

A Review of Explosive Ordnance Risk Education: IRAQ as a Case Study

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Abstract: *The Explosive Ordnance Risk Education (EORE) activity is considered one of the most important activities to mine action for humanitarian, which seeks to reduce the risk of injury from explosive ordnance, by raising the awareness of all segments of society according to their various weaknesses, roles, and needs, as well as through promoting behavioral change within the society. The focus of this research is to discuss the criteria and available alternatives for explosive ordnance risk education messages regarding these dangers, in general, in countries that have faced ongoing wars and conflicts, especially Iraq, which is being used, here, as a case study. This is stated by reviewing what was analyzed and covered by various studies and research that have addressed this activity, and showing the scientific importance of these studies, and the possibility of incorporating them with the theories and practices of decision modeling applications. The studies that have dealt with (EORE) activities were reviewed according to the available resources and multiple alternatives, by finding the best ways to preserve the lives of the population in the Hazardous Area (HZA) and educating the communities in the affected countries, especially the target groups of the explosive ordnance risks. Analyzing the importance of compiling studies related to the activities of (EORE) to decision-makers specialized in Mine Action (MA) activities in general and (EORE) activities in particular, under the international supervision of the Geneva International Center for Humanitarian Demining, has been attempted and carried out. However, the use of modeling methods and approaches will, significantly, support the decision-making process to increase awareness among the different categories of affected communities, hence, reaching the highest percentage of the affected population. This, undoubtedly, will lead to (raising the level of awareness, allowing normal activities necessary for social and economic recovery, and benefiting from the efforts of non-governmental organizations in developing policies, and programs for mine risk education.*

Keywords: Mine Action, Explosive Ordnance, Explosive Ordnance Risk Education, Hazardous Area, Criteria, Alternative, Modeling, Iraq

1. Introduction

The Explosive Ordnance Risk Education (EORE) activity is considered as one of the most important activities to mine action for humanitarian, and it is a group of activities that aim to mitigate the risks of death and injury caused by mines and explosive remnants of war, by raising awareness and promoting safe behavior. These activities include the exchange of information with communities at risk, communicating through safety messages to targeted groups, advocating community risk management, and participating in mine action (IMAS, 2010).

The International Mine Action Standards (IMAS, 2021) highlight that the objective of Mines Risk Education (MRE) is to “reduce the danger to a point where people can live safely, and re-create an environment viable for economic and social development away from the constraints imposed by the contaminated area, and it identifies three main activities for (EORE), these are: Public Information Dissemination, Education, Training and Community Communication for Mine Action (GICHD, 2007), (Al-Shukri & Dammak, 2022).

The EORE's activities, by and large, aim at:

- 1) Increasing awareness of the dangers caused by mines and unexploded ordnance and influencing the behaviour

of individuals to help them avoid injuries by changing their behaviour to safe conditions and behaviour.

- 2) Raise awareness in clearly defined areas that require some time to be cleaned of explosives and hazards.
- 3) Allow normal activities necessary for social and economic recovery to be carried out despite the threat of an explosive hazard.

1.1 Research Objective

The goal of decision modeling is to support decision-makers and analysts in their activities by using optimization methods in operations research, and thus optimal use of available resources, and finding the best ways to preserve the lives of the population in hazardous areas, through educating communities in the affected countries, especially the target groups of the (EO), and accordingly, the focus in this research was to discuss the standards and alternatives available to raise awareness of these risks in general, in countries that faced ongoing conflicts, especially Iraq, as a case study, as an initial step for future work aimed at developing a model suitable for Iraq in particular, and for the rest of the countries in general, based on optimization methods in operations research.

1.2 Research problem

Not using quantitative and descriptive methods to pave the way for using decision modeling methods in EORE activities

Volume 11 Issue 8, August 2022

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according to available resources, and multiple alternatives, by benefiting from a review of studies that dealt with this activity.

1.3 Studies Related to Explosive Ordnance Risk Education (EORE) Activity

With the increasing interest in the activities of Mine Action (MA), including the activity of (EORE) and the prominent role it plays in the lives of societies and economies of countries that have suffered, and are still suffering from wars and conflicts, a number of studies and research have been conducted by specialists in this area, among which we reviewed the research which dealt with some of the criteria and alternatives communicated and related to (EORE) activity.

The researcher Filippino has demonstrated the role of mine risk education programs and the need to integrate social and economic data and analysis in planning awareness programs, and setting priorities for the purpose of evaluating programs, as well as delivering awareness messages to targeted groups, and covering the largest proportion of hazardous areas, using awareness messages (information, from child to child, prepare society leader and social media). Greater links, however, must be established between the mine action and development community in order to share resources and help targeted groups living under the specter of mine contamination (Filippino, 2000).

