

## Public awareness and knowledge about seawater desalination and its impacts on the environment: Gaza strip, Palestine

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### Abstract

The research tests public awareness and knowledge in the coastal area in Gaza strip, Palestine focusing on the residents who live in *Dier Al balh* city (where the first seawater desalination plant had constructed) about seawater desalination and its impacts on the environment. The study investigates how socio-demographics, motivational factors, and information use shape public awareness and knowledge. Data was collected using a survey from a random sample of residents in *Dier Al balh* city in Gaza using criteria's McNeill. This research followed the similar method used in previous studies of testing public awareness about desalination, marine life, and impacts on the environment. The study assessed three indicators to examine people knowledge and awareness.[2] These indicators are *Public awareness* of desalination, and impacts on the environment; *People personal knowledge* of desalination and the impacts on the environment; and *Factual knowledge* of desalination and the impacts on the environment.

The results of the research were: Both personal and factual knowledge about the desalination and its impacts on the environment were low, with only three of thirteen factual questions answered correctly by more than 45% of respondents. Furthermore, It was found that people who were more connected with their place showed high awareness. Besides, information resources record a low relation with personal knowledge and awareness and more low with factual knowledge. The research recommends investigating more variables that could form people awareness about seawater desalination since their new technologies have just entered Gaza. Moreover, it recommends increasing media role to raise people knowledge, by making a useful campaign that targets the different society spectra and not just focusing on one layer. Also, the study encourages the government agencies to increase its efforts and be more effective in dealing with the environmental issue since the results showed quite weak connection between people and government agencies.

keywords: Desalination; Water crisis; Awareness; Knowledge; Environment; Palestine

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## 1. Introduction

### 1.1 Public knowledge

Although Awareness and knowledge are two words that might be used interchangeably in bound contexts, there exists a definite distinction between them. Awareness could be a perceiving, knowing, feeling, or being attentive to events, objects, thoughts, emotions, or sensory patterns. Knowledge is facts, data, and skills none heritable through expertise or education.[3] The key distinction between awareness and knowledge is that knowledge is related to deep understanding and familiarity with an issue whereas awareness does not imply a deep understanding.

Environmental “*awareness and knowledge*” is one of the most important perceptions that humans should have.[4] Many scholars argued, environmental awareness should contain two sides, first one is knowledge side and the other is functional side. They explained environmental awareness as the first degree of creating an environmental trend, which determines individual behavior towards the environment. It aims to establish a base of knowledge regarding environmental problems, relations between these problems and how its effects on different sides. So people could improve their reaction to these challenges and increase the possibility of solving those problems. [4]Argued individual should have the necessary education to achieve the limits of awareness to be effective in the environment. However, it is not a condition that environmental awareness contains a benign behavior towards the environment; an individual may be totally aware of the damage of pollution but he does not hesitate to pollute. Many scholars believe that environmental education is the incubator, which should be used to improve environmental culture and civilized behavior towards nature.[5] Moreover, they presented environmentalism as the process that aims to promote environmentally responsible citizenship by bringing sustainable change and protecting natural resources. Furthermore, by increasing public awareness and the necessary knowledge of environmental problems can lead to increase the probability of solving these problems.

On the contrary, creating knowledge on environmental issues is costly “mentally and economically” and this cost increase with people who have little environmental knowledge.

The acquisition of knowledge varies among people; depend on many factors; this difference between people knowledge is called *knowledge gap*. There are many theories presented to explain the knowledge gap between society layers and its different spectra. Two of the most spread theories that explain the difference between people awareness and knowledge about the environment are the *theory of trans-situational* and the *theory of situation-specific variables*.[6]

The first theory investigates the racial, economic characteristics, education degree, and income. These elements have been found strongly related to environmental knowledge in developed countries such as Canada and USA. Other studies also found that sex and age were an important influence factor.[7][8][9]

The other theory suggests that the motivational factors related to the place influence the knowledge acquisition and the degree of awareness diversity. Motivational factors could be sort in two groups: place identify factors and factors associated with the place. People become more familiar with the environmental aspects of the place where they engage in activities which they are interested in or to the degree of their attachment to the place or what the place mean for them.[8][10]

Both theories assume that, if there is a low level of knowledge within these cells, it is easy to identify the required niche for making campaigns to increase awareness. [11]

In addition to previous, information sources, especially Media play an important role in increasing knowledge about the environment or reducing the knowledge gap between people. Media should diversify its mechanisms in order to protect the environment, preserve the quality of life, alert against potential hazards, protect biodiversity, stop interfering in its balance, and expose who pollute the environment and destroy it in various ways. It should also seek to motivate public to actively participate in environmental

care by encouraging people to work, encouraging individuals to engage in dialogue and send their opinions with a strong message to the government, which will lead people to be an effective decision-making tool. Also, considering the importance of social media, which carries more influence since it does not wait for editorial policy or censorship of the content and it is a direct tool from people to people.

