

## Comparison Between the Risk and Target Indicators of Environmental Sanitation Practices as a Step Towards Hygiene Promotion for Upper Egypt Governorates

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**Abstract:** Hygiene promotion is more specific and targeted than health promotion as it focuses on the reduction and elimination of diseases and deaths that originate from poor hygienic conditions and practices. The objective of the present study was to provide planners and implementers with comprehensive up-to-date figures about risk indicators versus the recommended target indicators of environmental sanitation practices; personal hygiene, environmental hygiene, water and food handling, getting rid of human excreta and disposal of refuse and waste water. These indicators were studied in four Egyptian districts lying in three of upper Egypt governorates that are proved to be out of the poorest governorates of Egypt; Etssa district in Fayoum governorate, Nasser district in Benisuef governorate, Samalout and Abukorkass districts both of which lie in El Menia governorate. Furthermore, the study defined the target groups who employ the risk practices and who influence them and determined the communication channels which are most credible and trusted for dissemination of hygienic messages for behavioral changes. This was achieved through a cross sectional baseline survey study on 2128 families focusing mainly on practices of household women in the selected districts related to the studied indicators. The results showed that the most prevalent risk indicator was drinking water from suspicious infected sources without boiling which ranged from (92%) in Abukorkass district to (98.8%) in Samalout district. Another risk indicator was having animal zerebas inside houses which was highest in Etssa district (55.5%) which also showed the highest percentage for storing insecticides and chemicals inside the house (35.4%). The percentage of housewives who prepared and cooked food in any room in the house was high in all districts reaching (73%) in Abukorkass district. As for the disposal of waste water by throwing in rivers and canals, it was found to be highest in Etssa district (70.6%). Regarding the recommended target indicators; hand washing with soap and water only after disposal of their children defecates. This was high in all districts reaching up to (97.1%) in Abukorkass district. The percentage of housewives who washed vegetables with water only before eating ranged from (92.9%) in Samalout district to (98.9%) in Nasser district. The majority of families had a private latrine in their house with the highest percentage in Samalout district (90.1%). The majority of families always kept their latrines clean which was also highest in Samalout district (97.3%). Moreover, the study found that the use of mass media in the form of T.V spots and rural leaders were the most favorite sources for dissemination of environmental information targeting the whole family. It is recommended that hygiene promotion programs should focus on developing skills in collaboration with the existing local government structures using practical and interactive methods rather than just passing on information so that good hygiene behavior and its benefits would not only be clearly defined but also be practised by their communities. This could be achieved by programs that do not only target household women but also the whole family and particularly husbands.

**Key words:** Risk indicators, target indicators, water and food handling, personal hygiene, environmental hygiene, water and refuse disposal

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### INTRODUCTION

While health promotion is the process of enabling people to increase control over, and improve their health, to reach a state of complete physical, mental and social well-being, an individual or group must be able

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to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is therefore seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. These wide-ranging perspectives of health mean that health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to well-being. (WHO, 1986)

Hygiene promotion is more specific and more targeted than health promotion. It focuses on the reduction - and ultimately the elimination - of diseases and deaths that originate from poor hygienic conditions and practices. For example, good hygienic conditions and practices are enhanced when people can consume water that is safe, use sufficient amounts of water for personal and domestic cleanliness, and dispose their solid and liquid wastes safely. These simple habits will prevent sickness and promote good health. (Almedom *et al.* 1997, Ferron *et al.* 2000)

Many hygiene education programs focus on increasing people's knowledge. Planners and implementers assume that when people know better about how water and sanitation diseases are transmitted, they will drop unhygienic practices and adopt improved ones. However, this is not often the case. Increasing people's knowledge does not automatically lead them to change behaviors. Positive hygiene behaviors include a wide range of practices that promote health, and prevent catching and spreading water and sanitation related diseases. Our health-related behavior is partly determined by a complex mix of our knowledge, beliefs, attitudes, norms and customs. Socio-economic determinants and even political factors also play important roles. Without the resources to construct and maintain water supply and sanitation facilities, it is difficult to attain levels of personal, domestic and environmental hygiene conducive to health. (Boot and Cairncross, 1993)

To be able to develop interventions to promote hygiene behavioral change, planners and implementers need to have an account of and assess the situation of communities' current behaviors i.e. practices that are good or safe and which are risky to be tackled.

#### ***Aim of the Study:***

The aim of this study was to provide planners and implementers with comprehensive up-to-date figures about risk indicators versus the recommended target indicators regarding personal hygiene, environmental hygiene, water and food handling, getting rid of human excreta and disposal of refuse and waste water. The studied hygiene practices fall under four different categories: sanitation, water, food and environment. These indicators were studied in four Egyptian districts lying in three of Upper Egypt governorates, that are proved to be out of the poorest governorates of Egypt; Etssa district in Fayoum governorate, Nasser district in Benisuef governorate, Samalout and Abukorkass districts both of which lie in El Menia district. Furthermore, the study defined the target groups who employ the risk practices and who influence them and determined the communication channels which are most credible and trusted for dissemination of hygienic messages for behavioral changes.

## **MATERIALS AND METHODS**

A cross sectional baseline survey study was conducted focusing on knowledge, attitude, and practices (KAP) of household women in the selected districts. The baseline survey data collection was implemented for measuring a stage of behavioral changes needed to plan for hygiene promotion intervention.

