The 2004 and 2006 Survey-Based Estimates of Mortality in Iraq: Frequently Asked Questions

The Center for Refugee and Disaster Response at the Johns Hopkins Bloomberg School of Public Health undertook two studies to address the consequence of war for the Iraqi population, both of which were published in The Lancet. The first survey covered the period from January 2002 through mid-2004, and the second study encompassed the period from January 2002 through mid-2006 (1,2). The two studies overlapped from January 2002 through mid-2004. Clusters were randomly selected in both studies using similar probability-based sampling techniques. The surveys encompassed the same administrative areas but households were sampled from different neighborhoods, therefore, results from the two studies are completely independent. Interest continues in the findings of these studies, and below are responses to frequently asked questions.

1. Why were the studies undertaken?

The work of the Center for Refugee and Disaster Response focuses on the public health consequences of natural and conflict-related disasters. Center staff has studied public health consequences of conflict in Afghanistan, Sierra Leone, Liberia, Albania, Tanzania, Uganda, Sudan, DR Congo, as well as the consequences of natural disasters, including earthquakes in Peru and Pakistan, the tsunami in Sumatra and drought in East Africa. The Iraq war’s impact on civilians was an important unanswered research question.

2. How were the two Iraq studies financed?

Both studies used standard cluster survey methods, widely used by the U.S. government and many other organizations to estimate characteristics in a population, including mortality (7). A number of clusters are selected from a population in a manner so all persons have an equal opportunity to be selected.

In the Iraq studies, death rates after the March 2003 invasion were compared with the death rates from January 1, 2002, through the date of the invasion in the same households. Mortality rates were calculated for the households sampled in the survey and then applied to the population as a whole. The number of persons to be included in the survey depends on the prevalence of the characteristic in the overall population, not the size of the population itself. In the 2006 study, the sample size was calculated to detect a doubling of the pre-invasion mortality rates, and the sample size proved more than adequate for describing changes in the population mortality rate.

The number of clusters influences the confidence interval or precision of estimates, and increasing the number of clusters reduces the range in which the true value has a 95 percent chance of being present. A larger number of clusters also allows for comparisons among groups of clusters, but increasing the number of clusters does not influence the accuracy of results. For many outcomes measured in emergencies or disasters, a total number of 30 clusters has given consistently reliable results and is a recommended method for mortality assessment. The 2004 Iraq study used 33 clusters, and the 2006 study included 47 clusters. The number of clusters was increased in 2006 to narrow the confidence interval and provide a smaller range of estimated deaths.

In cluster surveys, a random method is used to locate the first household. In 2004, GPS units were used, but these could not be used in 2006 for security reasons. The sampling method used in 2006 was selected to ensure that all households would have an equal chance of inclusion. This included a listing approach of residential streets and back streets, as well as main streets, to ensure equal representation. In the 2006 survey, two low-voltage provinces were inadvertently omitted from the sample. The results were adjusted accordingly, and the mortality estimates exclude these two governorates.

Survey questionnaire: This questionnaire was approximately 10 questions or half a page in length. If no deaths had occurred in the household, the demographic information would typically be completed in less than 15 minutes. While the survey was brief, the study focus was mortality, thus the questionnaire contained as many or more mortality questions than any other surveys that have recently been implemented in Iraq. Teams of four physician-interviewers and one supervisor could complete a cluster in about five hours. If a death was reported then additional data were collected, including a request to see any death certificates.

Death certificates: Issuing death certificates has been common in Iraq for many years, but tabulation of deaths has stopped. In this study death certificates were seen for 501 of the 629 (80 percent) deaths reported. In some cases the certificates were locked up and the household member responding did not have
access. In other cases interviewers opted not to ask because of local conditions and sensitivities. Missing certificates were distributed across 20 of the 47 clusters.

**Migration:** Responses to questions on migration mirrored the levels of violence found in the data. In areas of low violence only 3.6 percent of households reported an out-migrant. This increased to 9.7 percent in medium-violence areas and to 11.2 percent in high-violence areas. In-migrants to households were the highest in low- and medium-violence areas, as would be expected.

6. Why is there such a preponderance of male deaths?
Of the violent deaths reported, 90 percent were among men. Men clearly had greater mobility and usually had jobs to attend to which likely increased their exposure to violence. In general, women and children were more likely to remain sequestered at home. It is also probable that some of the male deaths reported were among combatants. The rapidly escalating numbers of widows reported in Iraq is consistent with the death patterns observed (8).

