

**Original Research**

**Diagnostic Radiology Challenges and Barriers During Daniel Storm in Derna, Libya**

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**ABSTRACT:**

In September (2023) during flooding in Derna by Storm Daniel's, health system failure to get the demands of the disaster and hospitals possess cutting. The main purpose of this study is to explore the challenges and barriers faced radiology department. The questionnaires were distributed online, and a sample of 40 participants was obtained. SPSS was used to analyze the data and exploratory factor analysis (EFA) and Descriptive Statistical Analysis (Mean, Std. Deviation) were used to explore the challenges and barriers faced radiology department in Derna–Libya. The results showed



that the most challenges faced the radiology department during the Storm Daniel disaster hindered their ability to effectively respond to the increased demand for imaging services during the disaster. Likewise, this study in Derna – Libya may provide a more in-depth understanding of what is needed for Libyan radiology departments, when crisis or disasters possibly arise. And, thus, permit the improvement of strategies to face any crisis or disasters. Future researchers can extend the understanding of this study in other crisis and more samples of radiology department, and its practices in response to issue storm Daniel.

**KEYWORDS:** Storm Daniel's, Radiology Department, Derna–Libya, Challenges, Barriers.

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## INTRODUCTION

Report by (Médecins Sans-Frontières (MSF's) (2021) addressed (Health system in a state of hidden crisis) explained that, Libya is currently grappling with a displacement issue as individuals seek refuge from the ongoing bloodshed.

In September (2023) during flooding in Derna by Storm Daniel's health system failure to get the demands of the disaster and hospitals possess cutting (Saieh, 2021).

The world has begun to realize that global health issues, so, the radiology department have faced more crisis in the world (e.g. Covid-19, SARS Hurricane Katrina). As known, the majority of radiology department staff has direct physical contact with patients when doing radiological exams under any scenario (Alkan & Cilengiroglu, 2022). During crisis radiology departments offers useful data to support decision-making about treatments and can direct surgical procedures. (Buckley & MacMahon, 2021).

On Sunday 10 September, Storm Daniel

struck the eastern coast of Libya. The cities of Benghazi, Al Marj, Al Bayda, Batah, Sousa, and Derna experienced excessive winds and massive flooding including from the fail of two barriers. Derna, the city most influenced by the disaster saw significant damage and loss of lives; 40,000 citizens have been internally moved.

An approximation 250,000 people require humanitarian assistance, including health, food, non-food item, and education. Over and done with 30 September, international assistance provided by the United Nations (UN) and its partners had reached over 125,000 affected people (UNOSAT, 2023). Daniel Storm has damaged the city of Derna, and the city hospital faced health care problems in radiology department during providing rapid and accurate imaging to help diagnose and manage critical conditions.

Strom Daniel be situated such a barrier for health systems in Libya. Primary care is the first-line in controlling when crisis Daniel Storm occurs at the area level, but many barriers and challenges faced by radiology departments during the service practices are

not fully identified. In addition, radiology departments are vulnerable to system failures that can occur either spontaneously or as a result of a catastrophic incident, particularly during times of increased demand for imaging tests during crisis. The content of this research will outline and assess the challenges and potential problems in radiology departments in relation to both present and future crisis. The study has many questions: The main question; What are the most challenges and impacts faced radiology departments during Daniel Storm in city Derna?. To end with; what are the worker force radiology department's perceptions of the crisis of the Daniel Storm in city Derna? The purpose of this study is to explore the most challenges and impacts faced radiology departments during Daniel Storm in city Derna. In addition to emphasize the significance of disaster planning and to offer frameworks for identifying and planning for various types of urgent system failures that may affect radiology departments. Finally to build strategies to face any health crisis face radiology departments in the future. This study is considered novel because this would be one of the first few attempt to determine the diagnostic radiology department's challenges and barriers during storm Daniel in city Derna. So the summary of the significant are in three points; First of all to establish role to deal with any health crisis that maybe occur the next times in radiology departments. To help making strategies and to support healthcare workers to carry out any health crisis face radiology departments. Finally, to make those were working in hospital and/clinics during the

crisis Daniel Storm, such as radiologists and technicians as expertise to deal with any health crisis.

