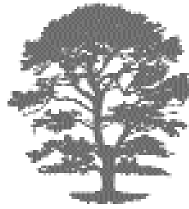

# Bosnia: The War Against Public Health

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The health of the civilian population in Bosnia -- including the fundamentals for survival such as food, water, and fuel, as well as the country's medical infrastructure -- has been a direct target of the current war. More than half a million people had been killed, wounded, or displaced as of September 1993, the end point of a detailed study that was conducted of each major condition for health and personal safety affected by the war. This report, culled from a wide range of sources and relying on data limited in time and/or scope, has attempted to define the health vulnerabilities of the civilian population prior to the onset of the winter of 1993-94. Bosnia's crippled health system, the authors determined, could no longer meet even basic health needs, and a wide range of specific illnesses, including diarrhea, respiratory ailments, chronic diseases, premature and low birthweight babies, and vaccine preventable diseases pose an increasing threat. The fundamental means by which this war on public health has been conducted are denial of access and restriction of movement of people and goods. "Ethnic cleansing" has resulted in major population shifts that have increased vulnerability to sickness and death. External support to existing health authorities must be combined with accurate documentation and analysis of the war on health in Bosnia, to determine accountability. The experience of Bosnia should prompt a rethinking of the ways in which the impacts of collective violence on health are measured and assessed. [M&GS 1994;1:130-146]

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To the outside world, the war in Bosnia has been confusing, marked by apparent random violence and relentless ❧ tragedy. War evokes images of armies and battles, yet the pictures and stories from Bosnia are more often about civilian casualties and personal suffering, presented as the tragic by-products of conflict. Behind these confusing images, and beyond the complex question of which factions, ethnic groups, or nationalities have been responsible, there is a hidden logic to this conflict that emerges from an analysis of its effects on the health of the civilian population.

This is a war on populations, not armies. The basic conditions that people need to protect their health -- their physical, mental, and social well being -- are being systematically and ruthlessly undermined in Bosnia. The

war against the public health of Bosnia has been powerful and ominously effective. Bosnia has been converted from a modern, industrialized country into one unable to ensure even the basic elements of health security and protection for its people.

As of September 1993, an estimated 150,000 people had been killed in the wars in the former Yugoslavia; 300,000 people had been wounded and an estimated 200,000 had been displaced [1]. Yet beyond the extraordinary violence reported in the media, displacement and isolation of populations have been the central weapons of war. Lack of access to food, fuel, medical supplies, and other material, compounded by the stresses of physical and emotional isolation -- only partially and intermittently relieved by courageous humanitarian efforts -- are the final common pathway to the damage done to public health in Bosnia.

The tragic success of aggression has been abetted and intensified by three factors: increasing concentrations of vulnerable people, including the elderly, young children, the institutionalized and disabled, and people displaced by the conflict; the depletion of material and physical, mental and social "reserves" that occurs with the passage of time; and the predictably damaging yet diffuse effect of winter.

This is a report on a war against the health of an entire population. Most, but not all, of the data presented here focus on central Bosnia. Conditions throughout Bosnia vary greatly and continue to evolve. This report will present data about a wide range of areas in Bosnia over the period leading up to the 1993-94 winter season.

To reveal and assess this dimension of the war in Bosnia, the report is divided into three parts:

I. The war on public health: the central and major part of this report is an examination of the impact of this conflict on public health, including an assessment of how winter intensifies the war on public health in a diffuse and apparently "natural" manner.

II. The defense of public health: a brief summary of how those charged with protecting the public health have responded to this broad assault.

III. Recommended action: based on this analysis of the essential nature of the conflict, a set of broad recommendations is proposed to enhance accountability; to strengthen the capacity of the public health response; and to mitigate the long term health impact of the conflict.

This analysis, although necessarily incomplete, draws many fragments of information into a coherent picture. The authors hope that a clear understanding of this war on public health will contribute to a more effective response in Bosnia and help strengthen the world's resolve to prevent and prepare for this kind of war in the future.

## The War Against Health

Public health focuses on providing and protecting those conditions that allow people to achieve physical, mental, and social well being. For practical reasons, previous descriptions of the health threat to the Bosnian population have usually focused on individual measures of physical health, such as child mortality rates, nutritional status, or reports of epidemic disease. It is important to move beyond this approach, for several reasons:

* "health" cannot be viewed as physical health alone; information on mental and social dimensions of well being should also be considered;
* a focus on mortality data and limited statistics on morbidity represent only partial and incomplete measures of physical health;
* several conditions are necessary for health that extend far beyond access to medical care. The evaluation of threats to health should include conditions such as housing,nutrition, sanitation, personal security, education, employment, and systematic violations of personal and collective dignity.

At this time, it is not possible to present a full analysis or accounting of this war's burden on the physical, mental, and social well being of the Bosnian population. The information needed to identify fully and measure adequately these health impacts does not yet exist -- in Bosnia or elsewhere. Nevertheless, since this war involves the systematic under mining and destruction of the full range of conditions that people require to be healthy, and despite the limitations in available information, this report seeks to illustrate the process through which a more complete accounting of suffering in Bosnia and, by extension, human suffering in conflicts and war, could be approached.

## Conditions Needed for Health

Health -- physical, mental, and social well being -- depends upon several basic, essential conditions. For this analysis, five such conditions were selected; the availability and/or quality of: (1) food; (2) water; (3) fuel/energy; (4) health services; and (5) per-

sonal security. In a modern community in any developed country, these conditions share two characteristics: they are provided through complex systems beyond individual control (food supply, water systems, fuel distribution networks, private and governmental health systems, and police/ justice systems); and they are taken for granted. If these essential conditions are not provided, individual and social life must be drastically reorganized. In Bosnia, the search for an adequate supply of food and safe water, fuel for heating and transport, health services (preventive and curative), and a modicum of personal security becomes not only a matter of survival but a source of risk.

Winter can only lead to further deterioration of health in Bosnia. Cold weather tends to increase crowding, which may have a broad range of effects on personal and collective hygiene, heightens the risk of transmission or amplification of pathogenic agents (via personal contact, food, water, vectorborne, respiratory, and fecal-oral routes), and may also have substantial impact on mental and social well being. Winter creates new problems, including cold-related injury. To the extent that availability of material and supplies (including food, fuel, and medical supplies) is further con strained by transportation difficulties secondary to winter conditions, the damage to public health will be increased.

