3.3 Health Problems

Trainer's Note

Session at a Glance:

Content	Activity	Time
1 Introduction	Brief Oral Presentation	5 minutes
2 Recurrent problems	PPT presentation with plenary discussion	40 minutes
3 Death rate analysis, calculation and uses	Individual exercises with analytical review using short case study analysis	40 minutes
4 Conclusions	Brief Oral summary of main points	5 minutes
		Total Session Time: 90 minutes

Required Materials: 3.3 PPT set, and handout copies of the 2 short background papers "Communicable Diseases Following Natural Disasters" and " Mullahs, Mountain Tops, and Mortality: Creative Demography in Refugee Emergencies" by Brent Burkholder, attached to the end of this trainer's note.

Trainer's Notes:

1. Introduction

This session on emergency health, like the other "problem" sessions, is intended to show the types of recurrent problems that seem to persist in disaster-affected, and particularly, refugee camp populations. Explain that the point of these "problem" sessions is to show very practical ways to address these problems in a realistic rather than theoretical way. The Sphere guidance that follows in the next session can then be discussed as "solutions".

If you are not a doctor, nurse, or other public health professional, it is critical that you read through the background material and Sphere chapter very closely and explain your "tour guide" status to the group. If there are expert doctors, epidemiologists, or public health practitioners in the group, work closely with them to help explain the more technical areas of the presentation. This material should be readily understood by generalists, and usually presents no real problems in understanding, given enough time to talk things through. The Sphere & Health Action session (session 3.4) that follows is more technical in nature and requires a more careful preparation and field experience with emergency health programs.

2. Recurrent Problems

Using the PPT slides # 2 – 23 prepared for this session, present each problem and provide examples from your own experience to fill out each problem in greater detail. If there are people in the group who have seen illustrations of these problems, ask them to contribute them to the discussion as you cover each problem, rather than waiting until the end. Remind the group that these are only representative problems, and that there are many others that are also common. The only way to get to the bottom of these in actual responses, of course, is through more in-depth assessment and full participation of the affected people in the response. At the end of this presentation ask if any participants have experienced other types of problems in relations to emergency health programs.

If there is adequate time, distribute the handout excerpt of the WHO paper "Communicable Diseases Following Natural Disasters". Ask the participants to review it and compare what they have read to the presentation you have just given. Ask them to be ready to answer the 3 questions at top of the handout.

The presentation generally follows the background reading provided for this section. Remind the participants that a description of each problem and corresponding solutions are to be found in the background reading as well as the Sphere book. The last 2 problems deal with understanding the death rates both crude mortality rates (CMR) and the under 5 death rate. The exercises that accompany these problems set the stage for the longer discussion about the meaning, use, and limitations of these indicators in the next part of the presentation as well as in the Sphere and Health Actions session that follows.

3. Death rate analysis, calculation and uses

This part of the presentation (slides # 24-26) is based on the last two problems presented in the "health problems" PPT series. The PPTs will guide you through the meaning and math required to produce both the crude and under 5 mortality rates. In each case take time to allow each participant to work through the math individually before revealing the correct answers.

After the participants are familiar with the mechanics of calculating the death rate, use the prompt from the PPT to refer them to the short paper by Brent Burkholder (an old paper, but still very informative!) on analysis of death rates. People usually require about 10 minutes to read and digest this short piece. After everyone has read through the article ask the following questions to facilitate a discussion about the uses, biases, and limitations of death rates as indicators for health systems in disaster response:

Q. What is the management value of the CMR as an indicator of health systems in mass displacement emergencies such as refugee or IDP camps?	A. It is the ultimate indicator of real impact - death, specifically excess mortality.
Q. What is the most difficult number in the death rate calculation to accurately determine?	A. Finding the true total population is often very difficult to establish
Q. What types of bias may be inherent in the reporting of these numbers?	A. Deaths may be hidden by beneficiaries to preserve larger distributions. B. Deaths may be under-reported by those with out adequate means of registering and or counting total deaths C. The mortality rates may be vastly skewed depending on the total population figures used.
Q. What are the limitations of using CMR as an indicator?	A. It comes late; more predictive indicators would allow you to avoid excess mortality. B. Often the number is faulty since the total population number required in the denominator is often not known, or agreed upon. C. The cause of the deaths is also extremely important in order to address problems of excess mortality.