Libyan health ministry stated the start on of the National strategy for primary healthcare from 2023 to 2028. The objectives are to restructure the current system by improving services provided by group of clinics and health centers. (Fitzgerald, 2023)

Nevertheless, appearing funding limitations threaten the sustainability of these interventions, with resources expected to diminish in the upcoming months. Addressing these financial challenges will be crucial for the continued support of health services in the region (OCHA, 2023).

This entails conducting further monitoring visits to evaluate requirements and strengthen the capabilities of local governments, focusing on areas such as supplying medical equipment, enhancing outreach and referral services, and fostering local proficiency in crucial health domains (OCHA, 2023). The report explained the mass of health system during Storm Daniel. The challenges in radiology departments will be delineated and evaluated relative to current and future technology. (Vannier, 2009).

During crisis, the healthcare personnel are under escalating pressure as a result of the large influx of patients, strain on healthcare system capacity, and negative impact on healthcare services (Alkan & Cilengiroglu, 2022).

In general, radiology departments are experiencing unprecedented levels of pressure and limitations due to the ongoing COVID-19 epidemic, increased patient loads, a rapid growth in the quantity of produced x-

ray images, and the need for more complicated image evaluations. In addition, radiology departments are confronting these difficulties while striving to deal with globally limitations of workers and stress. (Cailey, 2021).

Any crisis faced many expressions of psychological distress between health workers as reported in (Regulation of The Minister of Health Republic Indonesia ,2016), like as fear, anxiety, frustration, and anger in addition, frustration is effected by the increasing working hours that make doctors have to work longer than standard with more cases of disease handled (Erjalía & Syakurah, 2021)

Radiologists have used in many aspect of crisis, as explained by the topic of identifying victims (DVI) in mass mortality occurrences has been addressed in previous studies, Morgan, 2014: Viner, 2015). According to the current rules of the International Criminal Police Organisation (Interpol), radiography is included as one of the examination procedures used during Phase 2 (Post-mortem investigation) of the identification process. Radiologists are also mentioned as professionals who assist in this process.

Therefore, disaster planning is an essential aspect of contemporary healthcare practice. Due to the intricate infrastructure needs, radiology departments are susceptible to system failures that can happen either independently or following a catastrophic event, when there is a higher demand for imaging exams. The application of a systematic technique, such as the hazard, risk, and vulnerability analysis, may help identify the potential dangers that a radiology

department may be exposed to the failure mode and effects analysis tool identifies potential significant vulnerabilities inside the departments.

By identifying possible underlying circumstances and immediate failures that might affect systems, it becomes possible to employ techniques that can either avoid failure or enhance the system's ability to recover and minimize the impact of such failures. (Gibney et al, 2021)

The primary areas of vulnerability in a radiology department are personnel, infrastructure, resources (such as supplies and equipments), and software (Gibney et al, 2021).

However, it is important to note that the precise challenges and remedies within these areas may vary depending on the department. Portable imaging modalities and teleradiology can be utilized to enhance the disaster response when the radiology department is unable to meet the demands for medical imaging. Every aspect of disaster response planning must take into account the maintenance of operations and the eventual return to regular functioning. (Gibney et al, 2021).

When evaluating disaster response and surge capacity, the elements of healthcare may be categorized into systems of persons (staff), structure (building, utilities, and infrastructure), and resources (supply and/or equipment)

Radiology when (COVID-19) disaster accrued had the challenge common to most of the government facilities was the poor availability of personal protective equipment (PPEs) (Omidiji et al, 2022).

**MATERIALS AND METHODS**

***Study Design***

This is a quantitative study used a descriptive research with a phenomenological approach (Sekaran, 2006). This study aims to explore the challenges and barriers at radiology departments during Crisis Daniel Storm in hospital and/clinics in city Derna. A cross-sectional study was carried out among individual workers in city Derna.