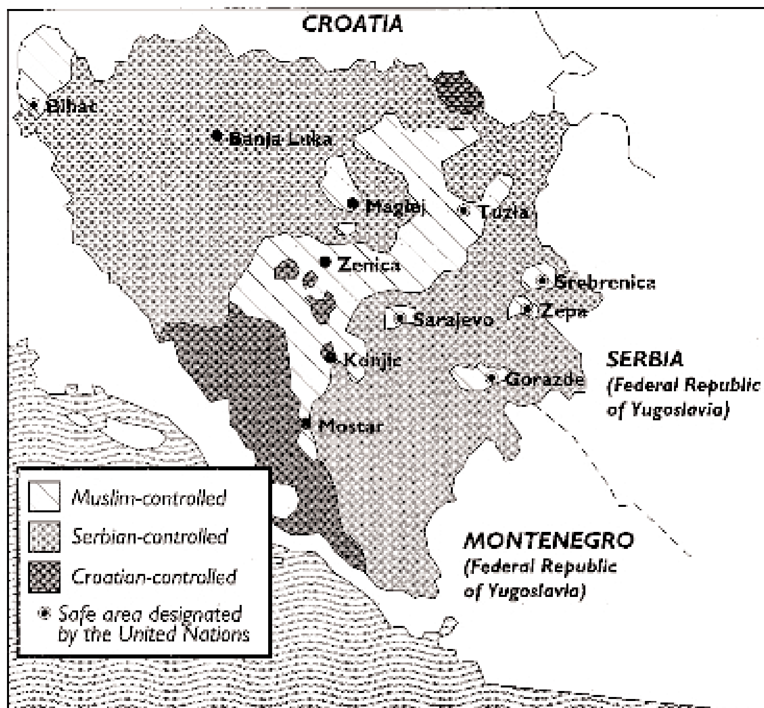


**Figure 1.** Map of Bosnia-Herzegovina, showing areas of control. (Adapted from the *New York Times*, January 23, 1994)

## Lack of Access

Denial of free and unconstrained access is the fundamental method through which each of the essential conditions for health have been undermined and attacked. The movements of people and goods to, from, and within Bosnia have been dramatically restricted. The creation of "enclaves" is symbolic of the extent to which the civilian population of Bosnia have become a hostage people; isolation deprives them of practical and emotional support and provokes despair.

The damage to basic conditions for health and the exacerbation of specific health problems are intensified by three factors: geographical and demographic concentration of the most vulnerable populations; depletion of physical, mental and social "reserves" due to the duration of the conflict; and the specific conditions of winter.

The concept of vulnerability as applied to people living in a war zone may seem superfluous. Certainly in the current war in the former Yugoslavia, in which an estimated 180 200,000 people may have already died from violence, the principal hazards seem clear for both civilian and military populations.

A focus on the civilian population, however, reveals three critical facts:

1. New vulnerable populations have been created, involving enclaves and other areas with lack of access to the essential conditions needed for health.
2. Illness, disease! and death are not randomly distributed. The greatest health burdens among non-combatants fall upon four groups: the very young, the elderly, the chronically sick, and the disabled. As a consequence of the current conflict, the vulnerable populations mentioned above have been concentrated geographically far beyond pre-war conditions.
3. Displaced people constitute another new vulnerable population, created by warfare and the horror of "ethnic cleansing."

Therefore, the illness, suffering, and death of these three interrelated groups in Bosnia is not "collateral" or incidental; rather, they are the frontlines of the war on public health.

## Geographical Concentration

The progression of the conflict has concentrated the Muslim population of Bosnia in an ever-shrinking area (Figure 1). As of early 1994, central Bosnia (the region of Tuzla, Zenica and Sarajevo) and the isolated

enclaves of Bihac and Tesanj/Maglaj in the west; and Srebrenica, Zepa, and Gorazde in the east constituted the area still under political control of the government of Bosnia. The total population within these boundaries was approximately 2.7 million. Of these, an estimated 2.1 million were within areas where more than 90 percent of the population is Muslim.

The characteristics of the population are as important as the number of people in any given area. Vulnerability can be expressed in demographic terms (age, gender), by the presence of certain conditions (pregnancy, chronic illness, disability), or in social terms (institutionalized populations, such as prisoners, the mentally ill, the retarded, orphans).

A distinctive feature of the population of Bosnia is its shifting demographic structure. As the territory of Bosnia shrinks it includes an ever-increasing proportion of these vulnerable populations (those too young, old or weak to escape). Limited available data for specific areas suggest that the proportion of children (under 14 years of age) in the population has increased along with the proportion of elderly (over 65 years of age). The health status of these groups is precarious or highly susceptible to a variety of external factors such as lack of food, water, fuel/energy, and health services.

## Displaced Populations

As a result of "ethnic cleansing" and other aspects of war in Bosnia, there have been major shifts in the population structure which increase vulnerability to illness, suffering, and death. As seen in Table 1, from 21 to 76 percent of the current population in various parts of Bosnia are displaced people.

The first of these shifts is towards communities dominated by large refugee populations -- more than 700,000 displaced persons -- 38 percent of the total population -- now reside in the besieged areas of Bosnia-Herzegovina. In many areas, however, such as Banjaluka (population 303,000) and the Eastern Bosnian enclaves (population 110,000), refugees and displaced persons exceed 50 percent of the total population.

These data indicate the mixing of new populations under conditions that may facilitate the introduction and spread of infectious diseases. Of equal or greater significance are changes associated with the sudden intimacy of new populations under conditions of terror, deprivation, and loss. These changes have important implications for mental and social well being. Crime, extortion, forced labor and forced enrollment in the military are all more difficult to prevent in a world in which half the people are strangers.

The altered age distribution of displaced populations in 1993 also suggests an increased vulnerability to ill health. Among displaced people in Tuzla, 49 percent were younger than 14 years, compared with 33 percent in the host (previously resident) population. Women consistently constitute the majority of people in refugee/displaced person populations (53 percent in Bihac; 58 percent in Tuzla and Zenica). In addition, recent United Nations High Commissioner for Refugees (UNHCR) data from Eastern Bosnia, which includes both Serbian and Muslim populations, indicate that the elderly population (over age 65) increased from 50 to 150 percent among refugee/displaced person populations, which constitute about 38 percent of the total population of the area. The pre-war population of the area was 735,000, but by September 1993 it had declined to 508,000, of whom 272,000 (more than 50 per cent) were refugees/displaced persons [2].

The combination of displacement, war, and the deprivation of food, fuel, and medicine all can produce large increases in death rates -- especially among vulnerable populations of the elderly and the very young [3]. Recent studies of many countries and peoples affected by wars and associated displacement indicate very large increases in the crude death rate -- from 5 to 25 times above those normally prevailing.

## Winter and Cold: New Threats

The winter season in Bosnia is generally severe, with the average temperature at 0° C. The regions in which most Bosnians are now concentrated are at higher altitudes and have more severe winters (e.g., Sarajevo has an average winter temperature of -5° C).

The principal direct threat of winter

**Table 1. Displaced and host populations of cities of Bosnia-Herzegovina (*1993)**

| | Displaced Persons/Refugees | | Host/Local | |
|---|---|---|---|---|
| | Number | % Total Pop | Number | % Total Pop |
| Bihac | 61,000 | 27% | 166,800 | 73% |
| Sarajevo (B H ) | 68,200 | 21% | 262,400 | 79% |
| Maglaj/Tesanje | 16,700 | 55% | 13,800 | 45% |
| Gorazde | 38,000 | 58% | 28,000 | 48% |
| Srebrenica | 33,600 | 76% | 10,500 | 24% |
| Zepa | 5,000 | 50% | 5,000 | 50% |
| Tuzla | 233,400 | 33% | 420,800 | 67% |
| Zenica | 272,400 | 50% | 277,500 | 50% |
| Mostar | 25,000 | 41% | 35,000 | 59% |
| Jablanica | 12,000 | 50% | 12,000 | 50% |
| Konjic | 20,900 | 38% | 33,400 | 62% |

*Under control of the Government of Bosnia-Herzegovina
Source: UNHCR (1993, October 3) Information Notes No 10/93

involves cold-induced and cold-related disease and injury. The concentration within Bosnia of segments of the population (the young, the chronically ill, and the elderly) are more vulnerable to cold-related illnesses and injury will intensify the damage to health resulting from the winter.

