Mortality Rates, Causes of Death, and Health Status Among Displaced and Resident Populations of Kabul, Afghanistan

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Objective.—To determine the mortality and health effects from the current civil war in Kabul, Afghanistan.

Subjects.—One resident population and one displaced population.

Design.—Between November 22 and December 16, 1993, we conducted a retrospective, population-based, household survey, interviewing 312 displaced families and 300 resident families.

Results.—During the 285 days before the survey, the highest average daily crude mortality rate and the mortality rate for those younger than 5 years (0.9 and 2.6 per 10 000 population per day, respectively) were among residents who had lived at their current location for 10 months or less. The average daily crude mortality rate and the mortality rate for those younger than 5 years were lower among displaced persons (0.6 and 1.9 per 10 000 per day) and lowest among residents who had lived at their current location for more than 10 months (0.5 and 0.6 per 10 000 per day). Overall, the most common cause of death for both groups was gunshot or other war trauma; for children younger than 5 years, deaths resulting from measles, diarrhea, and acute respiratory tract infection predominated.

Conclusions.—While provision of basic public health measures would likely decrease mortality among both displaced and resident populations, the most urgent health need is for a cessation of hostilities against the civilian population. During humanitarian relief operations, organizations should not focus exclusively on persons identified as displaced.

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WAR frequently affects the health of civilian populations,[1,2] primarily by destroying or disrupting the social infrastructure of a country. Damage to health, sanitation, and water facilities, as well as housing and agriculture, may lead to a rapid increase of malnutrition and communicable diseases, such as measles and infectious diarrhea and pneumonia.

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Since the overthrow of the communist government in Afghanistan during April 1992, mujahideen groups have waged a civil war in Kabul. While three major battles have occurred in Kabul since this time, none of the political factions have achieved victory. During October to December 1993, five major factions and several smaller factions had a military presence in the city, and gun battles and artillery attacks occurred daily.

This civil war has resulted in the destruction of many residential buildings in Kabul and the displacement of an unknown number of people. To determine the effect of the war on the mortality and health status of displaced and resident persons living in Kabul, Médecins Sans Frontières conducted a population-based survey between November 22 and December 16, 1993.

METHODS

Samples

An Afghan physician fluent in Dari, Pashto, and English and I surveyed one displaced population and one resident population. Shortage of time and staff limited our assessment to approximately 300 families from each population. Because the location and number of displaced persons living in Kabul was unknown, we selected a sample for study from an estimated 2100 displaced families identified before our survey who lived in 46 schools, mosques, or abandoned buildings. We selected all 15 locations with more than 50 families and randomly selected 10 of the remaining 31 locations. For each of these 25 locations, we went door-to-door, collecting information from every fifth family. For each family, the first available member at least 18 years of age was interviewed. One displaced family refused to participate.

An impoverished resident population living in a well-defined, approximately 16-km^2 area (known as the old city) was also surveyed. Since no accurate population data exist for this area of Kabul, we conducted a two-stage random cluster survey based on estimated housing

Table 1.—Crude Mortality Rates and Mortality Rates for Displaced and Resident Populations Using Two Methods of Determining Mortality Rates: Kabul, Afghanistan, February to December 1993

Group	Method 1*			Method 2†		
	No. of Deaths/ Population at Risk	Mortality Rate‡	Relative Risk (95% CI)§	No. of Deaths/ Population at Risk	Mortality Rate‡	Relative Risk (95% CI)§
All ages						
Displaced	40/2407	0.6	1.2 (0.7-1.9)	35/2362	0.5	1.0 (0.6-1.6)
Resident	40/2209	0.6	. . .	37/2175	0.6	. . .
Resident ≤10 mo	13/511	0.9	1.7 (0.9-3.2)	10/499	0.7	1.3 (0.6-2.6)
Resident >10 mo	26/1688	0.5	Referent	26/1666	0.5	Referent
Aged <5 y						
Displaced	22/422	1.9	3.0 (1.0-8.5)	17/378	1.6	2.6 (0.9-7.7)
Resident	10/311	1.1	. . .	7/277	0.9	. . .
Resident ≤10 mo	6/81	2.6	4.2 (1.2-14.6)	3/69	1.5	2.5 (0.6-11.1)
Resident >10 mo	4/228	0.6	Referent	4/234	0.6	Referent