4. Conclusion

There are recurrent problems associate with mass displacement emergencies where crowding, lack of food, and inadequate water and sanitation are the norm. These problems are often considered "medical" problems and are addressed by health programs. In actuality, if water, food, sanitation, and shelter sectors are adequately addresses, the health sector is relatively manageable - the primary areas being curative care of specific cases and immunization campaigns against communicable diseases. The Sphere materials in this chapter represent some of the more agreed-upon findings from many situations around the world. The following session will explain some of the specific guidance provided by Sphere in running emergency health programs.

HANDOUT 1

The short excerpt is from the WHO paper "Communicable Diseases Following Natural Disasters"

WHO/CDS/NTD/DCE/2006.4

Further information is available at:
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Instructions: Read the short excerpt from the paper below and be ready to answer the following questions:

Q1 – What are the main health issues following major disasters?

Q3 – What are the primary causes?

Q3 – Do these health problems arise from the disaster itelf, or from early failures of the humanitarian response to those disasters?

1. Assessing the risk of communicable diseases

1.1 Communicable diseases associated with natural disasters

The sudden presence of large numbers of dead bodies in disaster-affected areas can heighten expectations of disease outbreaks, despite the fact that dead bodies do not pose a risk of outbreaks following natural disasters. Rather, the risk of outbreaks is associated with the size, health status and living conditions of the population displaced by the natural disaster. Crowding, inadequate water and sanitation, and poor access to health services, often characteristic of sudden population displacement, increase the risk of communicable disease transmission. Although the overall risk of communicable disease outbreaks is lower than often perceived, the risk of transmission of certain endemic and epidemic-prone diseases can increase following natural disasters.

1.2 Waterborne diseases

Diarrhoeal disease outbreaks can occur following contamination of drinking-water, and have been reported following flooding and related displacement. An outbreak of diarrhoeal disease post flooding in Bangladesh in 2004 involved more than 17 000 cases, with the isolation of *Vibrio cholerae* (O1 Ogawa and O1 Inaba) and enterotoxigenic *Escherichia coli*. A large (>16 000 cases) cholera epidemic (O1 Ogawa) in West Bengal in 1998 was attributed to preceding floods, and floods in Mozambique in January–March 2000 led to an increase in the incidence of diarrhoea.

The risk of diarrhoeal disease outbreaks following natural disasters is higher in developing than in developed countries. In Aceh Province, Indonesia, a rapid health assessment performed in the town of Calang two weeks after the December 2004 tsunami found that 100% of the survivors drank from unprotected wells, and that 85% of residents reported diarrhoea in the previous two weeks. In Muzaffarabad, Pakistan, following the 2005 earthquake, an outbreak of acute watery diarrhoea occurred in an unplanned, poorly-equipped camp of 1800 persons. The outbreak involved over 750 cases, mostly adults, and was controlled following the provision of adequate water and sanitation. In the United States, diarrhoeal illness was noted following hurricanes Allison and Katrina, and norovirus, *Salmonella*, and toxigenic and nontoxigenic *V. cholerae* were confirmed among Katrina evacuees.

Hepatitis A and E are also transmitted by the faecal–oral route, in association with lack of access to safe water and sanitation. Hepatitis A is endemic in most developing countries, and children are exposed and develop immunity at an early age. As a result, the risk of large outbreaks is usually low in these settings. In endemic areas, hepatitis E outbreaks frequently follow heavy rains and floods; it is generally a mild, self-limited illness, but in pregnant women case-fatality rates can be up to 25%. Clusters of both hepatitis A and hepatitis E were noted in Aceh following the December 2004 tsunami.

Leptospirosis is a zoonotic bacterial disease that is transmitted through contact of the skin and mucous membranes with water, damp vegetation, or mud contaminated with rodent urine. Infected rodents shed large amounts of leptospires in their urine. Flooding facilitates the spread of the organism due to the proliferation of rodents and the proximity of rodents to humans on shared high ground. Outbreaks of leptospirosis occurred in Taiwan, China, associated with Typhoon Nali in 2001, and following flooding in Mumbai, India, in 2000.

