legitimate justifications for the violations of some rights, the humanitarian disaster which has occurred in Iraq far exceeds what may be any reasonable level of acceptable damages according to the principles of discrimination and proportionality used in warfare.

The Geneva Conventions on the protection of civilians in warfare and rules of military engagement provide useful comparisons. The shortage of food and medical care experienced during the embargo would likely have triggered an emergency response and wide condemnation of the U.S. and UN if it had occurred among civilians in occupied territory during warfare. Any occupying force which would continue to deny more than 20 million civilians adequate access to food and medicine might be prosecuted for war crimes. The far greater number of deaths to civilians in the embargo, compared to civilians in the Gulf war, civilians during postwar bombings, or soldiers during the Gulf war, all would be unacceptable levels of collateral damage were sanctions guided by the rules of warfare.

Only recently has a large-scale reaction against the humanitarian impact of sanctions occurred in the U.S. Ironically, this response increased during 1998, when the most severe embargo-related damages had already ended. The focus on excess deaths, while important, is perhaps misplaced as a primary focus at present. More attention should be focused on the well being and living conditions for Iraqi children. Even at the time of highest mortality among under five-year-olds, nine out of ten Iraqi children survived to reach school age. The large-scale limitations that sanctions impose on their lives is now the major issue in need of attention if humanitarian damage is to be reduced. It will become an increasingly important issue as sanctions are eliminated on humanitarian goods and postwar, postsanction reconstruction begins. Many Iraqis believe that oil riches will return their country to its pre-Gulf war status within months of the lifting of sanctions. More likely, long-term social and economic investments will be needed for a five- to ten-year period to recover. Community-based health education and health promotion efforts, involving neighbors and civil organizations can speed and make more effective the process of reconstruction. In this regard, the CCCUs provide an excellent Iraqi model for postconflict development.

Conclusions

Sustained increases in young child mortality are extremely rare in this century (3). Such a large increase as that found here is almost unknown in the public health literature. In Iraq, a rate of mortality among under five-year-olds in excess of 80 per one thousand births was last experienced about twenty years ago (52). Living conditions in Iraq, thus, represent a loss of several decades of progress in reducing mortality. This is a social disaster which should be urgently addressed. To the degree that economic sanctions complicate access to and utilization of essential goods, sanctions regulations should be modified immediately. In addition, the international community should urgently make available to Iraq materials and expertise to improve child health programs and policies in the fields of feeding and weaning practices, diarrhea and respiratory infection recognition and care, and maternal and child health care, family income, and education.

Perhaps more importantly, careful and aggressive monitoring of the humanitarian situation should be instituted as soon as any future sanctions are considered. The Iraqi tragedy has been compounded by an extended period of inadequate monitoring following 1991. No international assistance was provided to the Iraqi Nutrition Research Institute or the Statistical Branch of the Ministry of Health at least until 1995. There was a delay of six years in initiating a large-scale program to provide humanitarian supplies.

Accurate mortality data are seldom available for monitoring short-term or recent changes in a country. Common methods for demographic assessment require a lag time of three to five years for assessing mortality (27). Further research on more timely monitoring indicators, like nutritional status, and more accurate and complete monitoring data on factors such as weaning practices and water quality, are needed to assess and guide humanitarian interventions in emergency situations around the world.

Qualitative data, information from small surveys, and service statistic data from health institutions and NGOs providing humanitarian assistance have often been available, but underutilized in developing timely and accurate assessments of health and well being in Iraq. We must develop more skill, standardize procedures, and increase the coordination of efforts among the many small and large institutions that can contribute to these assessments.

There is much to learn from the problems in data collection, interpretation, and reporting which have occurred in Iraq. These problems limited the utility of researcher efforts and create unnecessary confusion regarding the reliability of data sources. Information on the reliability and precision of estimates of mortality and well being derived from varied sources can then better orient and facilitate timely interventions to reduce morbidity and mortality in many situations around the world.

Notes

1. In the direct method (also called life table method), women of childbearing age are asked the dates of birth and death of their children. Life table estimates of the risk of dying at various ages are calculated from these data in five-year cohorts. This method has been shown to provide good estimates of mortality risk when well designed and conducted by trained interviewers. Compared to the indirect estimation method, this direct approach requires more and higher quality information from mothers, and thus is more subject to error. When there are errors, they tend to bias toward low mortality estimates, as there is a tendency to omit reports of those births that result in child deaths.

Indirect methods are based on questions about the total number of children ever born to a woman and the number of children who subsequently died (27). The indirect approach is less vulnerable to errors in reported births and deaths. The proportion of child deaths to women in five-year cohorts are compared to standard patterns of fertility and deaths by age and converted into probability estimates of mortality. This approach generates reliable estimates of childhood mortality for a period of time 5 to 15 years prior to interviews, but tends to overestimate

mortality levels in the years just prior to interview. This overestimation is reduced when women are grouped by duration of marriage rather than age; data reported here are marriage-grouped.

