

## **The impact of climate change on the awareness and perception of the residents of Alexandria Governorate as a coastal city**

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### **Abstract:**

This study aims to determine perception and awareness levels about climate change in Alexandria Governorate. The study uses a questionnaire method via internet to obtain data. Generally, knowledge levels regarding climate change is relatively high but about adaptation were comparatively moderate. It is important to increase communication tools to understand the scientific bases of climate change, and increase the public awareness.

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### **I. INTRODUCTION**

Climate change is one of the most significant issues of today's world, for that, atmosphere researchers have reasoned that the earth's surface air temperature warmed by  $0.5\pm 0.2^{\circ}$  during the twentieth century, joined by changes in the hydrologic cycle, (Buhairi MH, 2010).

Climate change has already been observed globally, including increases in air and water temperatures, reduced number of frost days, increased frequent and intensity of heavy downpours, a rise in sea level, and reductions in snow cover, glaciers, permafrost, and sea ice (World Health Organization, 2009). In 1990, the Intergovernmental Panel on Climate Change concluded that there was broad international consensus that climate change is human induced (IPCC, 2001).

Climate change has been recognized globally as an ever-increasing threat to our planet that is becoming impossible to ignore (Sarkar et al., 2012). Despite a few skeptical views (Dunlap, 2011), many researcher believed that climate change is one of the most important environmental issues facing the world today and Egypt (David, 1998, Parry et al., 2004; Ebtessam, E. and Beltagy 2008; Brooks et al., 2009; Ayanwuyi et al., 2010, AbunTaleb, 2010; Ekpoh and Ekpoh, 2011; FAO, 2012; Wang, 2012; Karfakis et al., 2012; Arbuckle Jr et al., 2013; Mohamed, 2014; Pishbahar, 2016).

As Sarkar et al. (2012) mentioned, it is necessary to understand climatic change from the socio-economic perspective to prepare a road map for capacity building of people and to help the policymaker in formulating future policy based on human perception and attitude. Therefore, it is very crucial to investigate what people know, think, believe and behave across a spectrum of issues related to climate change (Jamelske et al. 2013).

As Ochieng and Koske (2013) stated, "Increasing people's awareness on climate change is an important measure to persuade people at all levels in the community to play an active role in mitigating and adapting to climate change

The Mediterranean coastal zone is the site of Egypt's second largest city, Alexandria, which is the country's main harbor. Located on the western side of the Nile Delta, the city sits partly on low-elevation land. Alexandria is home to about 40% of the country's industrial capacity, in addition to being a prominent summer resort, (David Michel, 2010).

The coast of Alexandria is characterized by its diverse topography. Alexandria's seafront- is represented by the narrow coastal strip extending from AbuQir to Agamy-lays on a hill or a raised barrier of limestone, ranging from +2.5 to +11 meters (on average +4 meters) above sea level. Although, this barrier forms a natural shield against the sea advanced toward the land, there are areas at a lower altitude that may be submerged as a result of rising sea levels, or exposed to high waves causing erosion to the coast line. According to (Awad, 2017), thirty percent of the city's area would be destroyed, 1.5 million people would have to be evacuated, and over 195.000 jobs would be lost.

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The aim of this research was to evaluate perception towards climate change, level of knowledge of respondent about climatic change their opinion about climatic change and their explanation about the causes of this change and their knowledge about the impact of climatic change on their life. Inform recommendation on the best method to communicate with the people.

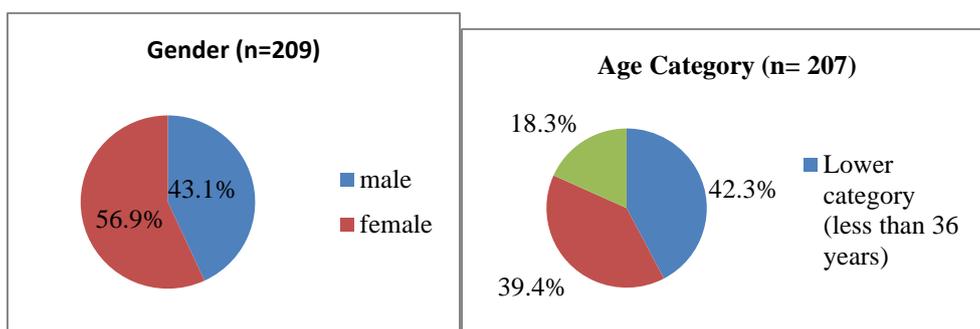
## II. MATERIAL AND METHOD

The quantitative method is used in this study. It was conducted to examine the levels of knowledge, attitudes and practices towards climate change. A questionnaire was designed and published online. Only 211 respondents answered the questionnaire and return it back. The collected data are analyzed using SPSS software. The sample was analyzed according to many categories such as total sample, gender, age, education, district and job status.

## III. RESULT AND DISCUSSION

### Profile characteristics of respondents

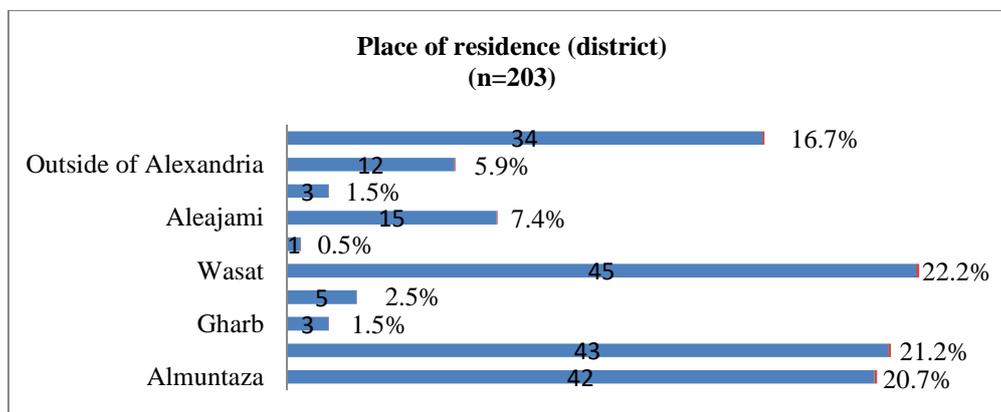
56.9 % of respondents (119) are females while 43.1% are male (Fig.1). The age of the respondent is distributed into three categories. The first one is known as lower category with age less than 36 year, middle category with age in between 36 and 53 year and the top category with age more than 53 year. The highest percentage of respondent (42.3%) representing the lower age category (Fig.2) followed by middle category (39.4%).