Six domains of essential family practices were studied as follow:

- Personal hygiene mainly practice of hand washing
- Disposal of human excreta especially those of young children
- Practices of solid refuse and liquid waste disposal in the households
- Practices related to drinking water handling in the households
- Practices related to food handling in the households
- Practices related to home and environmental sanitation

#### ***Target Groups:***

The majority of the selected indicators targeted women, children and families. So women, as household heads, were the focus of the majority of the indicators while the whole household was the target for some indicators. This study focused on communities in the following four districts: Etssa (Fayoum governorate), Nasser (Benisuef governorate), Samalout and Abu Korkass (El-Menia governorate). The field team explained

the purpose of the study to each prospective female head of household in the four districts. Field workers emphasized that participation was voluntary, and verbal consent was obtained.

The calculation of the sample size through using the appropriate mathematical formulae required that several factors be specified and values for others be assumed or taken from previous or similar surveys. These were as follows:

Parameter	Assumption
√ The precision, or margin of error, wanted	0.05
√ The level of confidence desired	95 %
√ The estimated (or known) proportion of the population in a given target group	For women (30 %) For children >2 years and <18 years (31 %)
√ The predicted or anticipated coverage rate, or prevalence, for a given indicator	50 %
√ The average household size	6
√ An adjustment for potential non-response	10 % for losses

Accordingly, number of households that needed to be surveyed from each of the four districts should not be less than 475 houses (1900 households from the four mentioned districts in the three mentioned governorates). This sample size ensured adequate sample size for both women and children to be interviewed in each district for their KAP as well as the expected number of losses. The baseline survey sample size ranged from 500 to 588 families in the four selected villages.

As communities vary considerably in population size, so probability proportional to size (PPS) was used as sampling technique so that clusters of both large and small communities had the same probability of being included within the sampling frame. (Lemeshow *et al.*, 1990).

**Questionnaire:**

The baseline questionnaire consisted of designed questions and structured observations related to personal hygiene behaviors, water handling behaviors, environmental hygiene, water and food handling, means of getting rid of human excreta, disposal of refuse and waste water and proper handling of water.

Structured observations using a checklist were completed for each interviewee; through observations of the interviewers; such as children with trimmed nails, water handling and latrine structure and cleanliness. All the interviewers had previous experiences in such field. (Metwally *et al.*, 2006)

**Statistical Analysis:**

Data are were presented as percentages for the desirable and undesirable indicators for the studied groups of behaviors in each district. Statistical analysis was done through SPSS version 7.5 and Microstat Computerized Programs. Hypothesis test for 2 proportions from independent groups (Z-test) to compare the behavioral changes regarding the studied behaviors as well as Chi-square (c2) were used. All reported P-values were two tailed, with 95% confidence intervals.

**RESULTS AND DISCUSSION**

**Results:**

Table (1) shows the general characteristics of the study sample; the pattern of distribution of sex among the studied families was the same for all the studied districts in which the percentage of males was higher than that of females (chi square =2.99 p=0.3, insignificant). However the pattern of distribution of educational status of the family members was different between the four studied districts (Chi square =109.7, P< 0.01, highly significant); although the percentage of those who couldn't read or write was the highest among all studied districts, the percentage of those who were primary –educated represented the second in Etssa district (Fayoum Governorate) and in Nasser district (Benisuef Governorate) and represented the fourth in Samalout and Abu Korkass districts (El Menia Governorate). The percentage of those who were graduated from university represented the least for all studied districts. Although the percentage of family members who didn't work was higher for all studied districts, the percentage of those who worked in Nasser district (Benisuef governorate) was nearly equal to those who didn't work (chi square =124.8, P< 0.01).

**Table 1:** General Characteristics of Study Sample.

Parameter	Fayoum Governorate Etssa (n=500)	Benisuef Governorate Nasser (n=540)	El Menia Governorate Samalout (n=588)	El Menia Governorate Abu Korkass (n=500)	Total
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	%	%	%	%	
Sex of Individuals					
-Male	54.9	50.1	53.9	52.2	52.6
-Female	45.1	49.9	46.1	47.8	47.4
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	Chi square = 2.99, P = 0.3 (insignificant)				
Educational Status of Family Members					
- Can't read or write	56.8	37.6	33.1	48.6	43
- Read and write	10.2	14.6	18.3	13.5	14.3
- Primary school	13.2	21.8	16.1	11.5	16.3
-Preparatory school	6.6	11.1	9.7	9.6	9.4
-Secondary school or equivalent degree	10.4	9.3	17.2	14.4	12.6
-University	2.8	5.6	5.6	2.4	4.4
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	Chi square =109.7, P < 0.01 (highly significant)				
Occupational Status of Family Members					
-Work	17.9	47.8	24.5	28.6	31.2
-Don't work	82.1	52.2	75.5	71.4	68.8
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	Chi square = 124.8, P < 0.01 (highly significant)				

