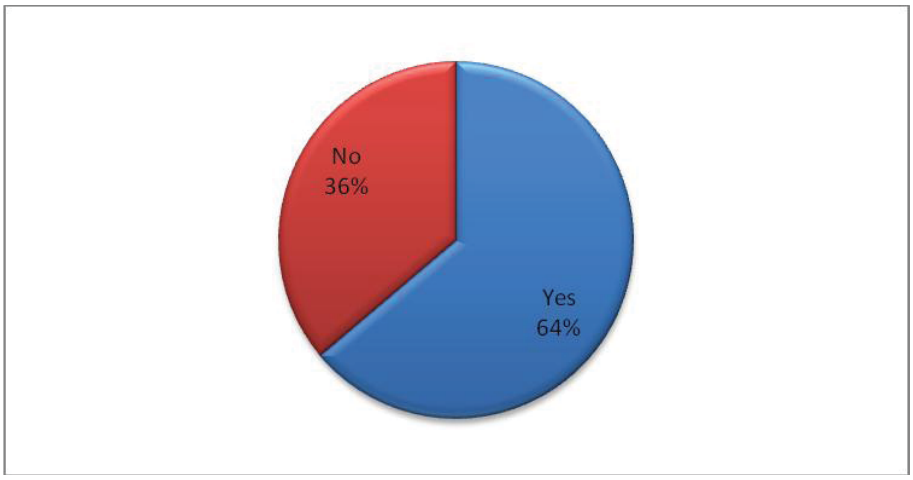


FIGURE 9: SUFFICIENCY OF WATER SUPPLY

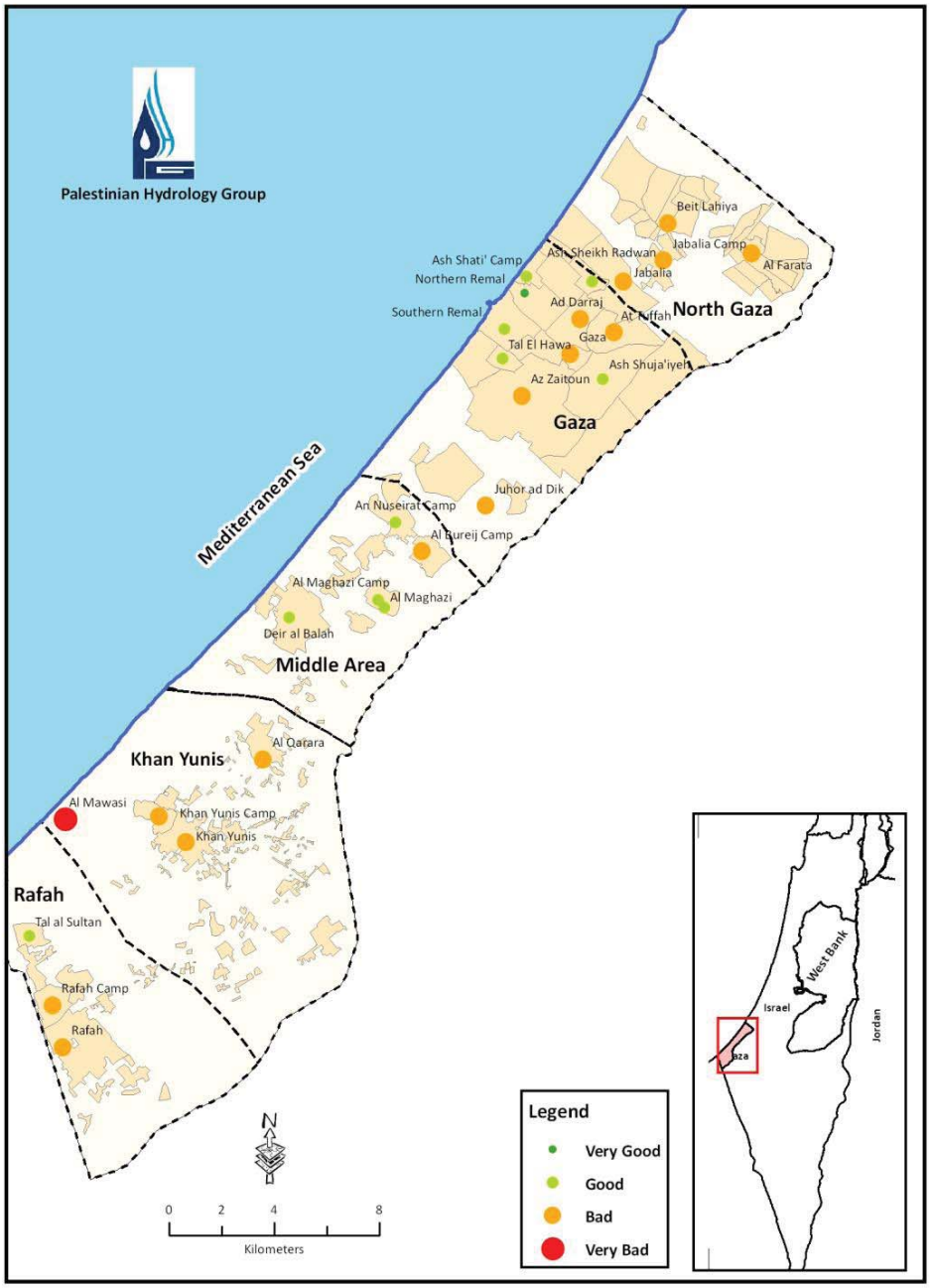


FIGURE 10:DOMESTIC WATER STATUS IN GAZA

2.3 Wastewater

More than 75 per cent of the surveyed households are connected to a wastewater network (see Figure 11). Communities in areas such as Juhor ad Dik, Al Qarara and Al Mawasi, which are not connected, rely on cesspits at the household level. These cesspits are emptied once filled using the CMWU cesspit emptier and the sludge is emptied at the sewage treatment plant. As the cesspits are not water tight, potential exists for water contamination due to infiltration of sewage.

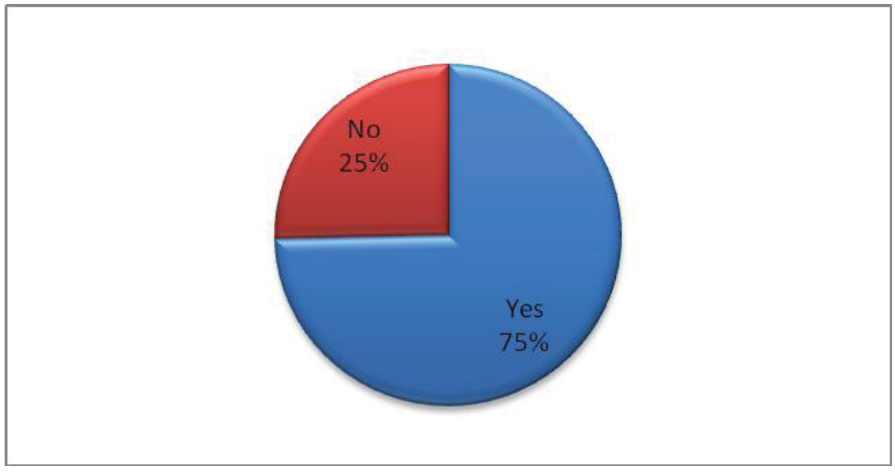


FIGURE 11: CONNECTIVITY TO WASTEWATER NETWORK

Sewage stagnation is exacerbated due to Gaza's sandy clay soil, which is easily saturated during rainfall. Although 25 per cent of respondents in the areas surveyed in Juhor ad Dik and Rafah had complaints about sewage stagnation, 93 per cent of the respondents in general did not complain of wastewater flooding in the vicinity of their homes. It should, however, be noted that the survey's timeframe did not cover the rainy period when such stagnation is most likely to happen.