**Figure (1) Gender Category**

**Figure (2) Age category**

Most of the respondents live in Wasate district (22.2%) followed by Sharqe district (21.2%), 0.5% live in Al-eamiria district while 16.7 of respondent did not define their district, 5.9 of them live outside Alexandria governorate (Fig. 3).



**Figure (3) Place of residence in different district**

Most of the respondents (43.1%) are born in Alexandria, while 27.3 stated that they reside to Alexandria for period fluctuated between 20 and 39 years. Only 3.3% of them are residing to Alexandria for period ranged between 1 and 5 years (Fig. 4).

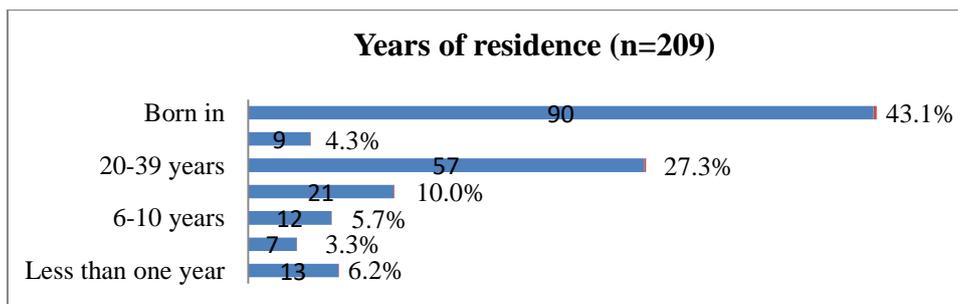


Figure (4) Years of residence for respondents

Most respondents 68.7% stated that they are highly qualified (Msc and Phd). 28.4 % stated that they are university qualifications. While 2.8% are secondary school qualifications (Fig.5).

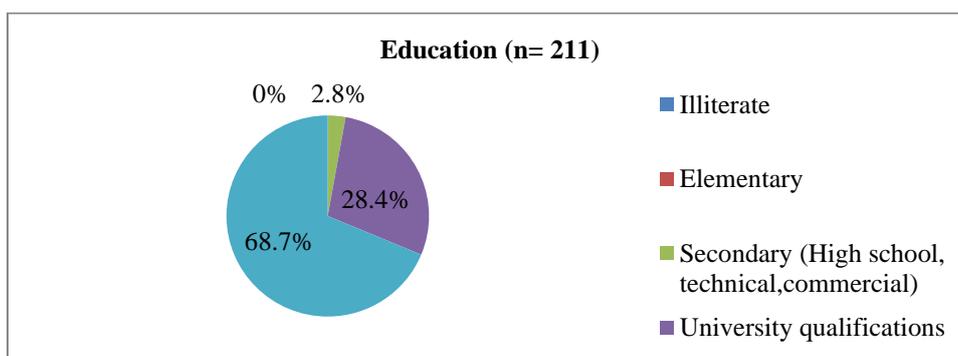


Figure (5) The respondents disaggregated by Education

About 60.9% of the respondents working in Governmental authorities, while 9% of them are small business, 8.6% are unemployed, 8.1% are wise house. The rest of the groups of respondents represent about 10.5% as represented in Figure (6). 42% of the respondent held leadership positions (table 1).

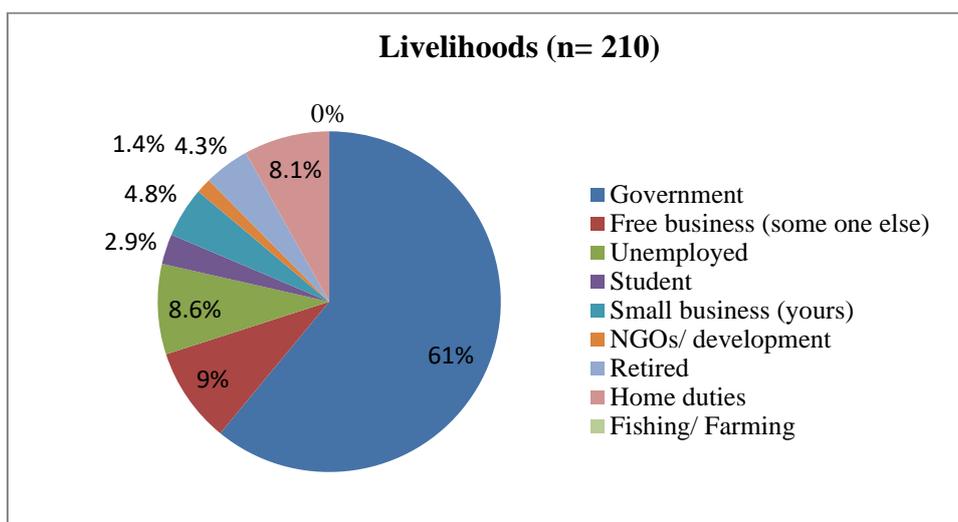


Figure (6) showing respondents disaggregated by employment

Table (1) showing respondents disaggregated by hold any leadership position/s

Leadership positions	No. Respondents	% Respondents
Government	42	20.4
Religious institution	0	0
Youth	2	1
Women	0	0
Union	2	1

NGOs/ development	9	4.4
Business	11	5.3
No	140	68

**Knowledge and vision about climate change:**

All of the surveyed population had heard about the term “Climate Change”. 92.4 % of them understood the meaning of climate change and 7.6 % don’t know its meaning (Fig.7).