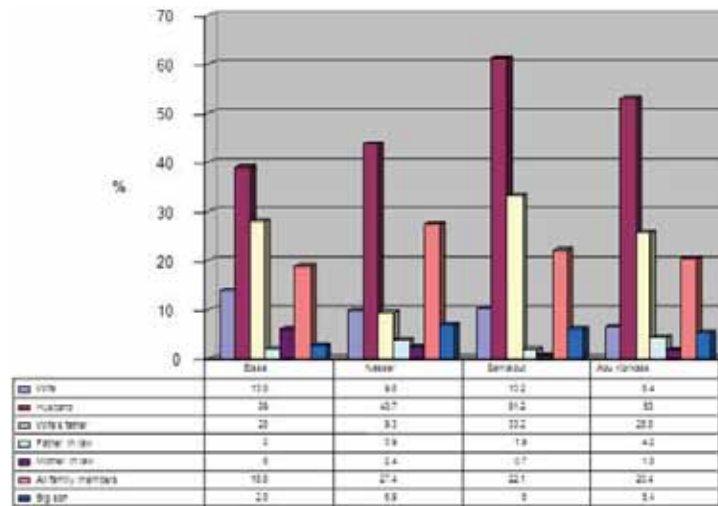
On studying the sources of information about environmental pollution (Table 2), it was found that although the percentage of those who had information about environmental pollution was higher than that of those who hadn't heard about it in all studied districts, yet the pattern of distribution was different between the four districts, (chi square = 17.9, P < 0.001 , highly significant). The percentage of those who had information from television was the highest among all studied districts followed by rural leaders as the second source. Meanwhile the third source was friends and neighbors in Etssa district, the radio in both Nasser and Abu Korkass districts and newspapers or magazines in Samalout district (chi square=20.2, P<0.001, highly significant).

**Table 2:** Exposure to Sources of Information

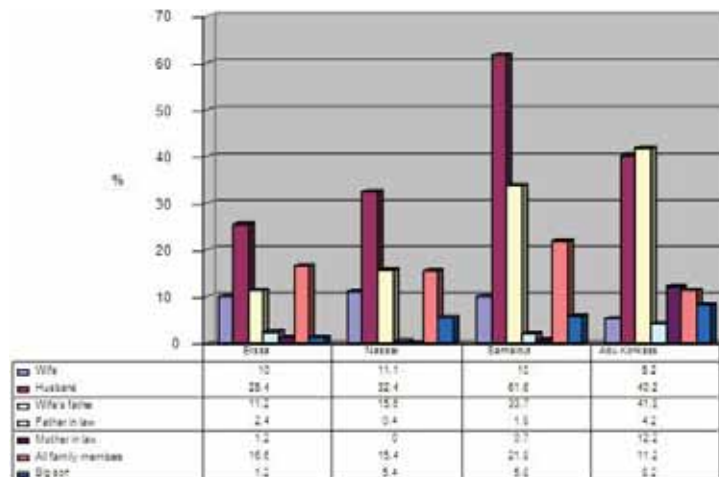
	Fayoum Governorate Etssa (n=500)	Benisuef Governorate Nasser (n=540)	El Menia Governorate Samalout (n=588)	El Menia Governorate Abu Korkass (n=500)
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	%	%	%	%
1-Heard about environmental pollution:				
-Yes	82	90.7	85.5	87.6
-No	18	9.3	14.5	12.4
2-Sources of hearing about pollution				
- T.V	76.3	70.6	83.9	75.3
- Friends or neighbours	15.9	10.8	7.0	13
-Newspapers or magazines	7.1	8.4	8.5	4.6
-Relatives	10.7	5.1	4.5	10
-Husband or son	8.0	6.1	6.4	12.3
-Rural leaders	24.4	42.2	28.8	20.1
-Agricultural guide	3.4	0.8	1.4	0.5
-Radio	8.3	14.5	3.0	15.5
-Other sources	1.2	0	0	0.7

Figure (1) shows that the decision makers in the marriage of sons & daughters was different statistically between the four studied districts; although the highest percentage of decision makers & opinion counseling within the family was for the husband in all districts but the second was for the wife's father except in Nasser districts where the wife's father ranked fourth, the third rank was for all family members and the least percentage was for the mother in law in all districts (chi square =156, P<0.0001). Moreover, figure (2) shows that the pattern of distribution of decision makers in selling & buying of family property was also different between the four studied districts. The highest percentage was for the husband in all studied districts except

Abu korkass district; where the highest percent was for the wife's father and the husband came second as decision maker. The smallest percentage was also the same for the three districts except for Abu korkass where the father in law came last (chi square = 276.5, P<0.0001).



**Fig. 1:** Decision Maker in Marriage of Sons and Daughters.



**Fig. 2:** Decision Maker in Dealing with Family Property.

Regarding assessment of healthy personal hygiene practices, Samalout district showed the highest percentage for healthy personal habits such as housewives who washed their hands with soap and water before food preparation (83.3%), children's hands that were washed before eating with soap and water (75.9%) and children with trimmed nails (81.8%) with significant statistical difference between the four studied districts as regards housewives who washed hands of their children with soap and water. As for risky hygiene practices, the percentage of families which wash their clothes in canals was highest in Etssa (18.4%) followed by Abu korkass (9.4%), Nasser (3.3%) and the least percentage was in Samalout district (1%) (Table 3).

The pattern of distribution of risk indicators for environmental pollution was highly significant in all the studied districts (table 4). The percentage of families that didn't have a zereba separate from their home was highest in Abu korkass district (61.6%) followed by Etssa district (55.8%). Insignificant difference was only observed between Samalout district and Etssa district. Concerning the storage of insecticides and agricultural chemicals inside houses the percentage of families who practiced this was highest in Abu korkass district (49.5%) followed by Etssa district (35.4%), Nasser district (30.9%) and the least percentage was in Samalout district (28.1%). Insignificant difference was only observed between Nasser district versus both Etssa and

Samalout districts. As for the percentage of families, which used to get rid of agricultural residues by incineration outside their houses, the difference between the districts was highly significant except between Nasser district (14.3%) versus Etssa district (14.4%) where the difference was insignificant. The highest percentage was seen in Abu korkass district (31.8%) followed by Samalout district (21.6%). The percentage of families that threw dead poultry and animals in canals and drains was highest in Samalout district (86.1%) followed by Etssa district (69%), Abu korkass district (30.8%) and the least in Nasser district (22%).

