

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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Study about:

**Operations Response of Disasters and Emergences, in Almatamma locality,
River Nile State, Sudan, 2015 - 2017.**

A thesis for requirement of M.Sc degree in Public Health

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A- الأية الكريمة

قال تعالى:

" وَلِتَبْلُوهُمْ بِشَيْءٍ مِّنَ الْخَوْفِ وَالْجُوعِ وَنَقْصٍ مِّنَ الْأَمْوَالِ وَالْأَنْفُسِ وَالثَّمَرَاتِ وَبَشِّرِ الصَّابِرِينَ

البقرة الآية (155)

B- DEDICATION

To the spirit of my father

To my mother

To my brothers

To my friends

C- ACKNOWLEDGEMENT

Praise is to **Allah**, peace and blessings are upon our Prophet **Mohammad**, peace is upon him.

I would like to extend my thanks and gratitude to all of help and assistance to me during my studies continue And stop with me since the beginning of my candidacy for admission to this university and until the completion of the study.

And special thanks: Dr. **Adam Dawria Ibrahim**, Who supervised the studies.

I also thank Dr. **Ahmed Mohammed Hussein**, Who have helped so much that this study graduated optimally, I also thank the **professors** of the Faculty of Public Health Shendy University.

D- Abbreviations

AIDS	Acquired Immune deficiency Syndrome
CDC	Centers for Diseases Control and prevention
FEMA	Federally Emergency Management Agency
FMOH	Federally Ministry of Health
HIV	Human immunodeficiency Virus
IFRC	International Federation of Red Cross
NIMS	National Incident Management System
OR/MS	Operations Research/Management Science
ORM	Operational Risk Management
SCM	Supply Chain Management
SFP	Supplementary Feeding Programmes
SPSS	Statistical Package for Social Sciences
SRCS	Sudanese Red Cross Society
TFP	Therapeutic Feeding Programmes
UN/ISDR	United Nation/International Strategy for Disaster Reduction
UNICEF	United Nations Children's Emergency Fund
WASH	Water Supplies and Sanitation and Hygiene Promotion
WHO	World Health Organization

E- ABSTRACT

Disasters are large intractable problems that test the ability of communities and nations to effectively protect their populations and infrastructure, to reduce both human and property loss, and to rapidly recover.

This cross sectional descriptive study-community based conducted in Almatama locality in the period of time (2015 - 2017). The aim of this study is to evaluate operations response disasters and emergencies.

The data was collected from primary sources that related with the research; the researcher and his assistants were used close questionnaire, and oral interview to data collection from study population in the three administrative units in the study area, according on sample size that was determined 400 members, according to this equation:

$$n = (z^2) pq \div d^2 .$$

400 questionnaires were distributed to study population, and 50 interview form to the health staff in health department in the study area. Samples were selected by cluster random sample.

The data collected from the field, were analyzed used simple percentages frequency and statistical packages for social Sciences program (SPSS).and pro analysis process, study was showed many Results that;

All the procedures and methods of rapid assessment for disaster were existing. Were by the ratio: 60.3% it was used large, and 39.7% it was used moderate.

The personal equipment and supplies that is associated with the response team, available by the ratio: 53.3%.

The procedures that used in the process of intervention after disaster some exist include: Water, food and drugs supplies during disaster response were available by: 47.6%.

Sanitation operations processes were used during disaster response available by: 55.1%. Procedures used in the process of evacuation and sheltering after a disaster, used by; 74.8%, were 59% used large, and 15% use moderate.

Prevention Factors of the common communicable diseases, available by ratio 56.6%.

The obstacles related with disaster response operations exist by the ratio 79.8%. After the data were collected and analyzed, and results were abstracted, the study recommended to:

The Health authority should encourage and train the target population to participate in the response operations of disasters, especially those concerning evacuation and rescue.

The Health authority should coordinate and maintain continuous communication with civil organizations and community leaders.

F- ARABIC ABSTRACT

تعرف الكوارث بأنها مأساة كبيرة تؤثر سلبا على المجتمع والبيئة وتشكل تهديدا على مستوى الحياة والصحة والممتلكات.

أجريت هذه الدراسة الوصفية المقطعية بمحلية المتممة في الفترة الزمنية (2015 - 2017) بهدف تقييم عمليات الاستجابة للطوارئ والكوارث .

تم جمع البيانات من المصادر الأولية المرتبطة بموضوع الدراسة , وتم استخدام الاستبيانات والمقابلات لجمع البيانات من مجتمع الدراسة بالقطاعات الإدارية الثلاثة التابعة لمنطقة الدراسة بناءً على حجم العينة الذي حدد بـ 400 فرد, حيث تم تحديده وفقا لمعادلة حجم العينة:

$$n = (z^2)pq \div d^2$$

تم توزيع 400 استبيان على مجتمع الدراسة , و 50 استمارة مقابلة للعاملين بإدارة الصحة والسكان بمنطقة الدراسة , حيث تم اختيار العينات بالطريقة العشوائية العنقودية المتعددة المراحل .

بعد جمع البيانات من الميدان , تم تحليلها باستخدام الجداول التكرارية والنسب المئوية, بالإضافة إلى برنامج التحليل الإحصائي للعلوم الاجتماعية (SPSS) . و بعد عملية التحليل تم التوصل إلى عدد من النتائج أهمها:

أن جميع الوسائل التي تستخدم في عملية التقييم السريع للكارثة موجودة , منها 60,3% تستخدم بدرجة كبيرة , و 39,7% تستخدم بدرجة متوسطة.
أن المعدات والإمدادات الشخصية التي تكون مصاحبة لفريق الاستجابة متوفرة بنسبة 53,3% .

أن معظم التدخلات التي تتم في مرحلة الاستجابة للكوارث موجودة بنسب متفاوتة وتشمل:

إمدادات المياه والغذاء والدواء متوفرة فقط بنسبة 47,6% , ومعينات الإصحاح البيئي متوفرة بنسبة 55.1% .

أن التدخلات التي تستخدم في عملية الإخلاء والإيواء بعد حدوث الكارثة مستخدمة بنسبة 74,8% , منها 59% مستخدمة بدرجة كبيرة , و 15% مستخدمة بدرجة متوسطة .

أن عوامل الوقاية من الأمراض السارية الشائعة عند حدوث الكارثة متوفرة بنسبة 56,6% . وأن المعوقات التي تواجه نظام الاستجابة للكوارث تبلغ نسبة وجودها 79,8% .

بعد جمع البيانات وتحليلها واستخلاص النتائج , وضعت الدراسة عدد من التوصيات أهمها:

تشجيع وتدريب المواطنين على المشاركة في عمليات الاستجابة للكوارث خاصة فيما يتعلق بعمليات الإخلاء والإنقاذ. و على السلطات الصحية التنسيق الكامل والتواصل المستمر بين إدارة الصحة والسكان , ومنظمات المجتمع المدني .

توعية السكان بمخاطر السكن في الأماكن المعرضة للكوارث الطبيعية خاصة الفيضانات.

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CHAPTER ONE

1.1- Introduction

Disaster studies address the social and behavioral aspects of sudden onset collective stress situations typically referred to as mass emergencies or disasters. These situations can be created by natural hazards, technological accidents, violent intergroup conflicts, shortages of vital resources, and other major hazards to life, health, property, well-being and everyday routines. Disaster studies address the impacts of these events on all social units ranging from individuals and households to nation-states. All aspects of the life history of such events, both actual and threatened, are examined in terms of the ways in which populations at risk conduct hazard and vulnerability analyses as well as plan and implement mitigation, preparedness, response and recovery actions. As Stallings (2006) noted, disaster research has been characterized by inductive field studies in which one or more researchers travel to the site of a reported disaster to observe behavior and conduct personal interviews. Slow onset disasters such as hurricanes might allow researchers to observe pre-impact response activities but it has been more common to collect data after a disaster strikes. In either case researchers collect important documents and interview key informants who are identified by organizational position or by snowball sampling. In recent decades, there has been an increasing reliance on survey research. In most cases, surveys have been conducted to study households' warning response or perception and response to natural hazards. In both types of studies, the research objectives and methods of sociologists have overlapped significantly with those of geographers. In other cases, surveys have been conducted on businesses struck by disasters

and emergency preparedness organizations. Occasionally, disaster studies have analyzed archival data, (**Lindell, 2011**).

Sudan is prone to many types of disasters; as an example, in the year 2003, in addition to the ongoing civil strife in the south, local tribal conflict flared up in Darfur, and is still continuing, with social and economic impacts on the Darfur's people. During the same year, El Gash river, in the eastern part of the country, flooded with almost total damage to Kasala city (population approximately = quarter of a million). Many parts of Sudan are still affected annually by such incidences of floods and flash-floods during the rainy season. This adds to the burden of endemic diseases such as malaria and is sometimes the source of epidemics of other diseases. Beside the above mentioned hazards and risks; other types of emergencies occur in Sudan like drought, environmental degradation and pest infestations. The capacity to respond to these incidents at the local level is, at best, weak. A public health approach to emergency management will aim to decrease the risk by reducing the vulnerabilities of communities (prevention and mitigation measures), building the capacity of the health systems to address the health needs (preparedness), and by the provision of prompt and efficient emergency response (response) once the disaster has occurred, (**FMOH, 2006**), also Rive Nile State in years (2013 and 2014) include Almatamma locality exposed to floods disasters led to chase away more than two thousand people, (**Sudanews, 2015**).

1.2- Justification

Across the globe, various disasters like earthquake, landslide, cyclone, volcanic, eruption and floods are some of the natural hazard that kill thousands of people and destroy billions of dollars of habitat and propriety each year, (**WHO, 2011**).

Followed by such disasters range of health risks, whether directly (deaths, injuries) or indirectly linked to those lows in Environmental Health, (**Naji, 1997**).

The proportion of the existence of deficiencies in standby operations to disasters around the world, including the Sudan, particularly in the River Nile State, which is located by the study area, those responsible always focused on the response process that occurs after a disaster or emergency. Since the effective response system greatly reduces the health risks that must keep track of disasters on each side installment of disaster management and emergency response application optimize the system.

Therefore, the researcher assessed the application of the response system to disasters and emergencies in Almatamma locality - River Nile State to find out the shortcomings of that system and to what extent needed to strengthen the system used, modification or switch.

1.3- Objectives of study

1.3.1- General objective:

To evaluate of operations response of disasters and emergencies, in Almatamma locality, 2015 - 2017.

1.3.2- Specific objectives:

- To assess degree use of rapid assessment measures in disasters and emergency response operation.
- To identify degree of availability the equipment, supplies, services during disaster response.
- To describe procedures that used in the process of intervention after disaster.
- To identify the presence of community participation in disaster and emergency response operation.
- To identify the obstacles and challenges that affect response operation.

CHAPTER TOW

2.1- Definitions

2.1.1- Disaster:

A disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. In contemporary academia, disasters are seen as the consequence of inappropriately managed risk. These risks are the product of a combination of both hazards and vulnerability. Hazards that strike in areas with low vulnerability will never become disasters, as is the case in uninhabited regions, (UN, 2008).

United Nations body defined disaster: is a tragic case affected the daily life of her puppies pattern and suddenly people become without help and suffer from its horrors and they become in need of protection, and clothing, and shelter, and medical care, social and other essential needs of life.

International Organization for Civil Protection defined disaster: is unexpected incidents caused by the forces of nature, or because of human reaction and the consequent loss of life and destruction to property, and be of a severe impact on the national economy and social life and exceed the capacity of national resources to face the possibilities and require international assistance.

Industrial civil defense guide defined disaster: is a big incident resulting in massive loss of life and property was a natural disaster are due act of nature (Seoul, earthquakes, storms, etc. ..) may be a technical disaster are caused by man-made, whether voluntarily (deliberately) or involuntarily (negligence) and require

encountered aid all national agencies (government and private) or whether the international face of national capacity exceeds capacity.

American organization of safety engineering defined disaster: is (Sudden shift is expected in the normal way of life because of natural phenomena or human being who did cause many injuries and fatalities or large material losses). And also it is known as (a sudden incident caused extensive damage to life and property and to extend its effects beyond the scope of the affected region or community).

2.1.2-Emergency:

“Is a situation generated by the real or imminent occurrence of an event that requires immediate attention” (key words) Paying immediate attention to an event or situation as described above is important as the event/situation can generate negative consequences and escalate into an emergency. The purpose of planning is to minimize those consequences, (**Quarantelli, 1998**).

An emergency is a situation in which the community is capable of coping. It is a situation generated by the real or imminent occurrence of an event that requires immediate attention and that requires immediate attention of emergency resources. **A disaster** is a situation in which the community is incapable of coping. It is a natural or human-caused event which causes intense negative impacts on people, goods, services and/or the environment, exceeding the affected community’s capability to respond; therefore the community seeks the assistance of government and international agencies. Researchers have been studying disasters for more than a century, and for more than forty years disaster research. The studies reflect a common opinion when they argue that all disasters can be seen as being human-made, their reasoning being that human actions before the strike of the hazard can prevent it developing into a disaster. All disasters are hence the result of human

failure to introduce appropriate disaster management measures. Hazards are routinely divided into natural or human-made, although complex disasters, where there is no single root cause, are more common in developing countries. A specific disaster may spawn a secondary disaster that increases the impact. A classic example is an earthquake that causes a tsunami, resulting in coastal flooding, **(Commonwealth, 2013)**.

2.1.3-Hazard:

“Is the potential for a natural or human-caused event to occur with negative consequences” (key words) A hazard can become an emergency; when the emergency moves beyond the control of the population, it becomes a disaster. Hazard may be defined as “a dangerous condition or event, that threat or have the potential for causing injury to life or damage to property or the environment.” The word ‘hazard’ owes its origin to the word ‘hasard’ in old French and ‘hazar’ in Arabic meaning ‘chance’ or ‘luck’. Hazards can be grouped into two broad categories namely natural and manmade. **Natural hazards:** are hazards which are caused because of natural phenomena (hazards with meteorological, geological or even biological origin). Examples of natural hazards are cyclones, tsunamis, earthquake and volcanic eruption which are exclusively of natural origin. Landslides, floods, drought, fires are socio-natural hazards since their causes are both natural and manmade. For example flooding may be caused because of heavy rains, landslide or blocking of drains with human waste. **Manmade hazards:** are hazards which are due to human negligence. Manmade hazards are associated with industries or energy generation facilities and include explosions, leakage of toxic waste, pollution, dam failure, wars or civil strife etc..., **(Commonwealth, 2013)**.

2.1.4-Risk:

“Is the probability that loss will occur as the result of an adverse event, given the hazard and the vulnerability” (key words) Risk (R) can be determined as a product of hazard (H) and vulnerability (V). I.e. $R = H \times V$. Risk is a “measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of particular hazardous event and the losses each would cause.” The level of risk depends upon: Nature of the hazard, Vulnerability of the elements which are affected, Economic value of those elements. A community/locality is said to be at ‘risk’ when it is exposed to hazards and is likely to be adversely affected by its impact. Whenever we discuss ‘disaster management’ it is basically ‘disaster risk management’. Disaster risk management includes all measures which reduce disaster related losses of life, property or assets by either reducing the hazard or vulnerability of the elements at risk, (Commonwealth, 2013).

2.1.5-Vulnerability:

“Is the extent to which a community’s structure, services or environment is likely to be damaged or disrupted by the impact of a hazard? Vulnerability may be defined as "The extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area". Vulnerabilities can be categorized into physical and socio-economic vulnerability. **Physical Vulnerability:** It includes notions of who and what may be damaged or destroyed by natural hazard such as earthquakes or floods. It is based on the physical condition of people and elements at risk, such as buildings, infrastructure etc; and their Proximity, location and nature of the hazard.