1.3 Diseases associated with crowding

Measles and the risk of transmission in the disaster-affected population is dependent on the baseline vaccination coverage rates among the affected population, and in particular among children aged <15 years. Crowded living conditions, as is common among people displaced by natural disasters, facilitate transmission and necessitate even higher immunization coverage levels to prevent outbreaks. A measles outbreak in the Philippines in 1991 among people displaced by the eruption of Mt. Pinatubo involved more than 18 000 cases. In Aceh following the tsunami, a cluster of measles involving 35 cases occurred in Aceh Utara district, and continuing sporadic cases were common despite mass vaccination campaigns. Sporadic cases and clusters of measles (>400 clinical cases in the six months following the earthquake) also occurred in Pakistan following the 2005 South Asia earthquake.

Meningitis caused by *Neisseria meningitidis* is transmitted from person to person, particularly in situations of crowding. Cases and deaths from meningitis among those displaced in Aceh and Pakistan have been documented. Prompt response with antibiotic prophylaxis, as occurred in Aceh and Pakistan, can interrupt transmission.

Acute respiratory infections (ARI) are a major cause of morbidity and mortality among displaced populations, particularly in children aged <5 years. Lack of access to health services and to antibiotics for treatment further increases the risk of death from ARI. Risk factors among displaced persons include crowding, exposure to indoor cooking and poor nutrition. The reported incidence of ARI increased four-fold in Nicaragua in the 30 days following Hurricane Mitch in 1998, and ARI accounted for the highest number of cases and deaths among those displaced by the tsunami in Aceh in 2004 and by the 2005 earthquake in Pakistan.

1.4 Vector-borne diseases

Natural disasters, particularly meteorological events such as cyclones, hurricanes and flooding, can affect vector breeding sites and vector-borne disease transmission. While initial flooding may wash away existing mosquito breeding sites, standing-water caused by heavy rainfall or overflow of rivers can create new breeding sites. This can result (with typically some weeks delay) in an increase of the vector population and potential for disease transmission, depending on the local mosquito vector species and its preferred habitat. The crowding of infected and susceptible hosts, a weakened public health infrastructure and interruptions of ongoing control programmes are all risk factors for vector-borne disease transmission.

Malaria outbreaks in the wake of flooding are a well-known phenomena. An earthquake in Costa Rica's Atlantic Region in 1991 was associated with changes in habitat that were beneficial for breeding and preceded an extreme rise in malaria cases. Additionally, periodic flooding linked to El Nino-Southern Oscillation has been associated with malaria epidemics in the dry coastal region of northern Peru.

Dengue transmission is influenced by meteorological conditions including rainfall and humidity and often exhibits strong seasonality. However, transmission is not directly associated with flooding. Such events may coincide with periods of high transmission risk and be exacerbated by increased availability of vector breeding sites – mostly artificial containers – caused by disruption of basic water supply and solid waste disposal services. The risk of vector-borne disease outbreaks can be influenced by other complicating factors, such as changes in human behaviour (increased exposure to mosquitoes while sleeping outside, movement from non-endemic to endemic areas, a pause in disease control activities, overcrowding), or changes in the habitat which promote mosquito breeding (landslide deforestation, river damming and re-routing).

1.5 Other diseases associated with natural disasters

Tetanus is not transmitted from person to person, but is caused by a toxin released by the anaerobic tetanus bacillus *Clostridium tetani*. Contaminated wounds, particularly in populations where routine vaccination coverage levels are low, are associated with morbidity and mortality from tetanus. A cluster of 106 cases of tetanus, including 20 deaths, occurred in Aceh and peaked 2½ weeks following the tsunami. Cases were also reported in Pakistan following the 2005 earthquake. An unusual outbreak of **coccidiomycosis** occurred following the January 1994 southern California earthquake. The infection is not transmitted from person to person, but is caused by the fungus *Coccidioides immitis,* which is found in soil in certain semi-arid areas of North and South America. This outbreak was associated with exposure to increased levels of airborne dust subsequent to landslides in the aftermath of the earthquake.