**Research** on public knowledge about environment, desalination and coastal areas is quite limited either in the world or in Palestine. In the world, there exist different studies that investigated environmental knowledge among students and the influence of attitudes towards the environment.[12]–[14] In general, Studies on public knowledge have investigated awareness of coastal and marine environmental issues, and the influences of the nearness of residence to the sea, use of information sources, environmental values, and socio-demographic variables on knowledge about the ocean.[15] [16] A study by [2] examines coastal residents awareness and knowledge about impacts of seawater desalination on marine ecosystems Carlsbad, California. The study explored to what extent socio-demographics, motivational factors, and information shape people literacy about seawater desalination and its impacts on marine life. Other studies investigated people literacy about the ocean and how could it influence behavior. [15], [16] In Palestine there were limited cases and studies that investigated the role of environmental media and sources of information. In addition, there were some studies about general environmental problems with different causes. Although, there were many studies in Palestine investigated desalination, none of them had investigated the public knowledge on desalination's impacts on the environment.[17]–[26]

The research depending on the existing literature aims to investigate knowledge and awareness of “people of Gaza coast” about seawater desalination and its impacts on the environment. The research goals are: to investigate the socio-demographic variables affects on public awareness, to what extent motivational variables affect knowledge, how information resource affects people knowledge about desalination and environment, and finally the article aims to motivate people to increase them environmental knowledge which lead to a positive behavior towards the environment.

### **1.2 Impacts of desalination on Environment**

Desalination is a concept referring to the process of dissolved salts and other minerals from water. [27] The feed water sources of desalination may include many different basins such as Brackish, Wells, Surface water (rivers and streams), Industrial water, and Seawater, which the study is focused on.

The impacts of desalination process are highly noticeable which can create high damage to environment and ecosystem. The discharge of concentrate brine of saline water leads to pollution water aquifer, damage aquatic ecosystem and also sometimes it contains harmful chemicals that affect human.[27]

Desalination plants are quite high in producing of carbon dioxide emission, which causes environmental pollution. On the other hand, problems could be accrued such as noise pollution, gas emission, and dangerous marine life. The impact of desalination on the environment may be classified into three major categories: 1.Ecotoxicity potential, 2.Air emission, 3.People harm. [28]

In Eco toxicity potential, water polluting happens due to the charge of hot saline water directly to the sea. It affects the seawater salinity and increases water temperature, that all damages Marin life and kills the plants, which are the main source of nutrition to fish. All kinds of desalination technology have its negative effect on marine life and vary in pollution results.

In air emission, desalination process produces an emission that causes air pollution and creates greenhouse gases. Global warming is the potential problem related to green gases emission especially CO<sub>2</sub>. Water vapor is the main greenhouse factor which causes greenhouse effect (36-70)%, CO<sub>2</sub> cause (9-20)%, methane CH<sub>4</sub> cause (4-9%), and ozone cause (3-7%). [29]

The greenhouse increases the acidity of the soil, which is, reflected the acidic rain that created because of the air pollution with acids.

However, desalination is a solution to help humankind to keep a life on the plant, it is also the main creator of a major problem for other kinds life including humans themselves. The most effective solution to

overcome the drawback of desalination is improving renewable energy method that should be friendly to the environment.