It also relates to the technical capability of building and structures to resist the forces acting upon them during a hazard event, **Socio-economic Vulnerability:** The degree to which a population is affected by a hazard will not merely lie in the physical components of vulnerability but also on the socioeconomic conditions. The socio-economic condition of the people also determines the intensity of the impact. For example, people who are poor and living in the sea coast don't have the money to construct strong concrete houses. They are generally at risk and lose their shelters whenever there is strong wind or cyclone. Because of their poverty they too are not able to rebuild their houses, (**Commonwealth, 2013**). Safe areas and their houses are built with stronger materials. However, even when everything is destroyed they have the capacity to cope up with it. Hazards are always prevalent, but the hazard becomes a disaster only when there is greater vulnerability and less of capacity to cope with it. In other words the frequency or likelihood of a hazard and the vulnerability of the community increases the risk of being severely affected, (**Wisner, 2013**).

2.2- The Impact of Disasters on public health

Natural and manmade disasters have the direct and indirect impact on the health of the population, resulting in physical trauma, acute disease and emotional trauma along with increase in the morbidity and mortality associated with chronic diseases. A public health sector which conducts routine surveillance, good immunization coverage, maintains adequate environmental control is recommended to withstand the increased need following a disaster, while also expecting the health system to be prepared to resist the disaster, (**Shoaf, 2000**).

Indirectly impact (such as the high prevalence of infectious diseases and / or malnutrition rate). Often these indirect effects on health are linked to factors such as the quantity or quality of water is not appropriate, and the collapse of sanitation

systems, and the disruption of health services or diminishing the possibility to take advantage of them, and the deterioration of the food security situation. They can also insecurity and restrictions on movement, and the displacement of populations, and the deterioration of living conditions (overcrowding and lack of proper shelters) that poses a public health risk. It is likely that climate change, in turn; increase the likelihood of exposure to harm and danger, (Naji,1997).

Disasters affect all sectors of the region:

- They can cause an unexpected number of deaths, injuries or illnesses in the effect community, thereby exceeding the therapeutic capacity of the local health-care services and forcing authorities to reorganize the sector or to solicit outside help;
- They can destroy local health infrastructure such as hospitals, health-care centers, laboratories and the like, which will thus be unable to respond to the emergency.
- Disasters can also alter the provision of routine health-care services and preventative activities, with subsequent long-term consequences in terms of increased morbidity and mortality;
- Some disasters can have adverse effects on the environment and the population by increasing the potential risk of transmissible diseases and environmental dangers that increase morbidity and premature deaths and could lower the quality of life in the future;
- They can affect the mental health and the psychological and social behavior of the affected communities. Generalized panic, paralyzing trauma and antisocial behavior rarely occur after big disasters, and the survivors quickly recover from the initial shock. However, anxiety,

neurosis and depression can arise following both sudden and slowly forming emergencies;

- Some disasters can cause food shortages, with severe nutritional consequences such as protein energy malnutrition and specific deficiencies of micronutrients, e.g. vitamins; and
- They can cause broad movements of the population – whether spontaneous or organized– often to areas where the health-care services cannot meet the new situation, with a consequent increase in morbidity and mortality. The displacement of large population groups can also increase the risk of outbreaks of transmissible diseases in the displaced and host communities, where large groups of displaced persons may be housed in, and share, unhealthy living conditions with below-standard food, water, and sanitation resources and services.
- Disasters affecting industrial zones can have a major impact on the facilities, the environment, the surrounding community, and the country's economy. Increased risk of pollution, power shortages, service failures, and spread of infections and illnesses are amongst the immediate recognizable effects. These effects, and possibly other long-term effects, can last for a very long time after the initial incident. However, even though each emergency or disaster is unique, all emergencies share some similarities in their health-related effects. This means that the emergency management policy should adopt a consistent approach in addressing all types of emergencies, saving time and resources. Having said that all emergencies should be managed according to the needs; adopting common guidelines with different levels and details, **(FMOH, 2006)**.

2.3-Disaster management cycle

Disaster Risk Management includes sum total of all activities, programmes and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses. The three key stages of activities that are taken up within disaster risk management are:

Before a disaster (pre-disaster): Activities taken to reduce human and property losses caused by a potential hazard, for example carrying out awareness campaigns, strengthening the existing weak structures, preparation of the disaster management plans at household and community level etc. Such risk reduction measures taken under this stage are termed as mitigation and preparedness activities.

During a disaster (disaster occurrence): Initiatives taken to ensure that the needs and provisions of victims are met and suffering is minimized. Activities taken under this stage are called emergency response activities.

After a disaster (post-disaster): Initiatives taken in response to a disaster with a purpose to achieve early recovery and rehabilitation of affected communities, immediately after a disaster strikes. These are called as response and recovery activities, **(Balaka, 2006)**.

Disaster management (or emergency management) is the creation of plans through which communities reduce vulnerability to hazards and cope with disasters, **(MEMA, 2007)**.

Disaster management does not avert or eliminate the threats; instead, it focuses on creating plans to decrease the effect of disasters. Failure to create a plan could lead to human mortality, lost revenue, and damage to assets. Currently in the United States 60 percent of businesses do not have emergency management plans. Events covered by disaster management include acts of terrorism, industrial sabotage, fire, natural disasters (such as earthquakes, hurricanes, etc.), public

disorder, industrial accidents, and communication failures, **(Drabek and Thomas, 1991)**.

2.3.1- Mitigation

Mitigation embraces measures taken to reduce both the effect of the hazard and the vulnerable conditions to it in order to reduce the scale of a future disaster. Therefore mitigation activities can be focused on the hazard itself or the elements exposed to the threat. Examples of mitigation measures which are hazard specific include water management in drought prone areas, relocating people away from the hazard prone areas and by strengthening structures to reduce damage when a hazard occurs. In addition to these physical measures, mitigation should also aim at reducing the economic and social vulnerabilities of potential disasters. Disaster mitigation measures are those that eliminate or reduce the impacts and risks of hazards through proactive measures taken before an emergency or disaster occurs, **(Balaka, 2006)**.

One of the best known examples of investment in disaster mitigation is the Red River Floodway. The building of the Floodway was a joint provincial/federal undertaking to protect the City of Winnipeg and reduce the impact of flooding in the Red River Basin. It cost \$62.7 million to build in the 1960s. Since then, the floodway has been used over 20 times. Its use during the 1997 Red River Flood alone saved an estimated \$4.5 billion in costs from potential damage to the city, **(Simonovic and Slobodan, 2000)**. The Floodway was expanded in 2006 as a joint provincial/federal initiative.

2.3.2- Preparedness

This protective process embraces measures which enable governments, communities and individuals to respond rapidly to disaster situations to cope with them effectively. Preparedness includes the formulation of viable emergency plans,

the development of warning systems, the maintenance of inventories and the training of personnel. It may also embrace search and rescue measures as well as evacuation plans for areas that may be at risk from a recurring disaster. Preparedness therefore encompasses those measures taken before a disaster event which are aimed at minimizing loss of life, disruption of critical services, and damage when the disaster occurs, (**Balaka, 2006**).

Preparedness focuses on preparing equipment and procedures for use when a disaster occurs. This equipment and these procedures can be used to reduce vulnerability to disaster, to mitigate the impacts of a disaster or to respond more efficiently in an emergency. The Federal Emergency Management Agency (FEMA) has set out a basic four-stage vision of preparedness flowing from mitigation to preparedness to response to recovery and back to mitigation in a circular planning process. This circular, overlapping model has been modified by other agencies taught in emergency class and discussed in academic papers, (**Baird and Malcolm, 2010**). FEMA also operates a Building Science Branch that develops and produces multi-hazard mitigation guidance that focuses on creating disaster-resilient communities to reduce loss of life and property. FEMA advises citizens to prepare their homes with some emergency essentials in the case that the food distribution lines are interrupted. FEMA has subsequently prepared for this contingency by purchasing hundreds of thousands of freeze dried food emergency meals ready to eat (MRE's) to dispense to the communities where emergency shelter and evacuations are implemented. Emergency preparedness can be difficult to measure. CDC focuses on evaluating the effectiveness of its public health efforts through a variety of measurement and assessment programs.

2.3.3- Response phase:

Emergency response relies on one or more response plans. The proper execution of plans is typically managed by a command and control centre. A commander at the scene coordinates the activities of the units responding to the emergency. The on-scene commander and support staff gather and analyze data, make decisions, and monitor their implementation and consequences. The activities required to respond to an incident are often dangerous and must be carried out under time pressure. Activation of emergency plans is based upon assessment of the potential impacts of an accident and the courses of action needed to eliminate or at least mitigate this impact. These response plans can rarely be executed as expected, as the case of the Exxon Valdez accident showed, (**Harrald, 1992**). Flexible approaches to emergency management are therefore required. Any such approach must be able to deal with an uncertain and changing environment and allow for revision of planned courses of action. Moreover, the approach must be able to support emergency managers in improvising when no standard operating procedure can alleviate the catastrophe. Unanticipated events affecting planned activities may arise during response operations. Examples include traffic congestion delaying the arrival of the response team and bad weather preventing needed response equipment from arriving on-site. In such situations, the commander must be supported in assessing the potential impacts of these events and deciding whether to continue following planned courses of action or to pursue alternate activities in order to maintain the safety and efficiency of the operations. Performing these tasks requires that real-time monitoring and control of response activities, as well as of any external events that have the potential to affect these activities, be considered as integral parts of effective emergency response. The operational risk management (ORM) paradigm, (**Beroggi, 1998**). Takes into accounts the uncertain

nature of response activities. For example, fire trucks may be unavailable, weather conditions may change unexpectedly, or chemical dispersants may not work as planned. ORM also accounts for the fact that this uncertainty may change the risks associated with various courses of action. For example, a fire may overrun a barricade or the use of water could increase the threat of fire. Although ORM supports the emergency manager's decision making process, human cognitive limitations in operational environments must be considered as a constraint. Consequently, decision support in emergency management must always consider the human as an integral part of the decision making process. Technological and analytic support should be tailored to the human's capabilities and constraints, and not vice versa. In certain situations, no planned-for activities may be feasible, leading to the need to revise the plan. An unexpected event may evolve; so that implemented plans are no longer applicable. An unexpected event may be multi-faceted, requiring emergency response organisations (EROs) to combine many plans in unexpected ways, (**Scanlon.J, 1994**). In a response involving numerous organisations, allocation of resources to certain tasks may make those resources unavailable for other tasks. Finally, the resolution of unanticipated contingencies may not be immediately assignable to any particular organisation. In these circumstances, EROs must be prepared to improvise: that is, to rework their knowledge in a novel way in time to fit the requirements of the current situation. The need for skill in improvisation was emphasised for emergency management practitioners by, (**Kreps, 1991**). Klein stated that "The need for improvisation is a continual aspect of team decision making. There can be errors of rigidly adhering to someone else's plan as well as inappropriately departing from the plan (**Klein,1993**). Yet, as noted by Weick in his seminal study of the Mann Gulch fire, "What we do not expect under life-threatening pressure is creativity", (**Weick, 1993**). Indeed, there is considerable evidence to suggest that teams in decision

settings like emergency management enact strategies based on recognising characteristics of past problems in the current one, (Klein, 1993). A sobering conclusion of Weick's study of Mann Gulch is that, under certain conditions, teams may force their conception of the emergency to fit one they know how to address, (Weick, 1993).

2.3.4- Recovery:

The recovery phase starts after the immediate threat to human life has subsided. The immediate goal of the recovery phase is to bring the affected area back to normalcy as quickly as possible. During reconstruction it is recommended to consider the location or construction material of the property. The most extreme home confinement scenarios include war, famine and severe epidemics and may last a year or more. Then recovery will take place inside the home. Planners for these events usually buy bulk foods and appropriate storage and preparation equipment, and eat the food as part of normal life. A simple balanced diet can be constructed from vitamin pills, whole-meal wheat, beans, dried milk, corn, and cooking oil, (FEMA, 2013). One should add vegetables, fruits, spices and meats, both prepared and fresh-gardened, when possible. Professional emergency managers can focus on government and community preparedness, or private business preparedness. Training is provided by local, state, federal and private organizations and ranges from public information and media relations to high-level incident command and tactical skills. In the past, the field of emergency management has been populated mostly by people with a military or first responder background. Currently, the field has become more diverse, with many managers coming from a variety of backgrounds other than the military or first responder fields. Educational opportunities are increasing for those seeking

undergraduate and graduate degrees in emergency management or a related field. There are over 180 schools in the US with emergency management-related programs, but only one doctoral program specifically in emergency management, (Jaffin, Bob, 2008).

2.4-Operation of disaster response

2.4.1- Rapid assessment

- Establish the magnitude of the emergency
- Identify existing public health problems
- Assess environmental risk factors.
- Evaluate existing resources and logistics.
- Determine major priorities for action.
- Identify external resources needed
- Identify further information needs
- ❖ Disseminate findings widely

2.4.1.1- Factors affecting rapid assessment

- The size of disaster
- Geographical distribution of the population affected,
- The security situation,
- The conditions of access, transport and logistics, the human resources available and the methods used.

2.4.1.2- Methods for conducting needs assessment

To be Qualitative and Quantitative and include:

- The measures
- The surveys
- The maps
- The interview with VIP

2.4.1.3- Key Activities in Rapid Assessment

2.4.1.3.1- Planning the Mission

- Composition of the Health Assessment Team
- Collection of background Geopolitical Data
- Collection of background Health Data

2.4.1.3. 2- Field visit

- **Data:** Demography, Environment, Health data, Resource needs
- **Methods:**

- Inspection; direct observation;
- Interviews with agencies, the ministry of health and local authorities
- Collection of health data from medical facilities;
- Rapid estimation of population size by mapping, review of records and rapid surveys

2.4.1.3.3- Analysis

- Demographic pyramids
- Priority health interventions
- Identification of high-risk groups

2.4.1.3.4- Report writing

2.4.1.3.5- Dissemination

2.4.1.4- Composition of the Team

The Rapid Health Assessment team should consist of:

- Public health expert/ Epidemiologist,
- Nutritionist,
- Logistician/ Administrative officer,
- Water and sanitation/ Environmental health specialist.

* One member must be designated as team leader

2.4.1.5- Survey and Sampling Methods

Essential steps to be followed in any survey:

- Defining the aims clearly
- Selecting the site
- Defining the basic sampling unit
- Sample size
- The interview/questionnaire

2.4.1.6- Data to be collected

- ❖ Background health information (Health and Nutritional problems, vaccination coverage, health care infrastructure, health workers).
- ❖ Demography (Total population size, under 5 years, ethnic composition, Gender, average size of a family/household, high-risk groups):
- ❖ Mortality (Total deaths for given period, Deaths among those under 5 years, Major causes of death).
- ❖ Morbidity : (The number of cases of disease should include):
 - Diseases that cause substantial morbidity (i.e. Diarrhoea, Respiratory Infections and Malaria where prevalent);
 - Diseases that have the potential to cause Epidemics (i.e. Measles, Cholera, Meningitis and Haemorrhagic fevers).
- ❖ Health services and infrastructure:
 - Access
 - Facilities (Numbers, types of health facilities, Level of support, Level of damage, Number of beds, Availability of operating theatres, capacity of health facilities)
 - Health personnel
 - Drug and vaccine supplies

- (What is the different between accessibility and utilisation in term of health services?)

❖ Food

❖ Nutritional status: (Prevalence of acute malnutrition in children, micronutrient deficiencies, Feeding programmes; supplementary feeding programmes (SFP) and therapeutic feeding programmes (TFP))

❖ Water:

- Litters of water per person per day.
- Source and quality of water.
- Number and type of water points.
- Water storage facilities.
- Water purification methods available/in use.
- Length of time persons must wait for water.

❖ Sanitation:

- Current facilities for excreta disposal and population per latrine or toilet.
- Availability of soap.
- Presence of vectors (arthropods, mammals).