The war and the conditions it has created in the besieged areas of Central Bosnia influence the health of all groups. Elderly people and young children will be at special risk this winter due to cold, food shortages, and poor medical care. Under normal conditions, those over 65 years of age (approximately 10 percent of the population of pre-war Yugoslavia) account for 65 percent of all "natural" deaths. Infants (younger than 1 year old) are the other group that normally account for a disproportionate number of deaths; they constitute one percent of the population yet account for four percent of deaths. Therefore, the crude death rate will increase as the proportion of the elderly rises in the Bosnian population. In addition, the death rate among the elderly will increase due to winter conditions, exacerbated by poor nutrition and sanitation, the absence of medications, and mental stress.

As many as 60 percent of all causes of death observed in adults in industrialized countries (e.g. respiratory, cardiovascular, injuries, etc.) are susceptible to substantial increases through the effects of cold, hunger, and stress. In a country accustomed to Western medicine, the lack of access to modem medical care services is a huge change and may portend a sharp rise in death rates among vulnerable populations.

Winter months are routinely associated with increased mortality rates; generally the increase is 20 to 35 percent over summer rates. In pre-war Yugoslavia excess winter deaths were generally at the high end of this range, at 30 percent above the June-September figures. More developed and more prosperous northern countries with better health care and infrastructure (Sweden, for example) show less increase (lower than 12 percent) in winter compared to summer deaths [4].

The effects of winter on health have been studied for many years. In general, the cold acts on all organ systems, but cardiovascular and pulmonary diseases have been most closely studied. For both conditions there is an increase and a worsening in severity and outcome in cold winter months. In adults, 66 percent of the incremental deaths occurring in winter are due to cardiovascular diseases (especially myocardial infarctions) and 13 per cent are due to respiratory conditions (influenza and pneumonia). Winter's effects on health are often visible as two peaks of increased mortality -- one an "instantaneous effect of winter" on the cardiovascular system, the other a "delayed and much smaller effect" associated with respiratory infections [5].

The 1992/93 winter brought news from Bosnia of multiple families huddled in one room trying to keep warm and of "white death," as people looking for food traveled through the mountains in the winter, only to die from exposure. Though the winter was relatively mild, the lack of fuel forced Bosnians to use trees and wooden furniture from homes for heating [6]. In the second winter of the war, the weather was more severe and there were few trees or pieces of furniture left to burn. Refugees/displaced persons who left home in their summer clothes were totally dependent on humanitarian aid for clothes, shelter and food [7]. UNHCR alone has spent nearly $23 million in aid for fuel, clothing, stoves and other winter-related supplies to be distributed in Bosnia.

During the 1992/93 winter in Sarajevo, UNHCR reported that the mortality rate among the elderly in homes was double the usual December rate. The elderly in collective centers were observed to be sleeping on bare floors without adequate covering [8].

In hospitals, signs of hypothermia were seen among bedridden, incontinent people. "Hospitalized paraplegics, young men of 20 years old, lay for days in their cold urine -- no water, no washing, no linen changes, no catheters..."[9]. Surgeons were unable to operate with cold fingers, equipment failed and liquids froze.

In summary, despite the tragic nature of death and injury from cold itself (hypothermia), the major health impact of winter results from: the stresses produced by the constant struggle against cold weather, snow, and ice (with its associated burdens on daily living); pervasive deleterious effects on the broad range of conditions needed for health (e.g., food, fuel, medical supplies); and amplification of health risk to the very young and the elderly.

The influence of winter is insidious. For as the arrival of winter and its severity are both beyond human control, winter appears to be neutral in this conflict. Tragically, however, winter is aiding those seeking to destroy the health of the people of Bosnia.

## Food

A modern analysis views severe food shortages as a consequence of political actions or inactions, rather than simply a matter of insufficient food production.

Population food needs are assessed as a combination of baseline caloric requirements (daily caloric requirements increase by 1% for every degree drop in mean daily temperature below 20° C.) as well as availability of critical nutrients. Populations experiencing a widespread and sustained lack of food suffer a wide range of impacts on physical, mental, and social well being, particularly when the food deficit is of long duration.

Available evidence suggests that the Bosnian population is experiencing a chronic food deprivation whose severity varies widely, over time and among different sub-groups of the population.

Data from the spring of 1993 suggest that the normal mechanisms of food production and distribution have been profoundly disrupted in Bosnia. The rural areas have not been able to produce enough food to meet the needs of the urban population, and food shipments into and within Bosnia are severely constrained [10]. The main UNHCR warehouse in Metkovic, which supplies the southwestern portion of Bosnia, was empty in early April 1993. During that month, 7,780 metric tons (MT) of wheat flour were received but could not be moved into central Bosnia [11]. The port of Ploce had food aid for Bosnia in June 1993 which could not be delivered because there was no fuel for trucks; some of the perishable food spoiled and had to be discarded [12]. The local Red Cross society estimated that as a result of these types of disruptions, 90 percent of the population of Bosnia was unable to meet its basic food needs as of October 1993 [13]. According to UNHCR, the World Food Program (WFP), and UNICEF, an estimated 50% of the food needs of the population of Bosnia must be met through humanitarian aid [14]. In March 1993, the WFP estimated that 2.3 million refugees and displaced persons were in need in Bosnia [15].

Humanitarian organizations have made heroic efforts to feed the population of Bosnia. Particular nutritional needs of the population in different areas have been documented and the types of food delivered have been adjusted to alleviate health problems that may have arisen from malnutrition [13,16,10]. The basic foods supplied have included high-protein biscuits, oil, beans, flour, cheese, dried milk, sugar, salt, and vitamins [10].

These efforts have only been partially successful, for several reasons. Food stored in warehouses has not been able to reach its intended recipients due to shelling, closed roads, and the turning back of convoys [17]. The total amount of additional food needed for Bosnia in early 1993 was estimated to range from 9,000 (UNHCR) to 17,000 metric tons per week (WFP) [18]. According to available sources, need has far exceeded deliveries. UNHCR was able to deliver only 22,000 metric tons (62 percent of need) in July and 25,000 metric tons (69 percent) in August 1993. In October 1993, UNHCR delivered 29 to 35 percent of the food requirement to central Bosnia (exception: 62 percent to Tuzla) [2]. As of November 1993, UNHCR reported that due to weather and security problems, only about 50 percent of the food requirement was able to be delivered [18].