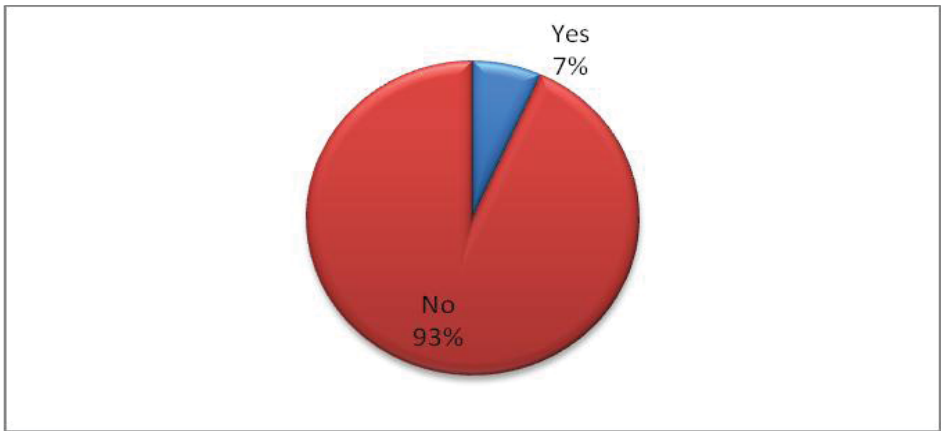


FIGURE 12: STAGNANT SEWAGE

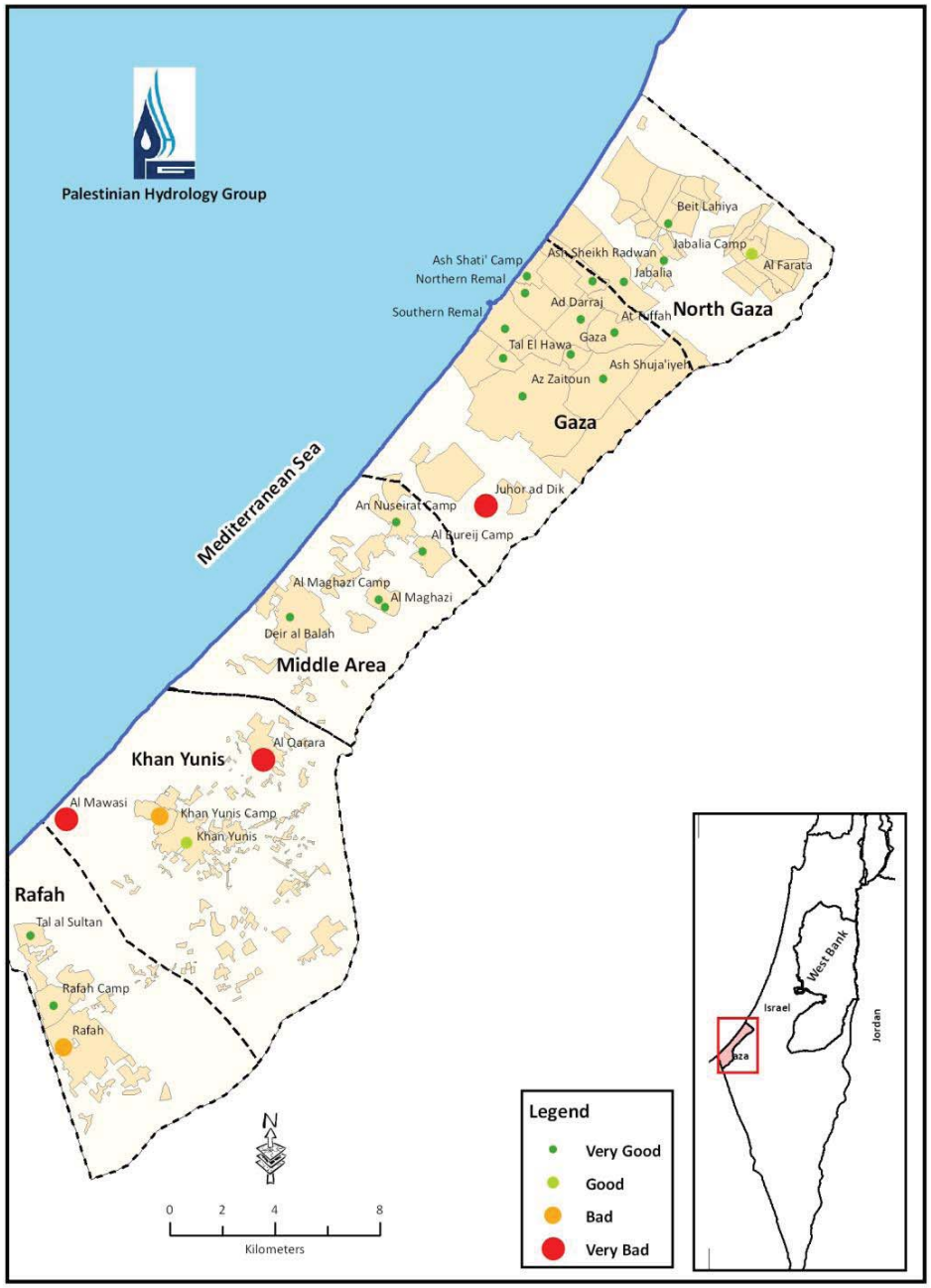


FIGURE 13: WASTEWATER STATUS IN GAZA

2.4 Solid wastes

Community-generated solid waste are collected at least once a week either using garbage trucks or mule-pulled cars. Although 90 per cent of the people surveyed are satisfied with the frequency of collection, open burning of 40 per cent of uncollected wastes is carried out in areas including Juhor ad Dit and Al Mawasi. Open burning is a health hazard.

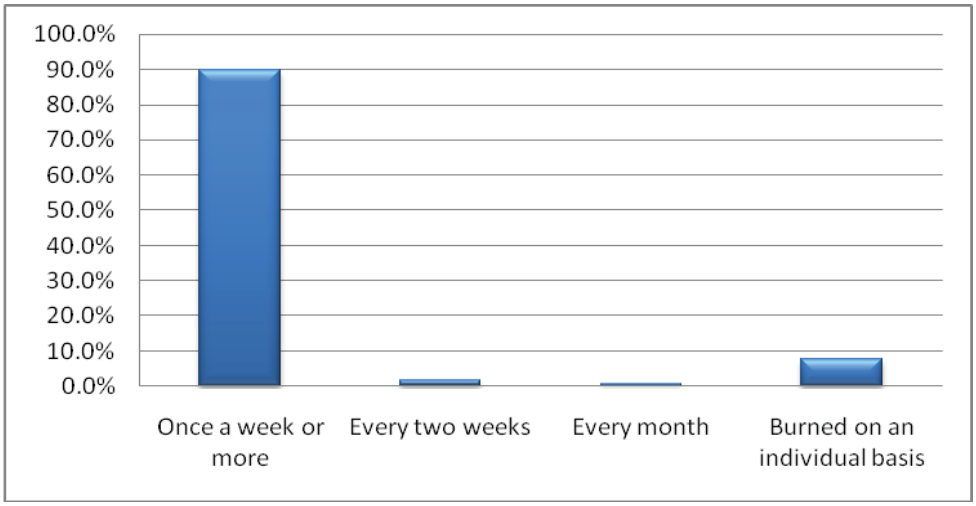


FIGURE 14: FREQUENCY OF SOLID WASTE COLLECTION

Uncollected wastes piles were reported by 13 per cent of the households. Wastes piles give rise to disease vectors such as flies and other insects and rodents including rats, especially in the warm climatic condition of Gaza.

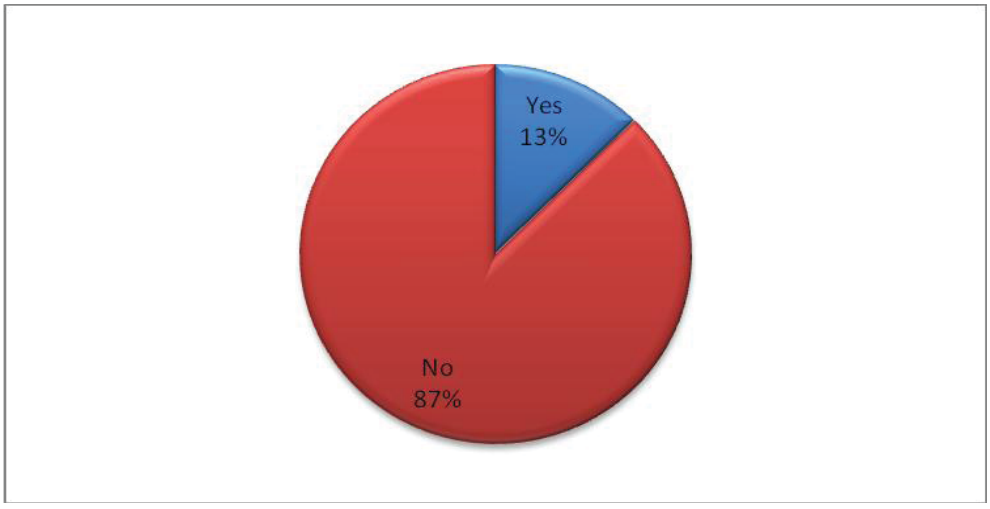


FIGURE 15: ACCUMULATION OF SOLID WASTE

FIGURE 16: SOLID WASTE STATUS IN GAZA

2.5 Hygiene

Across Gaza 44 per cent of people shower every day. Showering everyday is most common in Beit Hanun, where 74 per cent of households report daily showers, possibly because the majority is connected to the municipal network, with 88 per cent of households reporting they have running water four to seven days a week, (even though it mostly runs less than four hours a day). Showering everyday is least common in Khan Yunis, where less than three per cent of households report this practice, even though 79 per cent have running water four to seven days a week.

Hygienic practices vary, with 45 per cent of all survey respondents washing their hands before cooking and 65 per cent washing their hands before eating. Hand washing before cooking was most widely spread in Khan Yunis, where 76.7 per cent of respondents reported adhering to this practice. The same proportion also reported washing their hands before eating.

In Juhor ad Dik, where there is no wastewater connection and almost 60 per cent are not connected to the municipal water supply, hand washing before eating was reported at 97 per cent, second only to Al Mawasi's 100 per cent record. Yet only 50 per cent in Juhor ad Dik washed their hands before cooking.

Hand washing before eating was lowest in Khan Yunis with less than three per cent reporting this practice. However, hand washing before cooking was widespread with 74 per cent reporting the practice, well above the overall rate for Gaza of 45 per cent.