2. Throughout this document, the infant mortality rate (IMR) and under five-year-old mortality rate are per 1000 live births.

3. The 95% confidence interval for this estimate is a range of 16 to 60 deaths per thousand. A 95% confidence interval means that 95 out of 100 samples rates would be within this range. The confidence interval is unusually wide for this estimate because there are few data points available for their calculation.

4. Despite a small number of total deaths in the survey data and adjusting for increased variance introduced by the cluster method used to select respondents, the difference between these periods remains highly significant ($p>.00$) in proportional hazards analysis [survival probability $.964 \pm .015$ vs. $.958 \pm .015$ (32)].

5. Among under five-year-olds, weight for age is a composite indicator of both acute and/or chronic malnutrition. Low weight for age, indicates that the child is underweight. It is an expression of a process which has resulted in stunting or wasting or a combination of both. It is the most widely used international comparative indicator of undernutrition. Weight for height is a measure of acute, or recent, malnutrition. Low weight for height indicates that the child is wasted. Height for age is an indicator of chronic or long-standing malnutrition. Low height for age indicates that the child is stunted.

Mild malnutrition is represented by the proportion of the population between one- to two-standard deviations below the reference population's distribution. Moderate malnutrition is indicated by a two- to three-standard deviation deficit, and severe malnutrition is indicated by a three- or more standard deviation deficit from the reference population distribution. All malnutrition data reported here refer only to the proportion of children who are moderately or severely malnourished.

6. Details on the methods of the four best studies are examined here:

The IST carried out a multistage cluster sample survey from 25 August 1991 to 5 September 1991. Weighting of the samples included from each governorate was based on the population enumerated in the 1987 national census. The clusters to be included were randomly chosen from a list of population centers in each cluster and a microcomputer-based random number generator. Once the first house in a cluster was chosen, researchers went to that home. If a woman aged 15 through 49 lived in the home and had experienced a live birth since 1991, the household was included in the study. All children under five years of age in that and the subsequent neighboring 24 houses with young children were weighed. While this method does not generate a random sample, it closely approximates it. Since population census data were not fully accurate or available, it is the best method available to get a representative sample of the

population. The greatest limitation of this approach is the correlation of results, making confidence bands around a point estimate approximately 30% wider than they would in a true random survey (46). There were 299 clusters included in 17 governorates, proportionate to the relative magnitude of the population per governorate. Within each cluster 25 to 30 households were included. All children under age five in these households were included in the anthropometric survey. This included a total of 2676 children.

In 1996, UNICEF and the Iraqi government's Central Statistical Organization, led a large-scale sample survey in both the 15 governorates controlled by the Iraqi government (35) and, separately, in the three governorates in the Kurdish zone in the north (36). The sample frame for the ***Multiple Indicator Cluster Sample Survey (MICS)*** was developed by organizations sponsoring the nutritional survey. It used a probability sample—both the sites to be included in the sample and the households were representative. It included 6375 households—425 households in each of the 15 south and central governorates. Survey teams included international investigators and Iraqis trained by the Nutritional Research Institute. The ***MICS*** survey was the first national nutrition survey conducted since the IST study in 1991.

The World Food Program, UNICEF, and the Iraqi Ministry of Health in April 1997 subsequently carried out a large-scale nutritional survey during a national polio immunization campaign (47, 48). The immunization campaign in April included every fifth to tenth child present for immunization. This ***1997 Clinic Exit Survey*** provided a sample of 15,466 children. This over sampled children aged one and two relative to those aged four and five. A stratified random sample including 87 of the 850 primary health centers in the country was included. The 15 south and central governorates, covering 85% of the population, were included. The results are similar to those found in the 1996 large-scale multistage cluster sample survey carried out by UNICEF.

In March 1998 the World Food Program, UNICEF, and the Iraqi Ministry of Health again carried out a clinic exit interview during the spring polio immunization campaign (49). The results of the ***1998 Clinic Exit Survey*** are similar to the clinic exit interview study in April 1997 and the MICS study of August 1996. Malnutrition is highest in rural areas and slightly higher among males. Results from these studies, taken together, suggest that malnutrition rose rapidly from 1991 to 1996 and has been roughly stable among those under five years of age from August 1996 to March 1998.

Table 5: National Nutritional Assessments In Iraq Among Under Fives

	August 1991 (IST) (29)	August 1996 (MICS) (35,36)	April 1997 (Immunization Clinic Exit Survey) (47, 48)	March 1998 (Immunization Clinic Exit Survey) (49)
Percent Moderate or Severe Underweight for Age	9.2	23.4	24.7	22.8
Percent Moderate or Severe Underheight for Age	18.7	31.2	27.5	26.7
Percent Moderate or Severe Underweight for Height	3.0	11.0	8.9	9.1

7. See page 15; estimate of 3663 civilian deaths plus high estimate of 63,000 adult male Iraqi military deaths.