***Instrument Development***

The instrument for the study was developed based on multi scales of prior studies. The study adopted instrument design to assess information from radiology departments about Daniel Storm, to explore challenges and barriers at radiology departments during Crisis Daniel Storm in hospital and/clinics in Derna city, it consists of 3 sections that measured in different scales:

Section one was about Demographics:

Table (2.1) Demographics Items

1	2	3	4
GANDER	AGE	EDUCATION	EXPERIENCE

Section two was about Challenges:

Table (2.2) Challenges scales

1	2
NO	YES

Section three was about Barriers:

Table (2.3) Barriers scales

1	2	3	4	5
Don't Ready completely	Don't Ready	neutral	Ready	Ready completely

The sections Adopted from study (Veerasuri et al, 2020).

***Instrument Review***

The instrument for the study was written in an Arabic version to collect data. The external reviewer who was interested in radiology checked the scale that were used to measure the statements in the instrument whether they were appropriate for measuring so items were revised to guarantee the readability and valid flow of questions, (Cooper & Schindler, 2001).

***Instrument Validation***

According to (Sekaran, 2006) most of the items survey was adapted from others studies and some expert opinions were considered while preparing the survey. The validity of the survey was examined by taking the reliability value or Cronbach alpha value which in this study was about (0.85.5).

In this study three types of validity were used to validate survey:

1. Content validity the study adopted statements of survey from literature review.
2. Pilot study that had characteristics alike those of objective group in the main study.
3. Construct validity statements was actually measured by the survey, used factor analysis, which used to measure the ability to ensure that the questions asked related to the construct that they intended to measure (Sekaran, 2006).

The factor analysis extraction can only be considered if Kaiser-Meyer Olikin (KMO) measure of sampling adequacy value should exceed 0.05. The factor analysis extraction is considered if Bartlett's Test of Sphericity approx is significant at 0.05. The factor analysis extraction can only be considered if total variance approx is significant at 0.05.

### ***Sample Population***

The population was workforce and practice and students of Radiology department in the most damaged area by the Daniel Storm. Response in Radiology or Participants included those working in hospital and/clinics during the crisis Daniel Storm, such as radiologists, technicians and students. The population size (n=40.)

### ***Polit Study***

Prior to distribution, the online survey was piloted with amendments made to ensure the questions were clear and understandable (Sekaran, 2006).

### ***Data Collection and Analysis***

This study used an anonymous online questionnaire from 22th Feb. - 2024 to 11th April 2024. The online survey was considered an efficient method for gathering information after crisis the Daniel Storm in city Derna. (n=40.) responses were collected, the reason the sampling especially students are not supporting to collected data, So indicating an 80 percent response rate.

The collected data were checked as complete,

unmistakable, and consistent with other information and set to make coding simpler data into software to identify response with numbers (Seakern, 2006). The finally, this study was analyzed by statistical package for the social sciences SPSS for data analysis (Cooper & Schondler, 2001) frequency were used to describe the sample. Cronbach's alpha was used as a measure of reliability. Factor analysis with Varimax Rotation was achieved to determined validity analysis (knekta et al., 2019). Finally, descriptive analysis used to answer questions of study (Mean, Std. Deviation).

## **RESULTS**

### ***Quantitative Study***

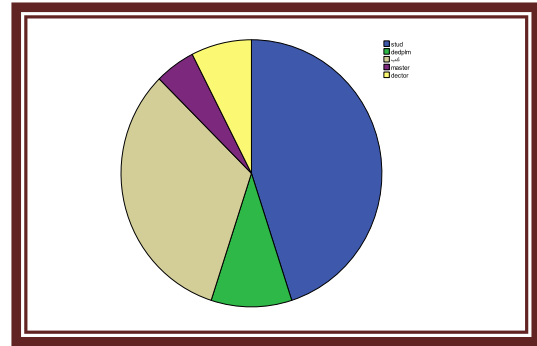
The quantitative method was used to explore whether radiology department faced the challenges and barriers during crisis Denial Storm in Derna and explore the frequency of sample characteristics.