Hanbury has developed and established a set of ideas and guidelines to help children from the dangers and polluted areas of how to avoid these risks, and encourage the rest of society to follow the same approach. The purpose of these ideas is to improve and support the care provided by older children to their younger brothers and sisters, due to their strong impact on peers, parents, and even the communities in which they live, and share information in schools as well as child-to-child (Hanbury, 2001).

A study conducted by the United Nations High Commissioner for Refugees (UNHCR), in which a set of basic concepts, training lectures and case studies were presented on explosive ordnance risk education that children are exposed to, with the aim of modifying their behavior to reduce the risk of being killed or injured, as well as the role of non-governmental organizations in developing mine risk education policies and programs (UNHCR, 2001).

Durham et al., presented an empirical study of MRE practices using data collected during the implementation of the MRE program. The study showed that common MRE programs that use top-down educational methods, based on the assumption that ignorance of the explosive ordnance risks is the main factor that causing mine accidents is insufficient, and the program notes that there is a need to complement or replace current common MRE practices with techniques that include an understanding of the economic, social, and political conditions faced by at-risk communities (Durham et al., 2005).

A group of international organizations sponsored by the United Nations International Children's Emergency Fund

(UNICEF) presented an assessment of MRE, with the aim of helping prioritize limited resources to strengthen and develop a results-based monitoring and evaluation system, using qualitative methods through personal interviews, and relying on international best practices guidelines for evaluating this activity, and that the print media and social media which aim to reach larger groups of beneficiaries, is the appropriate and effective context for raising awareness, thus requires a new approach to awareness with a focus on specific actions that include reviewing activities and messages to ensure that they are appropriate, realistic, and reaching the target groups (UNICEF, 2008).

Baaser and others, in their study, highlighted the importance of MRE to educate the target groups, and the role it plays in mine action activities. This is in addition to researching its impact and measuring its effectiveness through the actual benefits of the at-risk groups, which is the most important matter that the international mine action community was quite slow in clarifying them. The awareness messages develop and focus on practical alternatives as means of supporting the right motivations to reduce the likely risk. These alternatives, for example, are (society mapping, posted signs, from child to child, etc.), together with identifying their priorities, besides, the study has recommended the continuation of the awareness of the explosive ordnance risks, and improvement of this awareness to meet the needs of the target groups (Baaser et al., 2009).

Hue mainly researched the process of planning and developing MRE campaigns through the application of community communication theories, linking theories of changing attitudes and behavior in health communication, implementing awareness programs and awareness messages (from child to child), and other messages. This study made an effective contribution to awareness raising, specifically communication campaigns to save the lives of mine-affected populations (Hue, 2018).

The study presented by the Geneva International Center for Humanitarian Demining (GICHD) clarified that the main objective of communicating safety messages is to reduce injuries and deaths caused by mines and remnants of war, and that must reach the target groups and be characterized by social acceptance and relevant. Such awareness messages can be delivered through interpersonal communication, information, television, radio, theatre, or from child to child (GICHD, 2014b).

Scapolla & Cepolina presented a type of MRE message, a radio (Billy goats). This tool allows awareness workers to write and produce short educational drama series that are broadcast live and reach the target groups. The radio system (Billy goats) consists of four Basic components (technical equipment, radio broadcast drama and series, live roving shows and group discussions). This system was tested in the Sahrawi refugee camp, and the research focused on the concept of recreational education, which is a combination of education and entertainment and the use of the message (radio) as a main communication source. The evaluation of this method is through a series of questionnaires, which turns out that this type of message has been well received by the target groups in desert places, where it is difficult to spread

awareness messages, and that it is economically plausible, and relevant for all segments of the target society (Scapolta & Cepolina, 2014).

The GICHD Centre presented a study on evaluating the work of EORE activity, capabilities, coordination and resources for this activity, as well as its performance in light of the new threats and potential needs arising from the massive increase in the number of civilian casualties, and population displacement due to explosive ordnance. The ability of the activity to plan effectively for its needs, as the study was relied on the quantitative approach to evaluate this activity and focus on the outputs rather than the results. The study, however, focused on the need to use the quantitative and qualitative approaches to achieve balance and take appropriate decisions to improve the performance of the EORE activity (GICHD, 2019).