**Table 3:** Comparison of Risk and Target Indicators for Personal Hygiene between the Studied Districts.

Parameter	Etssa District (N=500)			Nasser District (N=540)		Samalout District (N=588)	Abukorkass District (=500)
	Vs. Nasser	Vs Samalout	Vs Abukorkass	Vs Samalout	Vs Abukorkass	Vs Abukorkass	
<b>Risk Indicators</b>							
Housewives who hands don't wash childrens before or after eating	%	16.6		9.3		9.4	9.9
	z	3.5**	3.5 **	3.1**	-0.5	-0.3	-0.2
Housewives who wash childrens' hands after eating only	%	8.8		9.6		4.6	21.9
	z	0.44	2.7**	-5.7**	3.2**	-5.4**	-8.5**
Housewives who don't wash childrens' hands with soap and water	%	12		20.6		26.4	32.6
	z	-3.7**	-5.9**	-7.8**	-2.2*	-4.3**	-2.2**
Families that wash clothes in canals	%	18.4		3.3		1.0	9.4
	z	7.9**	9.9**	4.1**	2.6**	-4.1**	-6.2**
<b>Target Indicators</b>							
Housewives who wash their hands after disposal of children's defecates with soap and water	%	74.2		65.9		96.6	97.1
	z		-10.3**		-12.7**	-0.47	
Housewives who wash their hands before preparation of food with soap and water	%	82		47.6		83.3	68.5
	z	-0.5		-12.6**		5.7**	
Children's hands washed before eating with soap and water	%	60		27.8		75.9	45.1
	z	5.6**		-16.1**		10.4**	
Trimmed children's nails	%	75.2		54.1		81.8	73.7
	z	-2.6**		-10**		3.2**	

N.B. : \* = Significant, \*\* = Highly Significant.

**Table 4:** Comparison of Risk and Target Indicators for Social Environmental Hygiene between the Studied Districts

Parameter	Etssa District (N= 500)			Nasser District (N=540)		Samalout District (N=588)	Abukorkass District (=500)
	Vs. Nasser	Vs Samalout	Vs Abukorkass	Vs Samalout	Vs Abukorkass	Vs Abukorkass	
<b>Risk Indicators</b>							
Families that don't have zereba separate from the house	%	55.5		38.3		50.9	61.6
	z	5.6**	1.6	-1.8*	-4.2 **	-7.5**	-3.5
Families that store insecticides and chemicals inside house	%	35.4		30.9		28.1	49.5
	z	1.4	2.5 **	-4.5**	1.03	-6.1**	-7.2**
Families that get rid of agricultural residues by incineration around houses	%	14.4		14.3		21.6	31.8
	z	0.04	-3**	-6.5**	-3.1**	-6.7**	-3.8**
Families that throw dead animals in drains and canals	%	69		22		86.1	30.8
	z	15.2**	-6.8**	12**	-21.6**	3.2**	18**
<b>Target Indicators</b>							

**Table 4: Continue**

Families that have zereba separate from house	%	15.8			10.7		6.6	10
	z	2.4**	4.8**	2.7**	2.4**	0.37		
Families that store agricultural chemicals in special place outside house	%	15.6	13.5	18.6	18.6			
	z		-4.7**	-1.2	-5.8**	-2.2*	3.5**	
Families that get rid of insects by continuous cleaning	%	37.6			13.5		30.3	42.8
	z	8.9**	2.5**	-1.6*	-6.7**	-10.5**	-4.2**	
Families that get rid of agricultural residues by turning into fertilizers	%	12.2	3.5	2.7	3.2			
	z	5.2**	6.1**	5.3**	0.33			

Regarding the assessment of risky indicators related to water handling (table 5), the practice of storing water in metallic containers was significantly highly in Nasser district. The percentage of families that don't wash their water containers was the highest in Abu Korkass district (81.4%) followed by Etssa (74.6%), Samalout (73%) and lastly Nasser district (63.6%) and the pattern of distribution showed highly significant difference between the four districts except between Samalout and Etssa districts where the difference was insignificant. Regarding families which didn't boil drinking water coming from suspicious infected source, no difference was seen between Nasser district & each of Etssa and Samalout districts while significant difference was seen between the remaining districts. The pattern of distribution of families that wash their utensils in common tap or in canals was highly significant between the four studied districts except between Nasser versus Abu Korkass districts.

Table 5 shows also the assessment of risky indicators related to food handling. The percentage of housewives who cooked their food in any room in the house was significantly higher than that of wives who cooked food in the kitchen for all the districts. The highest percentage of housewives who stored seeds inside the house and used insecticides to preserve them was found in Etssa district followed by Nasser districts. While significant difference was found between the majorities of the studied districts, no significant difference was found between both districts of El Governorate.

Regarding the distribution of target indicators for water and food handling (table 6), the highest percentage of families that washed water containers with soap and water was found in Nasser district (32.8%) with insignificant difference between Etssa and Samalout districts. There was highly significant difference between the four studied districts for the practice of washing utensils at home with the highest percentage in Samalout district (98%) followed by Nasser district. The percentage of housewives who washed vegetables and fruits and who preserved food covered was very high (above 90 %) in all the studied districts. The pattern of distribution of housewives who stored seeds in special stores showed insignificant difference only between Abukorkass district versus both Nasser and Samalout districts.