### ***Sample Characteristics***

Questionnaire were distributed to workforce the radiology departments by an electronic survey (Google form). The result showed that 26 respondents (65.0%) were males and 14 respondents were female (35%). On other hand, 13 respondents (35 %) were students and 18 respondents (32.5%) had Bachelor). About (62.5 %) were 20 to less than 30 years old. But, less than 10 were about (22.5%). table (3.1) and figures (3.1, 3.2 and 3.3).

**Table (3.1) Sample Characteristics.**

Variables	Frequency	Percent
<b>Gander</b>		
Male	26	65.0
Female	14	35.0
<b>Education</b>		
Student	13	32.5
Bachelor	18	35.0
Diploma	4	10.0
Master	2	5.0
PhD	3	7.5
<b>Age</b>		
20 to less 30	25	62.5
Less Than10	9	22.5
From42 And More	6	15.0
<b>Experience</b>		
Still Student	22	22.5
Less Than10	3	7.5
10 to 15	5	12.5
15 and more	10	25.5
Total	40	.100



**Figure (3.3) Experience Percent**

**Analysis's Reliability**

To measure the consistency of the scales of questionnaire, Cronbach's alpha was used as a measure of reliability.

The reliability scores for all variables and items of questionnaire extracted were high. This means, all items indicating excellent internal consistency, so all items are reliable and acceptable table (3.1) displays the Cronbach's alpha score for all items with measured values showing that the scale had satisfactory reliability.

**Table (3.2) Reliability.**

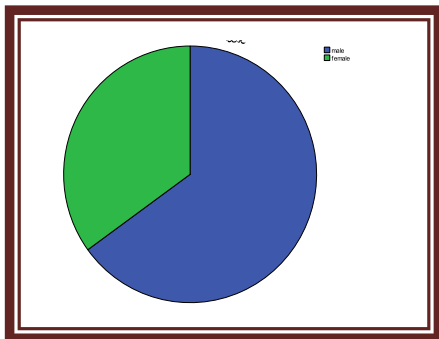
Variables	Numbers of items	Cronbach's alpha
Challenges	17	0.75
Excepts impacts	5	0.70

**Analysis's Validity**

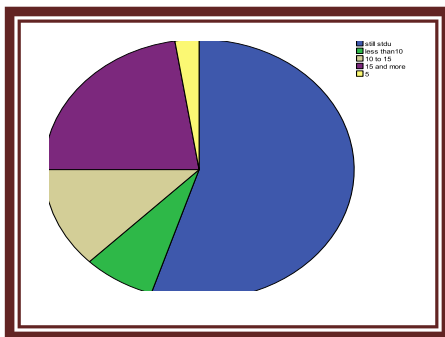
The validity analysis using factors analysis was then carried out for the variables which are Challenges and Excepts Barriers.

**Exploratory Factor Analysis (EFA)**

EFA used to reach out if a particular set of items can measure a particular construct (knekta et al., 2019).