Test them about their knowledge, all respondents were asked about what they believed to be the cause(s) of climate change. 77.8% (n158/203) attribute climatic change to carbon deforestation and remove vegetation were responsible for all the changes, 60.1% (n=122/ 203) selected burning fossil fuels, such as oil and coal. 27.1% (n=55/ 203) believed that emission of methane gas from the decomposition of agriculture and animal wastes (Fig. 8)

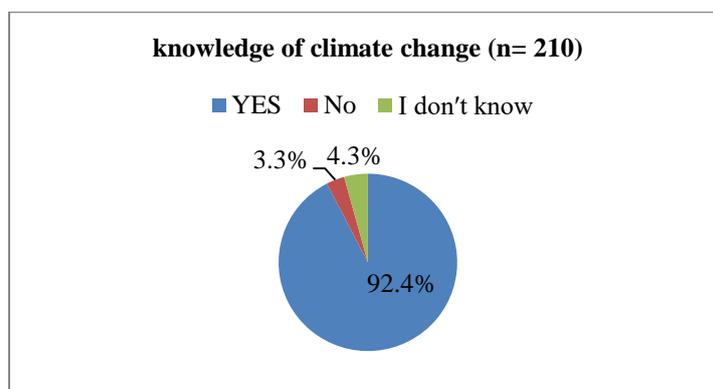


Figure (7) respondents Knowledge about climate change

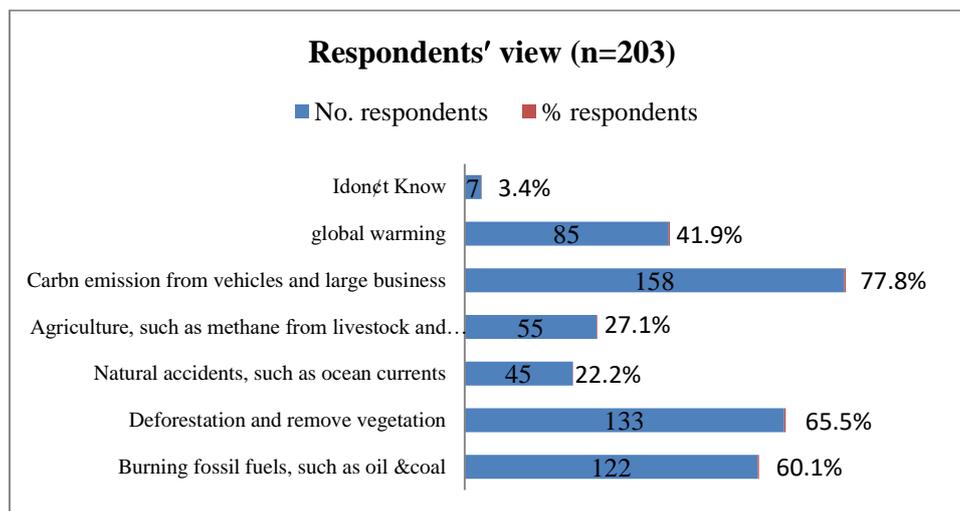


Figure (8) Respondents' views on causes of climate change

**Thinking about effects of climate change in Alexandria:**

Most of the respondents (87.2 percentage) (n=184/211)said that sea level rise will effect Alexandria. There were (64.5%) (n=136/211) of respondents thinking about rising temperatures, but (32.7%) (n=69/211) of respondents thinking about more rain and (20.9%) (n=44/211) of respondents were believed that there will be loss in animals and plants. (28.4%) (n= 60/211) of respondents stating that coastal erosion will effect, (Fig.9).

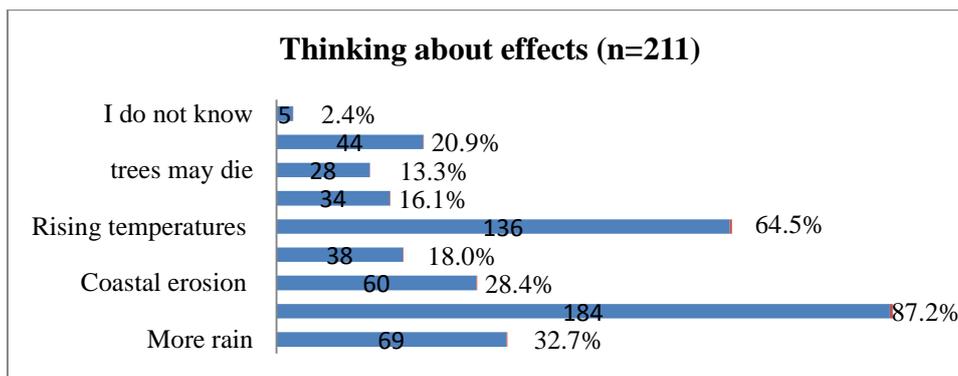


Figure (9) Thinking about effects of climate change in Alexandria

**Thinking about impact of climatic change on Alexandria:** There were (84.8%) (n=178/210) of respondents thinking sea level rise will affects the coastal area, but (74.3%) (n=156/210) of respondents stating that coastal area will suffer from erosion. (54.3%) (n=114/210) of respondents believed that air temperature will increase and (26.7%) (n=56/210) of respondents stating that melting glaciers lead to increase of sea level. Drought, flooding and desertification made up a total (33.8%) (n=71/210) of all respondents. Only (1.4%) (n=3/210) of respondents stating “I don’t know”, (Fig.10).

It is important to note that most of the respondent thinking about sea level rise and its impact on the coastal area.