❖ Shelter and non-food items,

- Blankets, clothing and domestic utensils.
- Shelter.
- Livestock.

2.4.2- The supplies :

2.4.2.1- importance of Water supplies and sanitation and hygiene promotion

Water and sanitation are critical determinants for survival in the initial stages of a disaster. People affected by disasters are generally much more susceptible to illness and death from disease, which to a large extent are related to inadequate

sanitation, inadequate water supplies and inability to maintain good hygiene. The most significant of these diseases are diarrheal and infectious diseases transmitted by the faeco-oral route (Water- and excreta-related diseases and transmission mechanisms). Other water- and sanitation-related diseases include those carried by vectors associated with solid waste and water. The term ‘sanitation’, throughout the Sphere Handbook, refers to excreta disposal, vector control, solid waste disposal and drainage. The main objective of WASH programmers in disasters is to reduce the transmission of faeco-oral diseases and exposure to disease-bearing vectors through the promotion of:

- good hygiene practices
- the provision of safe drinking water
- the reduction of environmental health risks
- The conditions that allow people to live with good health, dignity, comfort and security.

Simply providing sufficient water and sanitation facilities will not, on its own, ensure their optimal use or impact on public health. In order to achieve the maximum benefit from a response, it is imperative that disaster-affected people have the necessary information, knowledge and understanding to prevent water- and sanitation-related diseases and to mobilize their involvement in the design and maintenance of those facilities. The use of communal water and sanitation facilities, for example in refugee or displaced situations, can increase women’s and girls’ vulnerability to sexual and other forms of gender-based violence. In order to minimize these risks, and to provide a better quality of response, it is important to ensure women’s participation in water supply and sanitation programmers. An equitable participation of women and men in planning, decision-making and local management will help to ensure that the entire affected population has safe and easy access to water supply and sanitation services, and that services are

appropriate. Better disaster response in public health is achieved through better preparedness. Such preparedness is the result of capacities, relationships and knowledge developed by governments, humanitarian agencies, local civil society organizations, communities and individuals to anticipate and respond effectively to the impact of likely, imminent hazards. It is based on an analysis of risks and is well linked to early warning systems. Preparedness includes contingency planning, stockpiling of equipment and supplies, emergency services and stand-by arrangements, personnel training and community-level planning training and drills, (sphere, 2011).

2.4.2.2- Hygiene promotion

Hygiene promotion is a planned, systematic approach to enable people to take action to prevent and/or mitigate water, sanitation and hygiene-related diseases. It can also provide a practical way to facilitate community participation, accountability and monitoring in WASH programs. Hygiene promotion should aim to draw on the affected population's knowledge, practices and resources, as well as on the current WASH evidence base to determine how public health can best be protected. Hygiene promotion involves ensuring that people make the best use of the water, sanitation and hygiene-enabling facilities and services provided and includes the effective operation and maintenance of the facilities. The three key factors are:

- ❖ a mutual sharing of information and knowledge
- ❖ the mobilization of affected communities
- ❖ The provision of essential materials and facilities.

Community mobilization is especially appropriate during disasters as the emphasis must be on encouraging people to take action to protect their health.

Promotional activities should include, where possible, interactive methods, rather than focusing exclusively on the mass dissemination of messages

➤ **Guidance notes**

❖ **Targeting priority hygiene risks and behaviors:**

The understanding gained through assessing hygiene risks, tasks and responsibilities of different groups should be used to plan and priorities assistance, so that the information flow between humanitarian actors and the affected population is appropriately targeted and misconceptions, where found, are addressed.

❖ **Reaching all sections of the population:**

In the early stages of a disaster, it may be necessary to rely on the mass media to ensure that as many people as possible receive important information about reducing health risks.

Different groups should be targeted with different information, education and communication materials through relevant communication channels, so that information reaches all members of the population. This is especially important for those who are non-literate, have communication difficulties and/or do not have access to radio or television. Popular media (drama, songs, street theatre, dance, etc.) might also be effective in this instance. Coordination with the education cluster will be important to determine the opportunities for carrying out hygiene activities in schools.

❖ **Interactive methods:** Participatory materials and methods that are culturally appropriate offer useful opportunities for affected people to plan and monitor their own hygiene improvements. It also gives them the opportunity to make suggestions or complaints about the program, where necessary.

The planning of hygiene promotion must be culturally appropriate. Hygiene promotion activities need to be carried out by facilitators who have the characteristics and skills to work with groups that might share beliefs and practices

different from their own (for example, in some cultures it is not acceptable for women to speak to unknown men).

- ❖ **Overburdening:** It is important to ensure that no one group (e.g. women) within the affected population is overburdened with the responsibility for hygiene promotion activities or the management of activities that promote hygiene. Benefits, such as training and employment opportunities, should be offered to women, men and marginalized groups.
- ❖ **Terms and conditions for community mobilizes:** The use of outreach workers or home visitors provides a potentially more interactive way to access large numbers of people, but these workers will need support to develop facilitation skills. As a rough guide in a camp scenario, there should be two hygiene promoters/community mobilizes per 1,000 members of the affected on a contract or on a voluntary basis, and in accordance with national legislation. Whether workers have paid or volunteer status must be discussed with the affected population, implementing organizations and across clusters to avoid creating tension and disrupting the long-term sustainability of systems already in place.
- ❖ **Motivating different groups to take action:** It is important to realize that health may not be the most important motivator for changes in behavior. The need for privacy, safety, convenience, observation of religious and cultural norms, social status and esteem may be stronger driving forces than the promise of better health. These triggering factors need to be taken into account when designing promotional activities and must be effectively incorporated into the design and siting of facilities in conjunction with the engineering team. The emphasis should not be solely on individual behavioral change but also on social mobilization and working with groups.

Guidance notes

- ❖ **Basic hygiene items:** A basic minimum hygiene items pack consists of water containers (buckets), bathing and laundry soaps, and menstrual hygiene materials.
- ✓ **List of basic hygiene items**
 - 10–20 liter capacity water containers for transportation One per household
 - 10–20 liter capacity water containers for storage One per household,
 - 250g bathing soap one per person per month
 - 200g laundry soap one per person per month

Acceptable material for menstrual hygiene, e.g. washable cotton cloth One per person
- ❖ **Coordination:** Discuss with the shelter cluster and the affected population whether additional non-food items, such as blankets, which are not included in the basic hygiene items, are required.
- ❖ **Timeliness of hygiene items distribution:** In order to ensure a timely distribution of hygiene items, it may be necessary to distribute some key generic items (soap, jerry cans, etc.) without the agreement of the affected population and come to an agreement concerning future distributions following Consultation.
- ❖ **Priority needs:** People may choose to sell the items provided if their priority needs are not appropriately met and so people’s livelihoods need to be considered when planning distributions.
- ❖ **Appropriateness:** Care should be taken to avoid specifying products that would not be used due to lack of familiarity or that could be misused (e.g. items that might be mistaken for food). Where culturally appropriate or preferred, washing powder can be specified instead of laundry soap.
- ❖ **Replacement:** Consideration should be given for consumables to be replaced where necessary.
- ❖ **Special needs:** Some people with specific needs (e.g. incontinence or severe diarrhea) may require increased quantities of personal hygiene items such as soap.

Persons with disabilities or those who are confined to bed may need additional items, such as bed pans. Some items may require adaptation for sanitary use (such as a stool with a hole or commode chair).

- ❖ **Menstrual hygiene:** Provision must be made for discreet laundering or disposal of menstrual hygiene materials.
- ❖ **Additional items:** Existing social and cultural practices may require access to additional personal hygiene items. Subject to availability, such items (per person per month) could include: **75ml/100g** toothpaste one toothbrush, **250ml** shampoo, **250ml** lotion for infants and children up to **2** years of age one disposable razor underwear for women and girls of menstrual age one hairbrush and/or comb nail clippers nappies (diapers) and potties (dependent on household need), (**sphere, 2011**).

2.4.2.3- Water supplies

Water is essential for life, health and human dignity. In extreme situations, there may not be sufficient water available to meet basic needs and in these cases supplying a survival level of safe drinking water is of critical importance. In most cases, the main health problems are caused by poor hygiene due to insufficient water and by the consumption of contaminated water.

All people have safe and equitable access to a sufficient quantity of water for drinking, cooking and personal and domestic hygiene. Public water points are sufficiently close to households to enable use of the minimum water requirement

- ❖ **Water sources selection:** The following factors should be considered in water source selection: availability, proximity and sustainability of sufficient quantity of water; whether treatment is needed; and its feasibility, including the existence of any social, political or legal factors concerning the source.

Generally, groundwater sources and/or gravity-flow supplies from springs are preferable, as they require less treatment and no pumping. In disasters, a combination of approaches and sources is often required in the initial phase.

All sources need to be regularly monitored to avoid over-exploitation.

- ❖ **Needs:** The quantities of water needed for domestic use is context based, and may vary according to the climate, the sanitation facilities available, people's habits, their religious and cultural practices, the food they cook, the clothes they wear, and so on. Water consumption generally increases the nearer the water source is to the dwelling. Where possible, **15** liters per person per day (l/p/d) can be exceeded to conform to local standards where that standard is higher.

✓ **Basic survival water needs**

- **Survival needs: water intake** (drinking and food) is (**2.5 – 3** liters) per day
Depends on the climate and individual physiology
- **Basic hygiene practices** is (**2–6** liters) per day Depends on social and cultural norms
- **Basic cooking needs** is (**3–6** liters) per day Depends on food type and social and cultural norms

Total basic water needs is (**7.5–15** liters) per day

- ❖ **Measurement:** Household surveys, observation and community discussion groups are more effective methods of collecting data on water use and consumption than the measurement of water pumped into the pipeline network or the operation of hand pumps.
- ❖ **Quantity/coverage:** In a disaster and until minimum standards for both water quantity and quality are met, the priority is to provide equitable access to an adequate quantity of water even if it is of intermediate quality. Disaster-affected people are significantly more vulnerable to disease; therefore, water access and quantity indicators should be reached even if they are higher than the norms of the

affected or host population. Particular attention should be paid to ensure the need for extra water for people with specific health conditions, such as HIV and AIDS, and to meet the water requirement for livestock and crops in drought situations.

❖ **Maximum numbers of people per water source:** The number of people per source depends on the yield and availability of water at each source. The approximate guidelines are:

- **250** people per tap based on a flow of **7.5** liters/minute
- **500** people per hand pump based on a flow of **17** liters/minute
- **400** people per single-user open well based on a flow of **12.5** liters/minute

These guidelines assume that the water point is accessible for approximately eight hours a day only and water supply is constant during that time.

If access is greater than this, people can collect more than the 15 liters/day minimum requirement. These targets must be used with caution, as reaching them does not necessarily guarantee a minimum quantity of water or equitable access.

❖ **Queuing time:** Excessive queuing times are indicators of insufficient water availability due to either an inadequate number of water points or inadequate yields at water sources. The potential negative results of excessive queuing times are reduced per capita water consumption, increased consumption from unprotected surface sources and reduced time for other essential survival tasks for those who collect water.

❖ **Access and equity:** Even if a sufficient quantity of water is available to meet minimum needs, additional measures are needed to ensure equitable access for all groups. Water points should be located in areas that are accessible to all, regardless of, for example, gender or ethnicity. Some hand pumps and water carrying containers may need to be designed or adapted for use by people living with HIV and AIDS, older people, persons with disabilities and children. In situations where

water is rationed or pumped at given times, this should be planned in consultation with the users including women beneficiaries, (sphere2011).

2.4.2.4- Excreta disposal

Safe disposal of human excreta creates the first barrier to excreta-related disease, helping to reduce disease transmission through direct and indirect routes. Safe excreta disposal is, therefore, a major priority and in most disaster situations should be addressed with as much speed and effort as the provision of a safe water supply. The provision of appropriate facilities for defecation is one of a number of emergency responses essential for people's dignity, safety, health and well-being.

- ❖ **Safe excreta disposal:** Safe excreta disposal aims to keep the environment free from uncontrolled and scattered human faeces. Immediately after a disaster and while an excreta disposal management plan is put in place, consider implementing an initial clean-up campaign, demarcating and cordoning off defecation areas, and siting and building communal toilets.

Based on context, a phased approach to solving the sanitation problem at hand is most effective. Involve all groups from the disaster-affected population in the implementation of safe excreta disposal activities. Where the affected population has not traditionally used toilets, it will be necessary to conduct a concerted hygiene promotion campaign to encourage safe excreta disposal and to create a demand for more toilets. In urban disasters where there could be damage to existing sewerage systems, assess the situation and consider installing portable toilets or use septic and/or containment tanks that can be regularly dislodged. Due consideration should be given to dislodging, handling, transportation and final disposal of the sludge.

- ❖ **Defecation areas:** In the initial phase and where land is available, mark off a defecation field and/or construct trench latrines. This will only work if the site is

correctly managed and maintained and the affected population understands the importance of using the facilities provided and where they are located.

- ❖ **Distance of defecation systems from water sources:** The distance of soak pits, trench latrines and/or toilets from water sources should be at least 30 meters and the bottom of the pits should be at least 1.5 meters above the groundwater table. These distances need to be increased for fissured rocks and limestone, or decreased for fine soils. In some disaster response, groundwater pollution may not be an immediate concern if it is not to be directly used for drinking. In flooded or high water table environments, it may be necessary to build elevated toilets or septic tanks to contain excreta and prevent it contaminating the environment. It is also imperative that drainage or spillage from septic tanks does not contaminate surface water and/or groundwater sources.

- ❖ **Containment of children's faeces:** Give particular attention to the disposal of children's faeces, as they are commonly more dangerous than those of adults (excreta-related infection among children is frequently higher and children may not have developed antibodies to infections). Parents and care givers should be provided with information about safe disposal of infants' faeces, laundering practices and the use of nappies (diapers), potties or scoops for effectively managing safe disposal

- **Guidance notes:**

- ❖ **Acceptable facilities:** Successful excreta disposal programmes depend on an understanding of people's varied needs and their participation. It may not be possible to make all toilets acceptable to all groups. Special toilets may need to be constructed for children, older people and persons with disabilities, e.g. toilets with seats or hand rails or provision of bed pans, potties or commodes. The type of sanitation facility adopted depends on the time of the intervention, the preferences

and cultural habits of the intended users the existing infrastructure, the availability of water (for flushing and water seals), the soil formation and the availability of construction materials.

✓ **Possible alternatives for safe excreta disposal (Safe excreta disposal type, Application remarks)**

- Demarcated defecation area (e.g. with sheeted-off segments) IS First phase: the first two to three days when a huge number of people need immediate facilities
- Trench latrines is First phase: up to two months
- Simple pit latrines Plan from the start through to long-term use Ventilated improved pit (VIP) latrines is Context-based for middle- to long-term response
- Ecological sanitation (Ecosan) with urine diversion is Context-based: in response to high water table and flood situations, right from the start or middle to long term
- Septic tanks is Middle- to long-term phase
- ❖ **Public toilets:** In public places, toilets are provided with established systems for proper and regular cleaning and maintenance. Disaggregated population data are used to plan the number of women's cubicles to men's using an approximate ration of 3:1.
- ❖ **Family toilets:** Family toilets are the preferred option where possible. One toilet for a maximum of 20 people should be the target. Where there are no existing toilets, it is possible to start with one for 50 people and lowering the number of users to 20 as soon as possible. In some circumstances, space limitations make it impossible to meet these figures. In such cases, advocate strongly for extra space. However, it should be remembered that the primary aim is to provide and maintain an environment free from human faeces.
- ❖ **Shared facilities:** Households should be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Generally, clean

latrines are more likely to be frequently used. Efforts should be made to provide people living with chronic illnesses such as HIV and AIDS with easy access to a toilet as they frequently suffer from chronic diarrhea and reduced mobility.