In Al Mawasi, where there is no running water and no waste water connection, none of the survey respondents reported washing hands before cooking but all reported washing their hands before eating. Indeed, it was the only place where 100 per cent washed their hands before eating.

Although the availability of hygiene material does not seem to be a problem good hygiene practices are not adopted by significant percent. Nearly 35 percent do not wash hands before eating and 55 per cent do not wash hands before cooking. This could be attributed to the lack of adequate water, cost of supplies and knowledge on hygiene practices.

Ninety four per cent of women said they had appropriate material during menstruation. However, 25 per cent in Jabalya and 23 per cent in Az Zaitoun said they did not have adequate material mainly due to cost.

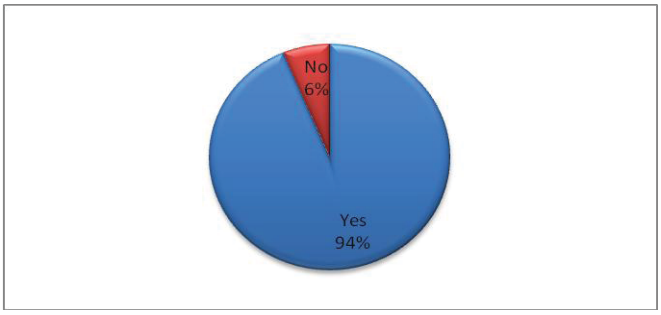


FIGURE 17: APPROPRIATE MATERIAL FOR MENSTRUATION

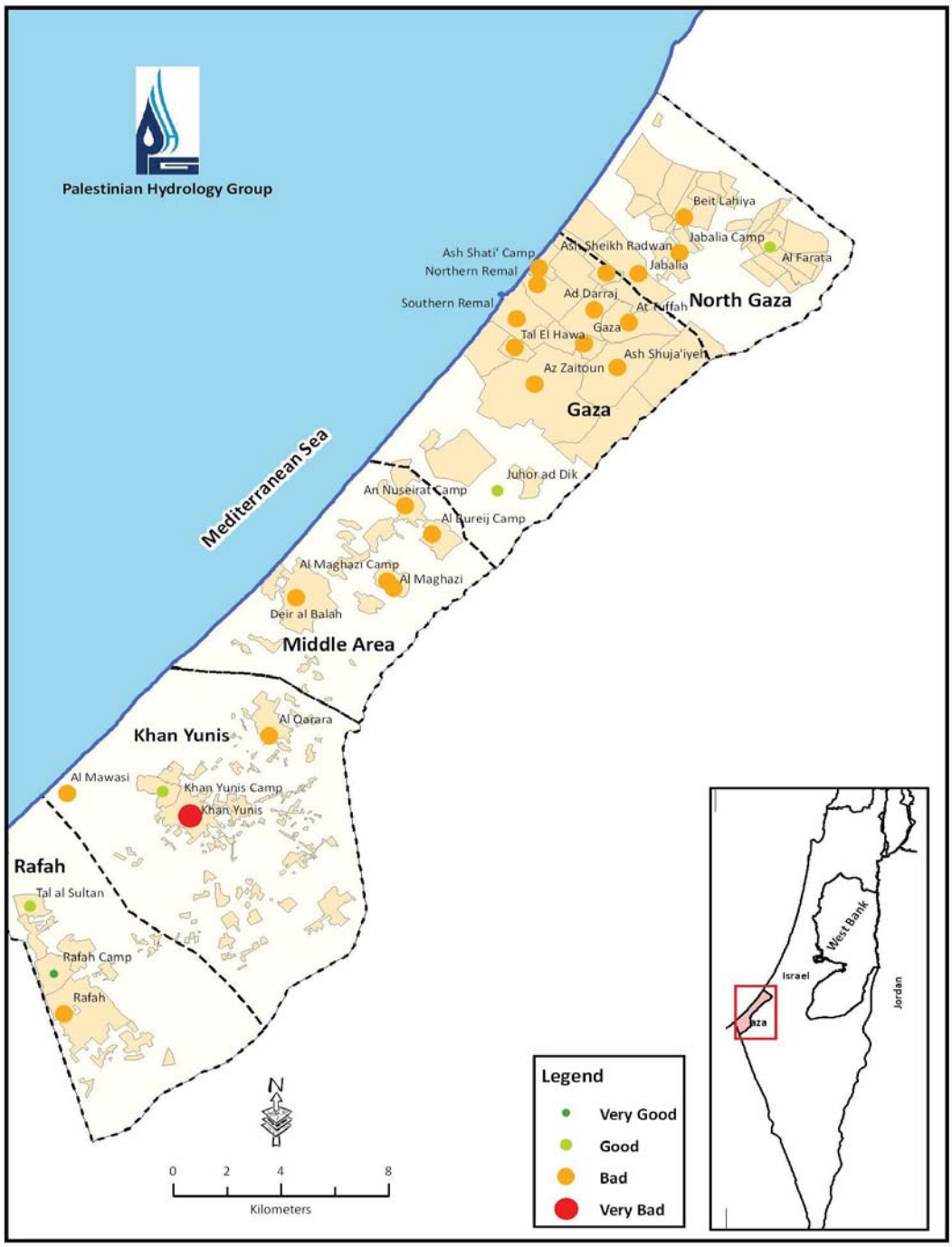


Figure 18: Hygiene status in Gaza

2.6 Health

Diarrhea is often contracted through polluted water or from poor hygiene. Twenty per cent, or one in five households said they had at least one child below five years old who had been infected with diarrhea in the four weeks prior to being surveyed (Figure 19). The incidence of diarrhea was much higher in Beit Hanun (38 per cent), despite a prevalence of hand washing before eating (93 per cent) that is higher than every other place in Gaza, except Al Mawasi, and where daily showering is most common (88 per cent), but where hand washing before cooking is very uncommon (5.4 per cent).

Yet in Al Mawasi, where no one washes their hands before cooking but everyone washes their hands before eating, less than one in five households had children who had been infected with diarrhea.

Approximately one in three households in Jabalya camp (32.1 per cent), As Shati' Camp (36.2 per cent), Northern Remal (34.7 per cent), Ash Sheikh Radwan (38.3 per cent), and Deir Al Balah (33.4 per cent) reported children under five with diarrhea.

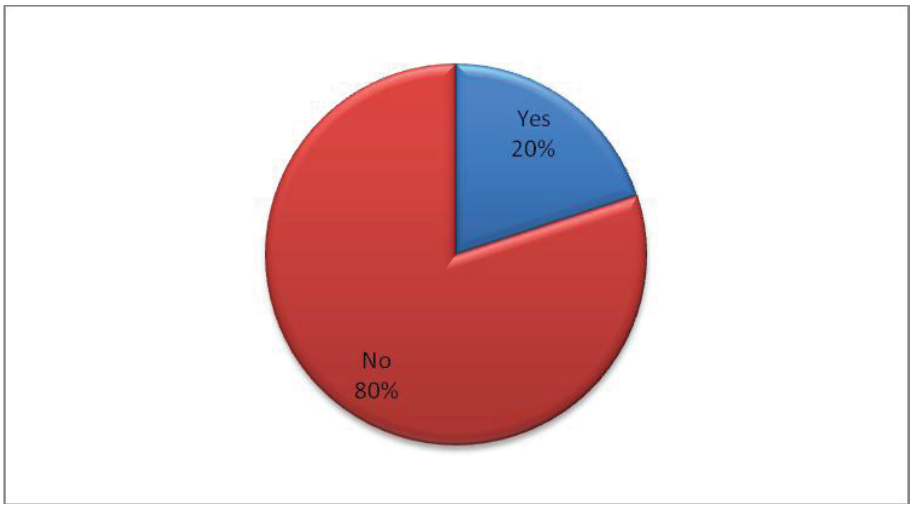


FIGURE 19: DIARRHEAL INFECTIONS IN CHILDREN LESS THAN 5 YEARS OLD

FIGURE 20: DIARRHEAL INFECTIONS IN CHILDREN

Recommendations

Based on the analysis of the collected data and the interpretation of the results the following are recommended:

1) Advocate for an end to the Gaza blockade

Gaza's WASH infrastructure risks collapse without urgently required supplies and equipment to rehabilitate water and sanitation networks, and without regular and sufficient supplies to fuel and electricity to operate networks and facilities. Most urgently required WASH related supplies include pipes and fittings, cement and other construction material, electro-mechanical equipment, and water purification chemicals without which repair, rehabilitation and new extension of water and wastewater networks cannot be implemented.

2) Conduct a comprehensive household needs assessment

The survey points to the need for a comprehensive assessment including broader geographical representation, with seasonal variation. Results should be used to correlate the prevalence of water-borne disease with water quality.

3) Introduce additional desalination units

To raise the proportion of households that have regular access to safe water for drinking and domestic use, additional desalination units need to be installed to address the gap between current capacity and water needs for drinking and domestic usage.

4) Strengthen monitoring and surveillance systems

The Palestinian Water Authority and the Coastal Municipalities Water Utility should establish strict licensing criteria, operational regulations and standards to regulate private water distribution sector, and strengthen overall monitoring to ensure that water delivered via the networks or through private distributors meet WHO and Palestinian standards.