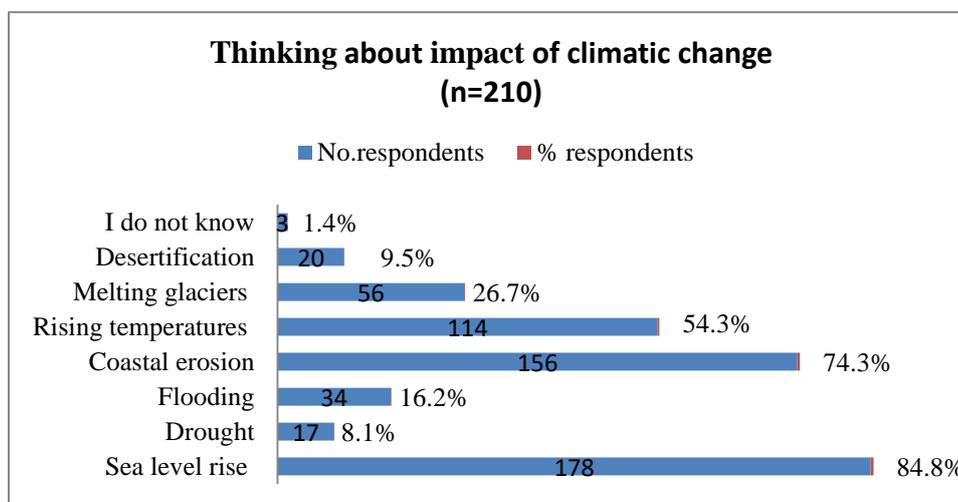


Figure (10) Thinking about impact of climatic change on Alexandria

**Respondents’ conviction about climate change:**

Asking the respondents about their convictions about climate change, 96.7% (n=204/211) of the respondents agreed that climate change has occurred. Also 57.8% (n=122/211) of the respondents stated that living today is more important than worrying about the effects of climate change in the recent period. More than half of respondents (n=176/211) agreed that climate change can reduce the quality of life for future generations, and (n=175/211) agreed that about human activities are responsible for climate change. And small proportion of respondents (n=81/211) agreed that it is a natural changes in the environment (Fig11).

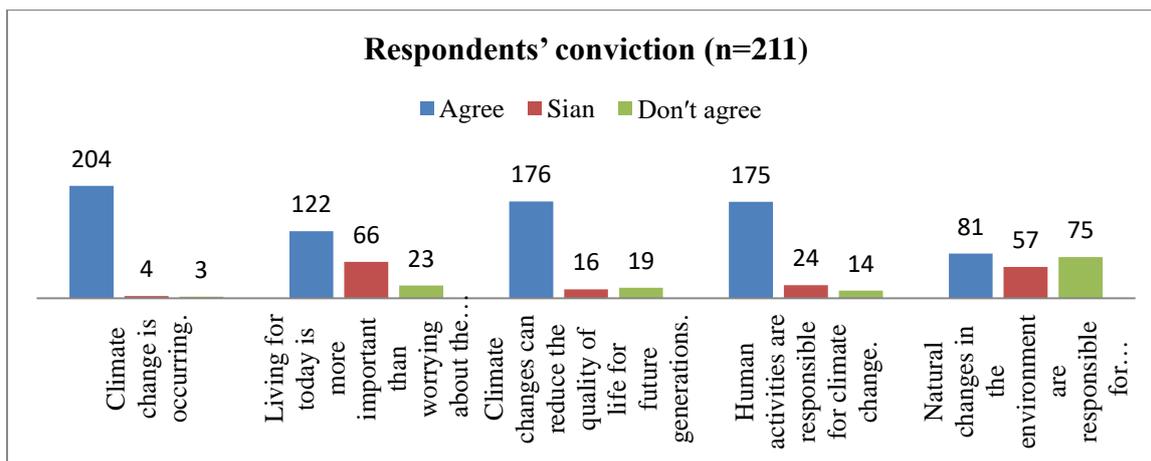
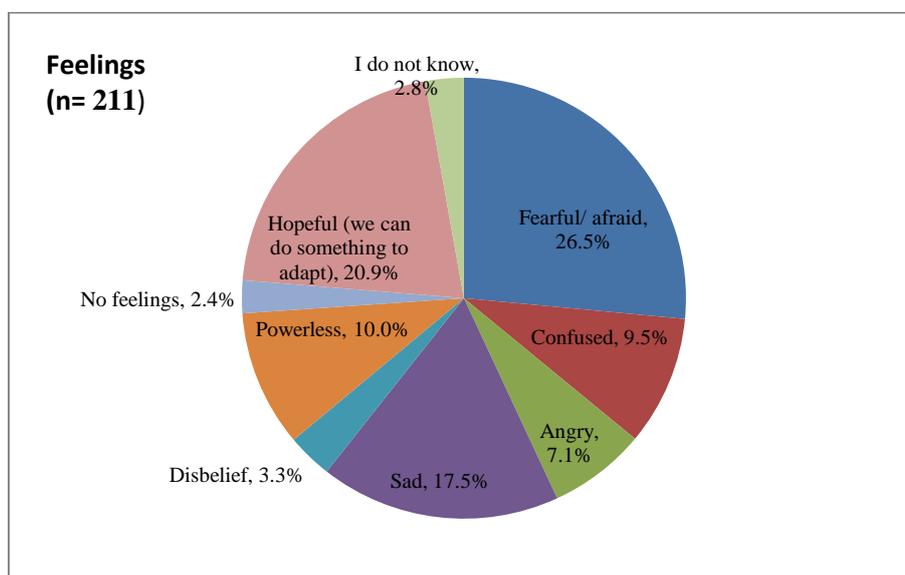