*In method 1, the denominator was persons alive at the beginning of and those born during the recall period; and the numerator, the number of deaths within this group.
†In method 2, the denominator was persons alive at the beginning of the recall period; and the numerator, the number of deaths within this group.
‡No. of deaths per 10 000 population per day.
§CI indicates confidence interval.

density. To estimate housing density, we climbed a nearby hill and assessed the distribution of buildings within the survey area. Based on this information, we divided the area into 20 sections having approximately the same number of houses each. For each section, we selected a central point, identified the first 15 nonrelated families, and interviewed the first available family member at least 18 years of age. No resident family refused to participate.

Assessments

For both displaced and resident populations of all ages, we assessed mortality rates for the 285 days between the beginning of the last Ramadan (February 21, 1993) and the midpoint of the survey; causes of death; source of drinking water; availability of a covered container for water storage that had an exit point smaller than the size of a child's hand (hand proof); length of residence at the current site; and number of rooms in which the family lived. For displaced persons, we also determined the number of persons per functioning toilet within the building compound. Additionally, for children aged 9 to 59 months, we determined nutritional status, occurrence of diarrhea during the week before the survey, and vaccination status.

We identified all living family members of the person interviewed and those who had died since the start of the last Ramadan. From these data, we calculated mortality rates by two different methods. The denominators for these calculations were the number of family members alive at the beginning of the recall period either including (method 1) or excluding (method 2) those who were born during the recall period. The numerators were the number within either of these groups who died before the survey date. Because we determined that many resident families had lived at their current location for 10 months or less and thus could be considered displaced themselves, we also present resident mortality rates for both methods, stratified by length of residence. Long-term and short-term residents refer to those who had lived at their current location for more than 10 months or for 10 months or less, respectively. (One resident family did not report a length of residence.)

Because of frequent immigration into and emigration from households during the assessment period, for determination of mortality rates we defined a family as the person interviewed and his or her parents, spouse, and children. For each reported death, we asked the person interviewed the presumed cause. If the person interviewed did not offer a cause of death, we asked if the death had resulted from one of six causes: measles (rash and fever with or without diarrhea or cough); bloody diarrhea (frequent loose, bloody stools); watery diarrhea (frequent watery stools); acute lower respiratory tract infection (cough, difficulty or rapid breathing, and fever); gunshot; or other war trauma. Deaths not attributed to one of these causes were recorded as other, if the cause was known, or unknown.

We report mortality rates as deaths per 10 000 population per day. Relative risks (RRs) and corresponding 95% confidence intervals (CIs) (Taylor series approximation) were conducted with Epi Info computer software.[3]

Because we did not have the proper equipment or time to assess weights and heights, nutritional status was determined by measuring the middle upper-arm circumference (MUAC) of unclothed children aged 9 to 59 months living with the person interviewed. A recent meta-analysis[4] of MUAC compared with weight-for-height measurements demonstrated that MUAC measurements may be used as a rough indicator of the prevalence of acute malnutrition, the correlation between MUAC and weight-for-height does not change between ages 9 and 59 months, and a MUAC less than 12.5 cm was most compatible with a weight-for-height z score less than 2.0. We assessed the occurrence of diarrhea by asking the person interviewed which children had watery stools or loose, bloody stools during the past week.

RESULTS

We surveyed 312 displaced families and 300 resident families. The median number of people in both displaced and resident families was seven. For the displaced population, a mean of 15 people lived in each room compared with two per room for the resident population. Displaced families had lived at their current location for a median of 10 months (range, 1 to 15 months) compared with a median of 60 months (range, 1 month to 70 years) for resident families; 30% of resident families had lived at their current location for 10 months or less.