In addition, the lack of fuel for cooking has exacerbated the effects of the food shortage [17,12]. Much of the flour and rice could not be used because there was no water or fuel for cooking. The 1993 summer fruit harvest in Tuzla was plentiful, but fresh fruit could not be preserved due to lack of sugar. Similarly, because there was no fuel to run the farm equipment, Tuzla was expected to have a wheat harvest of only 2,200 MT compared with a potential yield of 20-25,000 MT [12,19].

Statistics on both the scope and impact of chronic food deprivation are only available for individual towns, neighborhoods, hospitals and collective centers (for refugees and displaced persons), and are generally not available for the most isolated and threatened communities. Yet the information that can be obtained reveals a picture of a suffering population.

### *The Food Crisis and Malnutrition*

UNHCR, UNICEF, and the World Health Organization (WHO) have carried out several nutritional surveys since the beginning of the conflict. While small surveys from collective centers in 1992 found a high percentage of children to be malnourished, a WHO summary of 1993 data found only 1.8 percent of children to be undernourished [20,21]. Nutritional studies of adults have utilized the Body Mass Index (BMI). In Srebenik, in November 1992, 35 per cent of adults were found to be suffering from malnutrition (BMI below 18.5). In March 1993, WHO found that in two areas -- Sarajevo and Zenica -- between four and 12 percent of women surveyed were suffering from malnutrition. Strikingly, women belonging to the resident population in these areas were more likely to be malnourished than women among refugee or displaced populations. The same survey found that more than one-third of children and mothers in Bihac and 13 percent of mothers in Sarajevo had some degree of anemia (Table 2) [21].

In a survey conducted in October 1993, UNHCR found that adults in central Bosnia

**Table 2. Anemia in Bihac and Sarajevo as indicated by hemoglobin level, WHO Survey, March 1993**

| | | Total Anemic[1] | Mild | Moderate | Severe |
|---|---|---|---|---|---|
| Children | Bihac | 26 (34%)[2] | 19 (25%) | 6 (8%) | 1 (1%) |
| Mothers | Bihac | 45 (38%) | 19 (16%) | 25 (21%) | 1 (1%) |
| | Sarajevo | 14 (13%) | 11 (11%) | 2 (2%) | 1 (1%) |

[1] *Mild anemia is defined as hemoglobin levels at 8-10g/dl for children <5 years and 11-12g/dl for non-pregnant women; moderate anemia is defined as hemoglobin levels at 5-8g/dl for children <5 years and 7-11g/dl for non-pregnant women; and severe anemia is defined as hemoglobin levels at <5g/dl for children under 5 years and <7g/dl for non-pregnant women.*

[2] *Number (percent)*

*Source: WHO. (September 1993) Monthly Report. WHO Field Office, Tuzla*

had lost an average of 10 kilograms (22 pounds) over the course of the war [22]. Sources in Sarajevo have estimated the weight loss among adults in central Bosnia to average nine to 15 kilograms (19.8 to 33 pounds) [23]. WHO reported that body fat reserves of much of the population had been exhausted by the end of the 1992-93 winter, and that the population of central Bosnia was on the verge of chronic energy deficiency [7].

As the war continues, the food crisis becomes more desperate. In March 1993, WHO reported a few cases of scurvy, suspected pellagra, and other vitamin and nutritional deficiency syndromes among refugees/displaced persons. WHO estimated that there were 20 to 30 additional deaths per day due to malnutrition and related infections in Srebrenica in March 1993. The estimated population of 60,000 people needed 60 metric tons of food per day, but was totally cut off from incoming convoys and supplies [24].

Mental and social well being are not only threatened directly by lack of food, but the struggle for limited food supplies can generate emotional distress and interpersonal conflict. The monotony of the diet has been reported to cause depression and associated lack of appetite even among the malnourished [24]. At Knin General Hospital, in Croatia near the Bosnian border, desperate mothers tried to leave their children in the care of the Pediatric Department because they could no longer feed them [25].

In summary, food -- the single most fundamental requirement for health -- is being denied to the population of Bosnia. A chronic food deficiency of variable severity and duration has been created in Bosnia, with its ensuing physical, mental, and social consequences. Winter can only aggravate this situation, due to the combined result of diminished/absent food production, increased transportation difficulties, and the higher energy/caloric needs of a population in cold weather.

## Water

Water -- clean and in sufficient quantity -- is absolutely essential for health. In terms of availability of adequate and safe water, Bosnia has been reduced to a pre-modern condition. Water can no longer be taken for granted and its acquisition has become a source of risk. Paradoxically, the Bosnian population, which has ample natural water supplies, now lacks drinking water because the water supply infrastructure has been systematically destroyed. Water treatment plants have become largely non-functional and water pumping and distribution systems have collapsed, due to sabotage, vandalism, lack of power (also a result of sabotage and vandalism), and lack of maintenance and supplies [16,2,26].

Pre-war consumption of water in Sarajevo was about 200 liters per person per day. Sarajevo used a 6.2 megawatt electrical system to supply power to water pumping stations that supplied 210,000 cubic meters of water daily to a 53-square-kilometer area [27]. Since the war began, however, electricity has been available intermittently or not at all [28]. In Sarajevo, different factions control parts of the electrical network that supplies power to the pumping station, resulting in a limited and unpredictable water supply. The shortage of electricity has severely hampered water pumping from the stations. Thus, in July 1993, there was virtually no power available for water pumping; water was rationed at two to three liters per person per day [26].

Further, under pre-war conditions, an aver age of 5,000 leak repairs were performed on the water system in Sarajevo each year; during the past year, it was only possible to repair 300 leaks. As a result, the leakage factor has doubled from a pre-war level of 30 percent to 60 percent. The Sarajevo water company normally employs 1,300 people, but its work force has now been reduced to only 300 [27].

An International Rescue Committee project has developed two new water treatment plants for Sarajevo. Protection from shelling has been achieved by installing one plant in a tunnel and another under a concrete roof covered with a meter of soil and junk cars intended to detonate mortars before impact. Thus, by early January 1994, 450,000 liters of clean water were to have become available in Sarajevo, which is sufficient to supply at least one-third of the Sarajevo population [27].

In Srebrenica, destruction of the municipal water supply infrastructure has had several important consequences. People have been forced to obtain water from other sources, including untreated water from wells, rivers and streams, or from humanitar-

ian organizations which truck in water when possible [8,29]. In Srebrenica, before the war, there were 5,000 inhabitants and all raw sewage went into the Jelini River. By September 1993, the number of inhabitants had increased to 25,000, and raw sewage was still released into the river [29]. As the water treatment plant was not operational, however, untreated river water has been used for drinking; this river is also known to have high levels of lead. Inadequate water flow has also created dangerous sanitation problems; without water, modern human waste disposal systems cannot function. Sewage has backed up into homes and low pressure in water lines has led to cross-contamination with sewage lines [27].

Scenes previously associated with poorer developing countries have now become an integral part of life in Bosnia. Standing in line for water, and carrying water in small containers for long distances, have become commonplace. In addition to the logistical difficulties, container-related contamination, and additional expenditure of energy, people making their trips for water are exposed to sniper fire. In Mostar, inhabitants have risked their lives by crossing the front lines at night to get water [30].