The United Nations Mine Action Service (UNMAS) presented a study on mine action activities, including the EORE activity by providing indicative evidence through data collection and field tours, and indicated that successful awareness is based on understanding practices and beliefs through the availability of standards in awareness messages, including that they are persuasive and relevant, and the use of messages that include radio and television means, posted signs, and sports activities, to deliver them to the target groups of all segments of society (UNMAS, 2019a).

UNMAS referred in this study to the (P-Process) process, which is a framework used to design strategic communications to promote behavior change, and it consists of five steps (analysis, strategic design, development and testing, implementation and monitoring, evaluation and development), and this study only addressed three steps, namely; (analysis, strategic design and a small part of development), where awareness messages are analyzed by comparing the messages used and the messages supposed to be used (posted signs, video clips, radio, resource allocation, etc.) to deliver awareness messages to all groups (the target), in addition to political, economic, social and cultural analysis, to understand the general context of the study sample, and that this process represents a framework for monitoring and evaluation to measure the extent of progress in this activity, and thus will reduce civilian casualties of the dangers of Explosive Ordnance (EO) (UNMAS, 2019b).

The Asian Regional Mine Action Center (ARMAC) of the Association of Southeast Asian Nations submitted a research project to develop an integrated approach to improve EORE for affected communities of ASEAN member states. Awareness of risks for the affected communities according to the aggregated measures of support, and relying on the theories and concepts related to the activity, and lessons are taken from highly polluted areas, as well as international standards and new developments for this activity. Hence, reducing human casualties in these societies (ARMAC, 2020).

Boyd and others presented a new approach to measuring behavior change resulting from (EORE) activity, by using a combination of qualitative and quantitative survey methods, using a measurement matrix. The result was positive, as it

increased confidence among the target groups, and workers in the field of (MA), and also on (EORE) workers to gain a more understanding of the needs of the target groups, and use the information to improve work by reaching these groups and identifying the best awareness messages, to reduce the risks of EORE (Boyd et al., 2020).

GICHD presented a study to assist EORE workers in their search for how to address challenges and analyze needs that have emerged in conjunction with the (COVID-19) pandemic, showing new techniques and methodologies used in implementing and monitoring activity-related interventions, in response to three main challenges (improvised explosive devices risk education, awareness of risks in complex urban environments, areas that are difficult or inaccessible). It also included case studies of several countries, including Iraq, in which it showed the awareness messages used (posted signs, television, radio, social media) and their reach to the target groups, which are economically plausible. Most of them are available for free on Google and other platforms, and the study indicated the use of the latest technologies in raising awareness of them (virtual reality glasses, talking devices, beekybox, robots, and many other technologies). However, it found that there is a wide range of low-cost digital tools that can assist EORE workers to reach target groups that reaching them is dangerous or non-existent, as well as in emergency situations such as the (COVID-19) pandemic (GICHD, 2020).

Loman aims to generate information about the knowledge of the target groups for EORE and their practices, and to examine the effectiveness of the awareness activity through the use of the knowledge, attitudes, and practices (KAP) model to analyze the effectiveness and the use statistical analysis program (SPSS) to determine to what extent the awareness activities have increased the level of awareness. knowledge influenced behavioural change among beneficiaries. The researcher concluded that awareness-raising activities led to an increase in the level of knowledge of the target groups (Loman, 2020).

Valencia et al. examined the data analysis of Explosive Ordnance (EO) and explosive victims, conducted by the Fondation Suisse De Deminage (FSD) to show lessons learned for the years (2012-2019), using the EORE statistics depository and activities and Explosive Ordnance (EO) databases. Such analysis has included the number of people who receive awareness messages through social media, as well as the training of those working in this activity, and the correlation between (EORE) activities and the annual number of victims was analyzed. The analysis indicated that the relationship between EORE activities and the number of casualties is only quantitative, while qualitative studies are also required to ascertain whether the expected change in behavior has been achieved through methodologies that were previously implemented in countries affected by ordnance and explosive materials, and the methodology for setting priorities for target groups is one of the main challenges that is constantly affected by economic, social and security conditions (Valencia et al., 2020).

Fletcher & McGrath conducted a barrier analysis survey and analysis of the results, to determine the constraints faced by the target groups in adopting behaviors related to EO and to implanted mine. The analysis was done by means of surveys designed to improve understanding of the factors that affect certain behaviors, as it includes a set of questions about personal, social, and environmental factors, to be analyzed. Through this analysis, the researchers found that young people who are less aware believe that EO incidents are more likely to lead to serious consequences, while their friends who encourage unsafe behaviors are more likely to engage in less safe behaviors than their peers, and these findings led to the need to design awareness messages that promote safer and less risky behaviors, in addition to encouraging friends among themselves to spread awareness messages that are realistic and socially acceptable (Fletcher & McGrath, 2021).