When including persons born during the survey period (method 1, Table 1), the average daily crude mortality rates for displaced persons, short-term residents (residence at their current location ≤10 months), and long-term residents (residence at their current location >10 months) were 0.6, 0.9, and 0.5 per 10 000 population, respectively, during the 285 days before the survey. Compared with long-term residents, the displaced population was not at an increased risk of death (RR, 1.2; 95% CI, 0.7 to 1.9), although short-term residents were at an increased risk of death (RR, 1.7; 95% CI, 0.9 to 3.2). The highest mortality rate we documented, 2.6 per 10 000 population per day, was in short-term residents younger than 5 years; comparable mortality rates among displaced

Table 2.—Number of Deaths by Cause for Displaced and Resident Populations: Kabul, Afghanistan, February to December 1993*

Group	No. (%)							
	Measles	Acute Lower Respiratory Tract Infection	Diarrhea	Dysentery	Gunshot	Rockets	Other	Unknown
All ages								
Displaced	4 (10)	6 (15)	6 (15)	1 (3)	5 (13)	8 (20)	6 (15)	4 (10)
Resident	1 (3)	5 (13)	5 (13)	0	3 (8)	14 (35)	10 (25)	2 (5)
Aged <5 y								
Displaced	4 (18)	5 (23)	6 (27)	0	0	2 (9)	3 (14)	2 (9)
Resident	1 (10)	3 (30)	1 (10)	0	0	3 (30)	1 (10)	1 (10)

*Including deaths to persons born during the recall period.

Table 3.—Middle Upper-arm Circumference Measurement for Displaced and Resident Children Aged 9 to 59 Months: Kabul, Afghanistan, November to December 1993

	≥13.5 cm, No. (%)	12.5≤13.5 cm, No. (%)	11.5≤12.5 cm, No. (%)	<11.5 cm, No. (%)	No. Not Measured
Displaced	231 (80)	38 (13)	16 (6)	3 (1)	71
Resident	177 (78)	37 (16)	10 (4)	3 (1)	43

and long-term resident children were 1.9 and 0.6 per 10 000 population per day, respectively. Compared with long-term residents younger than 5 years, both displaced children (RR, 3.0; 95% CI, 1.0 to 8.5) and short-term resident children (RR, 4.2; 95% CI, 1.2 to 14.6) were at an increased risk of death. Excluding persons born during the survey period (method 2, Table 1) from analysis resulted in slightly lower mortality rate estimations but did not change the comparison of mortality rates between groups.

For all ages, 33% of deaths among the displaced population and 43% of deaths among the resident population were attributed to gunshot or other war trauma (Table 2), making war trauma the most common cause of death for both groups. All persons reported to have died of non–gun-related war trauma had died of trauma from rocket explosions. None of the people who died of gunshots or other war trauma were combatants. Seventy-five percent of war trauma deaths occurred during months in which no major battle took place.

For children younger than 5 years, 68% of deaths among the displaced and 50% of deaths among residents were attributed to diarrhea, acute lower respiratory tract infection, or measles.

Of 400 displaced children and 301 resident children younger than 5 years alive at the time of the survey, 359 and 270, respectively, were between the ages of 9 and 59 months. Among those whose MUAC was measured, there were no differences between displaced and resident children for any of the measurement categories (Table 3).

Overall, 7% of the displaced children and 5% of the resident children had a MUAC less than 12.5 cm, indicating moderate malnutrition. Diarrhea during the week before the interview was reported for 78 (22%) of 356 displaced children and 50 (19%) of 266 resident children (for three displaced children and four resident children, this information was not known).

Respondents knew the measles vaccination history for 356 of the displaced children and 266 of the resident children aged 9 to 59 months. Ninety-three displaced children (26%) and 59 resident children (22%) had no history of measles vaccination, of whom 72 and 42, respectively, had no history of measles illness. Fifty percent of these 72 displaced children and 57% of these 42 resident children were between age 3 and 5 years and had been eligible for measles vaccination for at least 2 years before our survey. Although most children had a history of measles vaccination, 110 displaced children (31%) and 149 resident children (56%) did not have a card documenting vaccination.

During the survey, we identified five displaced children (1.4%) and nine resident children (3.3%) with fever, cough, conjunctivitis, and a skin rash suggestive of acute measles infection. The United Nations Children's Fund, in cooperation with the Afghanistan Vaccination and Immunization Center and the Ministry of Public Health, conducted a mass measles vaccination campaign in Kabul between November 9 and December 16, 1993; most of the buildings housing displaced people and all of the resident section had been targeted for immunization before our survey.