5) Promote environmental awareness and hygiene

Conduct awareness raising campaigns about safe water transport, storage and handling at household and supplier levels. Sound hygiene practices and environmental preservation issues should also be addressed through a variety of awareness raising activities targeting a wide audience especially children. Coordinated efforts on part of Water Authority, Health Authority and humanitarian community will be required to address this issue.

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Annex A Questionnaire

Water Sanitation and Hygiene

Monitoring at Household Level - GAZA STRIP 2009

Note for the Head of the Household :

Under the framework of the Emergency WASH Cluster Response comes this survey aiming to assess and monitor water, sanitation and hygiene conditions on household level across Gaza Strip. The survey, funded by UNICEF, will be conducted by the Palestinian Hydrology Group (PHG). The information gathered using the questionnaire will remain to be strictly confidential and will be used to

IDSAM	**Household Code :**	**LOCN**	**Locality**
NAN	**PCBS Code (Zone)**	**LOCC**	**Locality Code**
GOVN	**Governorate**	**Str**	**Neighborhood**
GOVC	**Governorate Code**	**Name**	**Name of Surveyor**

Family Information			
FAMN	**Family Name**		
HHN	Total number of family members		
MALEN	Total male members		
CHLN	Total children (less than 5 years old)		
INCOMES	**Main Income Sources**		
HOST	**Do you host another family in your house**	1. Yes	2. No (go to HOUSEA)
NOH	Total number of guests		
Shelter/House Information (conditions)			
HOUSEA	AREA: Total area of the shelter (m^2)	.....	
HOUSET	TYPE :	Apartment ☐ Separate house ☐ Asbestos/Metal roof house ☐ Other ☐	

Water			
W1	What is the primary source of **drinking** water for your household?	a) Municipal network b) Water vender – tanker delivery or c) Free aid from humanitarian d) Private well e) Other	
W2	How many liters of drinking water storage capacity do you have?		.....Litre
W3	How does your drinking water taste?	a) Excellent b) Good c) Acceptable d) Unacceptable	
W4	What is the primary source of water for **domestic use** in your household?	a) Municipal network b) Water vender – tanker delivery or c) Free aid from humanitarian d) Private well e) Other	
W5	What is the water source for cooking?	a) Domestic water b) Drinking water c) Both	
W6	How many litters of domestic water storage capacity do you have?		.....Litre
W7	How often does your household have running water from the network?	a) Not connected b) Less than 4 hours per day c) 5 to 12 hours per day d) More than 12 hours per day	
W8	How often does your household have running water from the network?	a) Not connected b) 4 - 7 days/week c) 2 - 3 days/week d) Once a week e) Less than once a week f) No supply	

W9	Is the water you are receiving enough to satisfy your needs?	1. Yes 2. No	
W10	How much did you pay for drinking water last month (NIS/month)?		
W11	How much was your water bill last month (NIS/month)?		
Sanitation			
WW1	What sort of toilet do you have?	a) Sit down toilet with water flush b) Squat toilet with water flush c) Pit latrine d) Other	
WW2	Do you have stagnant or sewage water near your house?	1. Yes 2. No	
WW3	Are you served by a wastewater network?	1. Yes 2. No	
Solid Wastes			
SW1	Do you have solid waste piles near your house?	1. Yes 2. No	
SW2	How frequently is the solid waste collected from outside your household?	a) Collected once every week or more b) Collected every two weeks c) Collected every month d) We deal with it ourselves by	
Hygiene practice			
PC1	What is the main source for heating water for bathing?	a)Solar heating b) Electrical heating c) Gas heating d) Other	
PC2	When do you usually wash your hands with soap? (More than one answer is possible)	a) At prayer times b) Before mealtimes c) After mealtimes d) Before bed e) Before cooking f) After using the toilet	
PC3	How often do your family members bath/shower?	a) Every day b) 4 times or more per week c) At least once a week d) Less often	
PC4	Do the women and girls in your household have appropriate materials for menstruation?	1. Yes 2. No 3. Does not apply	
PC5	Are the women and girls in your household able to keep clean during menstruation?	1. Yes 2. No 3. Does not apply	
Health			
H1	Has anyone in your household <5 year of age had unusual diarrheal symptoms (watery/bloody diarrhea for a few days) in the past four weeks?	1. Yes 2. No 3. Does not apply	
H2	Has anyone in your household >5 years of age had unusual diarrheal symptoms (watery/bloody diarrhea for a few days) in the past four weeks?	1. Yes 2. No 3. Does not apply	

Annex B Colour Coding System

Colour coding of indicators

ID	Indicator	Possible	Colour	Weights
Drinking water				
W1	Primary source of drinking water (Answers to b & c)	>75%		50%
		50 – 75%		
		25 – 50 %		
		< 25%		
W3	Drinking water taste (Answers to a &b)	< 25%		25%
		25 – 50 %		
		50 – 75%		
		>75%		
W10	Price of drinking water	> 100		25%
		66 – 99		
		33 – 66		
		< 33		
Domestic water				
W4	Primary source of domestic water (Answers to a)	< 25%		20%
		25 – 50 %		
		50 – 75%		
		>75%		
W6	Primary source of cooking water (Answers to b)	< 25%		40%
		25 – 50 %		
		50 – 75%		
		>75%		
W7	Frequency of running water from network, hours/day (Answers to c & d)	< 25%		10%
		25 – 50 %		
		50 – 75%		
		> 75%		
W8	Frequency of running water from network, days/week (Answers to b & c)	< 25%		20%
		25 – 50 %		
		50 – 75%		
		>75%		
W9	Satisfaction with quantity of supply	< 25%		10%
		25 – 50 %		
		50 – 75%		
		>75%		
Sanitation				
WW1	Connectivity to wastewater network	< 25%		50%
		25 – 50 %		
		50 – 75%		
		>75%		
WW2	Stagnant sewage water near house (Answers to Yes)	>25%		50%
		15 – 25%		
		5 – 15 %		
		< 5%		
Solid wastes				
SW1	Solid waste piles near house (Answers to	>25%		75%

	Yes)	10 – 25%		
		5 – 10 %		
		< 5%		
SW2	Frequency of solid waste collection (Answers to a)	< 25%		25%
		25 – 50 %		
		50 – 75%		
		>75%		
Hygiene				
PC2	Washing hands with soap (Answers to b & e)	< 25%		30%
		25 – 50 %		
		50 – 75%		
		>75%		
PC3	Frequency of bathing/showering (Answers to a)	<50%		30%
		50 – 70%		
		70 – 90 %		
		> 90%		
PC4	Appropriate materials for menstruation (Answers to Yes)	<50%		40%
		50 – 70%		
		70 – 90 %		
		> 90%		
Health				
H1	Unusual diarrheal symptoms < 5 years of age (Answers Yes)	>50%		100%
		30 – 50%		
		10 – 30 %		
		< 10%		

Annex C Statistical Results

Drinking Water Sub-Sector

Table C.1: Primary source of drinking water

	Municipal	Water	Humanitar	Private	Other
Beit Lahiya	5.8%	57.8%	0.0%	2.9%	33.6%
Beit Hanun	19.4%	70.4%	0.0%	7.5%	2.8%
Jabalya Camp	2.1%	63.9%	24.1%	3.7%	6.3%
Jabalya	15.0%	74.3%	0.0%	0.2%	10.4%
North Gaza-	10.6%	66.6%	6.0%	3.5%	13.3%
Juhor ad Dik	0.0%	95.6%	0.9%	3.6%	0.0%
Old City	0.0%	87.6%	0.0%	0.0%	12.4%
Ash Shati' Camp	0.4%	99.1%	0.4%	0.0%	0.0%
Az Zaitoun	1.4%	97.9%	0.0%	0.0%	0.7%
Ad Darraj	0.2%	97.8%	0.0%	0.0%	2.0%
At Tuffah	0.3%	99.7%	0.0%	0.0%	0.0%
Ash Shuja'iyeh	0.7%	99.3%	0.0%	0.0%	0.0%
Northern Remal	0.0%	100.0%	0.0%	0.0%	0.0%
Tal El Hawa	0.0%	67.0%	0.0%	0.4%	32.6%
Southern Remal	0.0%	96.3%	0.0%	0.0%	3.7%
Ash Sheikh	0.9%	92.7%	0.0%	0.0%	6.5%
Gaza-Average	0.4%	93.9%	0.1%	0.4%	5.3%
An Nuseirat	17.3%	82.7%	0.0%	0.0%	0.0%
An Nuseirat	7.6%	91.0%	0.0%	0.0%	1.4%
Al Bureij Camp	4.0%	95.1%	0.0%	0.0%	0.9%
Al Maghazi	7.2%	92.8%	0.0%	0.0%	0.0%
Al Maghazi	26.8%	73.2%	0.0%	0.0%	0.0%
Deir al Balah	1.3%	97.6%	0.0%	0.0%	1.1%
Deir al Balah-	10.7%	88.7%	0.0%	0.0%	0.6%
Khan Yunis	3.4%	92.9%	0.9%	0.6%	2.1%
Al Qarara	6.5%	81.8%	7.6%	4.1%	0.0%
Khan Yunis	4.4%	93.8%	0.4%	0.0%	1.3%
Al Mawasi	0.0%	52.4%	0.0%	0.4%	47.1%
Khan Yunis-	3.6%	80.2%	2.2%	1.3%	12.6%
Rafah	3.3%	87.8%	0.0%	0.0%	8.8%
Rafah Camp	4.9%	87.9%	0.0%	0.0%	7.1%
Tal al Sultan	8.5%	76.4%	0.0%	0.0%	15.1%
Rafah-Average	5.6%	84.0%	0.0%	0.0%	10.4%
Average	6.2%	82.7%	1.7%	1.0%	8.4%