1.6 Disaster-related disruptions

Power cuts related to disasters may disrupt water treatment and supply plants, thereby increasing the risk of water-borne diseases. Lack of power may also affect proper functioning of health facilities, including preservation of the cold chain. An increase in diarrhoeal incidence in New York City followed a massive power outage in the United States in 2003. Investigation of the outbreak revealed an association with the consumption of meat and seafood after the onset of the power outage, when refrigeration facilities

HANDOUT 2

This short paper is reprinted from: Carolina Population Center 9CPC) website http://www.cpc.unc.edu/ *The paper was written by Brent Burkholder, CDC*, *7 Feb 97*

Mullahs, Mountain Tops, and Mortality: Creative Demography in Refugee Emergencies

Demographers and epidemiologists share a passion for numbers--more specifically, we share a passion for precise numbers. However, dealing with international refugee emergencies requires both flexibility and a tolerance for ambiguity. Obtaining even basic demographic information amid the chaos of these settings can be extremely problematic, but is essential to humanitarian assistance efforts. The situation in Goma, Zaire in July-August 1994 presents an excellent example of the challenges faced in the field attempting to gather meaningful population estimates and indicators of health status, particularly mortality rates, while simultaneously attempting to maintain some semblance of scientific rigor.

Longstanding civil unrest in Rwanda between rival ethnic groups, the Hutus and Tutsis, finally exploded in mid 1994. Between July 14-17 thousands of ethnic Hutus fled Rwanda and sought refuge in the North Kivu region of neighboring Zaire around the small town of Goma. The chaos created by this rapid mass migration in just three days overwhelmed all attempts to count refugees at the border. Initial estimates of the refugee population around Goma ranged from 500,000 to 1.2 million. The wide range of these estimates was perhaps understandable due to the chaos of the situation and the wide geographic disbursement of the refugees, but greatly frustrated planing for humanitarian assistance.

Basic demographic information is needed in emergency situations principally for three reasons: 1. the total population is the denominator for all mortality, injury and morbidity rates; 2. it enables the calculation of relief supplies; and 3. a breakdown of the population by age (and sometimes gender) enables the targeting of special interventions (e.g. immunization and care for pregnant women). The "why" of collecting demographic data is much more obvious than the "what" or "how". A common problem in emergency situations is to attempt to collect too much data and epidemiologists must constantly resist the temptation to expand their scope beyond collecting only the basic, key information needed for initial planning. In general, the primary priority is to determine the total population and the general age structure (limited to "0-4 years" and "five years and over"). Other critical information but of slightly less priority is information on gender, identification of at-risk groups (e.g. unaccompanied children, pregnant women) and average family/household size.

Various strategies were attempted in Goma to further refine the wide range of population estimates. Counting shelters from aerial photographs of the three main camps and extrapolating from a "guesstimated" number of refugees/shelter provided a gross underestimation of total population because a majority of the refugees were initially surviving in the open without tents or even makeshift shelter. (In other recent situations more precise satellite imaging capable of counting discrete individuals has been used; however, even this high tech approach may be limited by weather, dense foliage, and sometimes politically sensitivities. In any case, satellite photos were not immediately available in Goma.) Epidemiologists from Medicines sans Frontieres (MSF) attempted a simple, yet systematic approach. Based on both aerial photographs and crude maps drawn from the vantage point of nearby mountain tops, MSF first created a grid of one camp showing gross population densities. Using a planimeter, they next measured the area of the grid, marked off areas of different densities on the ground, counted individuals within the few selected areas, and extrapolated to determine a number for the entire camp. (A formal registration was not attempted until over a year later; however, even this process proved extremely problematic, primarily for political reasons.) Nevertheless, based primarily on the MSF survey, humanitarian assistance agencies generally agreed on a planning figure of 750,000 for a total population estimate.

The debilitated condition of many refugees on arrival, crowded camp conditions, difficulties in providing even basic requirements to thousands of families, and the acute onset of a massive cholera epidemic led to an almost immediate increase in the number of deaths among refugees in Goma. Information on fertility is rarely available early in an emergency and of limited necessity for acute stage interventions. However, information on mortality in such settings is an essential indicator of improving or deteriorating health status. In emergency situations, mortality rates are usually calculated as number of deaths/10,000 population/day to allow for detection of sudden changes. The comparable rate for developing countries in non-emergency situations is around 0.5-1.0 deaths/10,000/day. In many recent emergencies, the crude mortality rate has been from 2-25 times higher than this baseline. It is generally accepted that health workers should be concerned when crude mortality rates in a displaced population exceed 1/10,000/day; the emergency is considered "out of control" if the rate is >2.0/10,000/day and a "major catastrophe" if the rate is >5.0/10,000/day.