Figure (11) Respondents' conviction about climate change

**Attitudes towards climate change:**

**Feelings towards climate change:**

The feeling of respondent about climatic change are mixed distributed between fear (26.5% of the respondents), 20.9% are hopeful and believe that something must be done to adapt about climatic change; 17.5% are sad; 10% are powerless; 9.5% are confused while 2.4% have no feeling and 2.8% do not know (Fig.12)



Figure(12) Feelings towards climate change

**The importance of climate change issue to the respondent:**

Asking about the importance of the climate change on respondent's live, 47.9% of respondents said it is important ; 42.9% stated that it is very important ; 8.5% stated that it is not important; and 1.4% told that it is not very important, (Fig. 13). 73% of the respondent wish to learn more about climate change, and 20.4%, said that it is not important (Fig 14)

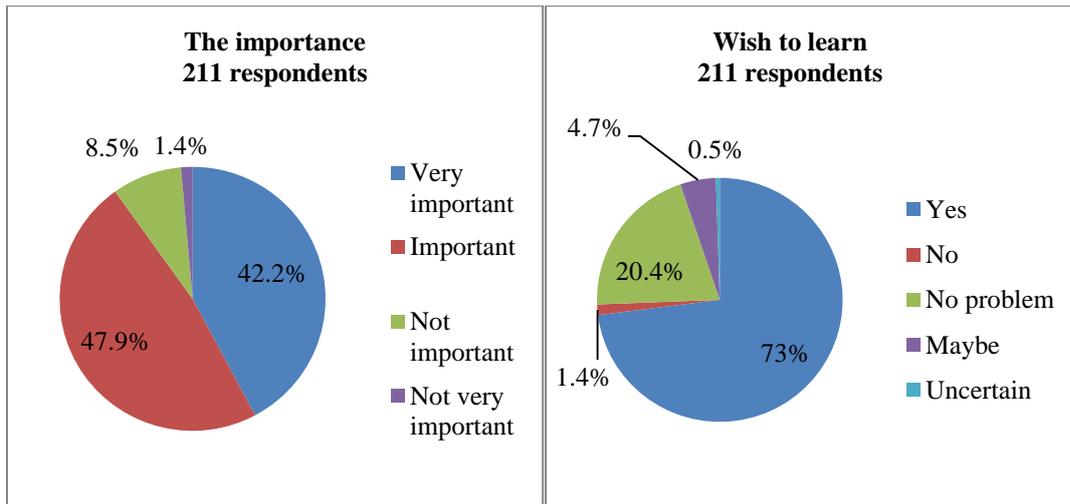


Figure (13) The importance of climate Change on respondent's lives

Figure (14) Respondent wish to learn more about climate change

**Adapting climate change:**

When asked if any actions are taken to adapt climate change, 49.3% reported that nothing are taken to adapt the climate change, but (36 percent) reported yes some action are taken to adapt climate change (Fig. 15). Asking them what actions are taken to adapt climate change 79.5% do not throw garbage on the street, 78.6% stated that they turned off water when not in use and 75.7% said that they turn off lights when not in use. This answers means that the respondents do not know the meaning of adaptation (Fig.16).

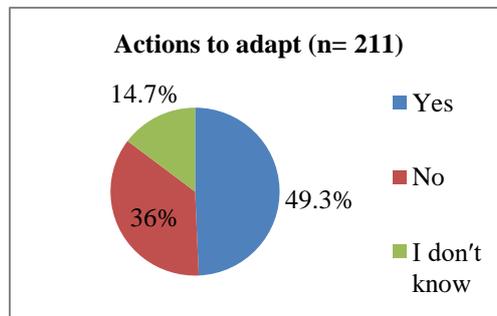


Figure (15) Actions to adapt climate change

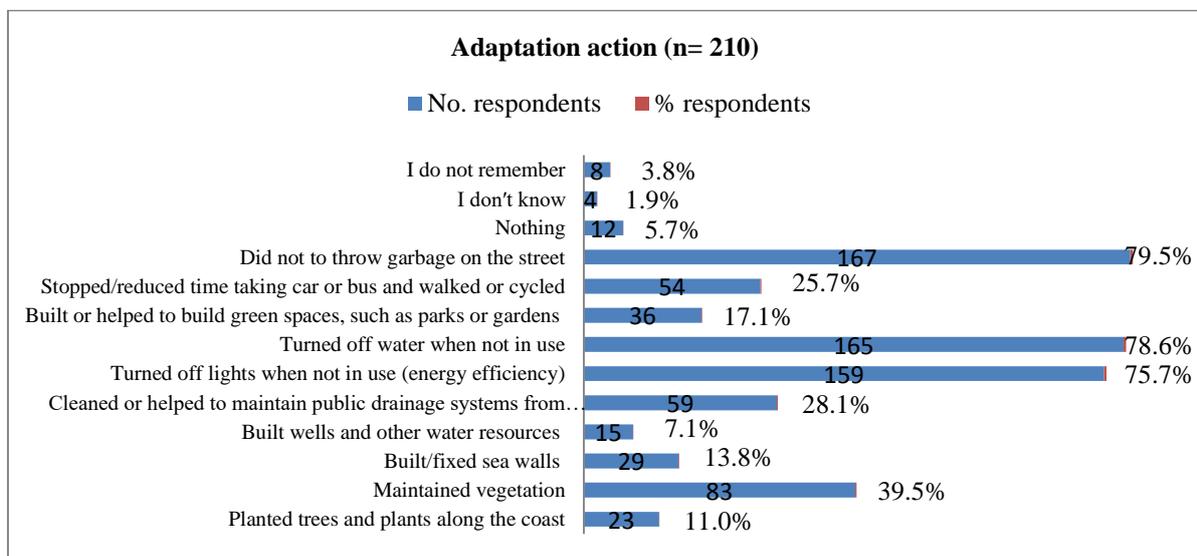
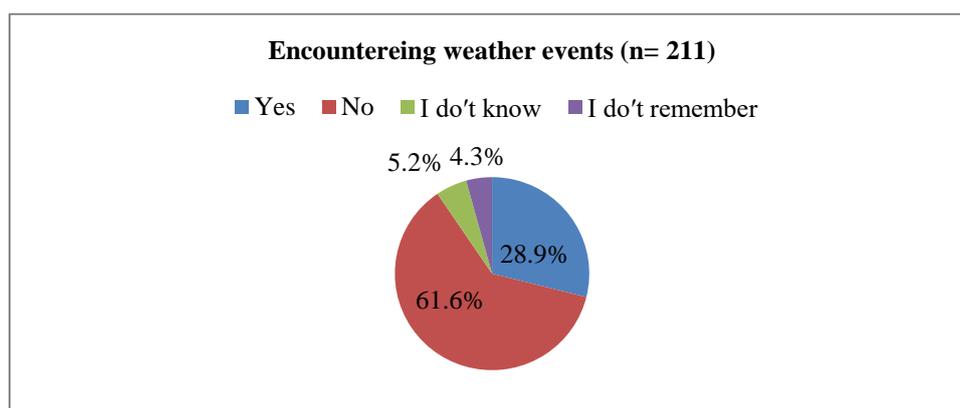