**Figure (3.1) Gender Percent**



**Figure (3.2) Age Percent**

**Table (3.3) EFA Analysis Challenge Items.**

Items	Loading
Does the Storm Daniel disaster have an impact to extent of the radiology department preparedness for high alert situations in Libya?	.804
Have radiation emergencies been investigated and managed?	.645
Have reports of the radiology department's services and public health services been sent to responsible authorities through unified processes during the disaster period?	.649
Have the risk assessment been conducted with a standardized mechanisms?	.640
Have epidemics been declared in order to activate the early warning and response system for epidemics?	.829
Are actual and potential risks reported during Daniel storm disaster?	.824
Has social mobilization taken place with risks?	.702
Have measures been taken to combat epidemic infections within the radiology department and remove pollution during the disaster period?	.752
Have any out breaks of epidemics been investigated within the department radiation and its control during the disaster period?	.746
Has coordination been mad with department inside and outside the city to provide assistance?	.632
Was the radiology department provided with all necessary equipment during the disaster period?	.744
Was the preparedness for cases in the radiology department supported during the disaster period?	.757
Did you take advantage of your disaster period in the radiology department?	.838
Have information or awareness methods been disseminated adequately and detailed?	.867
Did you know how big Daniel Strom was before the disaster strikes?	.800
Are you an academic or professional staff member in the radiology department?	.772
<b>KOM</b>	<b>.805</b>
<b>Bartlett's Test of Sphericity</b>	<b>.000</b>
<b>Total Variance</b>	<b>75.006</b>

Meyer,-Olkin (KOM) measure of sampling (.805) which exceed adequacy vales of 0.05 (i.e  $KOM \geq 0.05$ ) (knekta et al., 2019) the output above shows that the Bartletts Test of Sphericity Approx is 0.00 significant at 0.05 ( $p < 0.05$ ) indicated that the correlation matrix was not random.

There are items have high value as (Have information or awareness methods been disseminated adequately and detailed? Loading About (0.87) following the item (did you take advantage of your card period in the radiology department?) loading about (0.84). Then, this factor consist of one factor loading with total variance explained is 75.% (Has coordination been mad with department inside and outside the city to provide assistance?) has about(0.632) there is no items dropped from challenges Items.

items	Loading
How prepared the radiology department to conduct training courses in crisis and disaster management to preparedness and emergency teams?	.697
How prepared the radiology department to establish rapid teams for to preparedness and emergency situations?	.596
To what extent are authorities prepared a budget for emergency?	.723
How prepared a staff in the radiology department to the most dangerous natural disasters?	.775
How prepared the radiology department to the most dangerous natural disasters?	.796
<b>KOM</b>	<b>.624</b>
<b>Bartlett's Test of Sphericity</b>	<b>0.00</b>
<b>Total Variance</b>	<b>51.95</b>

**Table (3.4) EFA Analysis Barriers Items.**

Factor analysis extraction shows Keiser-

Factor analysis extraction shows Kaiser-Meyer-Olkin (KOM) measure of sampling (.805) which exceed adequacy vales of 0.05 (i.e  $KOM \geq 0.05$ ) the output above shows that the Bartlett's Test of Sphericity Approx is 0.00 significant at 0.05 ( $p < 0.05$ ). On other hand, this factor consist of one factor loading with total variance explained is 51.95%, (How prepared the radiology department to establish rapid teams for preparedness and emergency situations?) has less than 0.60 there is no items dropped from impacts Items to conclusion , the items is validity consists. Table (3.3).

### ***Challenges Faced Radiology Departments***

The survey recorded 40 valid responses from hospitals and clinics in Derna-Libya, which Denial Storm happened and to measure the responses rate and their agreements about the challenges faced the radiology departments, Table (3.4) shown response rate.

According to the majority of respondents (77.5%) are answered (yes) in term (the Daniel Storm disaster has an impact to extent of the radiology department preparedness for high alert situations in Libya). This means, the response Mean about (2.75) and Std. Deviation (.494) means, the most challenges faced the radiology department during the Daniel Storm disaster hindered their ability to effectively respond to the increased demand for imaging services during the disaster for high alert situations in Libya.

The next challenges responses rate mentioned to (epidemics been declared in order to activate the early warning and response system for epidemics) it term

(Don't Know) it is around (35%), Mean about (2.55) and Std. Deviation (.597) This means the next challenges is mentioned to the radiology department don't know (don't awareness) about epidemics being declared in order to activate the early warning and response system for epidemics during the Daniel Storm disaster.

The challenges responses rate mentioned to (if the reports of the radiology departments services and public health services been sent to responsible authorities through unified processes during the disaster period), it term (Don't Know) With approximately (50%) mean about (2.45) and Std. Deviation (.552) this means, there are no transparent confidential and accurate information systems during the disaster in radiology departments services.