## 2. Methodology

### 2.1 Study area:

The situation of water for the Palestinians of Gaza Strip is critical; Gaza Strip depends utterly on the underlying coastal aquifer that is replenished by precipitation and runoff. As it was highlighted within the report Gaza Strip in 2020, recharge is estimated at 50-60 million cubic meters (MCM) annually, with current abstraction at an estimated 160 MCM each year that is predicted to extend by sixty percent to 260 MCM in 2020. As groundwater levels later decline, water infiltrates from the near Mediterranean Sea. Nitrates from sewage and fertilizers from irrigation of farmlands combine this contamination with pollution of the aquifer. As result, the supply of unpolluted water is already restricted for most Palestinians in Gaza Strip, with ninety-eight percent of the water being unsafe for drinking without treatment. Gaza Strip aquifer may become unusable in near future, with the irreversible harm by 2020. [30] [31]

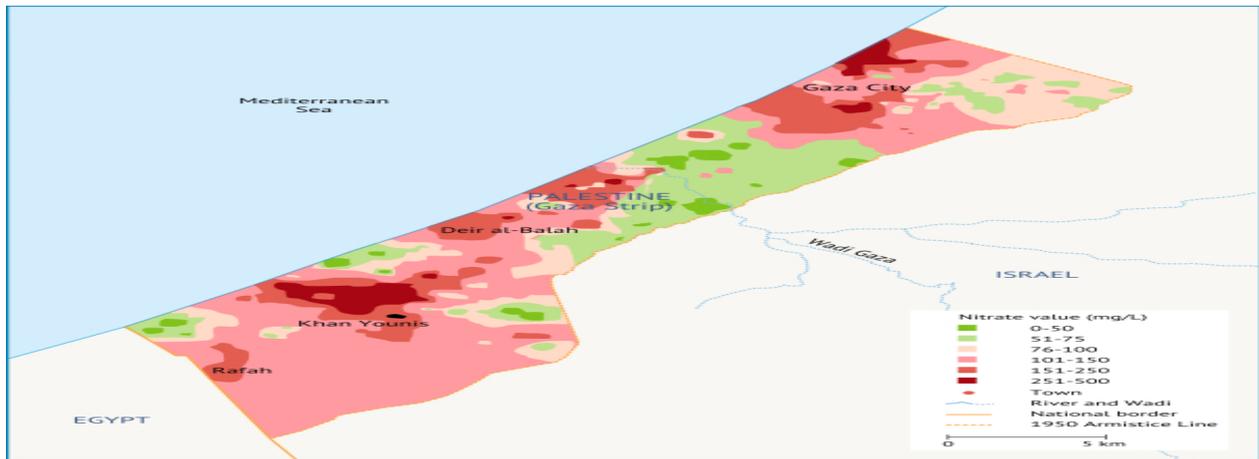


Figure 1: Nitrate concentrations in the Gaza Strip in 2009.<sup>2</sup> [31]

To overcome water crisis in Gaza, UNICEF with support from Arab Gulf and also the European Community, led a project for the development of Gaza's largest seawater desalination plant. The plant that is located in (Deir al Balah), was formally inaugurated on 19 Jan 2017; however, at the end of February, it absolutely was running solely on a partial basis powered by emergency fuel funded by the Humanitarian Fund. It at the start produced 6,000 cubic meters of desalinated water on a daily basis, with a projected target by 20 of more than three times this volume (approximately 20,000 cubic meters a day), serving 275,000 individuals in Rafah and KhanYounis with ninety liters of safe potable per capita per day.[32]

### 2.2 Method

As the similar studies of testing public awareness about desalination, marine life, and impacts on the environment, this research assessed three indicators to examine people knowledge and awareness.[2][6] [33] [11] These indicators are:

<sup>2</sup> Note: The internationally accepted guideline for nitrate in drinking water is 50 mg/L

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1. Public awareness of desalination, and impacts on the environment
2. People personal knowledge of desalination and the impacts on the environment
3. Factual knowledge of desalination and the impacts on the environment

The variation between people personal knowledge and factual knowledge is important since there is a big difference between what people believe they know and what is the fact of it. People knowledge was measured by evaluating what a person believes he or she knows about desalination and environment. Factual knowledge was measured by evaluating if a person knows the correct answers to specific knowledge questions regarding desalination.

**2.3 Survey:**

The questions of the study were selected to support the subjects of the main objectives of the study. So the questionnaire was designed in the Arabic language to be understood easily by the target population. Similarly to public awareness research, the questions inside the questionnaire were obtained from different articles and from similar studies especially that one investigated public knowledge about marine life. [6][33][11]

The questionnaire was distributed between November 2017 and January 2018 in two stages: *the first one* was the pilot study where it has done to evaluate the clarity of the questionnaire and to optimize the techniques. The pilot study sample, 30 questionnaires (10% of the sample size), was distributed randomly. The pilot study was used to give the feedback on the reading level, understanding of each question and the completeness of the instrument. At the end of the pilot study, a revision and modification were done on the questionnaire as necessary. *The second stage* was the distribution of the questionnaire, where the *sample size* was chosen to accept a margin of error 5% at confidence level 95%. Considering response distribution is 50%. Questionnaires were sent for the sample size of (300) people. The target population was the residents of the *Deir al-Balah*, especially who have direct or semi-direct relation with the desalination plant in their city. The total respondents were 289 with respondents rate 96%. This response rate is consistent with surveys asking the public about natural resource issues.