7. Refusal and absentee rates seem low.
The consent process offered the opportunity to decline participation in the survey. At 15 households residents refused to participate, and at 16 dwellings no one was home. This level of refusal and absenteeism is lower than in many surveys. The small number of absentees can be explained by the number of people staying home for security reasons. High participation is common in emergency situations. Having the physician-interviewers wear white hospital coats may have increased feelings of trust and willingness to participate. Onlookers in the streets were informed of the nature of the study, and encouraged to spread this information to the rest of the neighborhood so other households would not be caught off guard when interviewers arrived. This is a common survey strategy in many countries and may have reduced refusal rates.

8. How was the field work carried out?
Professor Riyadh Lafta, a member of the research team, oversaw the field work in both studies. Dr. Lafta has a long record as a solid partner in international research studies. These studies have included investigations of childhood cancers, the uptake of uranium into children’s teeth and polio in Iraq. Dr. Lafta’s publications include assessments of childhood nutrition during the period of the sanctions, and patterns of hospital admissions, both using standard and internationally accepted methods.

In the 2004 survey Dr. Les Roberts, from the Johns Hopkins team, and Dr. Lafta trained the interviewers, and Dr. Roberts supervised the interviewers in the initial phase of data collection. By 2006, security had worsened and Dr. Lafta alone provided the training using a curricula established by the JHU team in Jordan. Collection of data in each cluster was conducted by a team consisting of four physician-interviewers and a supervisor. Each team included a female interviewer because of cultural practices in some areas. In some neighborhoods additional local interviewers were recruited to assist teams with sample planning. Interviews were conducted inside walled household compounds, but interviewers did actually enter dwellings for reasons of safety.

9. Comparisons with other studies (see figures)
The lowest estimates of conflict deaths in Iraq come from the Iraq Body Count, which tabulates reports of deaths primarily in the international media, augmented with some reports from morgues (9). While such passive surveillance of deaths provides useful information on trends and causes of death, these counts cannot estimate the full scale of deaths. If the deaths noted by Iraq Body Count did represent the true sum of deaths in Iraq, the risk of death in Iraq would be similar to some of the more violent cities in the United States and several countries worldwide which are not considered conflict-affected. Surveys, not media reports, are the standard method of estimating mortality in almost all parts of the world. Small follow-up surveys show that passive surveillance methods such as Iraq Body Count omit many deaths which occur, including 10 percent or more of the Iraqi deaths reported in American print media (10).

![2006 Homicide Rates in the Most Violent US Cities & Iraq Mortality Estimates](image)


A recent Iraq government survey of living conditions in Iraq published in *The New England Journal of Medicine* (11). Interviews in this study lasted several hours and were based on long questionnaires that contained a few questions on household deaths. The deaths were not verified with death certificates. The study reported implausibly low mortality figures, and statistical adjustments were required to compensate for underreporting of deaths. Some of the most violent areas of Iraq were not visited in the survey, and mortality figures were further adjusted for missing clusters. The Iraqi government study estimated an excess mortality of 151,000 from violent causes during the time between the American-led invasion and June 2006. Their results paralleled death rates found by both the 2004 and 2006 Johns Hopkins studies for the first 18 months of the post-invasion period, then remained essentially flat for the next two years in spite of rising violence and resulting increases in migration.
The only other independent attempt to estimate a national violent death toll was conducted by the British polling group ORB which has conducted many polls in Iraq (12). They concluded that as of August 2007, an excess of one million deaths had occurred following the 2003 invasion of Iraq. After receiving some criticism for rural undersampling, additional samples were completed, which resulted in minimal changes to their total estimate. The ORB study found that at the end of 2007, violent deaths had occurred in 20.2 percent of Iraqi households as compared with the 15.5 percent of households in the 2006 Johns Hopkins survey.

10. Limitations
Every study has limitations, and in both Lancet reports we have addressed the key limitations which could influence study results. Random sampling depends on population data. The study relied closely on mid-year 2004 UNDP/GOI population estimates for sample locations, and migration associated with the later stages of the conflict may have affected sampling representativeness. A major limitation of the survey approach is inability to distinguish among combatants, criminal elements and those with no involvement in the violence. Neither is it able to detect underreporting of deaths by households or to independently confirm the causes of deaths reported by households.

8. Iraqbodycount.org