Survey's participants in term (No) around (42.5%) on term the preparedness for cases in the radiology department supported during the disaster period, Mean about (1.85) and Std. Deviation (.834) this could indicate the most challenges faced the radiology department have not any aspects of preparedness for cases as emergency response plans.

In term any out breaks of epidemics been investigated within the radiology department and its control during the disaster period accounted for (65 %) of the survey's participants in term (Don't Know) mean about (2.05) and Std. Deviation (.597) this could indicate a lack of communication or transparency within the department or were not conducted or were not widely publicized.

Almost 55% of all respondents reported (yes) there is actually and potential risks reported

during Daniel Storm disaster, means that Mean about (2.45) and Std. Deviation (.677) indicate the awareness about potential risks.

Finally, all responders rates are (yes) that can be advantage the radiology department needs more essential aspects of preparedness.

**Table (3.5) Mean, Std. Deviation Challenges Faced Radiology Department's**

Items	Mean	Std. Deviation	Percentage %		
			Yes	Don't Know	No
Does the Storm Daniel disaster has an impact to extent of the radiology department preparedness for high alert situations in libya? .	2.75	.494	77.5	20.0	2.5
Have radiation emergencies been investigated and managed?	2.10	.709	30.0	50.0	20.0
Have reports of the radiology departments services and public health services been sent to responsible authorities through unified processes during the disaster period	2.45	.552	47.5	50.0	2.5
Have the risk assessment been conducted with a standardized mechanisms?	2.27	.640	37.5	52.5	10.0
Have epidemics been declared in order to activate the early warning and response system for epidemics?	2.55	.597	6.0	35.0	5.0
Are actual and potential risks reported during Daniel storm disaster?	2.45	.677	55.0	35.0	10.0
Has social mobilization taken Place with risks?	2.45	.714	57.5	30.0	12.5

Have measures been taken to combat epidemic infections within the radiology department and remove pollution during the disaster period?	2.15	.736	35.0	45.0	20.0
Have any outbreaks of epidemics been investigated within the department radiation and its control during the disaster period?	2.05	.597	20.0	65.0	15.0
Has coordination been mad with department inside and outside the city to provide assistance?	2.30	.723	45.0	40.0	15.0
Was the radiology department provided with all necessary equipment during the disaster period?	2.35	1.733	35.0	42.5	22.5
Was the preparedness for cases in the radiology department supported during the disaster period	1.85	.834	27.5	30.0	42.5
did you take advantage of your disaster period in the radiology department?	1.90	.841	30.0	30.0	40.0
Have information or awareness methods been disseminated adequately and detailed?	1.90	.841	40.0	30.0	30.0
Did you know how size disaster Daniel Strom was before the disaster strikes?	1.80	.723	37.5	45.0	17.5
Are you an academic or professional staff member in the radiology department?	1.92	.859	32.5	27.5	40.0
Total			100		

***The Except Barriers of Radiology Department's***

As presented in table (3.6) shown measure the Barriers radiology department's response rate during the Denial Storm or if they are ready to face crisis as Denial Storm. the majority of respondents (45.0%) are neutral

about if the radiology department's ready to provide training about deals with crisis and disaster in Libya during the Denial Storm, based on below table the Mean is about 3.28 and Std. Deviation is (1.219) .It seems that there is some uncertainly or lack of consensuses among respondents about department preparedness.

Meanwhile, the radiology department's ready to create rapid teams to deal with any unexpected crisis or disaster, some of respondents reported being ready for such situation accounted for (32.5%) and Mean about (3.43) and Std. deviation is (1.217) .this indicates that the radiology department's has measures in place to effectively respond to unexpected events.

While about (30%) of the respondent's answer they are totally ready, if the government is ready to make budget to deal with any crisis and disaster in Libya. Mean about (3.40) and Std. deviation is (1.355), this means, responses being more confident in the governments readiness to make budget for dealing with crises.