SPSS program was used to analyze the data.

**3. Results**

**Table1: Socio-demographic profile of people in our study (N=289).**

Variable	Coding	Sample Percent
Years of living in Gaza	<10 (1)	5.2%
	10-20 (2)	37.4%
	>20 (3)	57.4%
Age	18-35 (1)	86.9%
	36-65 (2)	12.1%
	>65 (3)	1.0%
Level of education	Less than high school (1)	4.5%
	High school (2)	14.2%
	Undergraduate (3)	78.9%
	Postgraduate (4)	2.4%
Gender	Male (1)	69.9%
	Female (2)	30.1%

**Table2: Description and reliability analysis of Sea use (N=289).** Measured on a 4-point scale from 1= never to 4= almost every day

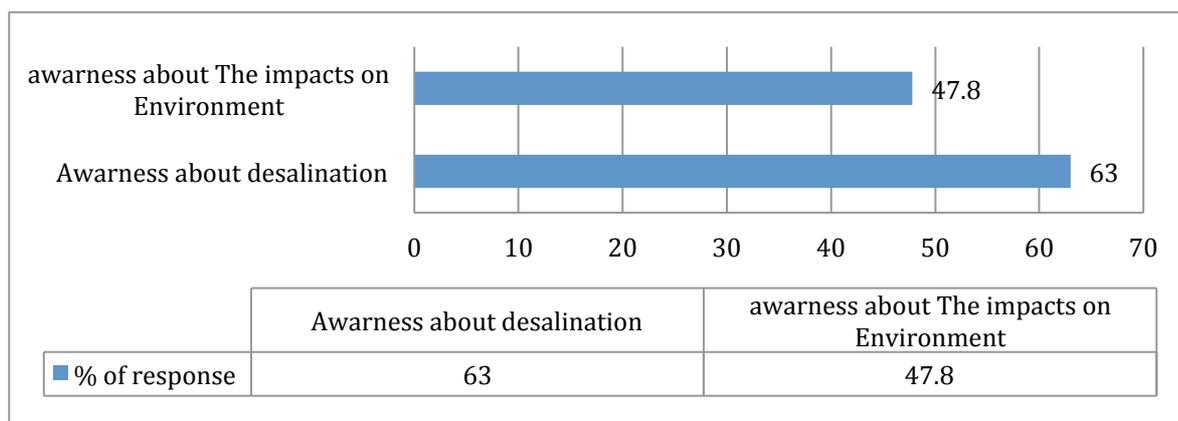
Variable	Mean	SD	Alpha
Swimming	2.26	0.828	0.714
Fishing	1.52	0.812	0.731
Beach sport	2.01	0.888	0.659
Meditation	2.81	1.024	0.743
Beach walking	2.53	0.841	0.712
<b>Sea use</b>	<b>2.228</b>	<b>0.546</b>	<b>0.732</b>

**Table3: Description and reliability analysis of Place Identity (N=289).** Measured on a 4-point scale from 1=strongly disagree to 4=strongly agree

Variable	Mean	SD	Alpha
This is the ideal place for me	2.96	0.758	0.611
This place is part of me	2.61	0.762	0.585
It would be very hard for me to leave this place	2.56	0.836	0.693
I have nothing in common with this place	2.62	0.886	0.676
I do not feel integrated into this place	2.96	0.989	0.632
<b>Place Identity</b>	<b>2.7412</b>	<b>0.48762</b>	<b>0.660</b>

### 3.1 People Awareness and knowledge about desalination and its impacts on the environment

For the first indicator (awareness about desalination and its impacts): [Figure2](#), show a high percentage of respondents in the study (63.0%) were aware of the desalination, in contrast, fewer than half respondents (47.8) reported that they were aware of the impacts on the environment.