Humanitarian organizations first attempted to provide Bosnia with adequate clean water and, when this was not possible, chlorine tablets were sent in an effort to make available water safer to drink. Between April 1992 and August 1993, the International Committee of the Red Cross (ICRC) supplied 40 municipalities with spare parts, pumps, chlorinators, and more than 70 tons of water treatment chemicals [31].

## Fuel/Energy

Fuel to produce electrical, thermal, and mechanical energy is essential to ensure adequate supplies of food and water, to protect against cold, to provide modern medical and preventive health services, and to ensure adequate sanitary and hygienic conditions. Insufficient supplies or distribution of fuel leads to serious direct and indirect threats to health.

The supply of fuel to Bosnia and its distribution have both been seriously curtailed, so that fuel for heat and transport has become a central focus of survival efforts. UNHCR estimated that Bosnia would need 17.3 million liters of diesel fuel for schools, hospitals, mines, and power plants during the 1993-94 winter. In November 1993, the available stock totalled 3 million liters, with another 10 million liters in the pipeline -- a shortfall of at least 4.3 million liters [16].

Before the war, Sarajevo relied mainly on natural gas from the Ukraine and Hungary to heat buildings. During the war, the natural gas pipe lines have been shut down. A project supported by outside aid has reconnected 20,000 people in Sarajevo with the natural gas pipeline. In November 1993, natural gas in Sarajevo was restored to the minimum pressure of 1 bar after having been shut down since May 1993 (pre-war pressure was 6-8 bar) [2]. In 1993, Sarajevo requested 105,000 m3 of gas from Hungary. Only 50,000 m3 were allowed, however, of which 30,000 m3 was diverted, leaving only 20,000 m3 for Sarajevo [32].

Given the difficulties of maintaining natural gas supply and distribution infrastructure, coal is considered the optimal fuel for Bosnia [33]. Humanitarian organizations have been struggling to provide materials for energy efficient stoves that burn wood or coal [34]. The ability to supply coal insufficient quantities has been the central problem [6,16].

## Health Services

Bosnia's once well developed health system has been crippled and is no longer capable of meeting even the basic health care needs of the population.

In general, health care personnel are avail able. Local health care workers -- who have borne the brunt of more than two years of conflict -- have been supported by a steady flow of international health personnel from humanitarian organizations. Major gaps have developed, however, in the infrastructure and supplies needed to deliver health care. This is the result of destruction of institutions (including ongoing threats to basic security), lack of specific medical supplies, and lack of fuel.

The lack of energy, food, and supplies means that many hospitals have no heat, lights, medical supplies, or capacity to ensure hygienic precautions. In these settings, operations may be performed by candlelight, with out anesthesia, by surgeons with freezing hands. Hospitals report a lack of diagnostic reagents, bandages, medicines, prostheses, dialysis equipment/supplies, and radiology supplies. Populations particularly vulnerable to deficiencies of health care include pregnant women, infants, the elderly, and the chronically ill.

Mental health services appear to have been particularly vulnerable to destruction. Prior to the war, Kosevo Hospital (Sarajevo) had one of the major psychiatry departments in the former Yugoslavia. The hospital was bombed in April 1992, resulting in closure of the psychiatry department, including its alcohol and drug rehabilitation units. Anecdotal

reports suggest that institutions serving the mentally retarded and men tally ill have been among the first to lose access to fuel and other supplies [9]. A household survey conducted in December 1993 in Sarajevo concluded that 9.5 percent of all households had one or more members suffering from mental health problems. Ninety seven percent of people suffering from mental health problems required professional assistance but only about one-third of them were able to gain access to professional help [35].

Humanitarian organizations and WHO have been sending medical supplies to Bosnia, including several types of medical kits designed to meet the needs of an area for several months. As a result of these efforts and the ability of some hospitals to obtain minimal supplies, some hospitals are operating under fair to good conditions. Others, however, overwhelmed with injuries resulting from the conflict, are operating under highly adverse conditions [36].

## Personal Security

Since the beginning of the war in the former Yugoslavia, an estimated 3,000 children have been killed by snipers. The news media have estimated that during the course of the current conflict, thousands of women have been raped. In Sarajevo alone, from April 1992 to March 1993, 6,800 civilians died and approximately 16,000 were wounded. In short, the war has deprived non-combatants of basic security and has torn apart a society.

In November 1993, a psychiatrist in Sarajevo described a phenomenon he called passive suicide: the act of walking in areas known to be dangerous... "a more primitive form of suicide, the emotion without the intellectual plan." "A great number of elderly hospital inpatients seem to have lost the will to live. People are suffering from all modes of severe trauma: shells, freezing, hunger, grief...Usually in war there are two soldiers killed or wounded for every civilian, but in this war there are eight to nine civilians for every soldier. After the war, psychiatry will be flooded" [37].

## Specific Health Problems

A wide range of specific health problems result from the combined effects described above. The following were selected to illustrate this connection: (1) vaccine preventable diseases; (2) diarrheal disease; (3) prematurity and low birthweight babies; (4) injuries (non-combat related); (5) respiratory tract infections; (6) ectoparasites (lice, scabies) and related diseases; and (7) chronic diseases (heart disease, diabetes, hypertension).

### *Measles and Other Vaccine-Preventable Diseases*

Prior to the war, childhood immunization was a regular and highly successful part of maternal and child health services. Before 1992, 95 percent of infants in the former Yugoslavia received measles immunization. As a result of the war, in the Bihac pocket, the vaccination level among 1-year-olds who should have received measles immunization fell to 60 percent in 1992 [26].

The disruption of health services, the short age of vaccines and cold chain equipment, and reduced access to services has severely affected the immunization program in Bosnia. In June to July 1993, a survey conducted in four sites in Bosnia found that the proportion of children fully immunized had plummeted in some areas to nearly 30 percent (Table 3).

The high drop-out rates shown in Table 4, indicating an inability to complete vaccination series, were a further alarming sign of declining performance of the child health protection system.

In Sarajevo, childhood vaccination coverage was estimated at 40 percent, declining further to about 20 percent by September 1993 [38]. In addition, while 96 percent of children included in the survey in Bihac (June 1993) had received BCG at birth, fewer than one-third had received all childhood immunizations, including measles, by 13 months of age [39].

Immunization coverage is at an all-time low in comparison with the pre-war era. A large pool of children susceptible to a sudden, large scale measles epidemics existed during the winter months of 1993-94. The level of immunization coverage is a measure of the status of public health. In Bosnia, the evidence is clear: public health services have deteriorated to the point where basic protections are not provided. This deficiency does not result from a lack of trained personnel, but reflects the paralysis of an entire infrastructure.

Low childhood immunization rates translate directly into adverse individual and collective consequences. At the individual level, the preventable burden of morbidity, disability, and mortality will be borne disproportionately by the youngest, most vulnerable segment of the population. The sequelae of tuberculous meningitis or poliomyelitis, added to the negative impact that vaccine preventable diseases will have on the precarious nutritional status of children, will have long-lasting effects.