Of the 25 locations housing displaced people, 11 (44%), representing 167 of the surveyed families, had a covered well with a working hand pump available at the housing site for drinking water. At other locations, water was collected from wells with hand-drawn buckets (three), public wells at various distances from the site (eight), or wells within private homes (three). Among the 300 resident families, 276 (92%) collected water from a public well. Two displaced families (1%) and 37 resident families (12%) had a covered, hand-proof container to store water. The mean number of persons per toilet at the 25 locations housing displaced people was 44 (range, 13 to 92). Two locations had no working toilets available.

COMMENT

We found high mortality rates among both resident and displaced populations in Kabul. Injuries sustained directly as a result of war were the most common cause of death for both populations, accounting for more overall deaths than measles, acute lower respiratory tract infection, and diarrhea combined. Others have found trauma to be a less important cause of death than infectious disease in countries where armed conflict has resulted in large numbers of refugees or displaced people,[1,5,6] and some have emphasized the indirect public health effects of war.[1,7-10] Our findings illustrate the serious health consequences that wars of attrition, using modern weapons, such as hand-held and vehicle-mounted rocket launchers, have on the civilian population. The attacks are frequently undirected and, as we found, endanger the civilian population at all times, not just during major battles.

For deaths due to trauma, mortality rates alone clearly underestimate the consequence of civil war to the population of Kabul. Unlike most illness caused by communicable diseases, those who do not die after injury from a bullet or rocket may suffer permanent damage, such as limb amputation, burns, intestinal resection, and vision or hearing loss. Furthermore, while communicable diseases affect predominantly children and the elderly, war deaths and injuries commonly occur among young adults as well, a population critical to future rebuilding efforts. Consequently, health outcomes from the war will cause medical, social, and economic burdens in Kabul for decades.

During crisis situations, communicable diseases and malnutrition are recognized

causes of mortality.[1,7-10] We also found that common, potentially preventable diseases contributed significantly to excess mortality, particularly among children younger than 5 years. In Kabul, deaths due to communicable diseases likely resulted from a combination of poor sanitation, overcrowding, malnutrition, and inadequate measles vaccine coverage. The inadequate measles vaccine coverage and high measles incidence we documented were especially concerning because our survey took place after a measles immunization campaign. Although bacteriologic testing of water was not possible, many people gathered water from uncovered wells and almost all people stored water in uncovered containers, suggesting drinking unsafe water may also have contributed to communicable disease mortality. Although malnutrition in Kabul had not reached catastrophic levels, the results we found suggest that the population younger than 5 years is vulnerable to further events that might decrease food availability.

Most investigations have reported higher mortality rates among refugees and internally displaced persons than among resident populations.[1] We found that, while the mortality rate for those younger than 5 years was higher for displaced children than for long-term resident children, the crude mortality rate was similar for both groups. In Kabul, mortality rates among the displaced may have approached those of long-term residents because almost all displaced families had at least one family member working, many families had been residents of Kabul before displacement, many families received support from nondisplaced relatives, and health posts supported by Médecins Sans Frontières were located at three of the most populated sites housing displaced persons.

We found that the highest crude mortality rates and the highest mortality rates for those younger than 5 years occurred among residents who had lived at their current location for 10 months or less. This suggests that the most vulnerable group of people in Kabul may have lived in one- or two-family dwellings rather than in easily identified encampments for displaced persons. Additionally, civil wars may adversely affect the health of all persons, not just displaced persons. For these reasons, during humanitarian relief operations organizations should not focus exclusively on persons identified as displaced. Evaluations should be conducted to locate populations at risk and, because these populations may change over time, evaluations should be repeated in a timely manner.

Reliable mortality rates for Kabul before the recent civil unrest are not available. The mortality rates we documented, however, were similar to those documented among refugees and displaced people in different countries[1,7,11] but less than those reported among refugees and displaced people during other crises.[1,12,13] There are two reasons, however, why these comparisons may not be valid. First, our investigation did not include the initial phase of the war in Kabul during which mortality might have been higher. Second, we have documented sustained elevated mortality rates during a 10-month period; others have reported high mortality rates for the first 1 to 2 months of a crisis (the emergency phase), after which rates declined to levels similar to or lower than those we found in Kabul.[1,13,14]

We have presented mortality rates calculated using two different methods. As expected, in areas where the neonatal mortality rate is higher than the overall mortality rate for those younger than 5 years, excluding children born after the start of the recall period resulted in slightly lower mortality estimates. The relation between mortality estimates from different groups, however, did not differ by method.