**Figure 2: Awareness (% of respondents, N=289),** Measured on a 4-point scale from, 1=low, 2=moderate, 3=high, 4=very high

For the second indicator (Personal level of knowledge), respondents indicate moderate and low knowledge with (60.9%), and there were (39.1%) have high and very high knowledge about the impacts on the environment ([Figure3](#)). From [figure 4](#), it is clear that there is a (moderate to high) Personal level of

knowledge about water price, and a moderate level of knowledge about Desalination impacts on Sea and environment and brine discharge, and low level of knowledge about the energy required for desalination and desalination process.

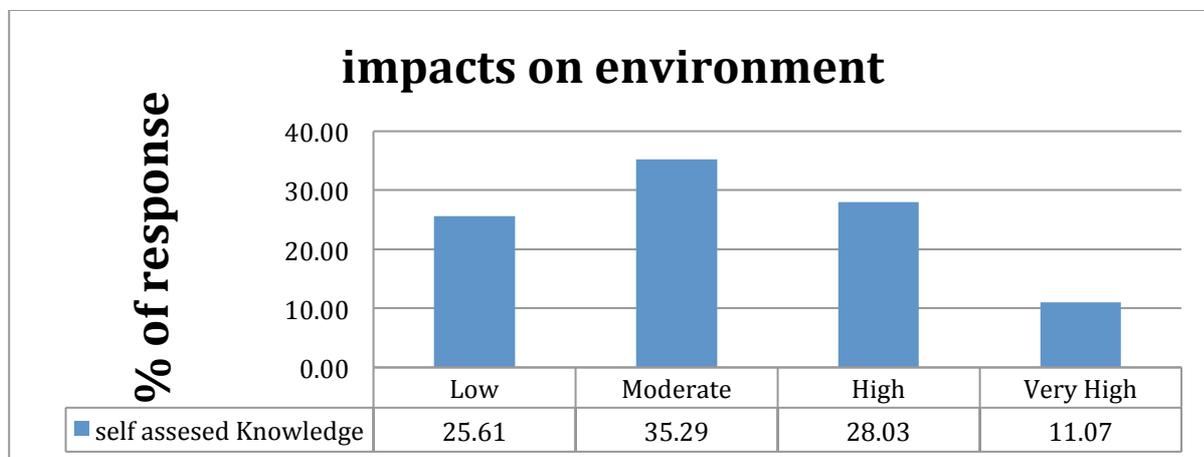


Figure 3: Personal level of knowledge about the seawater desalination impacts, Measured on a 4-point scale from, 1=low, 2=moderate, 3=high, 4=very high level.

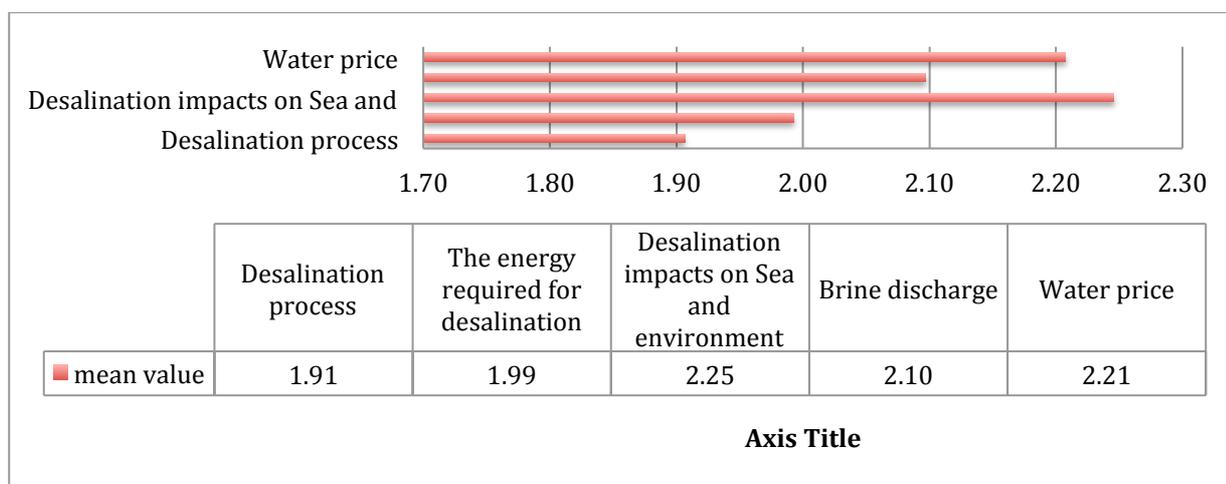


Figure4: Personal level of knowledge about desalination. Measured on a 4-point scale from, 1=low, 2=moderate, 3=high, 4=very high level.