Comparison of risk and target indicators related to disposal of refuse and waste water between the studied districts was shown in table 7. The percentage of families whose children defecate in the street or in open areas was highest in Etssa district followed by Abukorkass district with significant difference between the four studied districts. Whereas the pattern of distribution of families whose children defecate in the street was significantly different only between Samalout district and the other three studied districts. The highest percentage of families that don't clean their latrines was found in Abukorkass district (3.6%) followed by Etssa district (3.4%) and then Samalout and Nasser districts (1.2% and 1.1% respectively). No significant difference in the pattern of distribution was found only between Etssa district versus Abukorkass district and Nasser district versus Samalout district. As for families that used to get rid of stools by throwing outside the house, the highest percentage was found in Nasser district (21.8%) with high significant difference between Nasser district and the other three studied districts.

The percentage of families that dispose waste water near the house was highest in Abu Korkass district (45.8%) followed by Nasser district (37.6%), Etssa district (26.4) and then Samalout district. The pattern of distribution showed highly significant difference except between Etssa & Samalout districts. The pattern distribution of families that dispose waste water in canals or rivers showed also highly significant difference except between Nasser & Samalout district where the difference was not significant. The pattern of distribution of families that dispose refuse in the street was insignificant only between Etssa and Samalout districts. The percentage of families that dispose refuse by incineration outside the house was also highest in Nasser district (22.4%), while the pattern of distribution showed significant difference only between Samalout and abukorkass districts (Table 8).



**Table 5:** Distribution of Risk Indicators for Water and Food Handling Among the Studied Districts

Risk Indicator	Etssa District (n= 500)			Nasser District (n=540)		Samalout District (n=588)	Abukorkass District (n=500)
	Vs. Nasser	Vs Samalout	Vs Abukorkass	Vs Samalout	Vs Abukorkass	Abukorkass	
<b>Water handling</b>							
Families that use empty insecticide containers after washing	%	13.1		8.54		1.4	29.3
	z	2.3**	7.6**	-6.2**	5.5**	-8.6**	-13.1
Families that preserve potable water in metallic containers	%	2.6		2.8		0.7	1.4
	z	-0.19	2.5 **	1.3	2.7 **	1.5	-1.1
Families that don't wash water containers	%	74.6		63.5		73	81.4
	z	3.8**	0.59	-2.5**	-3.4**	-6.4**	-3.2**
Families that don't boil drinking water from suspicious infected source	%	96.8		97.8		98.8	92
	z	-0.9	-2.2*	3.3**	-1.3	4.2**	5.4**
Families that wash utensils in canals	%	19.6		11.9		1.4	11.2
	z	3.4**	10**	3.6**	7.1**	0.35	-6.8**
<b>Food Handling</b>							
Housewives who prepare and cook food in any room in the house	%	63.4		41.9		58.5	73
	z	6.9**	1.6*	-3.2**	-5.5**	-10**	-5**
Housewives who preserve food in the oven	%	8.2		8.5		20.9	11.6
	z	-1.7	-5.8**	-1.8*	-5.8**	-1.6*	4.1**
Housewives who preserve food under the bed	%	21.2		9.6		16.2	20
	z	5.2**	2.1*	0.4	-3.2**	-4.7**	-1.6*
Housewives who add insecticides for preserving stored seeds	%	23		10.9		6	7.2
	z	5.2**	8**	6.9**	2.9**	2*	-0.7

**Table 6:** Distribution of Target (recommended) Indicators for Water and Food Handling Among the Studied Districts

Target Indicator	Etssa District (n=540)			Nasser District (n=588)		Samalout District (=500)	Abukorkass District (n= 500)
	Vs. Nasser	Vs Samalout	Vs Abukorkass	Vs Samalout	Vs Abukorkass	Vz Abukorkass	
<b>Water Handling</b>							
Families that wash water containers with soap and water	%	25.4		32.8		27	18.4
	z	-2.6**	0.6	2.1*	5.2**	3.3**	
Families that boil drinking water from suspicious infected source	%	3.2		2.2		1.2	8
	z	0.9	2.2*	-3.3**		-4.2**	-5.4**
Families that wash utensils at home	%	56.6		84.6		98	69.4
	z	-9.9**	-16.7**	-4.1**	-8.1**	5.8**	13.1**
<b>Food Handling</b>							
Housewives who prepare and cook food in the kitchen	%	26.4		53.7		41.5	24.2
	z	-8.9**	-5.2**	0.8	4.1**	9.7**	6**
Housewives who preserve food in the refrigerator	%	26.6		52.4		34.7	22.6
	z	-8.4**	-2.8**	1.4	5.9**	9.8**	4.3**
Housewives who preserve food covered	%	99.2		98.5		100	92
	z	1	-2.1*	5.5**		-2.9**	6.9**
Housewives who wash fruits before eating	%	98.6		93.5		93.2	91.4
	z	4.1**	4.3**	5.2**		1.2	
Housewives who wash vegetables before eating	%	95		98.9		92.9	95.4
	z	-3.6**		-0.29	5**	3.4**	-1.7*



**Table 6: Continue**

Housewives who store seeds in special stores	%	9		3.9		2	2.2
	z	3.3**	5.1**	4.6**	1.8*	1.5	
Housewives who add coarse salt for preserving stored seeds	%	14.2		17		12.8	6.6
	z	-1.2		1.9*		5**	

N.B. : \* = Significant, \*\* = Highly Significant.