Table C.2: Taste of drinking water

Location	Good	Acceptable	Bad
Beit Lahiya	89.8%	9.3%	0.9%
Beit Hanun	61.4%	11.3%	27.3%
Jabalya Camp	66.6%	29.8%	3.7%
Jabalya	70.4%	26.8%	2.8%
North Gaza-Average	72.0%	19.3%	8.7%
Juhor ad Dik	98.7%	1.3%	0.0%
Old City	66.4%	31.8%	1.8%
Ash Shati' Camp	93.7%	6.3%	0.0%
Az Zaitoun	69.1%	28.2%	2.8%
Ad Darraj	80.8%	16.4%	2.7%
At Tuffah	55.9%	43.8%	0.3%
Ash Shuja'iyeh	78.8%	21.2%	0.0%
Northern Remal	96.0%	4.0%	0.0%
Tal El Hawa	82.7%	16.2%	1.1%
Southern Remal	82.1%	14.9%	3.0%
Ash Sheikh Radwan	99.3%	0.7%	0.0%
Gaza-Average	81.6%	17.3%	1.1%
An Nuseirat Camp	87.0%	12.1%	0.8%
An Nuseirat	96.1%	3.9%	0.0%
Al Bureij Camp	92.9%	7.1%	0.0%
Al Maghazi Camp	44.2%	55.3%	0.4%
Al Maghazi	29.3%	68.9%	1.8%
Deir al Balah	92.2%	7.6%	0.2%
Deir al Balah-Average	73.6%	25.8%	0.5%
Khan Yunis	58.0%	39.9%	2.2%
Al Qarara	41.5%	53.0%	5.6%
Khan Yunis Camp	75.6%	24.0%	0.4%
Al Mawasi	57.8%	41.8%	0.4%
Khan Yunis-Average	58.2%	39.6%	2.2%
Rafah	66.6%	30.1%	3.3%
Rafah Camp	54.0%	39.8%	6.3%
Tal al Sultan	63.2%	36.1%	0.7%
Rafah-Average	61.3%	35.3%	3.4%
Average	69.3%	27.5%	3.2%

Table C.3: Drinking water expenses (NIS/month)

Location	Mean water expenses
Beit Lahiya	39
Beit Hanun	54
Jabalya Camp	26
Jabalya	32
North Gaza-Average	38
Juhor ad Dik	65
Old City	21
Ash Shati' Camp	42
Az Zaitoun	29
Ad Darraj	32
At Tuffah	35
Ash Shuja'iyeh	46
Northern Remal	37
Tal El Hawa	51
Southern Remal	67
Ash Sheikh Radwan	38
Gaza-Average	42
An Nuseirat Camp	23
An Nuseirat	40
Al Bureij Camp	26
Al Maghazi Camp	32
Al Maghazi	22
Deir al Balah	45
Deir al Balah-Average	32
Khan Yunis	39
Al Qarara	21
Khan Yunis Camp	51
Al Mawasi	30
Khan Yunis-Average	35
Rafah	30
Rafah Camp	32
Tal al Sultan	33
Rafah-Average	31
Average	36

Domestic Water Sub-Sector

Table C.4: Primary source of domestic water

Location	Municipal	Water	Humanitaria	Private well
Beit Lahiya	87.1%	0.0%	0.0%	12.9%
Beit Hanun	91.9%	1.4%	0.0%	6.6%
Jabalya Camp	13.4%	28.5%	44.9%	13.2%
Jabalya	98.0%	0.0%	0.0%	2.0%
North Gaza-	72.6%	7.5%	11.2%	8.7%
Juhor ad Dik	55.1%	0.0%	0.4%	44.4%
Old City	100.0%	0.0%	0.0%	0.0%
Ash Shati' Camp	98.7%	1.3%	0.0%	0.0%
Az Zaitoun	99.8%	0.0%	0.0%	0.2%
Ad Darraj	100.0%	0.0%	0.0%	0.0%
At Tuffah	98.7%	0.0%	0.0%	1.3%
Ash Shuja'iyeh	89.0%	1.7%	0.0%	9.3%
Northern Remal	92.0%	2.7%	0.0%	5.3%
Tal El Hawa	79.6%	1.0%	0.0%	19.5%
Southern Remal	86.6%	3.4%	0.0%	10.0%
Ash Sheikh Radwan	97.6%	0.7%	0.0%	1.7%
Gaza-Average	90.6%	1.0%	0.0%	8.3%
An Nuseirat Camp	98.2%	1.8%	0.0%	0.0%
An Nuseirat	94.1%	0.4%	1.3%	3.9%
Al Bureij Camp	97.1%	2.9%	0.0%	0.0%
Al Maghazi Camp	98.7%	1.3%	0.0%	0.0%
Al Maghazi	96.3%	0.9%	0.0%	2.8%
Deir al Balah	98.0%	0.0%	0.7%	1.3%
Deir al Balah-	97.1%	1.2%	0.3%	1.3%
Khan Yunis	99.5%	0.5%	0.0%	0.0%
Al Qarara	91.3%	0.0%	0.0%	8.7%
Khan Yunis Camp	56.9%	0.0%	43.1%	0.0%
Al Mawasi	1.3%	0.0%	0.0%	98.7%
Khan Yunis-	62.3%	0.1%	10.8%	26.8%
Rafah	95.7%	0.9%	0.0%	3.4%
Rafah Camp	100.0%	0.0%	0.0%	0.0%
Tal al Sultan	100.0%	0.0%	0.0%	0.0%
Rafah-Average	98.6%	0.3%	0.0%	1.1%
Average	84.2%	2.0%	4.5%	9.3%

Table C.5: Primary source of cooking water

Location	Drinking water	Domestic water	Both
Beit Lahiya	48.9%	34.2%	16.9%
Beit Hanun	64.3%	19.0%	16.7%
Jabalya Camp	53.5%	39.9%	6.6%
Jabalya	42.7%	25.6%	31.7%
North Gaza-Average	52.3%	29.7%	18.0%
Juhor ad Dik	6.2%	64.0%	29.8%
Old City	32.3%	42.8%	24.9%
Ash Shati' Camp	0.4%	98.7%	0.9%
Az Zaitoun	58.1%	24.4%	17.4%
Ad Darraj	35.0%	40.1%	24.9%
At Tuffah	27.0%	45.4%	27.6%
Ash Shuja'iyeh	31.9%	63.2%	4.9%
Northern Remal	2.2%	97.8%	0.0%
Tal El Hawa	17.0%	69.7%	13.3%
Southern Remal	9.1%	82.6%	8.3%
Ash Sheikh Radwan	5.3%	65.4%	29.2%
Gaza-Average	20.4%	63.1%	16.5%
An Nuseirat Camp	22.4%	57.3%	20.3%
An Nuseirat	21.0%	59.3%	19.7%
Al Bureij Camp	49.4%	33.9%	16.7%
Al Maghazi Camp	13.0%	65.5%	21.5%
Al Maghazi	36.6%	57.0%	6.4%
Deir al Balah	6.3%	69.6%	24.2%
Deir al Balah-Average	24.8%	57.1%	18.1%
Khan Yunis	17.5%	56.1%	26.4%
Al Qarara	83.6%	6.5%	9.9%
Khan Yunis Camp	2.7%	79.6%	17.8%
Al Mawasi	5.4%	80.9%	13.8%
Khan Yunis-Average	27.3%	55.7%	17.0%
Rafah	49.1%	23.1%	27.7%
Rafah Camp	32.6%	35.3%	32.1%
Tal al Sultan	17.3%	58.2%	24.6%
Rafah-Average	33.0%	38.8%	28.1%
Average	31.6%	48.9%	19.5%

Table C.6: Frequency of running water supply (hours/day)