Kryvova indicated that (EORE) is the only applicable pillar in the field of mine action for humanitarian, and presented the project adopted by the Swiss Organization for Demining Specialist (FSD) for developing methods to target the population living in areas that are not under government control, through the use of types of awareness messages (such as; protection processes, media folders and posters, resource allocation and other alternatives). Nonetheless, due to the (COVID-19) pandemic and the restrictions of the health bans, digital awareness messages have been directed towards (social media such as facebook advertisements) and the design of a page entitled (without mines (Bez Mine) in

Albanian to display messages and videos of (EORE) messages, and how to report and deliver (EO) in an appropriate and understandable manner to cover the largest geographical area. This is, by and large, the most effective method in terms of being economically acceptable, and this type of message delivery is less effective. When the target audience is the elderly or young children under the age of twelve, and digital means are less effective in areas with poor internet connectivity or low Mobile data coverage. Therefore, the continuation of alternatives represented by social media campaigns are critical to raising awareness and promoting safe behavior in the targeted communities for mine risk reduction (Kryvova, 2021).

After this extensive presentation of previous studies, we find that most researchers in this field have worked with methods away from mathematical modeling and decision-making models of operations research, to support decision-makers in the field of Mine Action in general and in the field of EORE activities in particular. Hence, the importance of this paper is to cover the gap in previous research, where the researchers worked on defining some of the criteria for awareness messages as in Table (1), and some alternatives represented in secondary awareness messages as in Table (2) which were referred to in previous studies, and accordingly researchers would like to adopt all these criteria and the alternatives in one prospective applied research study that would be used as an integrated reference for the rest of the researchers in this field.

Table 1: EORE Activity Message Standards

Criteria	Understandable	Socially Acceptable	Relevant	Realistic	Persuasive	Geographically Coverage	Reaching Targeted Groups	Economically plausible
Researcher Name, Year								
(Filippino, 2000)						✓	✓	
(Hanbury, 2001)			✓				✓	
(UNHCR, 2001)	✓	✓						
(Durham et al., 2005)				✓			✓	
(UNICEF, 2008)			✓	✓		✓	✓	
(Baaser et al., 2009)							✓	
(GICHD, 2014b)		✓	✓				✓	
(Scapolla & Cepolina, 2014)			✓				✓	✓
(Hue, 2018)							✓	✓
(GICHD, 2019)	✓	✓	✓		✓		✓	
(UNMAS, 2019a)			✓		✓		✓	
(UNMAS, 2019b)	✓						✓	
(ARMAC, 2020)				✓	✓	✓	✓	
(Boyd et al., 2020)							✓	
(GICHD, 2020)							✓	✓
(Loman, 2020)							✓	
(Valencia et al., 2020)						✓	✓	
(Fletcher & McGrath, 2021)		✓		✓			✓	
(Kryvova, 2021)	✓					✓	✓	✓
Our Research	✓	✓	✓	✓	✓	✓	✓	✓

Source: Prepared by the author

Table 2: EORE activity message alternatives

Alternative Researcher Name, Year	Information	Resource Allocation	Society Mapping	Protection Processes	Child to Child	Prepare Society Leaders	Sport Messages	Radio	Posted Signs	Friend to Friend	Music	T. V	School	social media	Video	Training of Volunteers	Release of Cleared Land	Lectures and Seminars	Support of Survey and Mine Clearance	Theater
(Filippino, 2000)	✓				✓	✓								✓						
(Hanbury, 2001)			✓	✓	✓								✓							
(UNHCR, 2001)				✓					✓									✓		
(Durham et al., 2005)									✓										✓	
(UNICEF, 2008)	✓												✓	✓						
(Baaser et al., 2009)		✓	✓	✓	✓				✓											
(GICHD, 2014b)	✓				✓			✓				✓	✓							✓
(Scapolla & Cepolina, 2014)								✓							✓					
(Hue, 2018)				✓	✓			✓				✓	✓							
(GICHD, 2019)	✓			✓				✓				✓	✓	✓						
(UNMAS, 2019a)							✓	✓	✓			✓	✓	✓						
(UNMAS, 2019b)		✓						✓	✓			✓		✓	✓					
(ARMAC, 2020)												✓								
(Boyd et al., 2020)					✓															
(GICHD, 2020)								✓	✓			✓		✓	✓					
(Loman, 2020)									✓											
(Valencia et al., 2020)								✓						✓						
(Fletcher & McGrath, 2021)										✓										
(Kryvova, 2021)	✓	✓											✓	✓						
Our Research	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: Prepared by the author