- ❖ **Safe facilities:** Inappropriate siting of toilets may make women and girls more vulnerable to attack, especially during the night. Ensure that women and girls feel and are safe when using the toilets provided. Where possible, communal toilets should be provided with lighting, or households provided with torches. The input of the community should be sought with regard to ways of enhancing the safety of users (see Protection Principles 1–2 on pages 33–36).
- ❖ **Use of local building material and tools:** The use of locally available material for construction of latrines is highly recommended. It enhances the participation of the affected population to use and maintain the facilities. Providing the population with construction tools will also support this aim.
- ❖ **Water and anal cleansing material:** Water should be provided for toilets with water flush and/or hygienic seal mechanisms. For a conventional pit toilet, it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and their safe disposal.
- ❖ **Hand washing:** Users should have the means to wash their hands with soap or an alternative (such as ash) after using toilets, after cleaning the bottom of a child who has been defecating, and before eating and preparing food. There should be a constant source of water near the toilet for this purpose.
- ❖ **Menstruation:** Women and girls of menstruating age, including schoolgirls, should have access to suitable materials for the absorption and disposal of menstrual blood. Women and girls should be consulted on what is culturally appropriate.

- ❖ **Dislodging:** When appropriate, and depending on the need, dislodging of toilets/septic tanks and excreta containers, including siting of final sewage disposal point, needs to be considered right from the start.
- ❖ **Toilets in difficult environments:** In flood or urban disasters, the provision of appropriate excreta disposal facilities is usually difficult. In such situations, various human waste containment mechanisms, such as raised toilets, urine diversion toilets, sewage containment tanks and the use of temporary disposable plastic bags with appropriate collection and disposal systems, should be considered. These different approaches need to be supported by hygiene promotion activities, (**sphere project, 2011**).
- ❖ **2.4.2.5- Vector control**

A vector is a disease-carrying agent and vector-borne diseases are a major cause of sickness and death in many disaster situations. Mosquitoes are the vector responsible for malaria transmission, which is one of the leading causes of morbidity and mortality. Mosquitoes also transmit other diseases, such as yellow fever, dengue and hemorrhagic fever. Non-biting or synanthropic flies, such as the house fly, the blow fly and the flesh fly, play an important role in the transmission of diarrheal disease. Biting flies, bedbugs and fleas are a painful nuisance and in some cases transmit significant diseases such as murine typhus, scabies and plague. Ticks transmit relapsing fever, while human body lice transmit typhus and relapsing fever. Rats and mice can transmit diseases, such as leptospirosis and salmonellosis, and can be hosts for other vectors, e.g. fleas, which may transmit Lassa fever, plague and other infections. Vector-borne diseases can be controlled through a variety of initiatives, including appropriate site selection and provision of shelter, water supply, excreta disposal, solid waste management and drainage, provision of health services (including community mobilization and health promotion), use of chemical controls, family and individual protection, and

effective protection of food stores. The nature of vector-borne disease is often complex and addressing vector-related problems may demand specialist attention. However, there is often much that can be done to help prevent the spread of such diseases with simple and effective measures, once the disease, its vector and their interaction with the population have been identified, (**sphere project, 2011**).

2.4.2.6- Solid waste management

Solid waste management is the process of handling and disposal of organic and hazardous solid waste which, if unattended appropriately, can pose public health risks to the affected population and can have a negative impact on the environment. Such risks can arise from the breeding of flies and rodents that thrive on solid waste, and the pollution of surface- and groundwater sources due to leachate from mixed household and clinical or industrial waste. Uncollected and accumulating solid waste and the debris left after a natural disaster may also create an ugly and depressing environment, which might help discourage efforts to improve other aspects of environmental health. Solid waste often blocks drainage channels and leads to an increased risk of flooding, resulting in environmental health problems associated with stagnant and polluted surface water. Waste pickers, who gain a small income from collecting recyclable materials from waste dumps, may also be at risk of infectious disease from hospital waste mixed with household waste, (**sphere project, 2011**).

2.4.2.7- Drainage

Surface water in or near settlements may come from household and water point wastewater, leaking toilets and sewers, rainwater or rising floodwater. The main health risks associated with surface water are contamination of water supplies and the living environment, damage to toilets and dwellings, vector breeding, and drowning. Rainwater and rising floodwaters can worsen the drainage situation in a settlement and further increase the risk of contamination. A proper drainage plan,

addressing storm water drainage through site planning and wastewater disposal using small-scale, on-site drainage, should be implemented to reduce potential health risks to the disaster-affected population. This section addresses small-scale drainage problems and activities. Large-scale drainage is generally determined by site selection and development, (**sphere project, 2011**).

2.5-Previous studies

2.5.1- Study of (Acheson 1993); and its title: The relief–development transition following drought and floods in the Sudan:

Aims to identify Operations by the Sudanese Red Crescent Society (SRCS) following drought in 1984–1985 and the flooding of Khartoum in 1988, the study revealed that these operations are a good example of planning a smooth transition from emergency response through relief and recovery to normal development activities. Many people fleeing drought and war settled themselves spontaneously around Khartoum beginning in 1984–1985. In this period, at least 120000 refugees arrived from drought-affected rural areas, adding nearly 10% to Greater Khartoum’s 1983 population of 1.5 million. At first, 60 000 people were supplied by tanker trucks with water on a daily basis. These people were later affected by floods in 1988; further complicating attempts to satisfy their needs. A second phase called or the rehabilitation of existing boreholes and the construction of new public water points. Finally, commercial well-drilling contractors were engaged to increase the capacity of Khartoum’s urban water system while fitting in with the long-term water resource development plans of Greater Khartoum, using equipment that was within the Government’s ability to maintain and to operate. IFRC provided general management and technical support and coordinated input from member societies, while the SRCS supervised operations on the ground in liaison with the Government.

2.5.2- Study of (**Nitesh and et al, 2009**) and it is title Challenges and obstacles in sharing and coordinating information during multi-agency disaster response:

Although various scholars have researched issues regarding disaster management, few have studied the sharing and coordinating of information during disasters. Not much empirical data is available in this field and there is sparse insight into the factors that may impede or facilitate information sharing and coordination among stakeholders. In this paper, we provide an overview of the relevant obstacles and challenges by examining existing literature and then investigating a series of multi-agency disaster management exercises, using observations and a survey. Although all the people who took part in our study agree that sharing information is important, for the success of their own organization as well as the exercise as a whole, the extent to which information is actually being shared among organizations is often limited by a number of factors that can be attributed to the community, agency and individual level. We found that relief workers are often more concerned with receiving information from others than with providing information to others who may benefit. Incentives for sharing information, understanding each other's work-processes and the usability of information systems have shown positive effects on information sharing and coordination. The findings of our study have been formulated using six grounded propositions, which can be used by system designers and policy-makers upon validation in further research. We also provide directions for future research.

2.5.3- Study of (**Thomas Mignone, 2003**), and it is title; Public Health Response Actions and the Use of Emergency Operations Centers:

This study found that the Public health departments are the backbone of the public health system, but if they work alone they cannot be effective. In order to be successful in non-emergency and especially emergency situations, they must build and maintain working relationships outside of the classic public health arena.

These associations should include law enforcement, fire, emergency medical services, emergency management, environmental protection departments, and the medical community. Successful collaboration and coordination between these entities during any emergency situation is critical to a successful reduction in morbidity and mortality.

2.5.4- Study of (**Djamel Berkoune and etc, 2012**), and its title; Transportation in disaster response operations:

The aims from this study; define and formulate a practical transportation problem often encountered by crisis managers in emergency situations. This study found that disasters are extraordinary situations that require significant logistical deployment to transport equipment and humanitarian goods in order to help and provide relief to victims. An efficient response helps to reduce the social, economic and environmental impacts. The researcher defined and formulated a practical transportation problem often encountered by crisis managers in emergency situations. Since optimal solutions to such a formulation may be achieved only for very small-size instances, we developed an efficient genetic algorithm to deal with realistic situations. This algorithm produces near optimal solutions in relatively short computation times and is fast enough to be used interactively in a decision-support system, providing high-quality transportation plans to emergency managers.

2.5.5- Study of (**kanchana, 2007**) and its title; A multimedia communication system for collaborative emergency response operations in disaster-affected areas:

This study describes an emergency communication network platform based on a hybrid combination of Mobile Ad Hoc Networking (MANET) and a satellite IP network operating with conventional terrestrial internet. It is designed for collaborative simultaneous emergency response operations deployed in a number

of disaster-affected areas. The architecture of the network, called DUMBONET, and our emergency response applications are described. Experience from a real-life experimental test-bed is discussed. Our implementation involves multidisciplinary research areas such as MANET routing, peer to peer computing, sensor networks and face recognition. The article also identifies potential research challenges that we intend to investigate to further enhance the capabilities of our system.

2.5.6- Study of (**Maon and et al ,2009**), and it is title Developing Supply Chains in Disaster Relief Operations through Cross-sector Socially Oriented Collaborations:

This study provides insights into corporate achievements in supply chain management (SCM) and logistics management and details how they might help disaster agencies. The authors highlight and identify current practices, particularities, and challenges in disaster relief supply chains. The Findings from this study; theoretical, dual-cycle model that focuses on the key missions of disaster relief agencies: first, prevention and planning and, second, response and recovery. Three major contributions are offered: (1) a concise representation of current practices and particularities of disaster relief supply chains compared with commercial SCM; (2) challenges and barriers to the development of more efficient SCM practices, classified into learning, strategizing, and coordinating and measurement issues; and (3) a simple, functional model for understanding how collaborations between corporations and disaster relief agencies might help relief agencies meet SCM challenges.

2.5.7- Study of (**Reina, D. G and etc, 2017**) and it is title An evolutionary computation approach for optimizing connectivity in disaster response scenarios:

This article presents an evolutionary computation approach for increasing connectivity in disaster scenarios. Connectivity is considered to be of critical

importance in disaster scenarios due to constrained and mobile conditions. Herein, we propose the deployment of a number of auxiliary static nodes which their purpose is to increase the reach ability of broadcast emergency packets among the nodes which are participating in the disaster scenario. These nodes represent people and vehicles acting in rescue operations. The main goal is to find the optimum positions for the auxiliary nodes, reinforcing the communications in points where certain lack of connectivity is found. These points will depend on the movements of the rescue teams which are influenced by tactical reasons. Due to the complexity of the problem and the number of parameters to be considered, a genetic algorithm combined with the network simulator NS-2 is proposed to find the optimum positions of the auxiliary nodes. Specifically, NS-2 is used to model the communication layers and provide the fitness function guiding the genetic search. The proposed approach has been tested using the disaster mobility model included in the motion generator Bonn Motion. The simulation results that have been obtained demonstrate the feasibility of the proposed approach and illustrate its applicability in other scenarios where certain lack of connectivity is evident.

2.5.8- Study of (Nezih Altay, 2006) and its title; Disaster operations management:

Disasters are large intractable problems that test the ability of communities and nations to effectively protect their populations and infrastructure, to reduce both human and property loss, and to rapidly recover. The seeming randomness of impacts and problems and uniqueness of incidents demand dynamic, real-time, effective and cost efficient solutions, thus making the topic very suitable for OR/MS research. While social sciences and humanities literatures enjoy an abundance of articles on disaster management, the OR/MS community is yet to produce a critical mass. In this paper, we survey the literature to identify potential research directions in disaster operations, discuss relevant issues, and provide a starting point for interested researchers.

2.5.9- Study of (**Louise K, 2008**) and it is title; Coordination in Rapidly Evolving Disaster Response Systems:

Assessing the changing dynamic between the demand that is placed on a community by cumulative exposure to hazards and the capacity of the community to mitigate or respond to that risk represents a central problem in estimating the community's resilience to disaster. The authors present an initial effort to simulate the dynamic between increasing demand and decreasing capacity in an actual disaster response system to determine the fragility of the system, or the point at which the system fails. The results show that access to core information enhances efficiency of response actions and increases coordination throughout the network of responding organizations.

2.5.10- Study of (**David Mendonça, 2001**) and it is title; Decision support for improvisation during emergency response operations:

Emergency response organizations are faced with complex, unpredictable events with the risk of catastrophic losses. To assist emergency response organizations in responding to these events, new models must be developed and the traditional command and control structure of decision making must be revised to accommodate greater flexibility and creativity by teams. In this paper we propose the concept of decision support for improvisation in emergency management. The concept is based on the paradigm of operational risk management and is motivated by the observation that emergency response organizations must be prepared to improvise during response activities. The process of emergency response in light of this new concept is first discussed and opportunities for supporting the process identified. We conclude with a review of a project at the Port of Rotterdam, where we are currently assessing this new decision making approach for emergency management.

2.5.11- Study of (**Duane M. Smith, 2010**) and its title; A study of command and control of multi-agency disaster response operation.

Large-scale disaster response operations are complex events that involve multiple jurisdictions and multiple agencies in preparedness, response, and recovery efforts. In the aftermath of the attacks of September 11, 2001, the United States sought to develop a national model for managing disaster response operations. The result of those efforts was the creation of the National Incident Management System (NIMS) in 2004. In 2005, the Gulf Coast of the United States experienced Hurricane Katrina. This disaster provided the first real-world opportunity to employ NIMS and assess its ability in providing an effective framework for response and recovery operations. Post-event analysis revealed that few saw the response and recovery efforts as effective; subsequently, NIMS was revised in 2008. This study focused on the experiences of past incident commanders to gather a better understanding of the phenomenon of command and control of large-scale multi-agency disaster response operations. This phenomenological study identified seven themes and their interdependencies, seen by past leaders of disaster response operations as being key factors in establishing effective command and control of large-scale disaster response operations. This knowledge serves to inform current disaster response operations under NIMS and provides insights of potential areas requiring future revisions.

2.5.12- Study of (**Lee, Ghosh and Ettl, 2009**) and its title simulating distribution of emergency relief supplies for disaster response operation:

In the event of disasters such as hurricanes, earthquakes and terrorism, emergency relief supplies need be distributed to disaster victims in timely manner to protect the health and lives of the victims. We develop a modeling framework for disaster response where the supply chain of relief supplies and distribution operations are simulated, and analytics for the optimal transportation of relief

supplies to various POD (Points of Distribution) are tested. Our simulation model of disaster response includes modeling the supply chain of relief supplies, distribution operations at PODs, dynamics of demand, and progression of disaster. Our analytics optimize the dispatch of relief supplies to PODs and cross-leveling among PODs. Their effectiveness is estimated by the simulation model. The model can evaluate a wide range of disaster scenarios, assess existing disaster response plans and policies, and identify better approaches for government agencies and first responders to prepare for and respond to disasters.

2.5.13- Study of (Wei,Yi,. Linet Ozdamar, 2007) and its title; A dynamic logistics coordination model for evacuation and support in disaster response activities:

This paper describes an integrated location-distribution model for coordinating logistics support and evacuation operations in disaster response activities. Logistics planning in emergencies involves dispatching commodities (e.g., medical materials and personnel, specialized rescue equipment and rescue teams, food, etc.) to distribution centers in affected areas and evacuation and transfer of wounded people to emergency units. During the initial response time it is also necessary to set up temporary emergency centers and shelters in affected areas to speed up medical care for less heavily wounded survivors. In risk mitigation studies for natural disasters, possible sites where these units can be situated are specified according to risk based urban structural analysis. Logistics coordination in disasters involves the selection of sites that result in maximum coverage of medical need in affected areas. Another important issue that arises in such emergencies is that medical personnel who are on duty in nearby hospitals have to be re-shuffled to serve both temporary and permanent emergency units. Thus, an optimal medical personnel allocation must be determined among these units. The proposed model

also considers this issue. The proposed model is a mixed integer multi-commodity network flow model that treats vehicles as integer commodity flows rather than binary variables. This results in a more compact formulation whose output is processed to extract a detailed vehicle route and load instruction sheet. Post processing is achieved by a simple routing algorithm that is pseudo-polynomial in the number of vehicles utilized, followed by the solution of a linear system of equations defined in a very restricted domain. The behavior and solvability of the model is illustrated on an earthquake scenario based on Istanbul's risk grid as well as larger size hypothetical disaster scenarios.