Location	Not	Less than 4	5 to 12	More than 12
Beit Lahiya	9.6%	52.9%	34.2%	3.3%
Beit Hanun	1.8%	87.1%	11.1%	0.0%
Jabalya Camp	7.4%	90.3%	2.3%	0.0%
Jabalya	1.2%	39.4%	59.3%	0.1%
North Gaza-	5.0%	67.4%	26.7%	0.9%
Juhor ad Dik	40.9%	3.1%	56.0%	0.0%
Old City	0.0%	0.4%	58.2%	41.3%
Ash Shati' Camp	0.0%	54.7%	45.3%	0.0%
Az Zaitoun	0.2%	4.4%	78.2%	17.1%
Ad Darraj	0.0%	0.0%	7.9%	92.1%
At Tuffah	2.0%	9.0%	63.3%	25.7%
Ash Shuja'iyeh	2.7%	23.1%	73.1%	1.2%
Northern Remal	0.0%	4.9%	68.9%	26.2%
Tal El Hawa	1.6%	29.3%	47.4%	21.8%
Southern Remal	15.0%	15.7%	24.8%	44.5%
Ash Sheikh Radwan	0.0%	39.0%	56.6%	4.4%
Gaza-Average	5.7%	16.7%	52.7%	24.9%
An Nuseirat Camp	0.4%	15.7%	59.6%	24.2%
An Nuseirat	6.1%	3.5%	54.7%	35.7%
Al Bureij Camp	0.0%	8.3%	87.0%	4.7%
Al Maghazi Camp	0.0%	0.0%	11.1%	88.9%
Al Maghazi	0.0%	1.8%	10.7%	87.6%
Deir al Balah	0.0%	15.3%	66.2%	18.5%
Deir al Balah-	1.2%	7.3%	47.8%	43.7%
Khan Yunis	0.0%	57.4%	41.6%	1.0%
Al Qarara	8.7%	41.8%	49.5%	0.0%
Khan Yunis Camp	48.0%	50.2%	1.8%	0.0%
Al Mawasi	100.0%	0.0%	0.0%	0.0%
Khan Yunis-	39.2%	37.4%	23.2%	0.2%
Rafah	0.0%	8.8%	72.7%	18.5%
Rafah Camp	0.0%	5.3%	72.9%	21.8%
Tal al Sultan	0.0%	1.4%	78.0%	20.6%
Rafah-Average	0.0%	5.2%	74.5%	20.3%
Average	10.2%	26.8%	45.0%	18.0%

Table C.7: Frequency of running water supply (days/week)

Location	Not	4 to 7	2 to 3	Once a	No water
Beit Lahiya	9.3%	89.8%	0.7%	0.2%	0.0%
Beit Hanun	0.4%	87.9%	9.8%	0.4%	1.4%
Jabalya Camp	7.4%	92.2%	0.2%	0.2%	0.0%
Jabalya	1.4%	89.5%	9.0%	0.1%	0.0%
North Gaza-	4.7%	89.8%	4.9%	0.3%	0.4%
Juhor ad Dik	40.9%	0.4%	58.7%	0.0%	0.0%
Old City	1.4%	97.7%	0.9%	0.0%	0.0%
Ash Shati' Camp	0.0%	12.4%	74.2%	8.4%	6.2%
Az Zaitoun	0.2%	32.6%	67.2%	0.0%	0.0%
Ad Darraj	0.0%	0.7%	99.3%	0.0%	0.0%
At Tuffah	2.0%	36.0%	61.3%	0.7%	0.0%
Ash Shuja'iyeh	2.2%	39.9%	54.6%	0.2%	5.1%
Northern Remal	0.0%	78.2%	20.9%	0.9%	0.0%
Tal El Hawa	1.1%	34.6%	63.0%	1.1%	1.1%
Southern Remal	10.5%	25.0%	60.7%	0.0%	3.8%
Ash Sheikh	0.7%	71.6%	27.8%	0.0%	0.0%
Gaza-Average	5.4%	39.3%	53.3%	0.9%	1.5%
An Nuseirat	0.8%	74.2%	18.6%	3.7%	2.8%
An Nuseirat	6.1%	76.9%	16.7%	0.2%	0.0%
Al Bureij Camp	0.0%	82.5%	17.0%	0.5%	0.0%
Al Maghazi	0.0%	100.0%	0.0%	0.0%	0.0%
Al Maghazi	0.0%	97.8%	1.1%	1.1%	0.0%
Deir al Balah	0.0%	37.9%	62.1%	0.0%	0.0%
Deir al Balah-	1.4%	78.2%	19.1%	0.8%	0.5%
Khan Yunis	0.1%	78.6%	20.4%	0.6%	0.3%
Al Qarara	8.2%	9.2%	80.8%	0.4%	1.4%
Khan Yunis	52.2%	13.4%	30.8%	0.0%	6.2%
Al Mawasi	100.0%	0.0%	0.0%	0.0%	0.0%
Khan Yunis-	40.2%	25.3%	33.0%	0.3%	2.0%
Rafah	0.5%	11.2%	76.8%	11.0%	0.6%
Rafah Camp	0.4%	16.5%	80.0%	3.1%	0.0%
Tal al Sultan	0.2%	0.5%	97.2%	2.1%	0.0%
Rafah-Average	0.4%	9.4%	84.7%	5.4%	0.2%
Average	10.4%	48.4%	39.0%	1.5%	0.9%

Table C.8: Sufficiency of water supply

Location	Yes	No
Beit Lahiya	72.7%	27.3%
Beit Hanun	64.5%	35.5%
Jabalya Camp	75.6%	24.4%
Jabalya	74.0%	26.0%
North Gaza-Average	71.7%	28.3%
Juhor ad Dik	38.7%	61.3%
Old City	71.9%	28.1%
Ash Shati' Camp	20.0%	80.0%
Az Zaitoun	55.8%	44.2%
Ad Darraj	67.2%	32.8%
At Tuffah	54.1%	45.9%
Ash Shuja'iyeh	67.2%	32.8%
Northern Remal	71.6%	28.4%
Tal El Hawa	79.4%	20.6%
Southern Remal	52.8%	47.2%
Ash Sheikh Radwan	86.7%	13.3%
Gaza-Average	60.5%	39.5%
An Nuseirat Camp	86.4%	13.6%
An Nuseirat	86.7%	13.3%
Al Bureij Camp	81.2%	18.8%
Al Maghazi Camp	88.2%	11.8%
Al Maghazi	85.7%	14.3%
Deir al Balah	34.3%	65.7%
Deir al Balah-Average	77.1%	22.9%
Khan Yunis	60.4%	39.6%
Al Qarara	52.7%	47.3%
Khan Yunis Camp	51.6%	48.4%
Al Mawasi	60.4%	39.6%
Khan Yunis-Average	56.3%	43.7%
Rafah	53.6%	46.4%
Rafah Camp	48.7%	51.3%
Tal al Sultan	58.9%	41.2%
Rafah-Average	53.7%	46.3%
Average	63.9%	36.1%

Wastewater Sub-Sector

Table C.9: Stagnant sewage

Location	Yes	No
Beit Lahiya	2.2%	97.8%
Beit Hanun	4.6%	95.4%
Jabalya Camp	18.8%	81.2%
Jabalya	5.7%	94.3%
North Gaza-Average	7.8%	92.2%
Juhor ad Dik	25.3%	74.7%
Old City	0.4%	99.6%
Ash Shati' Camp	0.4%	99.6%
Az Zaitoun	9.3%	90.7%
Ad Darraj	1.8%	98.2%
At Tuffah	7.8%	92.2%
Ash Shuja'iyeh	5.1%	94.9%
Northern Remal	2.7%	97.3%
Tal El Hawa	1.3%	98.7%
Southern Remal	1.5%	98.5%
Ash Sheikh Radwan	0.2%	99.8%
Gaza-Average	5.1%	94.9%
An Nuseirat Camp	3.2%	96.8%
An Nuseirat	3.8%	96.2%
Al Bureij Camp	1.9%	98.1%
Al Maghazi Camp	1.3%	98.7%
Al Maghazi	0.4%	99.6%
Deir al Balah	1.8%	98.2%
Deir al Balah-Average	2.1%	97.9%
Khan Yunis	9.4%	90.6%
Al Qarara	4.5%	95.5%
Khan Yunis Camp	4.4%	95.6%
Al Mawasi	6.2%	93.8%
Khan Yunis-Average	6.2%	93.8%
Rafah	24.5%	75.5%
Rafah Camp	0.9%	99.1%
Tal al Sultan	12.1%	87.9%
Rafah-Average	12.5%	87.5%
Average	6.7%	93.3%

Table C.10: Connectivity to wastewater network

Location	Yes	No
Beit Lahiya	83.0%	17.0%
Beit Hanun	61.5%	38.5%
Jabalya Camp	98.7%	1.3%
Jabalya	98.4%	1.6%
North Gaza-Average	85.4%	14.6%
Juhor ad Dik	0.0%	100.0%
Old City	98.0%	2.0%
Ash Shati' Camp	97.3%	2.7%
Az Zaitoun	97.0%	3.0%
Ad Darraj	98.3%	1.7%
At Tuffah	98.0%	2.0%
Ash Shuja'iyeh	99.7%	0.3%
Northern Remal	98.7%	1.3%
Tal El Hawa	97.7%	2.3%
Southern Remal	95.8%	4.2%
Ash Sheikh Radwan	98.7%	1.3%
Gaza-Average	89.0%	11.0%
An Nuseirat Camp	100.0%	0.0%
An Nuseirat	98.6%	1.4%
Al Bureij Camp	88.7%	11.3%
Al Maghazi Camp	97.3%	2.7%
Al Maghazi	100.0%	0.0%
Deir al Balah	96.9%	3.1%
Deir al Balah-Average	96.9%	3.1%
Khan Yunis	54.0%	46.0%
Al Qarara	1.3%	98.7%
Khan Yunis Camp	43.3%	56.7%
Al Mawasi	0.0%	100.0%
Khan Yunis-Average	24.7%	75.3%
Rafah	33.9%	66.2%
Rafah Camp	98.0%	2.0%
Tal al Sultan	100.0%	0.0%
Rafah-Average	77.3%	22.7%
Average	74.7%	25.3%