Iraqi Mine Action Program

The explosive ordnance (EO) in Iraq was largely concentrated in the southern governorates, which include major minefields on the Iraqi-Iranian border, which dated back to long wars and conflicts. Thus, Iraq has a large legacy of munitions, EO pollution as a result of years of internal and external armed conflict from the past years until our present time, which made it at the highest levels of pollution in the world, and thus Iraq became a large field in which various types of land mines (anti-personnel mines, anti-tank mines) were planted, which affects the daily life of individuals and societies as well as development and reconstruction projects at all levels. Iraq faces several challenges to get rid of explosive ordnance, including (lack of financial resources, lack of human resources compared to

the volume of pollution, lack of modern techniques used in detecting and removing mines, loss of records and maps of mined areas, lack of international support, lack of international and local experts, ... etc.)(Cyprus, 2012; DMA, 2017; UNMAS, 2011).

The body responsible for this entire file is the Department for Mine Action (DMA), which was established in 2003 under the name of the National Mine Action Authority (NMAA) within the formations of the Ministry of Planning, and in 2008 its name was changed to the Department of Mine Action (DMA) and transferred to the Ministry of Environment. DMA consists of the regional centers, as shown in Table (3) and Figure (1) and(2):

Table 3: The National Authority and the Regional Centres of the Iraqi MineAction

Responsible provinces	code	Regional centre name
Erbil, Dohuk, Sulaymaniyah, Halabja	IKMAA	Iraqi Kurdistan Mine Action Agency
Anbar, Diyala, Salah al-Din, Kirkuk, Nineveh	RMAC-N	Directorate for Mine Action/ Regional Mine Action Centre-Northern
Baghdad, Wasit, Babylon, Karbala, Najaf, Diwaniyah	RMAC-ME	Directorate for Mine Action/ Regional Mine Action Centre-Middle Euphrates
Basra, Maysan, DhiQar, Muthanna	RMAC-S	Directorate for Mine Action/ Regional Mine Action Centre-Southern

Source: (DMA, 2017, 2018)

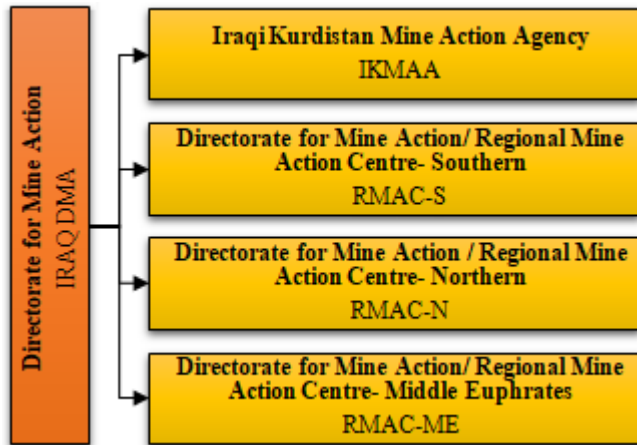


Figure 1: Iraqi Mine Action Centres

Source: Prepared by the author based on(DMA, 2017, 2018).

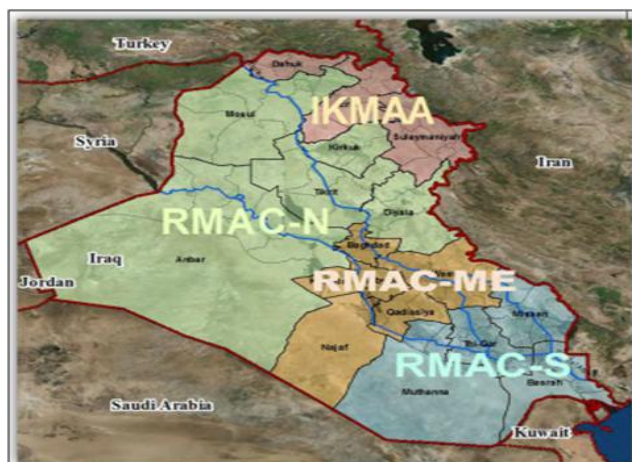


Figure 2: Mine Action Regions

Source: (DMA, 2017)

The bodies responsible for the three stages (decision, supervision, implementation) of each of the (DMA) and (IKMAA) are shown as in Table(4):

Table 4: The bodies responsible for the stages of the Iraqi mine action program

Entities responsible for the stages of the Iraqi Mine Action Program			Iraqi Mine Action Program
Implementation Phase	Supervision Stage	decision stage	
Ministry of Defense, Ministry of Interior, national and international organizations and national and international companies	DMA	The Higher National Committee for Mines / Iraqi Council of Ministers	DMA (RMAC-N, RMAC-ME, RMAC-S)
IKMAA ,General directorates in the governorates, national and international organizations, national and international companies	IKMAA	Council of Ministers in the Kurdistan Region of Iraq	IKMAA ¹

Source: Prepared by the researcher based on(DMA, 2017).