For the third indicator (Factual knowledge) Table4 shows a low level of respondent's factual knowledge about desalination and its impacts on the environment. For the majority of the statements, the correct answers were much lower than half, (vary between 20-30%).

Table 4: Factual knowledge about seawater Desalination and the environment affects

Variable	The Wright Answer	% Answer correct	% Answer wrong	% I don't know
1. Desalination technologies are classified into three main categories	Yes	24.6	25.6	49.8

2. RO technology uses heat as the primary resource of energy	No	28.4	24.2	47.4
3. The main classification of desalination technology is dependent on the separation process	Yes	34.9	23.2	41.9
4. Desalinated seawater could be distributed directly to non-coastal customers using existing or new pipelines.	Yes	27.7	22.8	49.5
5. Seawater desalination is an expensive source of water	Yes	47.4	19.7	32.9
6. Brine contain chemicals Additives	Yes	44.6	15.9	39.4
7. Brine contain heavy metals (copper, zinc, and nickel)	Yes	31.5	26.6	41.9
8. Brine contains dead marine organisms	Yes	28.0	29.1	42.9
9. Brine has less salt than seawater	No	33.2	29.4	37.4
10. Brine is discharged directly to the sea	No	21.1	35.3	43.6
11. Brine is cooler than the receiving waters	No	26.6	20.1	53.3
12. Desalination process would lead to greenhouse gas emissions into the atmosphere*	No	22.5	30.4	47.1
13. Brine discharge has the potential to kill marine organisms and cause damage to the marine population*	Yes	43.9	19.7	36.3
<b>Total (% average score)</b>		<b>31.88</b>	<b>24.77</b>	<b>43.34</b>

### 3.2 The information resources

Figure 5, shows the frequency of the information tools, which people use or trust to absorb knowledge about desalination. It is clear that the majority of these resources were used moderated except *water industry, water authority, government agency, and visit the plants* were low.

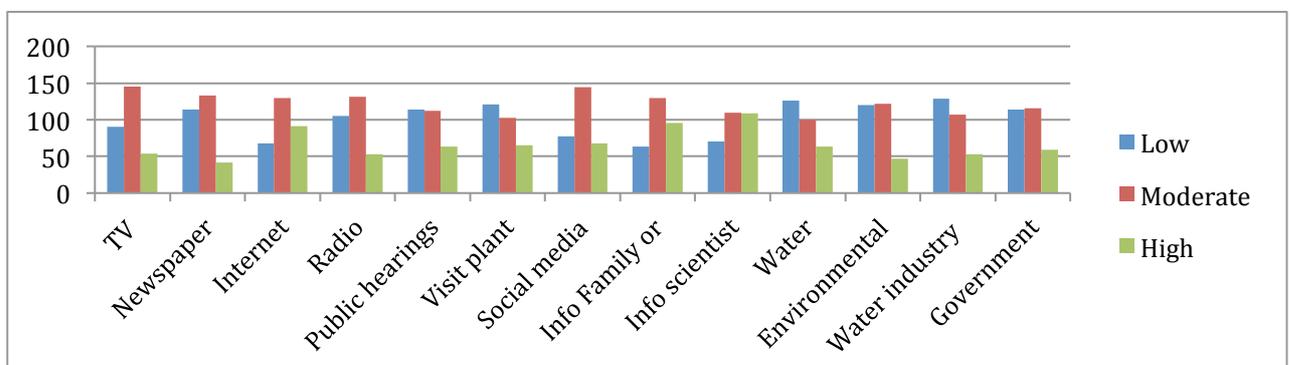


Figure 5: Frequency of using information sources for learning about the desalination. The frequency of use is measured on a 3-point scale from 0%never, 1= low, 2= Moderate, 3= High.

**3.3 Factors affect people awareness and knowledge.**

**3.3.1 Socio-demographic factors:**

For the three indicators a one-way analysis of variance (ANOVA) was calculated on resident's awareness and knowledge. The analysis was not significant for all socio-demographic variables except the education in first indicator where  $F_{(1,10)} < 0.05$ . That means socio-demographic factors had no effect on awareness except education.

**3.3.2 Motivational variables and Informational resources variables:**

To indicate the relation between the motivational variables and people awareness and knowledge, a correlation table (Table5) was made between the different factors and the three indicators of knowledge.