On a collective level, the risk of transmission of vaccine preventable diseases will expose the population of Bosnia -- and neigh-

**Table 3. Vaccination coverage (%) among children, 13-25 months old, in four sites in Bosnia, June-July 1993***

| | n, | BCG | OPV1 | OPV2 | OPV3 | DPT1 | DPT2 | DPT3 | Measles |
|---|---|---|---|---|---|---|---|---|---|
| Bihac | 243 | 96 | 78 | 68 | 55 | 81 | 70 | 59 | 32 |
| Sarajevo | 292 | 99 | 53 | 43 | 32 | 57 | 46 | 35 | 22 |
| Tuzla | 318 | 92 | 64 | 64 | 52 | 70 | 67 | 58 | 34 |
| Zenica | 263 | 92 | 75 | 67 | 55 | 78 | 71 | 63 | 34 |
| Weighted Average | 1116 | 94 | 66 | 61 | 49 | 70 | 64 | 55 | 31 |

*Source: WHO Field Office -- Monthly Report -- September 1993.

*Note: Vaccination data were collected for children 13-25 months old, by which age they should have received all vaccinations included in the schedule established in former Yugoslavia i.e.: BCG (anti-tuberculosis) at birth; three doses of DPT (diphtheria, pertussis, tetanus) combined with three doses of OPV (oral polio vaccine), followed by one dose of measles vaccine before the first birthday.*

boring countries as well -- to an increased risk of epidemic disease spread. Diphtheria, already reported from several Eastern European countries [40], as well as poliomyelitis, measles, and pertussis all find fertile ground in crowded situations.

### *Diarrheal Diseases*

While measles, polio, diphtheria, and pertussis vaccination coverage rates reflect the adequacy of health services (immunization delivery capacity), diarrheal diseases are a consequence and measure of sanitary conditions. Diarrheal diseases flourish under conditions of poor food and water hygiene, and most result from fecal-oral spread, which is also enhanced by crowding and lack of adequate facilities to dispose of human fecal waste.

Therefore, it is not surprising that diarrheal diseases and, more generally, food- and water borne diseases, have increased in Bosnia since the beginning of the conflict. The hygienic infrastructure which was intended to protect the Bosnian population against enteric disease has virtually collapsed.

The fecal contamination of water and food may have contributed to the spread of hepatitis A virus (HAV) infection. In the community of Sorck Bunar in Sarajevo (population 3,600) more than 10 percent of the population (364 people) were reported to have developed HAV infection from July to October 1993 [41]. The epidemic had also affected other communities as evidenced by reported HAV infections: in October 1993, the municipalities of Novi Grad, Novo Sarajevo, and Stari Grad had reported 27, 32, and 118 cases respectively, and more communities were experiencing the further spread of the epidemic [42]. Despite difficulties with disease surveillance, the number of reported hepatitis A cases increased more than 20-fold in Sarajevo Center in the first nine months of 1993. In Brizim, where 10 to 20 cases of HAV infection were reported annually before the war, more than 80 cases were reported during the period August 1 to November 18, 1993; 21 of these cases occurred in the first half of November [41].

As shown in Table 5, the number of reported cases of enteric infections in Sarajevo increased 2 to 9 fold in the first nine months of 1993 compared with 1992. Other communities also reported steep increases in hepatitis A and two other notifiable enteric infections (diarrhea and dysentery) as shown in Table 6. In Sarajevo in 1992, 3,718 cases of diarrhea were reported (1,239 cases/100,000 population) [38]. Thus, in 1993, based on reported cases for the first nine months, it could be estimated that this rate would exceed a staggering 5,255/100,000 for the whole year.

Diarrheal disease, in combination with the lack of water and sewage, affects more than physical health. The misery created by lack of sewage facilities in crowded quarters with many sick people has a serious, although unmeasured, impact on mental and social well being. The drastic decline in personal hygiene which accompanies diarrheal disease in the absence of adequate water and sewage also diminishes personal dignity.

Local authorities and humanitarian relief workers have made heroic efforts to improve the quantity and quality of the water supply, to promote better food hygiene, garbage and excreta disposal, and to reinforce early rehydration therapy for diarrheal

**Table 4. Drop-out rates for DPT, polio and measles immunization found in sample surveys conducted among children 13-25 months old, Bosnia, June-July 1993***

| | DPT | Polio | Measles |
|---|---|---|---|
| Bihac Pocket | 22% | 23% | 67% |
| Sarajevo | 21% | 21% | 78% |
| Tuzla | 21% | 25% | 61% |
| Zenica | 15% | 20% | 63% |

*Source: WHO Field Office -- Monthly Report -- Sept 1993.

**Table 5. Cases of enteric infection reported in 1992 (12 months) and 1993 (January-September), five reporting sites in Sarajevo.**

| | *1992 Jan.-Dec* | *1993 Jan.-Sept* | *Proportional Increase** |
|---|---|---|---|
| Hepatitis A | 72 | 644 | x 8.9 |
| Enterocolitis | 3,718 | 12,612 | x 3.4 |
| Baccerial dysentery | 110 | 218 | x 2.0 |

**Jan.-Sep. 1993 / Jan.-Dec 1992*

*Source: Builetin of the Public Health Institute, Sarajevo (October, 1993).*

cases. These efforts are confronted with mounting difficulties, including lack of fuel and access to referral health care facilities. In summary, all predisposing and aggravating conditions are now present in Bosnia for other water- and food borne diseases, including cholera, to break out in a sudden and explosive manner.

### Prematurity and Low Birthweight

The unborn child is vulnerable to aberrations in the physical and psychological state of the mother. In turn, the mother's condition reflects both the living conditions in her environment (adequate quantity and quality of food, water quality, protection from temperature extremes and illness, shelter) and her access to prenatal care. Prematurity and low birthweight are the major contributors to neonatal mortality and threaten the well being and normal development capacity of surviving infants For these reasons, prematurity and low birthweight indices are a sensitive measure of physical deprivation, emotional stress and inadequate health care, with important long term impacts on public health.

Two studies conducted in Bosnia in 1992 (after one year of war) found a doubling of perinatal and child mortality rates in Zepa as compared with the pre-war situation. Data from Kosevo Hospital in Sarajevo document a marked increase in pregnancy complications from 1991 to the period January 1992 to April 1993. Perinatal mortality increased 70 percent, from 15.8/1000 to 26.9/1000 live births. The stillbirth rate increased 64 percent (7.5 to 12.3/1000). Premature deliveries (defined as occurring prior to 36 weeks gestation) more than doubled (5.3 percent to 12.9 percent) and average birthweight decreased approximately 20 percent (3,700 to 3,000 grams) [43].