30.0% of respondents answer neutral about the workforces in the radiology department's ready to deal with crisis and disaster in Libya mean about (2.62) and Std. deviation is (1.192). Indicate that opinions are widely varied may be there are some of them feeling more prepared and others feeling less so (40.0%) of respondents answer the radiology department's don't ready to about deals with crisis and disaster during the Denial Storm in Derna-Libya, the Mean about (2.35) and Std. deviation is (1.189).

**Table (3.6) Mean, Std. Deviation Barriers Radiology Department's**

Items	Mean	Std. Deviation	Percentage%				
			Totally don't ready	Don't Ready	Neutral	ready	Totally ready
How prepared the radiology department to conduct training courses in crisis and disaster management to preparedness and emergency teams?	3.28	1.219	10.0	10.0	45.0	12.5	22.5
How prepared the radiology department to establish rapid teams for to preparedness and unexpected e?	3.43	1.217	10.0	10.0	27.5	32.5	20.0
To what extent are authorities prepared a budget for emergency?	3.40	1.355	10.0	17.5	25.5	17.5	30.0
How prepared a staff in the radiology department to the most dangerous natural disasters?	2.62	1.192	20.0	27.5	30.0	15.0	7.5
How prepared the radiology department to the most dangerous natural disasters?	2.35	1.189	25.0	40.0	17.5	10.0	7.5
<b>total</b>			<b>100</b>				

## DISCUSSION

There are a lot of challenges during the Denial Storm crisis in Derna-Libya, with government hospitals. The first challenges included the most challenges faced the radiology department during the Storm Daniel disaster hindered their ability to effectively respond to the increased demand for imaging services during the disaster (OCHA, 2023).

The next challenge which the work force

radiology department doesn't awareness about epidemics being declared in order to activate the early warning and response system for epidemics during the Storm Daniel disaster (UNOSAT, 2023).

Moreover, the challenge that responses rate mentioned to there is no transparent confidential and accurate information systems found during the disaster in radiology department's services. The challenges faced the radiology department encountered by have not any aspects of preparedness for cases as emergency response plans (OCHA, 2023).

In additions, indicate a lack of communication or transparency within the department or were not conducted or widely publicized along with, the awareness about potential risks. The finally challenge, the radiology department needs more essential aspects of preparedness (Fitzgerald, 2023).

Three fundamental subjects were found related to the probability impacts that faced radiology departments during Denial Storm in Derna – Libya:

The study found that there is some uncertainly or lack of consensuses among respondents about department preparedness.

The radiology departments don't ready to about deals with crisis and disaster during the Denial Storm in Derna–Libya.

Respondents answer neutral about the workforces in the radiology department's ready to deal with crisis and disaster in Libya, maybe there are some of them feeling more prepared and others feeling less so.

### ***Implications***

By implementing these preparedness measures, the radiology department can ensure its ability to continue providing essential imaging services and contribute to the overall disaster response efforts. Regular drills, reviews, and updates of the emergency response plans are also essential to maintain readiness for potential disasters (Fitzgerald, 2023).

Based on the results, it seems that there is some uncertainty or a lack of consensus among respondents about the department's preparedness. It may be beneficial to further investigate the specific concerns or areas where improvement is needed (Saieh, 2021). Additionally, considering the neutral response, it could be important for the department to focus on enhancing their training programs for dealing with crises and disasters (OCHA, 2023).

Further information on the specific strategies, resources, and training programs that the radiology department has in place or plans to implement could help in understanding their level of readiness for such events (Alkan & Cilengiroglu, 2022). This may include provisions for backup power, communication systems, disaster response protocols, and ongoing staff training in crisis management (Fitzgerald, 2023).

Ultimately, the data highlights the importance of addressing any potential gaps in preparedness and ensuring that the radiology department is equipped to effectively respond to crises like the Denial Storm (Fitzgerald, 2023).