¹The information was obtained through the researcher's visit to (IKMAA) in the Kurdistan Region of Iraq - Erbil

From the above table, it is noted that (IKMAA) performs the two phases of supervision and implementation, while (DMA) performs the phase of supervision only.

Several agencies implement the mine affairs program in Iraq (mine action activities in Iraq), including government agencies or the so-called national effort represented by the {Iraqi Ministry of Defense / Directorate of Military Engineering}, {Iraqi Ministry of Interior / Directorate of Civil Defense, Directorate of Explosive Control The Border Forces Command, the Federal Police Command} which organizes their work and tasks in coordination with (DMA) by means of the documented process organizing the works and defining roles and responsibilities (DMA, 2018), of these related organizations, being national and/or International. Hence, all of these organizations that are delegated by the (DMA) cooperate in the field of stability, security and humanitarian aid (Mogherini, 2018).

Mine action activities in Iraq are subject to a set of National Mine Action Standards (NMAS) derived from International Mine Action Standards (IMAS), with modifications in some of its paragraphs as required by the work environment in Iraq. The standards are playing an important role in guiding and setting consistent principles and methodologies for conducting mine action activities. Iraq is also bound by international conventions and treaties on mine action, as a member of each of the following conventions and treaties(Al-Shakrawi & Al-Awadi, 2016; DMA, 2017; GICHD, 2014a; Maslen, 2001; UN, 2008).

- The Ottawa Anti-Personnel Mine Ban Convention or Mine Ban Treaty (AP MBC), which prohibits the development, production, use, transfer and stockpiling of anti-personnel mines.
- Convention on Cluster Munitions/Oslo(CCM).This convention prohibits the development, production, use, transfer and storage of cluster munitions.
- Convention on Conventional Weapons (CCW) Carrying Concealed Weapons, banning weapons that would inflict casualties and cause undue suffering on combatants.
- Convention on Rights of Persons with Disabilities (CRPD), which is to enable persons with disabilities to exercise their rights, and to ensure their active participation in cultural, social, economic and political life.

Figure (3) shows a chart of EORE activities in hazardous areas, which was prepared by the author based on the EORE report issued by DMA/IMSMA (Information Management System for Mine Action) in cooperation with the Geneva International Centre for Mine Action.

As for Figure (4), it shows the flow chart of the EORE activity in the DMA, which is applied throughout Iraq. This chart summarizes the stages that this activity goes through, starting with the issuance of work orders, and ending with filling out the field awareness form. That said, when a case of notification of locating a dangerous area, by the beneficiaries, occurred, the process of delineating this dangerous area is carried out and the practice of filling the form is completed and to be sent to DMA. Meanwhile, in case there is no notification being received, the awareness

work is completed by conducting lectures, posted signs, resource allocation. Otherwise, a report is prepared and sent, in which the DMA is informed of the purpose of conducting

survey work, in the case of the staff have not been trained on non-technical survey(NTS) work.