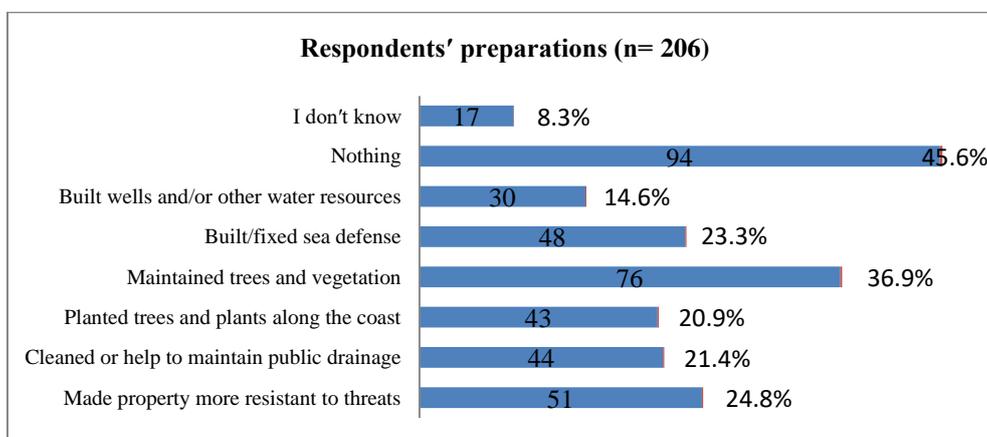
Figure (16) Percentage distribution of adaptation measures

When asked if they encountered extreme / unusual weather events, such as floods, wave overtopping or droughts 61.6% stated that don't encountered, but (28.9 percent) said that they encountered. Only (5.2 percent) stated that "I don't know", (Fig. 17).



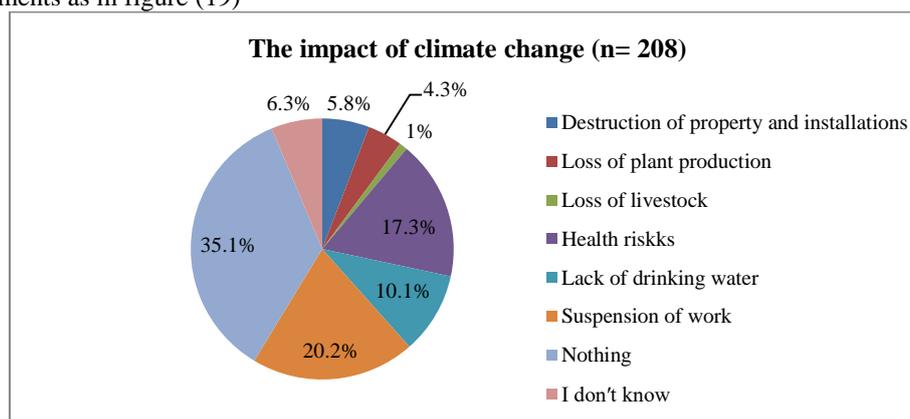
**Figure (17) Encountered extreme unusual weather events**

When asked the respondent about the preparation for natural disasters, 45.6% (n 94/206) nothing done; 36.9% (n=76/ 206) stated that it is must maintain trees and vegetation (Fig.18). 24.8% (n=51/206) stated it is important to take action to resist threats. Totally (65.6%) (n=135/206) of all respondents stated that it is important to clean or help maintaining public drainage, built/ fixed sea defense and planted trees and plants along the coast. Only (8.3%) (n=17/206) of respondents stated that "I don't know",



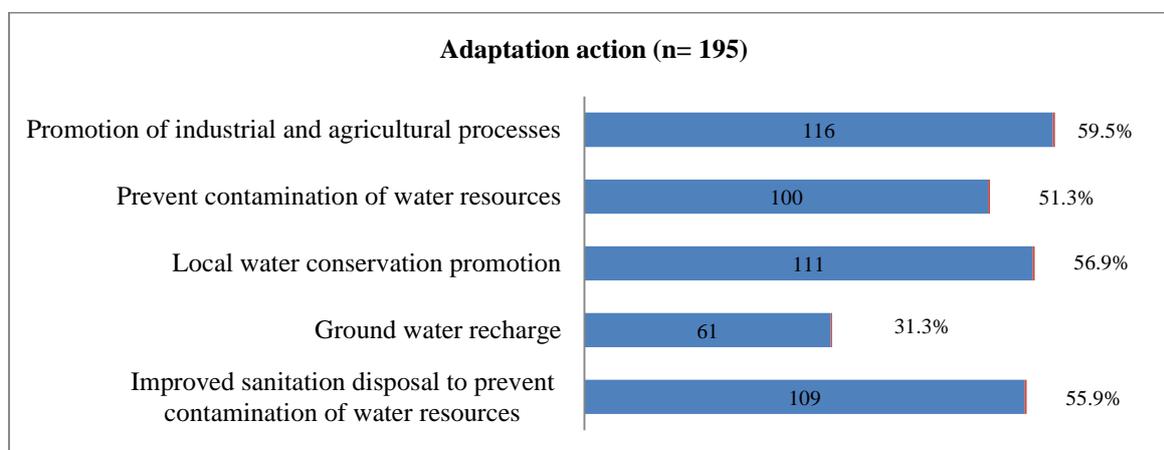
**Figure (18) Respondents' preparations for natural disasters**