Solid Waste Sub-Sector

Table C.11: Solid waste piles

Location	Yes	No
Beit Lahiya	8.7%	91.3%
Beit Hanun	12.5%	87.5%
Jabalya Camp	12.9%	87.1%
Jabalya	10.9%	89.1%
North Gaza-Average	11.3%	88.7%
Juhor ad Dik	31.1%	68.9%
Old City	0.4%	99.6%
Ash Shati' Camp	0.9%	99.1%
Az Zaitoun	4.5%	95.5%
Ad Darraj	13.8%	86.2%
At Tuffah	18.3%	81.7%
Ash Shuja'iyeh	7.6%	92.4%
Northern Remal	6.2%	93.8%
Tal El Hawa	2.2%	97.8%
Southern Remal	14.2%	85.8%
Ash Sheikh Radwan	4.9%	95.1%
Gaza-Average	9.5%	90.5%
An Nuseirat Camp	19.4%	80.6%
An Nuseirat	14.8%	85.2%
Al Bureij Camp	2.9%	97.1%
Al Maghazi Camp	3.6%	96.4%
Al Maghazi	1.3%	98.7%
Deir al Balah	36.0%	64.0%
Deir al Balah-Average	13.0%	87.0%
Khan Yunis	14.6%	85.4%
Al Qarara	16.5%	83.5%
Khan Yunis Camp	3.1%	96.9%
Al Mawasi	10.7%	89.3%
Khan Yunis-Average	11.2%	88.8%
Rafah	36.1%	63.9%
Rafah Camp	3.6%	96.4%
Tal al Sultan	13.7%	86.3%
Rafah-Average	17.8%	82.2%
Average	12.5%	87.5%

Table C.12: Frequency of solid waste collection

Location	Once a week	Every two	Every month	Burned on
Beit Lahiya	98.7%	1.3%	0.0%	0.0%
Beit Hanun	86.8%	1.9%	0.0%	11.4%
Jabalya Camp	99.8%	0.2%	0.0%	0.0%
Jabalya	97.3%	2.0%	0.3%	0.4%
North Gaza-	95.6%	1.4%	0.1%	2.9%
Juhor ad Dik	55.1%	3.6%	0.9%	40.4%
Old City	100.0%	0.0%	0.0%	0.0%
Ash Shati' Camp	99.6%	0.4%	0.0%	0.0%
Az Zaitoun	99.3%	0.2%	0.4%	0.0%
Ad Darraj	99.1%	0.9%	0.0%	0.0%
At Tuffah	67.9%	6.0%	7.1%	19.0%
Ash Shuja'iyeh	86.0%	2.2%	5.8%	6.0%
Northern Remal	99.6%	0.4%	0.0%	0.0%
Tal El Hawa	98.5%	1.3%	0.0%	0.2%
Southern Remal	97.0%	0.0%	1.5%	1.5%
Ash Sheikh	100.0%	0.0%	0.0%	0.0%
Gaza-Average	91.1%	1.4%	1.4%	6.1%
An Nuseirat Camp	100.0%	0.0%	0.0%	0.0%
An Nuseirat	97.5%	0.0%	0.9%	1.6%
Al Bureij Camp	100.0%	0.0%	0.0%	0.0%
Al Maghazi Camp	100.0%	0.0%	0.0%	0.0%
Al Maghazi	100.0%	0.0%	0.0%	0.0%
Deir al Balah	96.0%	4.0%	0.0%	0.0%
Deir al Balah-	98.9%	0.7%	0.2%	0.3%
Khan Yunis	98.5%	0.7%	0.8%	0.0%
Al Qarara	96.3%	0.0%	0.0%	3.7%
Khan Yunis Camp	80.0%	4.0%	4.9%	11.1%
Al Mawasi	4.0%	4.0%	2.7%	89.3%
Khan Yunis-	69.7%	2.2%	2.1%	26.0%
Rafah	82.0%	7.2%	0.4%	10.3%
Rafah Camp	100.0%	0.0%	0.0%	0.0%
Tal al Sultan	99.5%	0.2%	0.0%	0.2%
Rafah-Average	93.8%	2.5%	0.1%	3.5%
Average	89.8%	1.6%	0.8%	7.8%

Hygiene Sub-Sector

Table C.13: Frequency of bathing/showering

Location	Everyday	4 times or	2 - 4 times	Less often
Beit Lahiya	57.4%	40.7%	2.0%	0.0%
Beit Hanun	73.9%	25.4%	0.7%	0.0%
Jabalya Camp	26.9%	64.7%	8.5%	0.0%
Jabalya	24.8%	54.8%	20.4%	0.0%
North Gaza-	45.7%	46.4%	7.9%	0.0%
Juhor ad Dik	53.4%	46.7%	0.0%	0.0%
Old City	27.2%	72.8%	0.0%	0.0%
Ash Shati' Camp	24.1%	56.0%	19.9%	0.0%
Az Zaitoun	33.1%	63.6%	2.2%	1.1%
Ad Darraj	21.9%	68.1%	9.9%	0.0%
At Tuffah	33.2%	59.5%	7.4%	0.0%
Ash Shuja'iyeh	33.4%	61.3%	4.2%	1.1%
Northern Remal	40.0%	60.0%	0.0%	0.0%
Tal El Hawa	42.4%	49.5%	8.2%	0.0%
Southern Remal	27.8%	63.2%	8.9%	0.0%
Ash Sheikh Radwan	29.4%	70.7%	0.0%	0.0%
Gaza-Average	33.3%	61.0%	5.5%	0.2%
An Nuseirat Camp	26.6%	48.2%	25.2%	0.0%
An Nuseirat	34.2%	50.4%	15.5%	0.0%
Al Bureij Camp	27.2%	66.5%	6.4%	0.0%
Al Maghazi Camp	68.0%	32.0%	0.0%	0.0%
Al Maghazi	72.7%	27.4%	0.0%	0.0%
Deir al Balah	49.7%	45.4%	5.0%	0.0%
Deir al Balah-	46.4%	45.0%	8.7%	0.0%
Khan Yunis	2.8%	63.8%	3.0%	6.2%
Al Qarara	20.7%	73.1%	6.3%	0.0%
Khan Yunis Camp	44.7%	54.0%	1.4%	0.0%
Al Mawasi	55.4%	38.0%	6.0%	0.7%
Khan Yunis-	36.9%	57.2%	4.2%	1.7%
Rafah	45.0%	51.8%	3.2%	0.0%
Rafah Camp	68.5%	31.6%	0.0%	0.0%
Tal al Sultan	56.4%	42.6%	1.0%	0.0%
Rafah-Average	56.6%	42.0%	1.4%	0.0%
Average	43.8%	50.3%	5.5%	0.4%

Table C.14: Appropriate material for menstruation

Location	Yes	No
Beit Lahiya	99.3%	0.7%
Beit Hanun	89.8%	10.2%
Jabalya Camp	88.1%	11.9%
Jabalya	75.0%	25.0%
North Gaza-Average	88.0%	12.0%
Juhor ad Dik	88.8%	11.2%
Old City	94.0%	6.0%
Ash Shati' Camp	94.0%	6.0%
Az Zaitoun	77.2%	22.8%
Ad Darraj	99.3%	0.8%
At Tuffah	87.8%	12.2%
Ash Shuja'iyeh	90.3%	9.7%
Northern Remal	99.3%	0.7%
Tal El Hawa	98.0%	2.0%
Southern Remal	90.5%	9.5%
Ash Sheikh Radwan	100.0%	0.0%
Gaza-Average	92.6%	7.4%
An Nuseirat Camp	95.0%	5.1%
An Nuseirat	96.4%	3.6%
Al Bureij Camp	97.9%	2.2%
Al Maghazi Camp	100.0%	0.0%
Al Maghazi	100.0%	0.0%
Deir al Balah	90.4%	9.7%
Deir al Balah-Average	96.6%	3.4%
Khan Yunis	2.8%	2.5%
Al Qarara	90.3%	9.7%
Khan Yunis Camp	99.3%	0.8%
Al Mawasi	97.9%	2.1%
Khan Yunis-Average	96.3%	3.7%
Rafah	88.1%	11.9%
Rafah Camp	100.0%	0.0%
Tal al Sultan	97.0%	3.0%
Rafah-Average	95.1%	4.9%
Average	93.7%	6.3%

Table C.15: Hand washing practices

Location	Hand washing before	Hand washing before
Beit Lahiya	56.4%	21.7%
Beit Hanun	93.3%	5.4%
Jabalya Camp	71.2%	44.1%
Jabalya	41.8%	32.3%
North Gaza-Average	65.7%	25.8%
Juhor ad Dik	97.4%	50.0%
Old City	54.2%	60.6%
Ash Shati' Camp	66.0%	42.0%
Az Zaitoun	63.2%	56.0%
Ad Darraj	39.1%	75.0%
At Tuffah	49.9%	49.4%
Ash Shuja'iyeh	71.3%	54.0%
Northern Remal	66.7%	45.4%
Tal El Hawa	68.9%	61.4%
Southern Remal	27.4%	55.0%
Ash Sheikh Radwan	43.0%	64.4%
Gaza-Average	58.8%	55.7%
An Nuseirat Camp	15.9%	13.1%
An Nuseirat	50.9%	16.3%
Al Bureij Camp	65.5%	26.9%
Al Maghazi Camp	50.7%	14.7%
Al Maghazi	38.0%	8.7%
Deir al Balah	44.6%	18.5%
Deir al Balah-Average	65.3%	39.5%
Khan Yunis	2.8%	74.3%
Al Qarara	39.2%	34.4%
Khan Yunis Camp	76.7%	76.7%
Al Mawasi	100.0%	0.0%
Khan Yunis-Average	70.1%	48.2%
Rafah	65.5%	45.9%
Rafah Camp	53.2%	65.8%
Tal al Sultan	73.4%	50.9%
Rafah-Average	64.0%	54.2%
Average	64.8%	44.7%