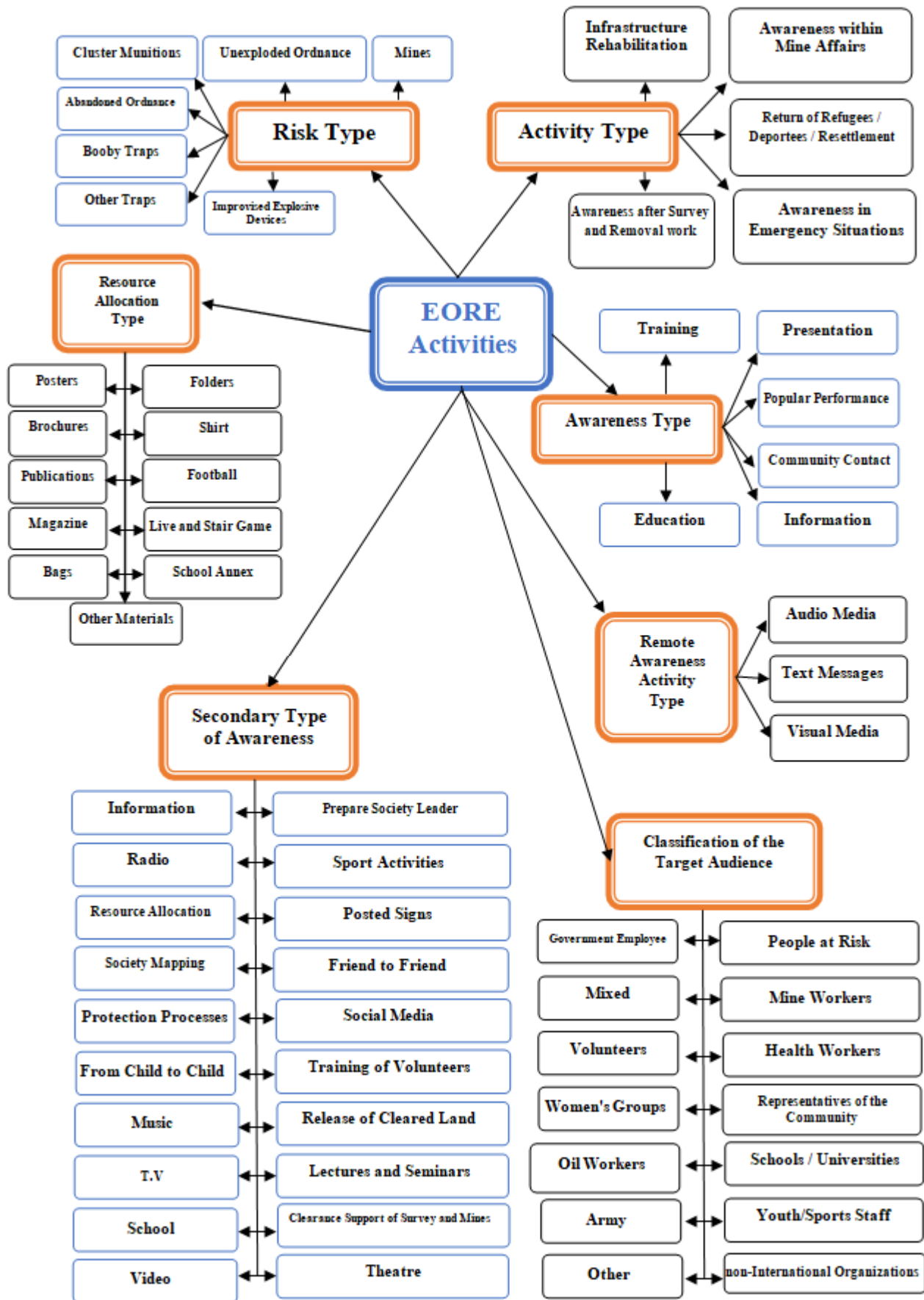


Figure 3: Outline of EORE Activities in the IMSMA form
Source: DMA/ Data base (IMSMA)