Many parts of Sudan are still affected annually by such incidences of floods and flash-floods during the rainy season. This adds to the burden of endemic diseases such as malaria and is sometimes the source of epidemics of other diseases (**FMH, 2006**). In 1984 Sudan was exposed to a drought disaster including the River Nile State, including the Matamma. This disaster had its aftermath, with regard to the process of migration to cities. This irregular migration has led to housing and settlement in areas where floods have been going on in sporadic periods, including 1988, 2013 and 2015, where floods and floods have resulted in a large number of material and human losses that require cooperation from outside the state. The response to these disasters is through the formation of the local emergency team, which consists of civil defense, the General Directorate of Health and Population, the General Department of Engineering and the Department of Social Affairs represented by civil society organizations. With regard to relief operations, there is no strategic stock of food or safe sources of water or transport of affected people; only coordination with the Bureau of Intelligence to provide the necessary needs or waiting for support from inside or outside the state, (Abdel Rahim, 2017).

CHAPTER THREE

3- Material and methods:

3.1 – Study design:

This cross sectional descriptive study-community based conducted in Almatama locality in the period of time (2015 - 2017). This study evaluates operations response of disaster and emergency.

3.2 - The study area:

The study area (ALmatama locality) it is between latitude 16 south and 17 north and longitude 32 west 33.4 east, Bordered to North Al damer locality, and Shendi locality east, and south the Khartoum State, and to the west the Northern State. The three units agnostic and includes unit northern countryside and its Taibh alkhawad , unitAlmatama and its Al matama City and unit the southern countryside and its Wad Hamid . And the social component are: 114 Base schools, 23 Secondary schools, one University, three Colleges ,one Factories, five Hospitals , 112 Mosques, 91 House of believers , 21 Markets , seven Terracing , 168 Drinking water sources. And Agricultural projects: It includes agricultural projects: (big sial, Alkamir, Klee, Matama , madiny), (**Almatamma locality, 2015**).

3.3 - Study population:

The total population in Almatamma locality is 151889 in addition to health staff (50 members) in health administration – Almatamma, (**Almatamma locality, 2015**).

3.4 – Sampling and sample technique:

3.4.1- Sample size:

Sample size determined by this Equation:

$$n = (z^2) pq \div d^2$$

Where:

n = sample size

z = the value in normal curve corresponding to level of confidence 95% = 1.96.

p = expected prevalence = 50%

q = not expected prevalence = 50%

d = margin of error = 0.05

So: $n = (1.96)^2 (0.5 \times 0.5) \div (0.05)^2 = 384$.

The researcher distributed 450 forms because there are some forms are not valid for entry.

400 sample from population, 50 samples from the health staff.

3.4.2- Type of sample:

Multi stages Cluster random sample was taken.

- **Stage one:** ALmatama locality was classified to three administrative units (clusters). And the clusters were: Unit (1) northern countryside , Unit (2) Almatama and Unit (3) southern countryside.

- **Stage tow:** any unit (cluster) was classified to villages (small clusters): Cluster number (1) include 24 villages (clusters)

Cluster number (2) include 28 villages (clusters)

Cluster number (3) include 28 villages (clusters)

The mean of villages in one unit= $(24+28+28)/3 = 27$ villages (clusters) in the unit.

The selected clusters= sample size/mean = $450/27 = 17$ villages (clusters).

From any unit was taken 5 villages by systematic random sample. Where the range among selected villages equal: In unit (1) = $24/5 = 5$ villages, in unit (2) = $28/5 = 6$ villages, in unit (3) = $28/5 = 6$ villages

- **Stage three:** Researcher sited the villages in three lists:

List one (unit (1)) numbered was flowing (v1, v2... v24)

List tow (unit (2)) numbered was flowing (v1, v2... v28)

List three (unit (3)) numbered was flowing (v1, v2... v28)

Then used Simple random sample to select first sample by randomize table:

In unit (1) starting from village No (9) ... the villages it are :(v9, v14, v19, v24,v5)

In unit (2) starting from village No (3)... the villages it are: (v18,v23,v28,v5,v10,v15).

In unit (3) starting from village No (18)... the villages it are: (v3,v8,v13,v18,v23,v28) .

3.5- Methods of data collection:

I was used the interview and questionnaire as the most appropriate means of scientific research that are consistent with the requirements of the study and achieve their goals by getting the information from which to operations of disaster and emergence response.

3.5.1- interviewing with health authority and community leaders:

Interview was used to collect data from health workers in administrative units in Almatama locality. Where include (personnel information , participation in disaster response , the training received in disaster management , the personnel equipment that related with disaster response team , in addition to general information were related with study.

3.5.2- questionnaire to population:

In line with the conditions of this study and the nature of the data to be collected and used and the type of study objectives it was reached that the most appropriate tool for the study is the questionnaire. It has been relying on the preparation of the questionnaire on a variety of sources, including:

- Relevant references
- Some studies on topics related to the study
- Supervisor of the study
- Opinions of professors who presented them with the questionnaire in the initial content

Where the researcher formulated questionnaire was initially presented to the scientific supervisor in addition to six other professors to find out their views on the questionnaire and evaluation to face validity. Also was use alpha cronbach to know stability of study tool... After that the questionnaire was drafted in its final form after making the amendments recommended by the professors to add, modify and delete. Where the questionnaire consists of three parts:

* **The first part;** contains a functional and personal data of members of the sample (age, profession, educational qualification, monthly income, citizenship, residence Duration region).

* **The second part;** contains the region's vulnerability to disasters and emergencies and the role of the citizen to participate in disaster response.

* **Part three;** study respect to the axes has been using the closed form that identifies potential answer each of the questions.

The questions were:

- . What are the procedures and methods of rapid assessment for disaster?
- . Degree of availability the personal equipment and supplies those are associated with the response team.
- . What are the procedures used in the process of intervention after the disaster?
- . What are the obstacles with related disaster response operations?

3.5.3- records and reports:

Also was analyzed to determine the study area exposed to disaster.

3.6- data analysis:

The data collected was analyze by used statistic packages for social Sciences program (SPSS version 16) ,to fine the correlation between deferent variable .

3.7- Ethical clearance:

Ethical approval for the study was obtained prior to data collection from the board of Faculty of Post Graduate Studies and Scientific Research in Shendi University, Verbal consent was taken from community leaders and all those participated in the study.

CHAPTER FOUR

4- Results

4.1- The result related with personnel variables

4.1.1- Figure (1): The Distribution members of study sample according to the age variable (n= 440)

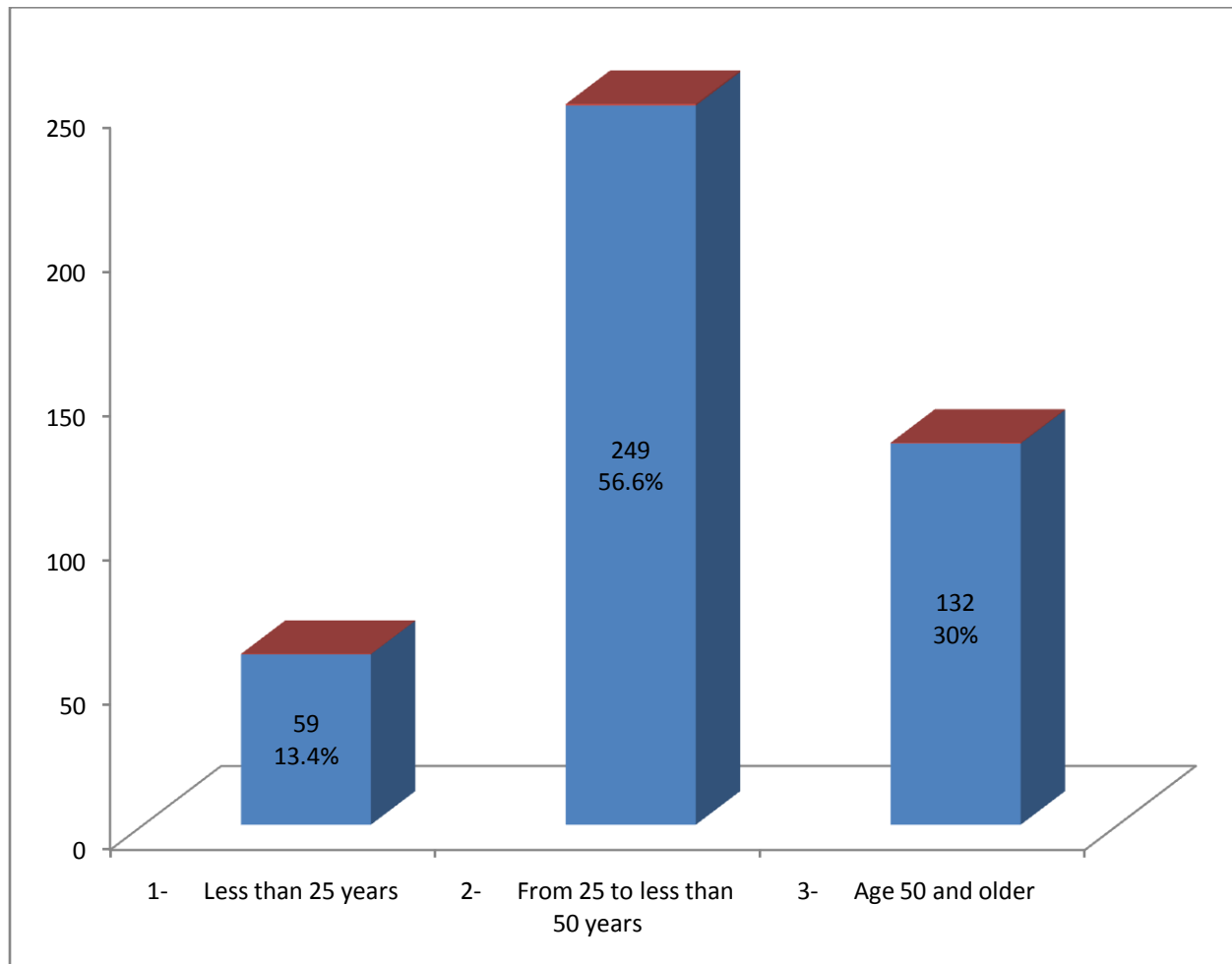


Figure (1): Shows the Distribution of study sample according to the age variable where shows that (56.6%), ages 25 - less than 50 years. While it was found that (30%) ages over 50 years, while it was found that (13.4%) ages less than 25 years.

4.1.2- Figure (2): The Distribution members of study sample according to the Educational level variable (n= 440)

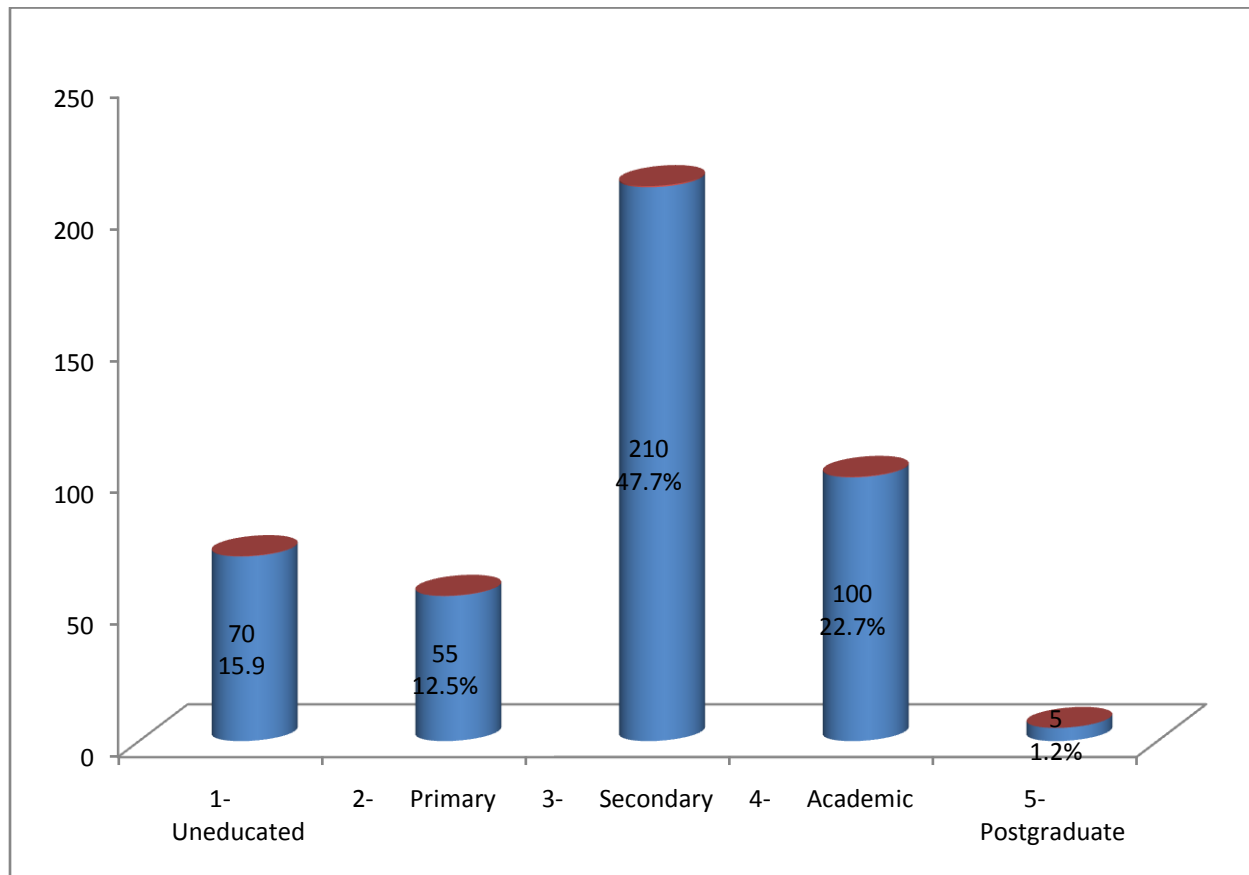


Figure (2): Shows the Distribution of study sample according to the variable level of education, which shows that (47.7%) a secondary level of education, and (22.7 %) academic level of education, while (15.9%) did not receive education, and (12.5%) primary level of education, and (1.2%) are only received education postgraduate.