When we asked the respondents about the impact of climate change on their life, 35.1% said that there is no impact (nothing); 20.2% stated that job opportunities will decrease. Another 17.3% reported that there will be health risks; 10% said that there is lake in drinking water and 17.4% of the respondents are distributed along the other elements as in figure (19)



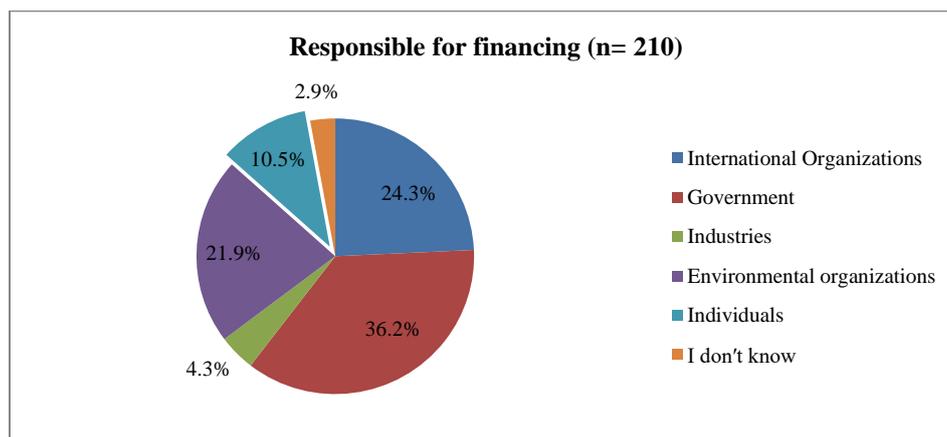
**Figure (19) The impact of climate change on respondent life**

Asking the respondent about how is the action to reduce the impact of climate change on water resources, 59.6% (n=116/195) said it must regulate the use of water for industrial and agriculture processes. 55.9% (n=109/195) stated that it must recycle and reuse wastewater. %56.9 of the respondent said that we must conserve water. Also, 51.3% (n=100/195) told that we must protect water resources from contamination and 31.3% (n=61/195) said that we can recharge ground water (Fig.20).



**Figure (20) Action to reduce impact of climate change on water resources**

Asking about the responsibility to finance the action of climate change adaptation, 36.2% of respondents, said that it is the responsibility of the Government, 24.3% said that the international organization must share; 21.9% stated that environmental organization must share too while 4.3% said the industry are responsible (Fig. 21).



**Figure (21) Responsibility for financing climate change adaptation**

**Resources of information and warming:**

When we asked the respondents about the resources of information about warming, 57.6% (n=121/210) stated that they get it from the internet, but 50.5% (n=106/210) reported that they get it from social media. Other 39% (n=82/201) said that they notice the changes, (Fig. 22).

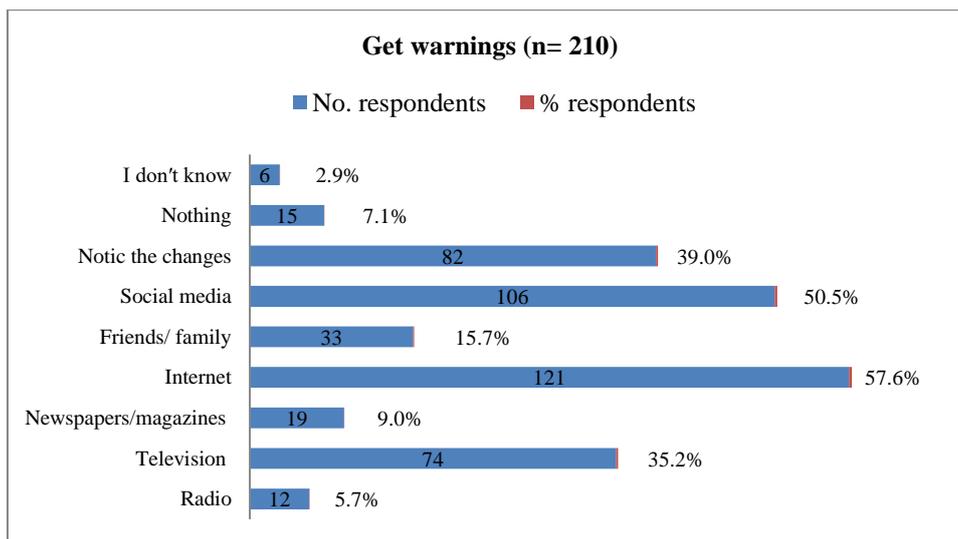


Figure (22) Resources of warming about climate change

Asking the respondents if anyone in charge tell him how to act in the event of a disaster such as flood or droughts, 79.5% said no, 13.8 said yes while 6.7% said I don't know (Fig. 23).