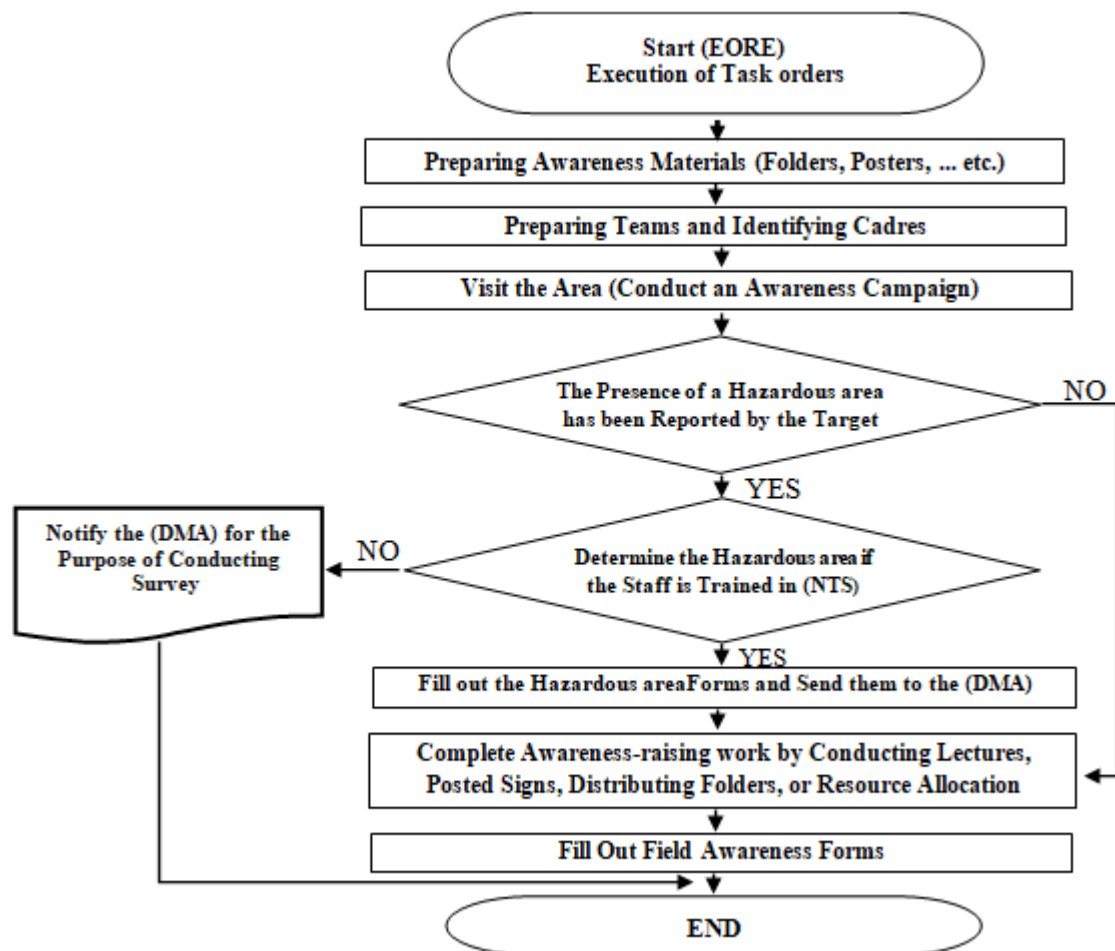


Figure 4: Explosive Ordnance Risk Education (EORE) Activities Flow Chart in Iraq

Source: Prepared by the researcher in cooperation with the Planning and Information Department at (DMA)

2. Limitations of the Present Study

Among the most important limitations of the study that faced the author/researcher are:

- 1) This activity is linked with most of the mine action (MA) activities, which caused confusion and required great efforts were made by researchers.
- 2) Most of the research on this activity are huge studies that required researchers to understand, comprehend and summarize them, which in turn demanding of a significant time and effort.
- 3) Continuous updates of the International Standard (IMAS 12.10) for the activity of (EORE), as this required a lot of efforts and time, by the author, to translate the International Standard on Mine Action (EORE 12.10) and the Technical Note (IED) (12.10/01) into Arabic, this was completed and submitted to the DMA in Baghdad for the purpose of sending it to the Geneva International Center for Humanitarian Demining (GICHD).

Acknowledgements

The researchers (authors) extend their deep thanks to the Geneva International Center for Humanitarian Demining (GICHD), the Department of Mine Affairs in Iraq (DMA) and (IKMAA), for providing a helping hand to the researchers/authors by providing the necessary information for completing this research. Last but not the least, we do

thank everyone who helped us or contribute to the accomplishment of this humble work.

3. Conclusions and Future Work

- 1) EORE is considered one of the most important mine action activities. It is vital in order to mitigate the danger to the extent that people can live safely, and re-create an environment viable for economic and social development away from the restrictions imposed by areas contaminated with EO.
- 2) Indicating the importance of compiling studies related to the activities of (EORE) for decision-makers concerned with the activities of (MA) in general, and the activities of (EORE) in particular, under the international supervision of the Geneva International Centre for Humanitarian Demining.
- 3) The significance of using operations research methods and techniques in modelling the EORE activities, to assist decision makers in optimizing the use of fiscal and human resources that are used in applying the guidelines, and principles of the International Standard for this activity (IMAS 12.10).
- 4) The researchers recommend:
 - a) The need for scientific and professional required approaches to bridge the scientific gap necessary to achieve more realistic analysis, through using modelling methods in operations research, and

hence, to educate the largest possible number of target groups for EORE in hazardous areas, in an effective manner.

- b) Benefit from studies published by specialists in the field of (MA) to develop policies and work programs for MRE.
- c) Depending on the results derived from Table (1) and (2), the researchers/authors would like to recommend a more applied research work should be conducted, in the near future, by preparing a mathematical model that includes (8) criteria as shown in table (1) and (20) alternatives indicated in table (2), in order to fill the research gap identified by the conducted literature review.

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