4.1.3- Figure (3): the Distribution members of study sample according to the Monthly income variable (n= 440)

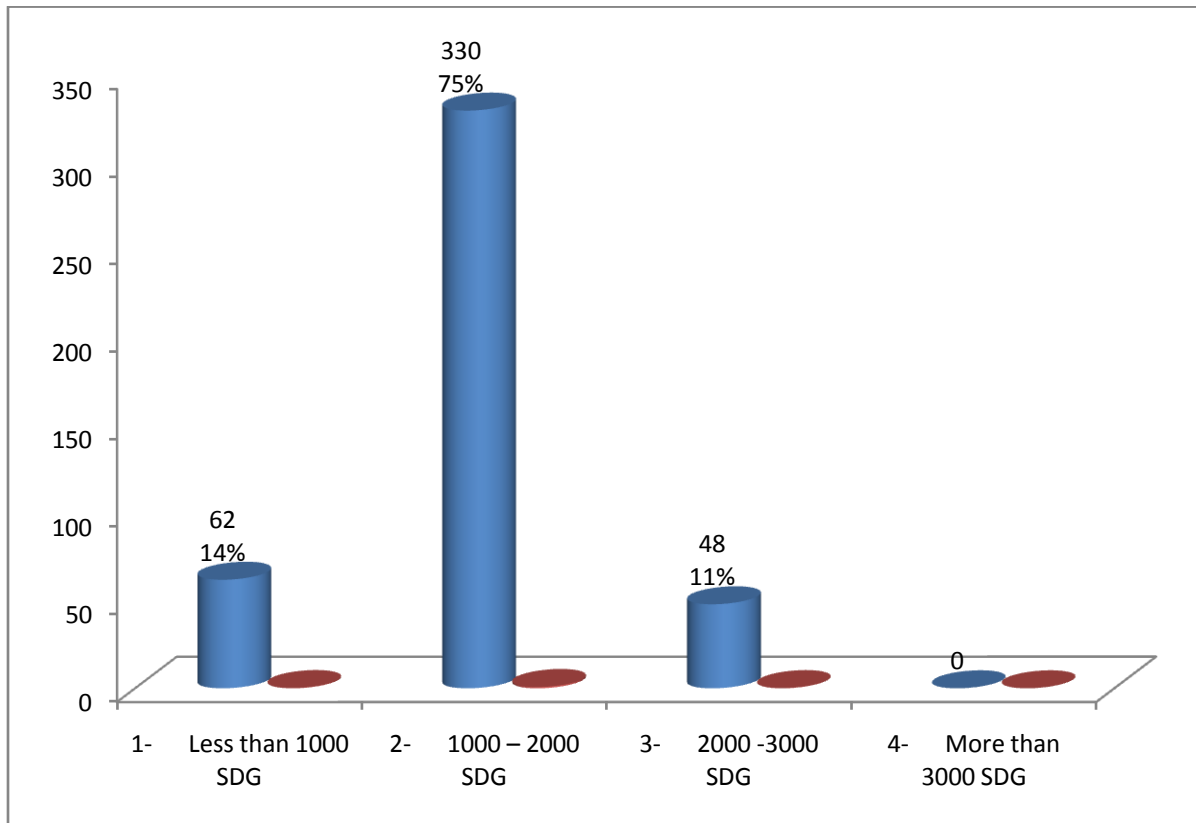


Figure (3): Shows the Distribution of study sample according to a variable monthly income which shows that (75%) monthly income from 1000 to 2000 pounds, and (14%) a monthly income of less than 1,000 pounds, while (11%) monthly income 2000-3000 pounds, and there is no member of the study sample monthly income above 3,000 pounds.

4.1.4- Table (1): The Distribution members of study sample according to the Occupation variable (n= 440)

The Occupation	Frequency	Ratio
1- Employee	258	58.6%
2- Employee in public health administration	50	11.4%
3- free business	86	19.5%
4- Worker	46	10.5%
The total	440	100%

Table (1): shows the Distribution of the study sample according to the Occupation variable, where found to be ((58.6%) they Employee, who are most of the sample group. While it was found that (19.5%) of their profession free business, while it was found that (11.4%) work in the public health, and (10.5%) they workers, while there were not a housewife among respondents.

4.1.5- Table (2); The Distribution members of study sample according to types of disasters that have occurred in the study area (n= 440)

types of disasters that have occurred in the study area	Frequency	Ratio
1- Floods	440	100%
The total	440	100%

Table (2); Shows the distribution of the study sample, according to the variable of disasters that have occurred in the study area where turns out that all the respondents (100%) assert that the disasters that have occurred in the region is the flood disasters.

4.1.6- Table (3): the Distribution members of study sample according to the Participation in the process of responding to disasters (n= 440)

Participation in the process of responding to disasters	Frequency	Ratio
1- Yes	412	93.6%
2- No	28	6.4%
The total	440	100%

Table (3): Shows the distribution of the sample according to the variable involved in disaster response operations, as can be seen that the (93.6%) they participated in disaster response operations, while (6.4%) did not participate in disaster response operations.

4.1.7- Figure (4); The Distribution members of study sample according to the Receive training in disaster response (n= 412)

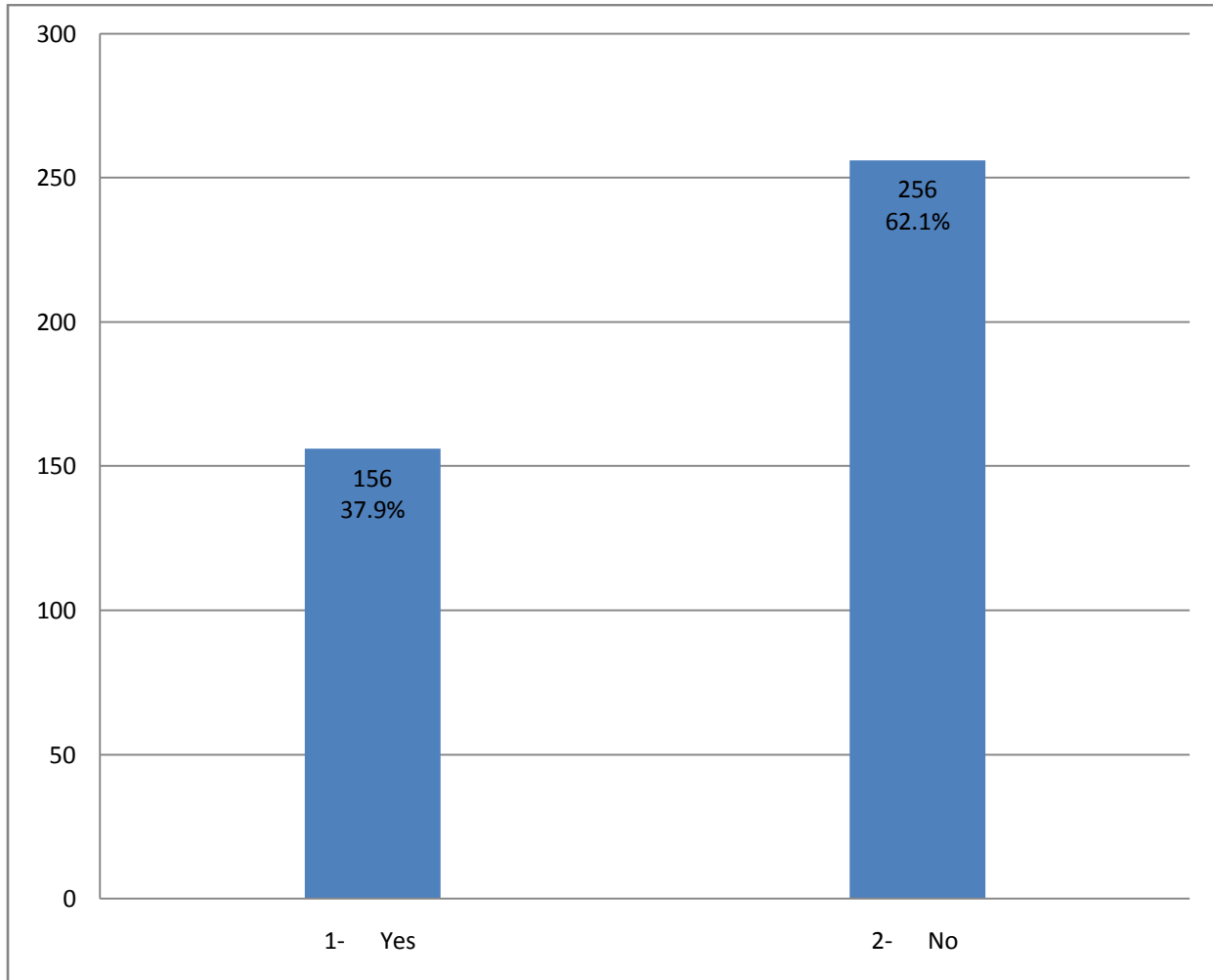


Figure (4); Shows the Distribution members of study sample according to the Receive training in disaster response, where it shows that (62.1%) of those who participated in disaster response had not received training in disaster management operations, while the (37.9%) have received training in the disaster management.

4.1.8- Table (4); The Distribution members of study sample according to the number of times where participated in disaster response process (n= 440)

number of times where participated in disaster response process	Frequency	Ratio
1- Once – twice	255	61.9%
2- Three – five times	147	35.7%
3- More than five times	10	2.4%
The total	412	100%

Table (4); shows the distribution of the study sample according to a variable number of times they participated in disaster response operations, as can be seen that (61.9%) participated once or twice, and (35.7%) of the involved three to five times, while (2.4%) participated more than five times.

4.1.9- Table (5): The Distribution members of study sample according to the Activity they are doing in response process (n= 412)

Activities they are doing in response process	Frequency	Ratio
1- Rescue	127	30.8%
2- Shelter	90	21.8%
3- Transportation	85	20.6%
4- Relief	32	7.8%
5- Water supply	10	2.4%
6- Environmental sanitation	68	16.6%
The total	412	100%

Table (5): Shows the Distribution of Study sample according to the activities they participants in disaster management, were shows that (30.8%) participated in the process the rescue, and (21.8%) participated in the process shelter, while (20.6%) participated in the process the transfer of affected, and(16.6%) participated in the process sanitation, and (7.8%) participated in the process of relief, and (24%) were involved in the water supply process.

4.1.10- Table (6): The Distribution members of study sample according to the Afield of public health (n= 412)

Are you in A field of public health?	Frequency	Ratio
1- Yes	50	12.1%
2- No	362	87.9%
The total	412	100%

Table (6): Shows the distribution of the study sample, according to the variable work in the field of public health, which shows that (12.1%) work in the field of public health, while (87.9%) do not work in the field of public health.

4.1.11- Table (7): The Distribution members of study sample according to the job description (n= 50)

job description	Frequency	Ratio
1- Health worker	5	10%
2- Observed	7	14%
3- Officer	30	60%
4- Inspector	8	16%
Total	50	100%

Table (7): Thaws the distribution of the study sample, according to the variable job description in the Department of Health, where (60%) of the total study sample health officers and is most of the sample group. While it was found that (16%) health inspectors, while it was found that (14%) they health observers, and (10%) they health workers).

4.1.12-Table (8): The Distribution members of study sample according to years of experience (n= 50)

years of experience	Frequency	Ratio
1- Less than 5 years	15	30%
2- 5 to 10 years	18	36%
3- More than 10 years	17	34%
Total	50	100%

Table (8): Shows The distribution of the study sample according to years of experience which shows that (36%) of their experience from 5-10 years, while (34%) they experience over 10 years, and (30%) of their experience less than 5 years.

4.1.13- Table (9); The Distribution members of study sample according to the Participation in the disaster response (n= 50)

Are you participated in disaster response	Frequency	Ratio
1- Yes	46	87.9%
2- No	4	12.1%
The total	50	100%

Table (9); Shows the distribution of the study sample, according to the variable Participation in the disaster response, as can be seen that (87.9) participated in the disaster response process, while (12.1%) not participated in the disaster response process.

4.1.14- Table (10); The Distribution members of study sample according to the type Practitioner working in the response phase (n= 46)

Type	Frequency	Ratio
Practitioner working in the response phase		
1- Administrative	6	13%
2- Field	40	87%
Total	46	100%

Table (10); Shows the distribution of the study sample according to the type of Practitioner working in disaster response phase, where that (87%), they type of work field, and (13%) they administrators.

4.2 The result related with the study variables (study objectives).

4.2.1- Table (11): The distribution members of study sample according to the degree of use of the rapid assessment measures of disasters and emergency (n =50)

The ferry	Frequen cy & Ratio	The degree of use	
		Using a large tray	Used to some extent
1- Inspection & measures	F	21	25
	R	45.7%	54.3%
2- Scurvies to information	F	40	6
	R	87%	13%
3- Interview with community leaders	F	35	11
	R	76.1%	23.9%
4- Graphic to know of population effected	F	15	31
	R	32.6%	67.4%

Table (11): Shows the distribution study sample of employees in Health Department, according to a variable use of the rapid assessment of the disaster response phase, which shows that (54.3%), believe that the means measurements and tests (used moderately), while (45.7%) believe it is (used significantly), and there is no person of respondents believe (do not use) the means of Inspection & measures. As for the term surveys to obtain information, shows that (87%) see the (use significantly), while (13%) believe it is (used moderately), and there is no person of respondents believe (do not use). interviews with community leaders, which shows that (76.1%) see the (use significantly), while (23.9%) believe it is (largely used medium), and does not see any member of the sample are (not used). graphics and maps to the affected population, show that (67.4%) believe it is (used moderately), while (32.6%) believe it is (largely used great), and there is no person of respondents believe (not in use).

4.2.2- Table (12): The distribution members of study sample according to the degree of availability personal requests to health staff (n=46)

The ferry	Frequency & Ratio	The degree of exist	
		Existing	Does not exist
1- Water hygiene services	F	46	0
	R	100%	0%
2- Shelter & planked	F	44	2
	R	95.7%	4.3%
3- First aid kit	F	40	6
	R	87%	13%
4- Personnel hygiene kit	F	25	21
	R	54.3%	45.7%
5- Food hygiene kit	F	40	6
	R	87%	13%
6- Protection planked	F	17	29
	R	37%	63%
7- Sleeping kit	F	21	25
	R	45.7%	54.3%
8- Local statistics	F	46	0
	R	100%	0%
9- Personnel card	F	18	28
	R	39%	60%
10- Telephone	F	21	25
	R	45.7%	54.3%
11- batteries	F	0	46
	R	0%	100%
12- protection kits of rain	F	14	32
	R	30.4%	69.6%
13- microphone	F	7	39
	R	15.2%	84.8%
14- flash light	F	4	42
	R	8.7%	91.3%

Table (12): Shows the distribution study sample who were involved in the disaster response operation, where it was found the following response:

- Health and safety of water services, available by 100% , Tents and fabrics available by 95.7% , first aid tools available by 87% , Personal Health Supplies available by 54.3% Health and food safety available by 87%, protective clothing available by 63%, sleeping equipment and blankets available by 54.7%, local statistics detailed information available by 100%, identity cards available by 60.9%, communication devices available by 45.7% , additional batteries for communication equipment not available , protection tools from the rain available by 30.4%, public microphone equipment available by 15.2%, flash light available by 8.7%.

4.2.3- Table (13); The distribution members of the study sample according to the degree of availability of special factors, water supply and food and therapy services, (n= 46)

The ferry	Frequency(F) & Ratio(R)	The degree of exist	
		Available	Un available
1- potted water	F	7	39
	R	15.2%	84.8%
2- Treatment tools	F	39	7
	R	84.8%	15.2%
3- Pumps	F	17	29
	R	37%	63%
4- Fuel tanks	F	11	35
	R	23.9%	76.1%
5- Chemical treatment component	F	29	17
	R	63%	37%
6- A self close peer	F	4	42
	R	8.7%	91.3%
7- Water inspection tools	F	25	21
	R	54.3%	45.7%
8- Container to water storage	F	21	25
	R	45.7%	54.3%
9- Strategic storage of food	F	17	29
	R	37%	63%
10- A criteria food relief	F	25	21
	R	54.3%	45.7%
11- Drugs services and triage	F	46	0
	R	100%	0%

Table (13); Shows the distribution members of the study sample according to the degree of availability of special factors related with water, food , therapy supply and, it was found that : Bottled water available by 15.2%, Water treatment tools available by 84.8% , pumps available by 37% , fuel tanks available by 23.9%, Chemical treatment materials available by 63% , Self-closing taps available by 8.7% , Check water quality tools available by 54.8%, Containers for storing water available by 45.7%, A strategic stockpile of food available by 37%, Food relief based on standards available by 54.3%,Therapeutic services available by 100%.

