APPLYING EPIDEMIOLOGY TO THE FIELD OF MINE ACTION

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By adopting some steps that epidemiologists use to study the health conditions of communities, mine action officials are gaining new insights into the direct and indirect public health consequences of landmines and unexploded ordnance. However, much remains unknown. The authors, two U.S. epidemiologists, argue that surveillance efforts need to be expanded and data collection made more consistent.

The public health impact of landmines and unexploded ordnance (UXO) on civilian populations has been well documented.[1-9] Landmines and UXO cause death, injury, and disability, but there are indirect public health consequences for civilian populations as well. In areas with large numbers of landmines and UXO, indirect health consequences can include long-term psychological effects, population displacement, and limited access to clean water and arable farmland, which can lead to heightened risk of disease transmission and malnutrition. Landmines and UXO can also impose a significant financial burden on families, health institutions, and communities.

We still have much to learn about the impact of landmines and UXO on the health status of conflict-affected populations. For instance, we do not know precisely how many people are injured or killed by landmines and UXO each year; we do not know what behaviors or characteristics put people at risk for injury or death from landmines and UXO; and we do not know whether prevention activities such as mine-risk education are effective.

We can begin to find answers to these questions by introducing some of the principles of applied epidemiology, the scientific basis of public health practice, into the field of mine action. By applying basic epidemiology, the public health community has developed an approach that has been successful in preventing other injury-related public health problems such as suicides and road traffic injuries.[10-12] Using the same approach in the field of mine action could provide the scientific rigor needed to address some of the field's unanswered questions, which could ultimately lead to greater success in preventing deaths, injuries, and disabilities caused by landmines and UXO.

The science of epidemiology involves the study of health conditions, such as disease and injury, among populations rather than among individuals. One goal of applied epidemiology is to determine the effects of a health condition on a population. To develop successful prevention strategies, epidemiologists collect and analyze data to answer the following basic questions:

- Who is affected by the health condition?
- Where geographically is the health condition occurring?
- When is the health condition occurring?
- How or why did a person get the health condition?

Epidemiologists move from questions to answers by using an approach that involves four critical steps: (1) determining the magnitude, scope, and characteristics of the problem; (2) studying the factors that increase the risk of disease, injury, or disability, and determining which factors are potentially modifiable; (3) assessing what can be done to prevent the problem by using the information about causes and risk factors to design, pilot test, and evaluate interventions; and (4) implementing the most promising interventions on a broad scale.[4]

The mine action community has adopted several of these critical steps. Surveillance systems have been developed in several settings, providing useful information on the magnitude of landmine and UXO injuries there. However, these surveillance systems are often limited in scope and are inconsistently implemented. Most landmine and UXO injury surveillance systems are hospital-based and do not cover people killed or injured who never reach the hospital.

Although collecting data on landmine-related injuries and disabilities is difficult in conflict-affected countries, we must expand the scope of current surveillance efforts by providing additional data from community-based surveillance systems and periodic cross-sectional surveys. We must also make sure that surveillance data are collected in a consistent manner that will allow comparisons across countries. Consistency in data collection could be achieved through the development and adoption of minimum datasets, which would provide standardized epidemiologic data collection instruments and definitions. Some effort has already been made to develop standardized data collection tools, but these instruments have not been adopted universally.[13, 14]

Determining those factors that increase the risk of injury is the second critical step in a public health approach to landmine and UXO injury prevention. Epidemiologic methods, such as case-control studies, can be used to identify potential risk factors for landmine and UXO injury and death. These studies can be conducted at individual and community levels to determine what behaviors or characteristics of individuals or communities put them at higher risk for injury or death. Public health agencies such as the Centers for Disease Control (CDC) and the World Health Organization (WHO) can conduct some of these studies, but it would be better if public health practitioners within the mine action community itself could help conduct these studies.

The public health approach also involves the evaluation and implementation of effective prevention programs. There are strategies currently in place, such as mine-risk education programs, that have not been rigorously evaluated. As a result, the effectiveness of these programs to decrease landmine and UXO injuries is unknown. By applying epidemiologic methods, prevention efforts, such as mine-risk education programs, could be systematically evaluated. For instance, communities where a mine-risk education program has been implemented could be compared with other communities where the program has not been implemented. This comparison strategy, which has been used successfully to evaluate other injury-prevention programs, could demonstrate whether the number of landmine and UXO injuries were reduced in the community that implemented the education program.[15, 16] Then, if the prevention program was found to be effective, public health practitioners could assist in widespread dissemination and implementation of the program.

Public health professionals can assist the mine action community in applying epidemiologic methods to the prevention of landmine and UXO injuries, and they can also train mine action personnel in basic epidemiology to begin applying these methods themselves. In October 2003, CDC and the United Nations Children's Fund (UNICEF) collaborated in conducting a Field Epidemiology for Mine Action Course (FEMAC). This course provided 25 mine action professionals with basic training in field epidemiology methods. The topics covered in the two-week course included basic concepts in epidemiology, survey design, surveillance, program evaluation, use of data for decision making, and data presentation. The participants also received training in EpiInfo 2002, a software package for epidemiological data collection and analysis. CDC and UNICEF plan to conduct the course on a regular basis to train mine action professionals in applied epidemiology and to promote the systematic development of effective landmine and UXO injury prevention programs.

The field of mine action faces many challenges in preventing injuries and deaths from landmines and UXO. The application of basic epidemiologic methods can provide the mine action community with cost-effective tools for meeting these challenges.

By thoroughly describing the problem, accurately identifying risk factors, and effectively targeting and evaluating prevention measures, we can lessen the impact of landmines and UXO on civilian populations. ◉

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