For the first indicator (awareness about desalination and its impacts), There is a high relation between awareness and the connection between people and their place and their frequency of use. In contrast, information resources results have not shown relation for all items, except public hearing where people who listen to others speaking about desalination indicated more awareness about desalination and environmental impacts.

For the second indicator (Personal level knowledge), There is a high relation with the frequency of use, but there is no relation with a place identity. Therefore, people who do special activities in the seaside have shown a high personal knowledge than others about desalination and environmental impacts. In contrast, information resources did not record a high correlation with personal knowledge, except visiting the plant where people who visited plant indicated a high knowledge and people who get information from friends. Public hearing and social media resources indicate moderate correlation with personal knowledge.

For the third indicator (Factual knowledge), none of the variables have relations with people factual knowledge except people who use newspaper with high rate indicates high factual knowledge.

**Table 5: Non-parametric correlation coefficients among independent and 3 knowledge variables.**

A: combined awareness of desalination and impacts. (Fig 2)

B: self-assessed knowledge of the impact on sea "environment". (Fig5)

C: number of correct answers in table 4

Variables	Awareness <sup>A</sup>	Personal level knowledge <sup>B</sup>	Factual knowledge (# of correct answers) <sup>C</sup>
<b>Situation-specific factors</b>			
Frequency sea use	-.185 <sup>**</sup>	.335 <sup>**</sup>	-0.024
Place Identity	-.195 <sup>**</sup>	0.041	0.025
<b>Information source</b>			
TV	0.029	0.052	0.078
Newspaper	-0.055	0.092	.133 <sup>*</sup>
Internet	-0.028	0.098	0.112
Radio	-0.073	0.076	0.039
Public hearings	.117 <sup>*</sup>	.123 <sup>*</sup>	0.022
Visit plant	-0.051	.203 <sup>**</sup>	0.019
Social media	-0.023	.136 <sup>*</sup>	0.071
Info Family or friends	0.038	.200 <sup>**</sup>	0.109

Info scientist	0.011	0.070	0.071
Water authority	-0.032	.172	-0.068
Environmental NGO	-0.060	0.071	0.007
Water industry	-0.081	0.094	-0.033
Government agency	-0.004	0.113	-0.008

#### **4. Discussion**

The study examined people of Gaza awareness and knowledge about desalination and its effects on the environment. One of the main aims of the study was to shed a light on the public knowledge of environmental problems and to raise questions of how could people protect the environment in Gaza, which already degraded.

The results of the study were consistent with results in similar studies that had been done in different countries in the world about public awareness of environmental problems; taking into account the geographical, temporal and conditional nature of Gaza, Palestine.[33][11] The results, in general, showed a lack of awareness, and a declined in the personal knowledge of the respondents on desalination and the problems resulting from its process. In addition, it has been found the absence of the factual knowledge of the elements of Desalination and its impacts. The study also showed the weak role of information sources for providing education to the people about the environmental problems. Furthermore, the result indicates a poor connection between people and the information sources.

The main goal was to investigate which factors influence public awareness and knowledge. Those factors were based on the: Personal and demographic factors, Motivational factors, and learning and information sources. The study assumed like to the previous studies three indicators to measure awareness and knowledge (awareness, personal knowledge, factual knowledge).[2]

##### **4.1 The demographic factors,**

Even though there was a relationship between “education” and public awareness of environmental problems, results did not show a strong correlation or relation between demographic factors and public awareness for the first indicator public awareness. The results can be explained by that, public awareness is the lowest level of knowledge that individuals have received through school or university; where there exists a minimum level of environmental education; that may be sufficient for a minimum level of awareness but not a factual knowledge. Thus, even low degree of education can lead people to achieve awareness about desalination and environment in Gaza.[4]

For the Second indicator, personal knowledge, the results did not show a relationship or correlation or difference based on demographic factors and likewise the third indicator Factual knowledge where the results did not show a relation also.

Furthermore, these results indicated a general cognitive imbalance of knowledge between the different segments of society due to the several reasons. Those reasons can be explained by determining the problems that affect different parts of the society. For example, the main components of the society of Gaza can be identified as individuals themselves, society as a whole, and government or politic parties. The reasons of the individual differences can refer to the lack of desire or interest in the environmental problem, inability to access the information, and may a desire for another subject more urgent, such as political topics. The social reasons can refer to the difference between age groups. Also, the nature of the society, which is not economically or socially motivated to diversify knowledge, because of the economic and political problems, that are a burden on individuals, which makes them swim in the same knowledge

lake. The government role is more inhibited in the society than the other circumstances where the political division that attracts individuals within the scope of the struggle between the parties led to a low interest in the environment and water problems.