4.2.4- Table (14); The distribution members of the study sample according to the degree of existence of special factors, of sanitation (n = 46)

The ferry	Frequency(F) & Ratio(R)	The degree of exist	
		Availabl e	An available
1- Water transfer	F	21	25
	R	45.7%	54.3%
2- Tractors	F	11	35
	R	23.9%	76.1%
3- Maps to water location	F	7	39
	R	15.2%	84.8%
4- Water screening device	F	42	4
	R	91.3%	8.7%
5- Waste disposal pools	F	27	19
	R	58.7%	41.3%
6- Waste container in food prepare place	F	23	23
	R	50%	50%
7- Animal waste disposal	F	23	23
	R	50%	50%
8- Water disposal	F	23	23
	R	50%	50%
9- It uses septic tank	F	16	30
	R	34.8%	65.2%
10- home waste Disposal continually	F	23	23
	R	50%	50%
11- a close containers to save food	F	23	23
	R	50%	50%
12- Uses paste site to vector control	F	46	0
	R	100%	0%
13- Uses mosquito net	F	39	7
	R	84.8%	15.2%
14- Liquid waste disposal	F	21	25
	R	45.7%	54.3%
15- Controlling in waste un controlled	F	35	11
	R	76.1%	23.9%

Table (14); Shows the distribution of the members of study sample employed in the health department according to the degree of existence of special factors of sanitation , it was found that:

- water transfer available by 45.7% , tractors and trailers available by 23.9%, Maps to water location available by 15.2%, Water screening device available by 91.3%, Waste disposal pools available by 58.7%, Waste container in food prepare place available by 50%, Animal waste disposal available by 50%, Wastewater ponds available by 50%, It uses septic tank available by 34.8%, home waste Disposal continually available by 50%, a close containers to save food available by 50%, Uses paste site to vector control available by 100%, Uses mosquito net available by 84.8%, Liquid waste disposal available by 45.7%, Controlling in waste un controlled available by 76.1%.

4.2.5- Table (15): The distribution members of study sample according to actions of interventions after emergency and disaster (n=440)

The ferry	Frequency(F & Ratio(R))	The degree of use		
		Using a large tray	Used to some extent	Not used
1- Temporary transfer	F	176	18	246
	R	40%	4%	56%
2- Broadcasting(radio)	F	149	119	172
	R	33.9%	27%	39.1%
3- Appropriate choice of the site	F	295	13	132
	R	67%	3%	30%
4- The use of schools and fields of shelter	F	220	145	75
	R	50%	33%	17%
5- Temporary transfer of the property	F	365	48	26
	R	83%	11%	6%
6- The use of simple language	F	308	132	0
	R	70%	30%	0
7- Messages that illustrate the danger	F	251	44	145
	R	57%	10%	33%
8- Priority for communities with high density and poor services put	F	238	26	176
	R	54%	6%	40%
9- Community participation	F	365	49	26
	R	83%	11%	6%

Table (15): Shows the distribution members of study sample according To Actions of interventions after Emergency and Disaster were shows that:

- Temporary transfer exists by (40% used significantly and 4% that they used moderately and 56% not used).
- Broadcasting exist by (33.9% use of radio broadcasts significantly and 27% the use of an intermediate broadcasting and 39.1% not used)
- choose the correct location for the process of accommodation exist by (67% used significantly and 3% used moderately and 30% not used).

- The use of schools and fields of shelter exist by (50% used significantly and 33% used moderately and 17% not used).
- Temporary transfer of the property exist by (83% used significantly and 11% used moderately and 6% not used).
- The use of simple language exist by (70% used significantly and 30%% used moderately).
- Messages that illustrate the danger exist by (57% used significantly and 10% used moderately and 33% not used).
- Priority for communities with high density and poor services exist by (54% used significantly and 6% used moderately and 40% not used).
- Community participation exist by (83% used significantly and 11% used moderately and 6% not used).

4.2.6- Table (16); The Prevention factors of communicable diseases in: (n=440)

The ferry	Frequency &Ratio	The degree of exist	
		Existing	Does not exist
1- A clean source of water	F	326	114
	R	74%	26%
2- The distinction between drinking water and water for other purposes	F	282	158
	R	64%	36%
3- Water source protected from contamination	F	365	75
	R	83%	17%
4- The distance between the water source and location of excreting more than ten meters	F	123	317
	R	28%	72%
5- Collects and stores water in a clean unconscious	F	242	198
	R	55%	45%
6- Water is taken from a container storage potted with a long hand	F	233	207
	R	53%	47%
7- Filtration and chlorination and boiling water	F	198	242
	R	45%	55%
8- Dedicated to baby food is boiled water	F	268	172
	R	61%	39%
9- Disposal of contaminated food by the disaster	F	365	75
	R	83%	17%
-10- Clean the area around the place of food	F	356	84
	R	81%	19%
-11- Use clean tools and utensils for cooking	F	365	75
	R	83%	17%
-12- Feed the children by spoons and cups instead of bottles	F	356	84
	R	81%	19%
-13- Children go to defecate on their own	F	123	317
	R	28%	72%
-14- Defecating near water sources	F	158	282
	R	36%	64%
-15- Defecate in latrines, defecation fields, trenches	F	123	317
	R	28%	72%
-16- Control of craps children uncontrolled	F	101	339
	R	23%	77%

Table (16); Shows the Distribution members of study sample according to the Prevention factors of common communicable diseases in emergencies and disasters were shows that:

A clean source of water exist by 74%, The distinction between drinking water and water for other purposes exist by 64%, Water source protected from contamination exist by 83%, The distance between the water source and location of excreting more than ten meters exist by 28%, Collects and stores water in a clean unconscious exist by 55%, Water is taken from a container storage potted with a long hand exist by 53%, Filtration and chlorination and boiling water exist by 45%, Dedicated to baby food is boiled water exist by 61%, Disposal of contaminated food by the disaster exist by 83%, Clean the area around the place of food exist by 81%, Use clean tools and utensils for cooking exist by 83%, Feed the children by spoons and cups instead of bottles 81%, Children go to defecate on their own exist by 28%, Defecating near water sources exist by 36%, Defecate in latrines, defecation fields, trenches exist by 28%, Control of craps children uncontrolled exist by 23% .

4.2.7- Table(17):The obstacles that affect disaster and emergency response, n=400

The ferry	Frequenc y &ratio	Agree	disagree
1- The delay in the response process	F	440	0
	R	100%	0
2- Lack of access to scientific research in the field of emergency	F	431	9
	R	98%	2%
3- Inadequacy of necessary supplies	F	281	159
	R	64%	36%
4- Lack of cooperation of the population with a response team	F	242	198
	R	55%	45%
5- Lack of awareness programs	F	387	53
	R	88%	12%
6- The difficulty of communication between residents and the center of disaster	F	383	57
	R	87%	13%
7- The difficulty of access to some affected areas	F	290	150
	R	66%	34%
8- Lack of trained manpower in the field of emergency response and disaster	F	365	75
	R	83%	17%
9- Lack of training programs and courses in the field of emergency and disaster	F	396	44
	R	90%	10%
10- The difficulty of communication between the field workers and the center	F	180	260
	R	41%	59%
11- Lack of news to those working in the field of emergencies and disasters response	F	295	145
	R	67%	33%
12- The difficulty of movement during disasters	F	401	39
	R	91%	9%
13- Lack of resources to conduct response programs and financial allocations	F	396	44
	R	90%	10%
14- Lack of participation from some quarters	F	414	26
	R	94%	6%
15- Weak cooperation and coordination between emergency center and civil society organizations	F	365	75
	R	83%	17%

Table (17): shows the distribution members of study sample according to the degree of agree of their approval of the obstacles that affect emergency and disaster response were shows that:

The degree of agree on delay response process 100%, Lack of access to scientific research in the field of emergency 98% , Inadequacy of necessary supplies 64%, Lack of cooperation of the population with a response team 55%, Lack of awareness programs 88%, The difficulty of communication between residents and the center of disaster 87%, The difficulty of access to some affected areas66%, Lack of trained manpower in the field of emergency and disaster response 83%, Lack of training programs and courses in the field of emergency and disaster 90%, The difficulty of communication between the field workers and the center 41%, Lack of news to those working in the field of emergencies and disasters response 67%, The difficulty of movement during disasters91%, Lack of resources to conduct response programs and financial allocations90%, Lack of participation from some quarters94%, Weak cooperation and coordination between emergency center and civil society organizations83%.

CHAPTER FIVE

5.1- The Discussion

The study focused on operations response of disasters and emergency – because Sudan is still affected annually by such incidences of floods and flash-floods during the rainy season. This adds to the burden of endemic diseases such as malaria and is sometimes the source of epidemics of other diseases, (FMH, 2006). This occurred in study area especially in the year 2014 and 2015, (table (2)).

The disaster operations response in study area started by rapid assessment, and they are as, (WHO, 2007): First-hand information may be gathered in the field using a variety of techniques, including the following: a- On-site visual assessment, with both structured and nonstructural observation techniques (e.g. a health observation walk);(b- Expert measurement and testing (e.g. water quality testing, or diagnosis of mechanical failure of a pump);(c- Surveys, to provide statistically valid information from a sample of the population; d- Interviews with key informants, community leaders, groups of disaster-affected people, focus groups or household members; e-participatory techniques, such as ranking or diagramming, to gain a rapid understanding of the way the disaster has affected different parts of the population and what peoples' own assessment of the situation and options for response might be. All above activities and methods of rapid assessment were applied according on answers of study sample groups, (table (11)), were, activities help in eestablish the magnitude of the emergency, Identify existing public health problems, Assess environmental risk factors, Determine major priorities for action, it is help in Identify external resources needed, Identify further information needs, tool for making assessment as Geographical distribution of the population affected, show risk zones or disaster impact zones, (sphere, 2011).The first step in any emergency response is to assess the extent and impact

of the damage caused by the disaster (the needs) and the capacity of the affected population to meet its immediate survival needs (degree of vulnerability). Such an assessment will identify the needs that require external intervention and the gaps to be filled. It is a vital component of the program -planning process. It provides the information on which key decisions affecting the lives of the disaster victims will be made. Whichever assessment techniques are used, they should be adapted to the urgency of the situation and the degree of detail and accuracy needed to mount an appropriate response.

The equipment, supplies, services during disaster response available were include: Drinking water , Shelter, First aid kit, Personnel hygiene needs, Sleeping needs and blanket, Information about effected area, Personnel protection need, **(table (12))**. This agrees with the, **(Sphere project, 2011)** as the flowing: At least 1 gallon of water per person a day for at least 3 days (be alert to hazards of frozen water and resultant container rupture), First Aid Kit, to include any necessary medications, baby formula and diapers if caring for small children, a basic minimum hygiene items pack consists of water containers (buckets), bathing and laundry soaps, and menstrual hygiene materials.

The procedures that used in the process of intervention after disaster include: A strategic stock consists of the necessary basic materials such as blankets, mattresses, tents, clothes, shoes and foodstuffs with a regional stock in the regional storage spaces, especially the first interventions when needed pending the arrival of central support. With a fleet of trucks to deliver aid. Provision of emergency water, hygiene and sanitation facilities and supplies, including the pre-positioning of chlorine and water testing kits, as well as jerry cans and water tankers to ensure rapid response, **(UNICEF, 2007)**. **In study area**; the activities related with disaster response exists by ratio; **58.5%**, and including: **a-Water and food and drugs**

supplies, during disaster response, were available by the ratio: 47.6%. **b-** Sanitation operations processes were used during disaster response, available by the ratio: 55.1%. **c-** Procedures used in the process of evacuation and sheltering after a disaster, used by the ratio: 74.8% were 59% used large, and 15% use moderate. **d-** Prevention Factors of the common communicable diseases, available by ratio 56.6%, (**tables, (13, 14, 15, 16)**). The average of (**58.5%**) is far less, compared to minimum standers for disaster response as in Sphere Project 2011. This due to many obstacles and challenges in the study area that collectively led to profound effect on disaster response system. This obstacles and challenges include: Delay in the response process because difficulty of access to some affected areas, Difficulty of movement during disasters, Difficulty of communication between residents and the center of disaster, Difficulty of communication between the field and the emergence center, (**table(17)**).

5.2- The Conclusion:

This Research evaluated the operations response of disaster and emergence in Almatamma locality in River Nile State.

- The study showed that the main disaster was floods. It is an annual phenomenon in the study area.
- The first response to the disaster was rapid assessment measures, followed by assembling of response team.
- That team had administrative and field personnel.
- The activities related to interventions in study area were **(58.5%)**.
- There were obstacles related to Operations of Disaster and Emergence response was **(79.8%)**.

5.3- The Recommendation

After the data were collected and analyzed, and results were abstracted, the study recommended to:

- There should be an establishment of separate department for emergency and disaster response in the locality level to rapid response.
- Establishment and training of response team to efficiency work.
- The Health authority should encourage and train the target population to participate in the response operations of disasters, especially those concerning evacuation and rescue.
- The Health authority should coordinate and maintain continuous communication with civil organizations and community leaders.
- The Faculty of Public Health in Shendi University should have prominent role in stimulation of campaigns to raise awareness of populations at risk of natural hazards, such as floods.

CHAPTER SIX

6.1- Reference:

Abdel Rahim. M.A.A, 2017, personnel interview, Almatamma locality,17/9/2017, 8:30m.

Acheson. M, (1993). Interventions in water supply and sanitation. Geneva, International, Federation of Red Cross and Red Crescent Societies.

Baird, Malcolm. E, (2010). "The "Phases" of Emergency Management" . Vanderbilt Center for Transportation Research, <http://www.memphis.edu/ifti/pdfs>.

Beroggi, G.E.G. and Wallace, W.A, (1998). Operational Risk Management: The Integration of Decision, Communications, and Multimedia Technologies, Kluwer, Boston .

Buchanan and Sally, (2000). "Emergency preparedness." from Paul Banks and Roberta Pilette. Preservation Issues and Planning. Chicago: American Library Association. 159–165. ISBN 978-0-8389-0776-4

CDC, (2003). fact sheet titled Food and Water Concerns, <<http://www.bt.cdc.gov/disasters/earthquakes/food> .

CDC, (2016). Emergency preparedness and you (Gather Emergency Supplies) Disaster Supplies Kit", <http://Emergency.cdc.gov/preparedness/kit/disasters>.

Commonwealth, (2013). Virtual University for the Small States of the Commonwealth (VUSSC) Commonwealth of Learning (COL) 1055 West Hastings Street Suite 1200 Vancouver, BC V6E 2E9.Canada.

Drabek and Thomas, (1991). Emergency Management: Principles and Practice for Local Government. Washington, D.C.: International City Management Association. pp. xvii.

Duane M. Smith, (2010). A study of command and control of multi-agency disaster response operations, university of phoenix, Arizona, December 2010.

FEMA (Federal Emergency Management Agency), (2015), coping with disaster.

FEMA, (1996). Emergency operations planning
<http://www.fema.gov/pdf/plan/slg101.pdf> Guide for All-Hazard Emergency Operations Planning September 1996

FMH(federal ministry of health),(2006), directrate of emergency and humanitarian, sudan national policy for emergency management in the health sector.

Guy Ellena, (2010), Disaster and Emergency Preparedness: Guidance for Schools, international finance corporation-world bank.

Harrald, J.R., Cohn, R. and Wallace, W.A. (1992) ‘We were always re-organizing... some crisis implications of the Exxon Valdez oil spill’, Industrial Crisis Quarterly, Vol. 6, pp.197-217

Kanchanasut, K ,Tunpan, A., Awal, M.A., Das, D.K., Wongsardsakul, T. and Tsuchimoto, Y, (2007).DUMBONET: a multimedia communication system for collaborative emergency response operations in disaster-affected areas’, Int. J. Emergency Management, Vol. 4, No. 4, pp.670–681.

Klein, G.A. (1993) ‘A recognition-primed decision (RPD) model of rapid decision-making’, in G.A. Klein, J. Orasanu, R. Calderwood and C.E. Zsombok (Eds.), Decision Making in Action: Models and Methods, Ablex Publishing Corp., Norwood, NJ, pp.138–147 .