Health Sub-Sector

Table C.16: Diarrheal cases infecting children less than 5 years old

Location	Yes	No
Beit Lahiya	8.3%	91.7%
Beit Hanun	39.9%	60.1%
Jabalya Camp	32.1%	67.9%
Jabalya	29.5%	70.5%
North Gaza-Average	27.4%	72.6%
Juhor ad Dik	28.6%	71.4%
Old City	13.0%	87.0%
Ash Shati' Camp	36.2%	63.8%
Az Zaitoun	11.9%	88.1%
Ad Darraj	3.7%	96.3%
At Tuffah	8.9%	91.1%
Ash Shuja'iyeh	19.3%	80.7%
Northern Remal	34.7%	65.3%
Tal El Hawa	25.0%	75.0%
Southern Remal	12.9%	87.1%
Ash Sheikh Radwan	38.3%	61.7%
Gaza-Average	21.1%	78.9%
An Nuseirat Camp	10.2%	89.9%
An Nuseirat	11.6%	88.4%
Al Bureij Camp	12.4%	87.6%
Al Maghazi Camp	22.3%	77.7%
Al Maghazi	16.9%	83.1%
Deir al Balah	33.4%	66.7%
Deir al Balah-Average	17.8%	82.2%
Khan Yunis	2.8%	72.5%
Al Qarara	9.7%	90.3%
Khan Yunis Camp	15.3%	84.7%
Al Mawasi	17.2%	82.8%
Khan Yunis-Average	17.4%	82.6%
Rafah	18.3%	81.7%
Rafah Camp	13.5%	86.5%
Tal al Sultan	16.7%	83.3%
Rafah-Average	16.1%	83.9%
Average	20.0%	80.0%

Annex D Colour Coded Results

Location	Drinking water				Domestic water						Wastewater			Solid waste			Hygiene				Health
	Source	Taste	Price	Score	Source	Cooking	Frequency (hours/day)	Service	Satisfaction	Score	Connectivity	Stagnant	Score	Accumulation	Collection frequency	Score	Washing hands	Showering	Menustration material	Score	
Beit Lahiya	0.42	0.10	0.52	0.40	0.13	0.66	0.62	0.10	0.27	0.47	0.17	0.02	0.12	0.09	0.01	0.08	0.61	0.43	0.01	0.41	0.08
Beit Hanun	0.30	0.39	0.72	0.46	0.08	0.81	0.89	0.02	0.35	0.60	0.38	0.05	0.27	0.12	0.13	0.13	0.51	0.26	0.10	0.32	0.40
Jabalya Camp	0.12	0.33	0.35	0.26	0.87	0.60	0.98	0.08	0.24	0.63	0.01	0.19	0.13	0.13	0.00	0.11	0.42	0.73	0.12	0.47	0.32
Jabalya	0.26	0.30	0.42	0.32	0.02	0.74	0.41	0.02	0.26	0.49	0.02	0.06	0.04	0.11	0.03	0.10	0.63	0.75	0.25	0.56	0.29
Juhor ad Dik	0.04	0.01	0.86	0.43	0.45	0.36	0.44	0.41	0.61	0.43	1.00	0.25	0.73	0.31	0.45	0.35	0.26	0.47	0.11	0.30	0.29
Old City	0.12	0.34	0.28	0.24	0.00	0.57	0.00	0.01	0.28	0.37	0.02	0.00	0.01	0.00	0.00	0.00	0.43	0.73	0.06	0.46	0.13
Ash Shati' Camp	0.00	0.06	0.56	0.28	0.01	0.01	0.55	0.13	0.80	0.31	0.03	0.00	0.02	0.01	0.00	0.01	0.46	0.76	0.06	0.49	0.36
Az Zaitoun	0.02	0.31	0.39	0.25	0.00	0.76	0.05	0.00	0.44	0.50	0.03	0.09	0.07	0.04	0.01	0.04	0.40	0.67	0.23	0.45	0.12
Ad Darraj	0.02	0.19	0.42	0.23	0.00	0.60	0.00	0.00	0.33	0.39	0.02	0.02	0.02	0.14	0.01	0.12	0.43	0.78	0.01	0.49	0.04
At Tuffah	0.00	0.44	0.46	0.32	0.01	0.55	0.11	0.03	0.46	0.38	0.02	0.08	0.06	0.18	0.32	0.23	0.50	0.67	0.12	0.47	0.09
Ash Shuja'iyeh	0.01	0.21	0.62	0.33	0.11	0.37	0.26	0.06	0.33	0.27	0.00	0.05	0.04	0.08	0.14	0.10	0.37	0.67	0.10	0.42	0.19
Northern Remal	0.00	0.04	0.50	0.25	0.08	0.02	0.05	0.01	0.28	0.10	0.01	0.03	0.02	0.06	0.00	0.05	0.44	0.60	0.01	0.41	0.35
Tal El Hawa	0.33	0.17	0.68	0.42	0.20	0.30	0.31	0.02	0.21	0.24	0.02	0.01	0.02	0.02	0.02	0.02	0.35	0.58	0.02	0.37	0.25
Southern Remal	0.04	0.18	0.90	0.46	0.13	0.17	0.31	0.14	0.47	0.23	0.04	0.01	0.03	0.14	0.03	0.12	0.59	0.72	0.10	0.51	0.13
Ash Sheikh Radwan	0.07	0.01	0.51	0.26	0.02	0.35	0.39	0.01	0.13	0.25	0.01	0.00	0.01	0.05	0.00	0.04	0.46	0.71	0.00	0.46	0.38
An Nuseirat Camp	0.17	0.13	0.31	0.21	0.02	0.43	0.16	0.07	0.14	0.28	0.00	0.03	0.02	0.19	0.00	0.17	0.86	0.73	0.05	0.62	0.10
An Nuseirat	0.09	0.04	0.53	0.27	0.06	0.41	0.10	0.06	0.13	0.27	0.01	0.04	0.03	0.15	0.03	0.13	0.66	0.66	0.04	0.51	0.12
Al Bureij Camp	0.05	0.07	0.34	0.18	0.03	0.66	0.08	0.00	0.19	0.42	0.11	0.02	0.08	0.03	0.00	0.03	0.54	0.73	0.02	0.50	0.12
Al Maghazi Camp	0.07	0.56	0.43	0.36	0.01	0.35	0.00	0.00	0.12	0.22	0.03	0.01	0.02	0.04	0.00	0.03	0.67	0.32	0.00	0.41	0.22
Al Maghazi	0.27	0.71	0.29	0.43	0.04	0.43	0.02	0.01	0.14	0.28	0.00	0.00	0.00	0.01	0.00	0.01	0.77	0.27	0.00	0.45	0.17
Deir al Balah	0.02	0.08	0.60	0.30	0.02	0.30	0.15	0.00	0.66	0.29	0.03	0.02	0.02	0.36	0.04	0.31	0.68	0.50	0.10	0.47	0.33
Khan Yunis	0.06	0.42	0.52	0.34	0.00	0.44	0.57	0.01	0.40	0.35	0.46	0.09	0.33	0.15	0.01	0.13	0.61	0.97	0.97	0.88	0.03
Al Qarara	0.11	0.59	0.27	0.33	0.09	0.94	0.51	0.10	0.47	0.63	0.99	0.05	0.70	0.17	0.04	0.14	0.63	0.79	0.10	0.56	0.10
Khan Yunis Camp	0.06	0.24	0.68	0.36	0.43	0.20	0.98	0.56	0.48	0.49	0.57	0.04	0.40	0.03	0.20	0.10	0.23	0.55	0.01	0.33	0.15
Al Mawasi	0.48	0.42	0.40	0.44	0.99	0.19	1.00	1.00	0.40	0.72	1.00	0.06	0.71	0.11	0.96	0.49	0.50	0.45	0.02	0.37	0.17
Rafah	0.12	0.33	0.40	0.27	0.04	0.77	0.09	0.12	0.46	0.51	0.66	0.24	0.50	0.36	0.18	0.33	0.44	0.55	0.12	0.39	0.18
Rafah Camp	0.12	0.46	0.42	0.32	0.00	0.65	0.05	0.04	0.51	0.44	0.02	0.01	0.02	0.04	0.00	0.03	0.41	0.32	0.00	0.28	0.14
Tal al Sultan	0.24	0.37	0.43	0.33	0.00	0.42	0.01	0.02	0.41	0.30	0.00	0.12	0.09	0.14	0.00	0.12	0.38	0.44	0.03	0.32	0.17

Very good Very poor