**Table 6. Incidence of selected enteric diseases, by region and period, Central Bosnia 1990-1993** (Rates/100,000/Month)

| *Region* | *Hepatitis A* | *Diarrhea* | *Dysentery* |
|---|---|---|---|
| Sarajevo City | | | |
| 1-6/1992 | 0.9 | 13.2 | 0.3 |
| 1-6/1993 | 5.1 | 94.9 | 4.0 |
| Change | up x 6 | up x 7 | up x12 |
| Zenica City | | | |
| 5-7/90 & 5-7/91 | 0.4 | 10.3 | 0.3 |
| 5-7/1993 | 4.6 | 83.9 | 4.4 |
| Change | up x 12 | up x 8 | up x17 |
| Tuzla | | | |
| 1992 | 0.5 | 6.5 | 0.5 |
| 1-6/1993 | 1.9 | 9.3 | 0.4 |
| Change | up x 4 | up 43% | down 10% |

Source: *MMWR—Centers for Disease Control—Dec. 24, 1993—Vol. 42/No 50*

### Injuries

Although sporadic combat, sniper fire, and random shelling of the civilian population constitute the major hazards to physical and mental health in Bosnia, injuries and violent deaths also result from other causes.

For example, incidents of severe burns, sometimes involving entire families, are occurring with increasing frequency as a result of gas leaks from "do-it-yourself" installations and accidental ignitions [43]. Those with serious burn injuries who cannot be treated adequately in Sarajevo are evacuated when possible. A WHO report estimated that the frequency of burn cases increased four-fold between 1992 and 1993 [44].

### Respiratory Tract Infections

As with previously mentioned health problems, the occurrence, spread, and severity of respiratory tract infections reflect a synergistic combination of factors, including immunological status (especially nutritional status) of the population, exposure to unfavorable living conditions, crowding, and reduced health service capability to detect and control epidemic disease. The severity of respiratory tract disease for individuals and the extent of epidemic disease in the community are increased by inadequate health care and referral systems for timely diagnosis and care. In addition, in the case of influenza A and B, the incidence and severity of epidemic disease also results from an inability of the preventive health system to provide influenza immunization, particularly to "high-risk" groups (the elderly, pregnant women, and the chronically ill) and to health care workers. Finally, as with most other health problems, certain people are at higher risk of contracting severe or life-threatening respiratory disease, including: infants and young children (for whom respiratory disease may be the major cause of death); the elderly; and the chronically ill (including people with diabetes, cancer, and cardiac or pulmonary conditions).

All of the precipitating and aggravating elements are present in Bosnia. Yet scarce data are available on the frequency and severity of acute respiratory tract infections.

Accounts from Sarajevo and Modrica suggest an increased frequency of respiratory tract infections; in displaced person centers, heating by smoky wood stoves led to a large number of eye infections and exacerbation of chronic respiratory diseases among the elderly [45,25]. Management of severe forms of respiratory tract infection has been affected by the lack of oxygen in Sarajevo hospitals [451. Respiratory tract infections were reported to be the most common cause of mortality in February-March 1993 in Volvodina. In Srebrenica, 20-30 deaths from pneumonia were reported daily during this period, more than 20 times the number recorded in prewar times during the same period of the year. In 1992, respiratory diseases were the most commonly reported cause of morbidity in Sarajevo [24]. In addition to pneumonia, which is a major cause of death among children living in precarious situations, the low immunization coverage among children (particularly regarding pertussis and measles) increase the risk of outbreaks of respiratory tract infections.

Tuberculosis is a particularly complex problem for health services, as its control requires both preventive and sustained case management capacity. In contrast to the viral respiratory diseases, treatment exists to prevent clinical tuberculosis in exposed people (such as household contacts with an active case) and to treat active tuberculosis cases and render them non-infectious. The control of tuberculosis is a useful indicator of the status of preventive health care services and infrastructure. The tuberculosis situation in the former Yugoslavia was assessed by a WHO team in June-July 1993 [46]. During the pre-war period, the former Yugoslavia had a high tuberculosis incidence (30/100,000 in 1990); Bosnia had the highest incidence of tuberculosis in the country (85/100,000 in 1990) [47]. The deterioration of the health care system currently does not allow for the procurement of meaningful data on tuberculosis. For example, 610 tuberculosis cases were reported in 1991, but only 81 in 1992. Yet by January 1993, a WHO report suggested that the number of tuberculosis cases had increased four-fold in Bosnia since the beginning of the war, a rise that was attributed partly to the influx of refugees and displaced persons [7]. Patient compliance with antituberculous treatment is hampered by the discomfort of having to stay in unheated hospitals, lack of medications, and pervasive insecurity that interferes with regular attendance at outpatient clinics. The risk of tuberculosis spread both within and from Bosnia is accentuated by the inability of the health care system to diagnose and treat cases early and completely. It is further accentuated by crowded living conditions and the movement of people in search of shelter, food, and security.

## *Ectoparasites and related diseases*

Outbreaks of vector-borne diseases reflect the combined lack of medical, sanitary, and preventive health services. Lice, the vector of epidemic typhus, propagate with more intensity under crowded conditions and where control measures are inadequate or absent.

Population concentration resulting from the conflict and the scarcity of topical agents to treat infestation and prevent reinfestation, combined with the shortage of insecticidal dust to treat clothing and bedding, has led to a major increase in louse infestation.

By September 1993, WHO reported that, "...head and body lice infestations were out of control in many war-affected areas" [48]. The population is now highly vulnerable to epidemic vector-borne disease, particularly among children and people living in institutions and communes.

Scabies, another ectoparasite, has spread rapidly since the beginning of the conflict. Of 109 children under the age of 5 years surveyed in Srebrenica in September 1993, 23 percent had scabies and 20 percent had lice [29]. In the same area, reported scabies infestation declined in five clinics: from 2265 cases in June 1993 to 639 in August 1993. This positive effect may have resulted from intensive efforts supported by Medecins sans Frontieres to train local workers and supply scabicidal treatment lotions [49].

## *Chronic Diseases*

Despite remarkable work by local health personnel and.humanitarian relief groups, the disruption of medical services in most of Bosnia [50] has created an immediate crisis and a longer-term threat to those with manifest, or not yet manifest, chronic diseases (diabetes, arthritis, cardiovascular disease, chronic pulmonary disease, cancer, chronic renal disease, and mental disorders, including severe depression and schizophrenia). While sustained supplies of specific medications are important, support of chronic illness (including attention to mental and social well being) requires early diagnosis, complex treatments and counselling, support to enhance societal integration, good hygienic and dietary conditions, and close medical follow-up.

In Bosnia, these dimensions of care and support for people with chronic illnesses are precarious, vulnerable, or absent. Specialized drugs and medical equipment are lacking

(for example, insulin, cardiovascular and anti-cancer drugs, dialysis equipment and supplies, and laboratory reagents) [51,7,45]. In December 1992, 17 patients who could have benefitted from dialysis died from renal failure [31]. Shortages of insulin for the treatment of diabetes have been reported to occur periodically. No data are available on excess mortality due to inadequate treatment of cardiovascular diseases, which affect mostly older adults. Some patients with chronic diseases were evacuated from Bosnia to areas where better diagnosis and treatment were available.