Kreps, G.A. (1991). ‘Organizing for emergency management’, in T.E. Drabek and G.J. Hoetmer (Eds.), *Emergency Management: Principles and Practice for Local Governments*, International City Management Association, Washington, D.C., pp.30–54 .

Lindell, M.K.,(2011). Disaster studies. Lindell, M.K., ‘Disaster studies’, Sociopedia <http://www.isa-sociology.org/publ/sociopedia-isa/sociopedia-isa-list-of-published-entries.htm>.

Louise K. Comfort, Kilkon Ko and Adam Zagorecki,(2004), *Coordination in Rapidly Evolving Disaster Response Systems: The Role of Information*, *American Behavioral Scientist*2004 ;,48,295, DOI: 10.1177/0002764204268987

Maon, F., Lindgreen, A., and Vanhamme, J. (2009), “Developing supply chains in disaster relief operations through cross-sector socially oriented collaborations: a theoretical model,” *Supply Chain Management: An International Journal*, Vol. 14, No. 2, pp. 149-164. (ISSN 1359-8546)

Mendonça, D., Beroggi ,G.E.G. and Wallace, W.A. (2001) ‘Decision support for improvisation during emergency response operations’, *Int. J. Emergency Management*, Vol. 1, No. 1 pp.30–38.

Mignone AT Jr.;Davidson R, (2003), *Public health response actions and the use of emergency operations centers. Prehosp Disast Med* 2003;18(3):217–218,<http://pdm.medicine.wisc.edu>, .

MS. Balaka Dey , P.A.-U.(2006), *Natural hazard and disaster management*. (A.D. Shari M.P sajnani,Ed) Delhi: secretary, central Board of secondary education.

Naji Eric, (1997), *the public health consequences of disaster*, oxford university press , new york. NY

Nezih Altay , Walter G., Green III,(2003), disaster operations management ,Robins School of Business, University of Richmond, Richmond, VA 23173, USA.

Nitesh Bharosa & JinKyu Lee & Marijn Janssen, (2009), Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises, published with open access at Springerlink.com ,2010.

Quarantelli E.L. (1998), "Where We Have Been and Where We Might Go", what is a Disaster? A Dozen Perspectives on the Question, London, Rutledge, 1 edition 1998, pp.146-159

RDC, (2002), Community Based Training and Awareness Programme for Natural Disaster Management - Flood and cyclone, January 27th – February 10th , 2002.

Reina D.G. et al, (2012), An evolutionary computation approach for optimizing connectivity in disaster response scenarios , Appl. Soft Comput. J. <http://dx.doi.org/10.1016/j.asoc.2012.10.024>

Scanlon, J. (1994) ‘The role of EOCs in emergency management: a comparison of American and Canadian experience’, International Journal of Mass Emergencies and Disasters, Vol. 12, No.1, pp.51–75 .

Shoaf, K. I., & Rottman, S. J., (2000), Public health impact of disasters. Australian Journal of Emergency Management, 15(3), pp. 58-63.

Simonovic, Slobodan, (2000), "Flood Mitigation Efforts in the Red River Basin" www.iclr.org. The Institute of Catastrophic Loss Reduction.

Sphere project, (2011), Humanitarian Charter and Minimum Standards in Humanitarian Response, Published by: The Sphere Project Copyright The Sphere Project 2011

Thomas Mignone, Jr.; CAPT. Robert Davidson,(2004), Public Health Response Actions and the Use of Emergency Operations Centers, US Public Health Service, New York, New York USA.

UN/ISDR, (2005). world conference on disaster reduction. cobe , hyogo , japan

UNICEF in south Sudan, emergency preparedness and response, Unicef.org/south Sudan, pdf.

Weick, K.E. (1993) ‘The collapse of sensemaking in organizations: the Mann Gulch disaster,’ Administrative Science Quarterly, Dec., pp.628–652.

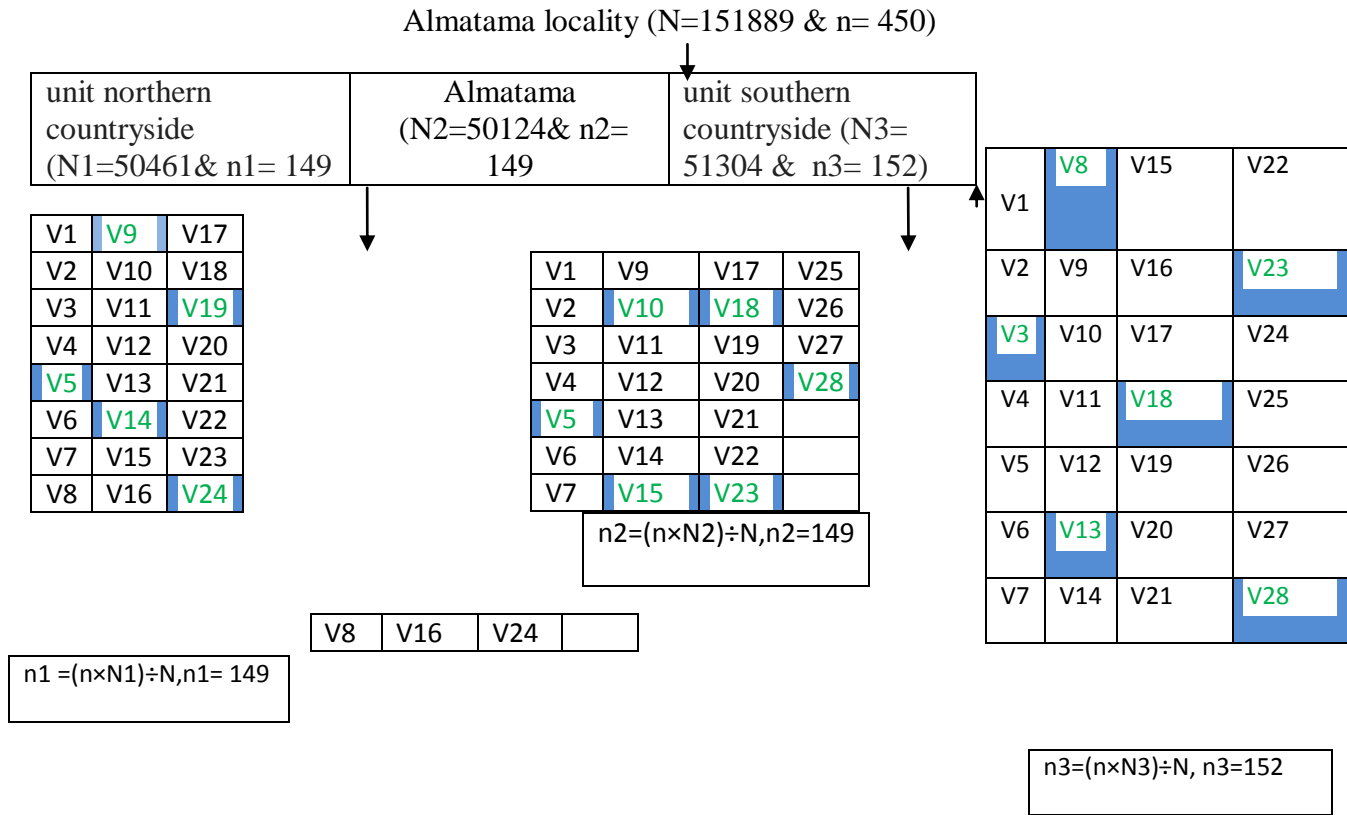
Wisner B and Adams J,(2002),environmental health in emergence and disaster; a practical guide, world health organization,2002, ISBN 92 4 154541 0

Wisner,B., Blaikie P., Cannon,T., and Davis,L., (2003). At Risk: natural hazards, people’s vulnerability and disaster, second edition.

Young M. Lee ,Soumyadip Ghosh ,Markus Ettl ,IBM T.J,(2009), simulating distribution of emergency relief supplies for disaster response operations. Watson Research Center. 1101Kitchawan Road York town Heights, NY 10598, USA.

6.2.- appendix

6.2.1 The Diagram shows how to be selected sampling units:



Where :

N=total population, N1=total population in unit (1), N2=total population in unit(2) , N3=total population in unit(3) , v = village , c = cluster, n = sample size , n1=sample size in unit(1) n2=sample size in unit(2) , n3=sample size in unit(3)

v = villages were selected for taking the samples

table(1) include a sampling units:

Unit(1)	n =149		Unit(2)	n=149		Unit(3)	n=152	
the Clusters	Nc	Nc	The clusters	Nc	nc	The clusters	Nc	nc
V9=Gozz Bora	1356	26	V18= Wady khalil	517	10	V3= Algabrab	987	14
V14=ALgblab	452	9	V23= Tabga	3229	62	V8= Alglaah	1056	16
V19=ALssoffor	1906	37	V28=Gozgaba	881	17	V13= Madiny	2765	41
V24=ALgweir	2867	55	V5= Big sial	1389	26	V18=Algweez	450	7
V5=ALabyadab	312	6	V10=Gbarona	912	18	V23=Alwefag	3786	56
V10=Alhmirab	800	16	V15=Adafory	815	16	V28=Alhogna	1100	18
$\sum NC$ & $\sum nc$	7693	149	$\sum NC$ & $\sum nc$	7743	149	$\sum NC$ & $\sum nc$	10144	152

Nc=total population in cluster , nc= sample size in cluster

6.2.2- The data collection tool

Q1- The age: 1. Less than 25 years() 2. From 25 to less than 50 years() 3. Age 50 and older ()

Q2- Educational level: 1. Uneducated() 2. Primary() 3.Secondary()
4. Academic() 5.Postgraduate()

Q3- Occupation: 1. Employee() 2. free business() 3.Worker() 4.House wife()

Q4- Monthly income : 1. Less than 1000 SDG() 2. 1000 - Less than 2000 SDG () 3. 2000 -3000 SDG () 4. More than 3000 SDG ()

Q5- Type of disasters was occurred in your zone:

1.floods () 2.epedemics() 3.fire()

Q6- Are you participated in disaster response? 1. YES () 2.NO ()

Q7- times where participated in disaster response operation:

1. Once – twice () 2. Three – five times() 3. More than five times()

Q8- Activity they are doing in response operation:

1. Rescue() 2. Shelter() 3. Transportation() 4. Relief () 5.Water supply()
6. Environmental sanitation()

Q9- Are you received training in disaster management: 1.YES() 2.NO()

Q10- Are you in public health field? 1. YES () 2.NO ()

➤ if you answered NO , go to Q18

Q11- Job description:

1.worker () 2.observer () 3.health officer () 4.insepector ()

Q12- Years of experience:

1.Less than 5 years 2. 5 – 10 years () 3. More than 10 years()

Q13- Type of active in the disaster response?

1. Administrative () 2. A field ()

Q14- what is a degree of use rapid assessment measures?

The ferry	The degree of use		
	Using a large tray	Used to some extent	Not-used
14.1- Inspection & measures			
14.2- Scurvies to information			
14.3- Interview with Community leaders			
14.4- Graphic to know of population effected			

Q15- what is a degree of availability personal requests to health staff

The ferry	The degree of exist	
	Existing	Does not exist
15.1- Water hygiene services		
15.2- Shelter & planked		
15.3- First aid kit		
15.4- Personnel hygiene kit		
15.5- Food hygiene kit		
15.6- Protection planked		
15.7- Sleeping kit		
15.8- Local statistics		
15.9- Personnel card		
15.10- Telephone		
15.11- batteries		
15.12- protection kits of rain		
15.13- microphone		
15.14- flash light		

Q16- what is a degree of availability of special factors, water supply and food and therapy services :

The ferry	The degree of exist	
	Available	Un available
16.1- potted water		
16.2-Treatment tools		
16.3-Pumps		
16.4- Fuel tanks		
16.5-Chemical treatment component		
16.6-A self close peer		
16.7-Water inspection tools		
16.8-Container to water storage		
16.9-Strategic storage of food		
16.10- A criteria food relief		
16.11- Drugs services and triage		

Q17- what is a degree of existence of special factors, of sanitation

The ferry	The degree of exist	
	Available	An available
17.1- Water transfer		
17.2- Tractors		
17.3- Maps to water site		
17.4- Water screening device		
17.5- Waste disposal pools		
17.6- Waste container in food prepare place		
17.7- Animal waste disposal		
17.8- Water disposal		
17.9- It uses septic tank		
17.10- Home waste Disposal continually		
17.11- a close containers to save food		
17.12- Uses paste site to vector control		
17.13- Uses mosquito net		
17.14- Liquid waste disposal		
17.15- Controlling in waste un controlled		

Q18- Degree of the intervention action used after Emergency and Disaster?

The ferry	The degree of use		
	Using a large tray	Used to some extent	Not used
18.1- Temporary transfer			
18.2- Broadcasting(radio)			
18.3- Appropriate choice of the site			
18.4- The use of schools and fields of shelter			
18.5- Temporary transfer of the property			
18.6- The use of simple language			
18.7- Messages that illustrate the danger			
18.8- Priority for communities with high density and poor services put			
18.9- Community participation			

Q19- what is the Prevention factors of communicable diseases in emergencies and disasters?

The ferry	The degree of exist	
	Existing	Does not exist
19.1- A clean source of water		
19.2- The distinction between drinking water and water for other purposes		
19.3- Water source protected from contamination		
19.4- The distance between the water source and location of excreting more than ten meters		
19.5- Collects and stores water in a clean unconscious		
19.6- Water is taken from a container storage potted with a long hand		
19.7- Filtration and chlorination and boiling water		
19.8- Dedicated to baby food is boiled water		
19.9- Disposal of contaminated food by the disaster		
19.10- Clean the area around the place of food		
19.11- Use clean tools and utensils for cooking		
19.12- Feed the children by spoons and cups instead of bottles		
19.13- Children go to defecate on their own		
19.14- Defecating near water sources		
19.15- Defecate in latrines, defecation fields, trenches		
19.16- Control of craps children uncontrolled		

Q20- what is a degree of degree of their approval of the obstacles that affect emergency response and disaster?

The ferry	Degree of agree	
	Agree	disagree
20.1- The delay in the response process		
20.2- Lack of access to scientific research in the field of emergency		
20.3- Inadequacy of necessary supplies		
20.4- Lack of cooperation of the population with a response team		
20.5- Lack of awareness programs was		
20.6- The difficulty of communication between residents and the center of Ghent disaster		
20.7- The difficulty of access to some affected areas		
20.8- Lack of trained manpower in the field of emergency response and disaster		
20.9- Lack of training programs and courses in the field of emergency and disaster		
20.10- The difficulty of communication between the field and the center		
20.11- Lack of news to those working in the field of emergencies and disasters response		
20.12- The difficulty of movement during disasters		
20.13- Lack of resources to conduct response programs and financial allocations		
2.14- Lack of participation from some quarters		
20.15-Weak cooperation and coordination between emergency center and civil society organizations		

6.2.3- Interview Form

1- Date.....

2-name.....

3-work place.....

4-jop description.....

5-type of work.....

6-typeof disaster.....

7-the years that disasters occurred.....

8-disaster response team composition

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.....
.....

9-what are supplies exist before disaster

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10-the sheltering

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.....

6.2.4- the assessment of data collection tools

استمارة التقييم الأولي للإستبيانات

الأستاذ/الدكتور:.....الموقر/السلام عليكم ورحمة الله

الموضوع: تقييم أولي للإستبيانات المرفقة

بالإشارة للموضوع أعلاه أرجو تكرمكم بمراجعة المرفقات وتسجيل ملاحظاتكم من حذف أو اضافة أو تعديل ... ودمتم في خدمة العلم والمعرفة.

(1) ملاحظات محتوى الإستبيان

أ/البيانات

الأولية:

ب/بيانات محاور

الدراسة

(2)ملاحظات

أخرى

(3)اضافة