The current findings offer important lessons for policy makers and leaders for improving future department's preparedness. In addition,

they highlight the importance of developing the primary care system to strengthen preparedness and response to upcoming health crisis and challenges (Alkan & Cilengiroglu, 2022).

There are several limitations in our study. First, the results may not be generalize able to other radiology department, because the study focus only who is workforce in department radiology and students. Second, delay of respondent and include the small number of radiographers and responses to the survey in department radiology and college. The authors highlight caution that the findings may not be generalizable beyond the study sample. Third, our study doesn't find a resource closed to our study that makes compare with similarity and differently others studies is very difficult.

### **CONCLUSION**

The Storm Daniel disaster highlighted the importance of enhancing the preparedness and resilience of the radiology department in Libya to better respond to and manage high alert situations in the future. This may involve investing in additional resources, training staff for emergency situations, and implementing robust contingency plans to ensure that the department can continue to provide vital services during crises. It suggests a potential area for improvement in terms of addressing and communicating about potential health risks related to radiation and disaster response. Therefore, it is crucial for the authorities to establish unified and transparent processes for reporting on the services provided by radiology departments during a disaster. This

will ensure that accurate and timely information is shared with the responsible authorities, leading to better coordination and management of public health services during such critical times.

This lack of awareness and preparedness can lead to delays in implementing crucial interventions and managing the spread of infectious diseases during disasters. Therefore, it is essential for the radiology department to establish clear communication channels and protocols for receiving and responding to epidemic declarations in order to enhance their overall disaster response capabilities.

Qualitative study used, so Future researchers can extend the understanding of this study in other crisis and more sample of radiology department, its practices in response to issue storm Daniel and qualitative method may be get more results.

### **ACKNOWLEDGEMENT**

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### **ETHICS**

The Ethical principles were followed as stated in Belmont Report (Gronowski et al, 2019). An informed consent was signed, and a questionnaire was filled for every participant in the project.

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## الملخص

في سبتمبر (2023) خلال فيضانات مدينة درنه بعد إعصار دانيال، عجز القطاع الصحي ووقفت مستشفيات المدينة حينها مكتوفة الأيدي عن تغطية متطلبات الكارثة. الهدف الرئيسي لهذه الدراسة هو اكتشاف التحديات والعوائق التي واجهت قسم الأشعة حينها. تم توزيع الاستبيان الإلكتروني، وتم الحصول على إستجابة من 40 مشارك (عينة البحث). تم استخدام منظومة الاحصاء الحيوي (إس بي إس إس) لتحليل البيانات وتحليل معامل الاكتشاف (إي إف أي) والتحليل الإحصائي الوصفي (الوسط الحسابي والانحراف المعياري)، استخدمت جميعها لأكتشاف التحديات والعوائق التي واجهت قسم الأشعة في مدينة درنه- ليبيا. بينت النتائج أن معظم التحديات التي واجهت قسم الأشعة خلال كارثة إعصار دانيال أعاققت قدرة الاقسام عن الاستجابة السريعة لتغطية الأحتياج المتزايد لخدمات التصوير الاشعاعي خلال الكارثة. إن مثل هذه الدراسة في مدينة درنه الليبية من شأنها تسليط الضوء عن كثر حول أحتياجات وامكانيات أقسام الأشعة في ليبيا وخاصة عند تزايد احتمالية أو توقع حصول كوارث أو أزمات. ما يؤدي بدوره إلى التطلع نحو الأفضل لوضع خطط محسنة تواجه مثل تلك الكوارث والأزمات. تقتضي الدراسات المستقبلية توسيع وشمولية مفاهيم هذه الدراسة لأدارة أزمات أخرى وينصح بتوسيع عينة البحث بأقسام الأشعة وأختبار مدى الأستجابة من السلطات لتغطية ما خلفته العاصفة دانيال في المدينة.

**الكلمات المفتاحية:** العاصفة دانيال، قسم الاشعة، درنة ليبيا، التحديات، الحواجز.