Age-, sex- and cause-specific mortality rates will indicate the need for interventions targeted at specific vulnerable groups; however, during the early stages of a relief operation even gross estimates of these parameters may not be possible to collect. If at all possible, information is collected on death rates for <5 years of age and >5 years of age since this former group is often the most vulnerable in an emergency. Further disaggregation and more specific mortality information must usually wait until the situation is more stable.

Sources of mortality data can be grossly divided into passive and active. Passive sources such as hospital clinic records and camp administrators are the easiest to collect but are notoriously incomplete. Epidemiologists in most emergencies must supplement clinic records with more creative sources which require active information gathering . Refugee populations may be reluctant to report deaths in their families because of the adverse consequences on their food ration. Grave-counting has been used in multiple situations, but refugees may not use a single burial site. Even if the overall number of deaths can be counted, obtaining information on age and cause of death may be very difficult. Verbal autopsy conducted with a family member of the deceased may give a clue to the major cause of mortality, but are of limited sensitivity and specificity in most situations. In some societies consulting community leaders or mullahs who distribute burial shrouds may provide the best source of mortality information, but these individuals may also be reluctant to provide potentially sensitive information to foreigners or even local health officials.

Because the ground in the area around Goma was hard volcanic rock, graves could not be easily dug and most bodies were simply left beside the road and in other public places. Several humanitarian agencies established a truck collection system to pick up these bodies daily and tallies were reported to epidemiologists at the United Nations High Commissioner for Refugee (UNHCR). Initial body counts had to be adjusted downward when it was discovered that workers exaggerated the body counts due to the misconception that their payment was related to the number of bodies collected. However, the problem of over-reporting was resolved and figures from this source are thought to be reliable. A household survey conducted in August found that 96% of families reported that they placed their dead along the road. This was confirmed by comparing body counts to the deaths registered in the camp clinics. During the period of highest mortality early in the emergency, over 45,000 bodies were collected compared to just over 4000 deaths in clinics. Thus over 90% of fatalities occurred outside health facilities. Relying only on camp records would have given a gross underestimation of the mortality rate. Obviously, the body tallies could not give information on the cause of death. Later, some estimations were made regarding the age of the deceased based on the length of the body (e.g. <100cm = <5 years of age); however, the sheer numbers of bodies in the first few weeks precluded gathering even this rudimentary information.

Goma provides a typical example of the difficulties in determining both accurate numerator and denominator data. In this cases, epidemiologists used the best available data for number of deaths (e.g. body count) and calculated mortality rates for various population estimations. The overall crude mortality rate (CMR) from July 18-August 14 was estimated at between 21.6/10,000/day and 34.5/10,000/day depending on total population estimations of 800,000 and 500,000 respectively.

Household surveys, which asked about mortality over the preceding month, were also conducted in August in the three major Goma camps. These retrospective surveys of surviving family members were subject to recall bias and presented further dilemmas in calculating denominator size yet they gave further evidence of these extremely high mortality rates. Estimates of the CMR in the camps ranged from 28.1/10,000/day to 41.3/10,000/day. Part of the differences among the camps may be explained by the differing time periods covered in the surveys since the highest mortality was known to occur in the first 2 weeks after the mass migration. The major point is that these estimates are generally consistent with the CMRs derived from body counts. From both the epidemiologic and public health planning point of view, it was sufficient to document a major catastrophe with death rates two to three times the highest previously reported rates among refugees. This finding documented the scope of the emergency and established a yardstick to measure effectiveness of humanitarian interventions. A well-coordinated relief effort (plus perhaps the initial high mortality) was associated with a steep decline in death rates to 5-8/10,000/day by the second month of the crisis.

Goma demonstrates both the limitations and importance of using epidemiology in refugee emergencies. The challenge is not only how to creatively gather information, but also how to interpret and critically analyze the validity and reliability of data from unconventional sources.

POPLINE Keywords: Refugees; Population statistics; Data collection; Mortality--Statistics; Death rate; Health--Statistics; Middle Africa; French Speaking Africa; Africa South of the Sahara; Africa; Zaire

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