**Table 7: Comparison of Risk and Target Indicators for Prevalent Behaviors during Getting Rid of Human Excreta between the Studied Districts.**

Target Indicator	Etssa District (n=540)			Nasser District (n=588)		Samalout District (=500)	Abukorkass District (n= 500)
	Vs. Nasser	Vs Samalout	Vs Abukorkass	Vs Samalout	Vs Abukorkass	Vz Abukorkass	
<b>Risk Indicator</b>							
Families whose children defecate in the street	%	11		9.1		3.9	10.4
	z	1	4.5**	0.3	3.5**	-0.7	-4.2**
Families whose children defecate in open areas	%	34.8		4.6		8.5	18.8
	z	13.2**	10.6**	5.7**	-2.6**	-7.1**	-4.9**
Families whose children defecate in streams & canals	%	16		0		1.9	0
	z	9.6**	8.3**	9.3**	-3.2**		3**
Families that don't clean the latrine	%	3.4		1.1		1.2	3.6
	z	2.5**	2.4**	-0.1	-0.1	-2.6**	-2.6**
Families that get rid of stools by throwing outside house	%	21.8		5.4		6.4	6.5
	z	7.7**	7.4**	6.9**	-0.7	-0.75	-0.06
<b>Target Indicators</b>							
Families that have a private latrine	%	47.4		87		90.1	84.2
	z	-5.3*	-15.3*	1.2	-1.6*		2.9**
Families whose children defecate in the latrine	%	37.8		45		83.3	46.4
	z		-15.4**	-2.7**	-13.4**	-0.5	12.8**
Latrines that are always kept clean	%	84.4		94.6		97.3	83.1
	z	-5.4**	-7.5**	0.55	-2.3*	5.9**	8.1**
Families that get rid of children's stools by throwing in latrine	%	34.8		68.5		59	53.4
	z	-10**	-7.8**	-5.9**	3.3**	4.9**	1.8*

N.B.: \* = Significant, \*\* = Highly Significant.

The highest percentage of families that had a private latrine was in Samalout district (90.1%) followed by Nasser district (87%), Abukorkass district (84.2%) and then Etssa district (47.4%), with significant difference between the studied districts except between Abukorkass versus both Nasser and Etssa districts. The highest percentage of families that always kept their latrines clean was in Samalout district (97.3%) and the lowest was in Abukorkass district (83.1%) with only significant difference between Etssa and Abukorkass districts. The pattern of distribution of families that used to get rid of their children's stools in latrines showed highly significant difference between the four studied districts with the highest percentage in Nasser district (68.5%) and lowest in Etssa district (34.8 %). The percentage of families that have scavenger for collecting refuse was highest in Nasser district (8.7%) and does not exist (0%) in Samalout district with insignificant difference between only Etssa and Abukorkass districts (Table 8).

### Discussion:

Health hazards and risk factors related to water, sanitation and hygiene (WSH) are of a composite nature. The impact of WSH on disease has been reassessed in a more comprehensive way which estimated that almost one tenth of the global burden of disease can be attributed to water, sanitation and hygiene (WHO,2007). Various determining aspects may need to be taken into consideration, including:

- drinking-water is a *medium* that can serve to transmit pathogens and toxic chemicals;

- the lack of services to provide access to safe drinking-water and adequate sanitation, and the lack of solid waste management services increase the risk of several diseases;
- the failure to apply integrated water resources management principles in the *planning, design and operation* of dams, irrigation schemes and other hydraulic projects may result in changes in water ecologies that lead to the proliferation of vectors of certain diseases (e.g. malaria, schistosomiasis, lymphatic filariasis, arbovirus infections); and
- water-associated *behaviours* including for example personal and domestic hygiene, water contact patterns and unsafe use of built environments;

**Table 8:** Comparison of Risk and Target Indicators Related to Disposal of Refuse and Waste Water between the Studied Districts

Target Indicator	Etssa District (n=540)			Nasser District (n=588)		Samalout District (=500)	Abukorkass District (n= 500)
	Vs. Nasser	Vs Samalout	Vs Abukorkass	Vs Samalout	Vs Abukorkass	Vz Abukorkass	
Risk Indicators							
Families that dispose waste water by throwing near house	%	26.4		37.6		23.8	45.8
	z	-3.8**	0.9	-6.3**	5**	-2.6**	-7.6**
Family that dispose waste water by throwing in canals or river	%	70.6		57.4		61.7	35.2
	z	4.4**	3**	11.2**	-1.4	7.1**	8.9**
Families that dispose refuse in street	%	13.6		31.5		11.2	5
	z	-6.8**	1.2	4.6**	8.3**	10.9**	3.6**
Families that dispose refuse by incineration outside house	%	11.2		22.4		5.3	6
	z	-4.8**	3.5**	2.9**	8.3**	7.5**	0.5
Families that dispose refuse by throwing in streams ,rivers or canals	%	49.2		33.7		48.5	48.3
	z	5**	0.23	0.28	5**	-4.7**	0.06
Target Indicators							
Families that dispose refuse by the scavenger	%	3.6		8.7		0	2
	z	-3.3**	4.6**	1.5	7.3**	4.7**	
Families that dispose refuse by burying then converting to manure	%	20		13.5		33.5	36.8
	z	2.8**	-4.9**	-6**	-7.8	-8.7**	-1.1

N.B. : \* = Significant \*\* = Highly Significant.