The impact of these deficiencies extends far beyond the individual patient to include families struggling to protect the health of their chronically ill members. In September 1993, a Centers for Disease Control report concluded: "there are severe unmet needs of specialized groups such as patients with cancer, diabetes, glaucoma and renal failure...war injuries and chronic diseases account for most mortalities"

## Conclusions and Recommendations

### *The Defense of Public Health*

Protecting and promoting the health of populations is a fundamental responsibility of any legitimate governing authority. While the conditions essential to protect health extend far beyond the authority and resources of a Ministry of Health, this Ministry is usually considered responsible, in the first instance, for public health. The work of public health includes three distinct yet closely related activities:

* assessment: data collection and analysis to identify and describe the health problems facing a community;
* policy development: establishment of goals based on data, setting of priorities, and development of strategies to address priority health problems; and
* assurance of services: design, implementation and evaluation of programs to address priority health problems.

Disruption of public health capabilities in Bosnia reflects the balance of assaults on the people's health and the greatly diminished capacity to respond to public health challenges. The war against public health is winning, for two reasons.

First, the attack on the essential conditions for health involves societal and governmental sectors that cannot be controlled by the Health Ministry (such as provision of fuel, housing, and food). Until or unless the fundamental access problem is resolved, the essential conditions for health cannot be repaired and restored.

Second, the capacity of Bosnian public health authorities to fulfill each of the central responsibilities of public health is severely handicapped, due to the collapse of data gathering mechanisms and disruption of service delivery systems, directly resulting from lack of access to, and free movement and communication within, Bosnia. As an example, the assessment function of public health has been seriously compromised. Since April 1993, almost no data have been gathered from local health posts, and data which do exist are considered unreliable. The disruption of the population of Bosnia has included many of the professionals and others involved in the public health system, as well as those involved in clinical medicine, who themselves may become refugees or displaced persons. Numerous hospitals and clinics have been shut down or destroyed since the war began.

Staff from humanitarian organizations have reported that their initial efforts to collect data were met with frustration. Desperate pleas for "help, not data; supplies, not analysis" reflect a society whose infrastructure has collapsed and whose major struggle is directed at survival. The difficulties in communication, the constant movement of the population, and the day-to day disruptions caused by the war have made data collection nearly impossible.

Nevertheless, the Director of the Institute for Public Health in Sarajevo attempts to keep track of disease outbreaks and the availability of appropriate vaccines and medications. The accuracy and timeliness of the information collected in this manner are limited, but the Institute strives to carry out these functions.

Yet without accurate and timely information, specific problems and needs cannot be appropriately identified and assessed; without the ability to possess and freely deploy equipment, supplies, and staff according to public health need, critical public health services cannot be provided. This collapse of health security is yet another burden on the mental and social well being of the people of Bosnia.

### *The Need for Information*

From a health perspective, it is humane and necessary, yet not sufficient, to focus upon individual tragedies, specific incidents, and immediate, urgent, and focal health needs. It is particularly tragic that a vocabu-

lary is not available that would permit a clearer description and expression of what is now occurring in Bosnia. For a massive effort is being made to destabilize the civilian population, involving chronic and widespread deprivation, terror, psychological stress, and destruction of societal coping mechanisms. This war is being carried out in a manner that conceals its goals, yet threatens, in the end, to be as effective as a military battle or overt genocide. It is therefore essential to recognize the essential nature of this conflict: a war on the health of the people of Bosnia. The war may be conducted by military forces, but the target is the physical, mental, and social well being of an entire civilian population.

The authors of this report regret that insufficient data exist to identify -- for those in Bosnia and for the entire world -- the nature, scope, and intensity of human suffering now under way. If a more comprehensive understanding and assessment of suffering were available, it could contribute to increasing international pressure for all parties to reach a settlement.

### *Recommended Action: Health and Peace*

The central weapon in this war on public health is interference with the free and unconstrained movement of goods (particularly fuel, food, and medical supplies) and people, which together are essential for protection of health in Bosnia. To the extent that this is a war on public health, it is impossible to protect public health without peace.

If peace is not obtained, the health of the people of Bosnia will continue to deteriorate. Nevertheless, attempts must be sustained and expanded to mitigate the impacts of the war on health. External support to existing health authorities, in order to enhance their ability to perform the basic functions of public health to the maximum extent possible under extremely difficult conditions, could be critical. Yet while several measures could be helpful, it must be clear that none of these will adequately respond to the clear and present danger to public health in Bosnia.

### *Crimes Against Public Health: Documentation and Accountability*

Documentation of this war against public health is essential. In the face of a massive assault on the foundations of civilian health, those in public health have a moral responsibility to bear witness and to describe and document what is happening. The war strategy that targets the health of an entire population must be analyzed and documented using the full range of public health expertise. Only through this process can the actual measure of damage to the Bosnian population begin to be understood and accountability determined. In addition, as future conflicts may share this fundamental nature of a war on public health, systematic documentation and analysis of the war in Bosnia may help prevent such occurrences, ameliorate their impact, and ensure account ability.

### *A New Public Health Challenge: The Epidemiology and Health Impacts of Collective Violence*

The public health response to Bosnia should stimulate a rethinking of our ability to predict, measure, and assess the health impacts of collective violence. To be successful, such analyses must go far beyond the traditional measures of damage to physical health that have classically dominated descriptions of the impact of war and conflict on the health of populations. Public health cannot and should not avoid addressing the problem of collective violence and its impacts on physical, mental, and social well being. The study of the epidemiology of collective violence, including a capacity to identify early warning signs of impending catastrophic damage to public health, is urgently needed.

### *Long-Term Rehabilitation*

It is essential to prepare now for identifiable health needs once peace is restored to Bosnia. Long-term medical and psychological support will be needed, including management of post traumatic stress disorder, the impact of "loss of childhood," and the long-term impact of rape. Expert groups should work now to identify the range of such needs, which will require assessment, policy development, and planning for assurance of services. A firm commitment from the outside world to go beyond the reconstruction of physical infrastructure and to help address rehabilitation needs when the war is over should not await the final act in the Bosnian tragedy, but must be made now. ❧

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## *Methods and Data Sources:*

The main objective of the field team, composed of Mr. Craig Sanders and Drs. Chuck Schroll and Jerry Paccione, was the collection of data, both quantitative and qualitative, that could be applied to the analytical frame work developed by the project team. Given the time limitations, as well as the situation in Bosnia, it was not considered feasible to gather primary data. Rather, the data used in this report was gathered from individual contacts (personal interview and telephone) and from organizations in the field.

To the greatest extent possible, key persons in the major humanitarian assistance organizations were identified and contacted by the project team and were asked to provide information pertinent to the project. Where an interviewee had specialized knowledge of either a sector or a geographic area, the project team attempted to pursue a more specific line of questioning. Reports and data collected during the course of this mission were sent to the Cambridge office.

More than 150 reports and other documents were collected in November 1993 and analyzed in Cambridge by Dr. Daniel Tarantola and Ms. Mary Pat McCabe. The final report was prepared by Drs. Jonathan Mann, Ernest Drucker, and Daniel Tarantola and Mary Pat McCabe. The report was reviewed by public health experts in the United States and in Europe, including several with direct experience in Bosnia, and was released in February 1994. This project was supported through a grant from the Open Society Fund