Two methodological limitations may have underestimated the mortality rates. First, because of our sampling method, families in which all people or all adults had died would not be included. For fatalities due to rocket explosions, the number of entire families killed may have been significant. Second, although we specifically asked about neonatal deaths, these may have been underreported because of cultural beliefs that an infant does not become human until it has lived for a period of time.[1]

Situations similar to the current civil war in Kabul exist in several countries, including Bosnia, Angola, Yemen, and Liberia. While data are scarce, our survey shows that trauma directly due to war may be as common a cause of mortality, and possibly morbidity, as communicable diseases. This suggests an urgent need for adequate epidemiologic surveillance during civil conflicts in developing countries to determine the most appropriate technologies for trauma care and follow-up and to determine strategies to better protect the civilian population.

The most useful prevention strategy, however, seems clear. After a public health assessment in areas of the former Yugoslavia, Toole et al[15] stated that "primary prevention means stopping the violence." Two weeks after we completed this survey, a full-scale war once again started in Kabul with much of the initial fighting concentrated in a predominantly civilian residential section of the city; as of June 1994, the fighting has continued unabated. If mortality rates in Kabul and other areas of civil war are to decrease, the international community, including the United Nations, international relief organizations, and the international media must use all means available, including political pressure, to stop the violence against the civilian population.

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References

1. Centers for Disease Control and Prevention. Famine-affected, refugee, and displaced populations: recommendations for public health issues. *MMWR Morb Mortal Wkly Rep.* 1992;41(RR-13):1-25.
2. Toole MJ, Waldman RJ. Refugees and displaced persons: war, hunger, and public health. *JAMA.* 1993;270:600-605.
3. Dean AG, Dean JA, Burton AH, Dicker RC. *Epi Info, Version 5: A Word Processing, Database, and Statistics Program for Epidemiology on Microcomputers.* Stone Mountain, Ga: USD Inc; 1990.
4. Ritmeijer K, Valstar A, Davis A. Middle upper arm circumference (MUAC): what are the uses and constraints at the field level? a meta-analysis of MSF survey data. *Med News, Médecins Sans Frontières.* 1993;3:72-77.
5. Centers for Disease Control. Public health consequences of acute displacement of Iraqi citizens: March-May 1991. *MMWR Morb Mortal Wkly Rep.* 1991;40:443-446.
6. Manoncourt S, Doppler B, Enten F, Nur AE. Public health consequences of the civil war in Somalia, April 1992. *Lancet.* 1992;340:176-177.
7. Centers for Disease Control. Update: health and nutritional profile of refugees—Ethiopia, 1989-1990. *MMWR Morb Mortal Wkly Rep.* 1990;39:707-718.
8. Centers for Disease Control and Prevention. Surveillance of the health status of Bhutanese refugees—Nepal, 1992. *MMWR Morb Mortal Wkly Rep.* 1993;42:4-7.
9. Yip R, Sharp TW. Acute malnutrition and high childhood mortality related to diarrhea: lessons from the 1991 Kurdish refugee crisis. *JAMA.* 1993;270:587-590.
10. Disaster epidemiology. *Lancet.* 1990;336:845-846. Editorial.
11. Centers for Disease Control and Prevention. Mortality among newly arrived Mozambican refugees—Zimbabwe and Malawi, 1992. *MMWR Morb Mortal Wkly Rep.* 1993;42:468-477.
12. Moore PS, Marfin AA, Quenemoen LE, et al. Mortality rates in displaced and resident populations of central Somalia during 1992 famine. *Lancet.* 1993;341:935-988.
13. Toole MJ, Waldman RJ. An analysis of mortality trends among refugee populations in Somalia, Sudan, and Thailand. *Bull World Health Organ.* 1988;66:237-247.
14. Centers for Disease Control. Nutritional and health status of displaced persons—Sudan, 1988-1989. *MMWR Morb Mortal Wkly Rep.* 1989;38:848-855.
15. Toole MJ, Galson S, Brady W. Are war and public health compatible? *Lancet.* 1993;341:1193-1196.