Experience shows that constructing water supply and sanitation facilities is not enough to improve health; sanitation and hygiene promotion must accompany the infrastructure investments to realize their full potential as a public health intervention. Changing hygiene behavior is complex. Hygiene promotion is most successful when it targets a few behaviors with the most potential for impact. Based on extensive research, WHO and UNICEF have identified hand washing with soap after stool disposal and before preparing food; safe disposal of faeces and use of latrines; and safe weaning food preparation, water handling and storage as the key hygiene behaviors. A recent review of all the available evidence suggests that handwashing with soap could reduce diarrheal incidence by 47% and save at least one million lives per year. (Curtis and Cairncross, 2003). This is consistent with other studies which found that 12 hand washing interventions in 9 countries achieved a median reduction in diarrheal incidence of 35%. (Hill *et al.*, 2001).

No figures are available on hygiene. However, experience has shown that clean water alone leads to only minor health improvements. The essential factor is sound personal hygiene, with adequate public sanitation and clean water as supporting components. While each of the three components alone has some health benefit, their combined effect is far greater. Hygienic behavior is virtually impossible without a source of safe water and a safe means to dispose of human and other wastes. Access to water and sanitation services is closely related to each nation's economy. The economic gap between rich and poor countries has widened over the last 20 years. Many of the least developed countries have been caught in a downward economic spiral. Their governments can find it hard to sustain basic social programs, including water and sanitation. Furthermore, aid programs often lack the flexibility essential in such cases. This crisis is most apparent in Sub-Saharan Africa. In Asia, the Middle East, North Africa, Latin America, and the Caribbean, the situation is generally better, although growing cities represent a critical challenge. (Hans Van Damme, 2001).

Researches show that hygiene-related practices such as safe disposal of faeces and hand-washing after contact with faecal material can promote health considerably. Consider the following figures:

- Hand washing with soap and water can reduce diarrhoeal disease by 35% or more.
- Hand washing can also help to reduce the prevalence of eye infections such as conjunctivitis and trachoma.
- Pit latrines, when used by adults and for the disposal of young children's stools, can reduce diarrhoea by 36% or more.
- Protection of water from faecal contamination can also reduce diarrhoea, because some diarrhoeal infections are water-borne. Improved water quality can be associated with up to a 20% reduction in diarrhoea.
- *Water hygiene related diseases* where hygiene and especially personal hygiene is important in prevention. Many of these diseases can also be water borne (e.g. infectious diarrhoea, bacillary dysentery, infectious hepatitis). Water hygiene related diseases also include skin and eye infections and infestations such as trachoma scabies, ringworm and conjunctivitis. Trachoma is considered to be 100% related to WSH risks; WHO is in the process of establishing criteria for certification of the elimination of blinding trachoma as a public health problem.
- Water quality at home can be improved by using only a protected water source for drinking purposes; by keeping water storage vessels clean, covered and out of the reach of young children and domestic animals; by boiling water where practical; or by putting water in clear plastic containers and exposing them to sunshine for several hours.
- Increased quantity of water used, which results from better access to water, can bring about 20 % reduction in incidence of diarrhoeas.

The aim of this study is to provide comprehensive up-to-date figures. Indicators were studied in four Egyptian districts lying in three of upper Egypt governorates, that are proved to be out of the poorest governorates of Egypt; Etssa district in Fayoum governorate, Nasser district in Benisuef governorate, Samalout and Abukorkass districts both of which lie in El Menia district. This study provides planners and implementers; public health specialists, scientists, policy makers, practitioners, academics and non-governmental organizations in Egypt with up to date figures about risk indicators versus the recommended target indicators related to four different categories of health related to environmental sanitation, water and food. These figures will assist different user groups to contribute towards the International Decade for Action, Water for Life: 2005-2015. Moreover, by including water supply, sanitation and hygiene in the MDGs (mid-decade goals), the world community has acknowledged the importance of their promotion as development interventions to ensure environmental sustainability, reduce child mortality and combat HIV/AIDS, malaria, and other diseases.

According to the World Health Organization the following, three hygiene behaviors lead to greatest reduction in diarrhoeal morbidity:

- Safer disposal of faeces, particularly faeces of young children and babies and people with diarrhoea.
- Handwashing, after defecation, after handling babies' faeces, before feeding and eating, and before handling food.
- Maintaining drinking water free from faecal contamination, at home and at the source. (WHO, 2002).
- Simple techniques for treating water at home and storing it in safe containers could save a huge number of lives each year. (WHO/UNICEF, 2005)

There is now conclusive evidence that simple, acceptable, low-cost interventions at the household and community level are capable of dramatically improving the microbial quality of household stored water and reducing the attendant risks of diarrhoeal disease and death. (Sobsey, 2002).

Recent evidence suggests that point-of-use water quality improvements alone result in a one-third or greater reduction in diarrhoeal disease morbidity. (USAID, 2006)

Self-sustaining, decentralized approaches to making drinking water safe, including point-of-use treatment, targeting the most affected groups, enhancing health contribute to development and productivity, and meriting far greater priority for rapid implementation. The principal activities involved in controlling water hygiene related disease are increasing access to water and encouraging use of water for hygiene. (Mintz *et al.*, 2001) For trachoma, which is also a vector-borne disease, a major global effort is under way to reduce the disease and to eliminate blinding trachoma through the 'SAFE' strategy. (Gundry *et al.*, 2003).