#### **4.2 The Motivations factors**

The results of the motivational factors in both categories: place identity and the rate of place using for hobbies and activities showed a high degree of correlation with two indicators: public awareness and personal knowledge. These findings, like similar studies, and research,[33][8] shows that people are more aware of the problems about the hazards that threaten the places they love or where they spend luxury time. Therefore, Individuals have an increased attention knowledge and awareness on a place which they love and their awareness increase more when they realize there are dangers that could affect the places they like. In contrast, the results of factual knowledge were not positive; the analysis did not show a correlation between this indicator and the motivational factors. The scientific fact assumes that people aware of a case does not mean they have the factual knowledge of its dimensions or details. Because the true knowledge depends on the scientific and real information that available for people, how people behave towards, and how much they are motivated to know more. It is completely understandable that this indicator was negative in Gaza since Information resources are not widely available in Gaza when there is not enough information for the public about desalination or environmental problems in general.

#### **4.3 Information Sources**

In general, the results showed that, there was no correlation between the majority of information sources and the three Indicators of knowledge, except the general hearing, plant visit, the social media, and the information from friends and relatives, which showed a correlation with awareness indicator and personal knowledge indicator; this refers to the society-nature where people get their main knowledge about urgent news and information from friends, what other people said, or sometimes try to discover the actual place of the matter. In reality, those kinds of sources do not build a strong true factual knowledge about the subject or the case under the light. As consequences, it was clear in the results of factual knowledge indicator, where the correlation was almost completely negative with information resources. Yet, one source "newspaper" correlated with factual knowledge. So, people who use the newspapers to know as a resource of information showed a higher factual knowledge about the environment and desalination. This may refer to the rise in environmental issues and subjects in the newspapers these days, which is connected with the political issues that use water problems to advertise its agenda.

Moreover, the results indicate that the information resources especially media are weak and do not include in their priorities environmental subjects, even those whose responsibilities are to educate people such as the environmental authority, government agencies or specialized scientists. They have zero impact in increasing people knowledge and awareness about desalination and environment problems.

To sum up, Knowledge is a strong tool. On the first hand, it transfers special conscious to behavioral abilities, facilitating a great number of tasks. Thus, Knowledge raising calls for the establishment of a dialogue through which people will reach the policies makers, and the official will convey to the people what the government is doing to protect the environment. It also urges the public to exert pressure and engage in the planning process. Public engagement in environmental dialogue leads to the maturity of public awareness to preserve the resources of nature. Moreover, Media and information sources are also

an engine of creating public opinion to build practical trends and to formulate legislation, proposals, and solutions.

On the other hand, knowledge, substantiality behaviors and attitudes need more than ability alone; they also require high levels of motivation. People should be Motivated and have the passion to know more about environmental issues. The role of motivations leads to push, influence, instigate and direct the actions that build the environment-sustained goals. Without the preferred motivation, even high increases in the ability of knowledge or availability of information sources will have little impact on behavior. So people who are motivated to engage in the environmental learning, and motivated to be a positive member of the society will have the major effects on environmental behavior.

### ***5. Conclusions***

The research has investigated to what extent socio-demographics, motivational factors, and information use shape public awareness and knowledge in Gaza, Palestine about desalination and its impacts on the environment. The study indicates that the public has lack in the understanding of basic ideas concerning desalination and its effect on the environment. Furthermore, the results show the great lack of knowledge including all the layers of society. Also, the study ensures that current ways of raising awareness and knowledge among the public about environmental issues are weak, and include major problems in making relations and ties with society. Moreover, the research predicts that increasing of desalination plants aiming to supply fresh water in Gaza probably leads to more pollution in the environment. So, there is a crucial demand for plenty of public education, media campaigns, also improvement of government policies to raise people knowledge about the new technologies and comprehend how this affects the environment.

Targeted education and reached efforts are going to be essential for addressing the knowledge gap. Moreover, the study recommends more analysis for public awareness in order to identify the influence of extra variables that increase policy-relevant knowledge of water sectors, like desalination and water treatment.

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