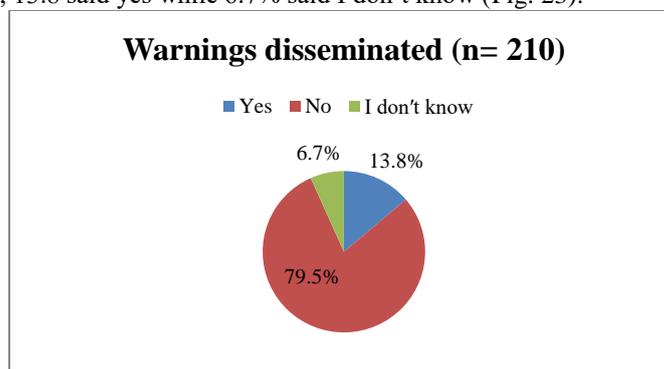


Figure (23) Warnings dissemination

Asking about the preferable resources of information about climate change.60.9% (n=128/210) prefer to access the information from mobile in daily manner, and55.2% (n=116/ 210) of respondents prefer using Whatsapp. (n=137/210) of respondents reported that they like to use Facebook to access the information, (Table. 2).

Table (2) Access of information through media

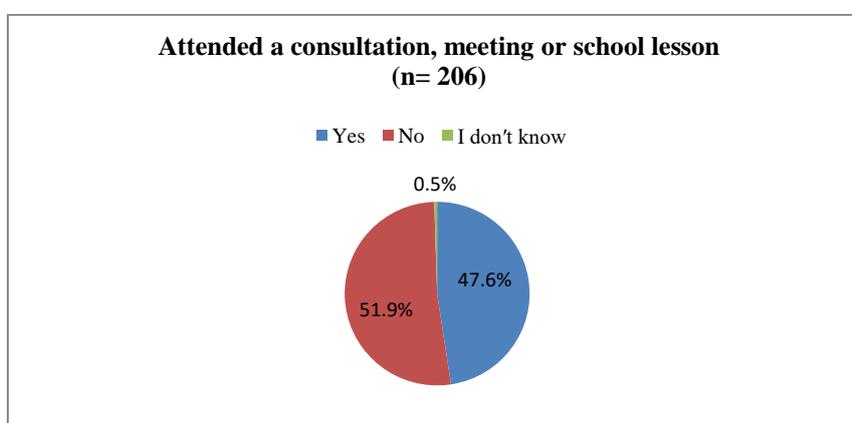
Media	Daily	Often	Seldom	Sometimes	Never
Mobil	128	25	5	21	4
Telephone	17	20	62	40	18
Towiter	22	23	54	21	30
Instagram	39	17	42	29	26
Facebook	137	26	8	18	0
Whatsapp	116	32	8	23	5
Text/SMS	53	37	27	49	8
Email	74	43	8	38	7
Radio	5	18	71	42	23
Newspaper	6	15	68	39	32
TV international	20	24	46	58	14
TV local	37	17	47	69	9

When asking about their preferred mode of communication to receive information about climate change, 66.5% prefers social media and the other media as in table(3).

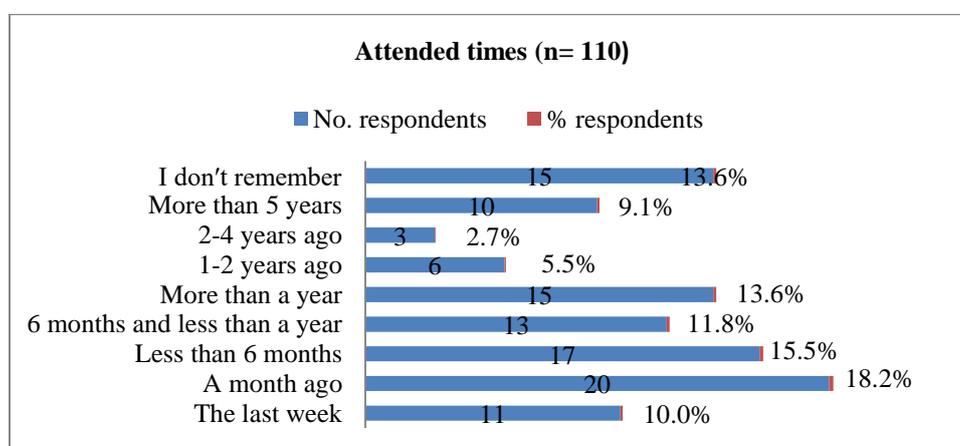
**Table (3).Preferred modes of communication**

Mode of communication	No. respondents	% respondents
National Radio	17	8.1
TV	64	30.6
Local Newspapers	18	8.6
Social Media	139	66.5
On line (Email/ internet)	97	46.4
Religious institution	14	6.7
NGOs	14	6.7
Government	35	16.7
Newsletter	49	23.4
Friends/ Family	14	6.7
Billboards/ Posters	28	13.4
Pamphlets/ Handouts	23	11
Leader from community	19	9.1

When asking if they attend a meeting or lectures about climate change. Only (0.5 percent) stated “I don’t know”. Whereas almost of half of the respondents (51.9%) indicated that they didn’t attend any meeting (47.6%) stated “Yes” (Fig. 24). Asking this group when they attend the meeting, 18.2% said a month ago, 15.5% from less than 6 months and another group from one year ago (Fig. 25).



**Figure (24) Attended a consultation, meeting or school/ lesson on climate change**



**Figure (25) The last one attended a consultation, meeting or school lesson**

#### IV. CONCLUSION AND RECOMMENDATION

Real changes in society come when we join people in expressing their opinions. The concern people in this study were gender. Most of the respondent age was ranged between less than 36 year and 53 years old. Most of them are highly educated. Approximately, all of them live in Alexandria. More than 60% work in governmental authority. The obtained results are a guide to increase perception and awareness about climate change. Most of the respondents have good knowledge about climatic change but the level of knowledge about adaptation is relatively low. The succeed in action planning to mitigate and adapt climate change by government and NGOs depend on the support of people .For that it is important to increase communication tools to understand the scientific bases of climate change, and increase the public awareness.

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