Safer household water storage may be an appropriate additional intervention to prevent contamination of domestic water. (Gundry *et al.*, 2003). This intervention is of great importance because in this study 29.3% of families in Abukorkass district stored water in empty insecticide containers, 2.8% of families in Nasser district preserved potable water in metallic containers and 81.4% of families in Abukorkass district used unwashed water containers.

A policy shift towards household water management appears to be the most attractive short term water-related health intervention in many developing countries. (WHO, 2002), as was found in this study where the vast majority of families in the four studied districts used drinking water from infected suspicious sources without boiling, their percentage ranging from 92% in Abukorkass to 98.8% in Samalout district.

Water treatment also needs to be accompanied by safe storage. This can be accomplished by using containers with narrow openings and a dispensing device such as a tap or spigot to protect collected water against recontamination. These measures are particularly important because the microbial quality of drinking water frequently declines after collection.

Similarly in other developing countries like India, water borne diseases are of immense public health importance. Collection, storage and handling of drinking water are the biggest areas of concern. (Nath, 2002) WHO estimates that 94% of diarrhoeal cases are preventable through modifications to the environment, including interventions to increase the availability of clean water, and to improve sanitation and hygiene. (Pruss and Corvalan, 2006). In addition, a 2005 systematic review concluded that diarrhoeal episodes are reduced by 25% through improving water supply, 32% by improving sanitation, 45% through hand washing, and by 39% via household water treatment and safe storage. (Fewtrell *et al.*, 2005)

Water Aid Uganda in their international evaluation study for hygiene intervention after four years, on the sustainability of key hygiene behaviors' changes, found that close to 100% of people were still using the latrines that had been previously constructed. However, hand washing had fallen to between 30% and 50%. (Human Development Report, 2006). In this study, hand washing ranged from 47.6% to 83.3% while the highest percentage for using latrines was 83.3% in Samalout district. In a sample survey in India it was found that 24% of the rural population wash their hands with water after defecation and a nominal 14% with soap and water. The urban situation is somewhat better with close to 100% washing with water but still just 75% use soap. (Nath, 2002)

According to the World Health Organization (WHO), among the most important causes of food-borne illness are errors in food handling and preparation at home. (WHO, 2002). This is in consistence with the results of this study where 73% of housewives in Abukorkass district prepared and cooked food in any room in the house, 21.2% of housewives in Etssa stored food under the bed and 20.9% of housewives in Samalout district stored food in the oven making it more liable to contamination. Health statistics clearly indicate that microbial contamination is the greatest risk to food safety. Good hygienic practices both in the home and outside have the potential to protect everyone against microbial contamination and the food-borne diseases caused by it. In the present study, most housewives preserved food covered (92%-100%) and washed vegetables and fruits (91.4%-98.6%) but preserving food in refrigerators showed relatively low percentage ranging from 22.6% to 52.4%.

Children are more susceptible to environmental hazards and degradation than adults due to their physiological immaturity and behavioral characteristics. Common threats to their survival, growth and physical/mental development often come from the immediate environments, such as home, school and community. Out of the environmental health hazards are the following; Biological pathogens and their vectors/reservoirs within the human environment which affect child growth and impair child health - including the many pathogenic micro-organisms in human excreta, disease vectors (e.g. mosquitoes, rats, and air born pathogens) and chemical pollutants within the human environment - for instance pesticides, fertilizers, industrial wastes. (David, 1996). This study showed that risky practices related to disposal of human excreta are still prevalent in many communities e.g. in Etssa district, 34.8% of families' children defecated in open areas, 21.8% threw stools outside the house while 16% defecated in streams and canals. These faulty behaviors are found in other underdeveloped communities as in India where improper disposal of human excreta and waste which may be either thrown in the yard, buried or sometimes not even disposed, is an area of great concern. Very often, faeces are deposited in proximity to the household. (Nath, 2002).

Reaching the vulnerable who are the primary audience, are those who carry out risk practices as well as being the primary victims for changing their behaviors, however implies much more than offering the service. Behavioral change interventions are most effective in preventing disease only if they are used correctly and consistently. This can be achieved through identifying the secondary target audience; those who are the immediate society of the primary audience and who can influence them. Moreover, implementing successful approaches to influence sustainable behavioral changes to achieve widespread and long-term success are dependent on the educational and promotional messages that will target positive ideas, such as clarity, taste, good health, affordability, and ease of use. Among different family members, husbands should be targeted effectively as they represent the main decision makers in the family .e.g. 61.6% of husbands in Samalout were the decision makers in the family followed by the wife's father (33.7%). Wives follow the belief of their husbands for any of life decisions and even for hygiene promotion related issues and so do other family

members, although the majority have never been to school (56.8%) in Etssa district, or just read and write (18.3%) in Samalout district or just have primary education (21.8%) in Nasser district. Considering the channels to be used for interventions T.V, as having the best reach than other mass media (8 in 10) and is the favorite for the majority of people, will be the obvious choice for mass media communication.

**conclusion:**

- Hygiene and sanitation programs need to be an integral part of water supply interventions. There is a need to shift emphasis from the provision of facilities alone to the inclusion of information and education on behaviour and practices
- Hygiene promotion programmes should develop skills in collaboration with the existing local government structures using practical and interactive methods rather than just passing on information
- Hygiene promotion messages need to be continually reinforced in order for changes in behaviour to be longlasting
- An understanding of prevalent beliefs in a given community and the design of culturally appropriate facilities and messages is essential
- Good hygiene behaviour and its benefits need to be clearly defined to communities and it is necessary during the training for hygiene practices to emphasize the importance of passing on the information gained to friends, neighbours and other peers

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