



crisis states research centre



Occasional Paper no. 1

**On the Death Toll in Iraq  
since 1990**

Tim Dyson  
London School of Economics

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## Crisis States Research Centre

### On the death toll in Iraq since 1990

Tim Dyson

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*'It is the mark of an instructed mind to rest satisfied with the degree of precision which the nature of the subject permits and not to seek an exactness where only an approximation of the truth is possible.'*

Aristotle (Harte 1988)

#### Introduction

The number of child deaths that have occurred in Iraq since 1990 because of the effects of conflict and economic sanctions is a matter of considerable contention. Shortly after the first Gulf war in 1991 a group of researchers—sometimes called the International Study Team (IST)—conducted a nationally representative household survey in Iraq. The results suggested that, comparing the period before and after the war, there had been a sharp rise in child (i.e. under age five) mortality. Indeed, the researchers estimated that in the short period from January to August of 1991 there had been very roughly 46,900 *excess* child deaths compared to what would have happened if the child mortality rate had remained constant at the level indicated for 1985-90 (see Ascherio et al. 1992). During the early 1990s, reports about the very difficult living conditions that were being endured by the Iraqi people increased. It seemed that by almost any measure of human welfare—e.g. food availability, nutritional status, water supply, waste disposal, immunisation coverage, health care provision, etc—conditions in the country were dire (e.g. see Garfield 1999). Yet despite the controversy and debate, no further direct data on mortality that could claim to be both fairly reliable and nationally representative were collected until the late 1990s.

Then in 1999—and in cooperation with the Government of Iraq—the United Nations Children's Fund (UNICEF) conducted a major national survey that was focused specifically on child (i.e. under-5) mortality. To obtain data that would be amenable to in-depth analysis, the survey collected birth histories from a representative sample of adult women. The collection of birth histories involves asking women to provide detailed information about each of their live births separately (e.g. the date of the birth, the sex of the child, and, if it is dead, the date of the death). There have been two related analyses of the birth history data collected by this survey. The first compared child death rates for 1984-89 and 1994-99 and concluded that under-5 mortality had roughly doubled as a result of the first Gulf war and associated events such as the imposition of economic sanctions by the United Nations Security Council (see Ali and Shah 2000). The second, more detailed analysis produced *annual* estimates of child mortality rates. It found that under-5 mortality had increased sharply in 1991 and that it had subsequently remained at a high level until 1998. Moreover, looking at the period 1991-98 as a whole, this second analysis estimated that there had been between 380,000 and 480,000 excess child deaths. The first figure resulted from the counterfactual assumption that child mortality would otherwise have remained constant at its 1986-90 level; the second resulted from the assumption that mortality would have continued to fall at the average rate of decline experienced between about 1960 and 1990 (see Ali, Blacker and Jones 2003).

In fact there is another direct source of information on child mortality in Iraq, which slightly pre-dates the 1999 UNICEF survey, but the data only became available after a considerable delay. In 1997 the Government of Iraq held a census in the fifteen of the country's eighteen governorates that at that time still remained under its control (three, predominantly Kurdish, northern governorates were by then under separate UN administration). The 1997 census asked women simple questions on the number of children that they had ever borne and the number of these children that were still surviving i.e. so-called CEB/CS questions. However, it took several years for the basic census data to be processed and for the resulting census report to be published in Arabic in Iraq. Moreover it was not until after the US/UK invasion of Iraq in March/April 2003 that a copy of the census report was obtained by the United States Census Bureau, and subsequently by the United Nations in New York. Indeed, the very existence of the census report seems only to have become evident to the wider world through a UN press briefing in August of 2003 (see United Nations 2003a). The UN briefing gave little information on the census results, and no specific data relating to child mortality. However in a *New York Times* report on the briefing a US Census Bureau demographer was quoted as saying that 'on a preliminary basis it looks like child mortality may not have been quite as high during the mid- to late 1990s as has been thought' (see Barringer 2003).

Information on child mortality from the 1997 census CEB/CS questions eventually became more generally available in 2005. This occurred in the report of a Working Group that was set up in 2004 by the Independent Inquiry Committee established by the United Nations Secretary General to investigate the impact of the UN Oil for Food Programme (OFFP) on the Iraqi people (see Working Group 2005). The Working Group was concerned with child mortality because the OFFP was specifically intended to improve the circumstances of Iraqi children. In its analysis the Group also uses CEB/CS data from the 1987 census. In addition it refers to—and largely dismisses—birth history data collected by the Iraq Living Conditions Survey (ILCS), a major investigation that was held in 2004. The ILCS—which, of course, was conducted the year *after* the US/UK invasion—was a nationally representative household survey, financed by the United Nations Development Programme (UNDP) and run jointly by Iraq's Central Organisation for Statistics and Information Technology and the Norwegian research institute, FAFO (see UNDP 2005a,b,c).

Although the Working Group says that it cannot conclude anything with much confidence, in arriving at its conclusions it nevertheless puts substantial weight on the 1997 census data—which in the Group's view suggest that there was only a modest rise in child mortality in the early 1990s amounting to about 10 percent (Working Group 2005:53). The Working Group concludes that the 1997 CEB/CS data make a sharp rise in child mortality around 1991—such as was indicated by both the IST and UNICEF survey data—'somewhat implausible'. Moreover, in discounting the UNICEF survey results the Group raises the possibility that the Iraqi government of the time may have tampered with the survey data so as to produce a false impression of a rise in the child death rate (see Working Group 2005:136). Perhaps not surprisingly then, the Group concludes that the scale of any excess child mortality in Iraq was comparatively modest—amounting to somewhere between 45,000 and 68,000 excess deaths during the period from 1991 to 1996 (Working Group 2005:50-55). The first figure results from the counterfactual that child mortality would otherwise have remained constant at the level of the 1980s, and the second from assuming that there would have been a slow decline. The main point, however, is that these figures are *much* more conservative than the other estimates.

With this as background, the central aims of this paper are to assess the trend of child mortality in Iraq in recent decades and to estimate the number of excess child deaths that occurred during the period 1991-2003. In contrast to the position adopted by the Independent Inquiry Committee's Working Group, the view taken here is that, all things considered, the IST and UNICEF data are of fair quality, and that they provide a reasonably consistent, broad account of what has occurred.

Furthermore, it will be argued that it is unwise to discount the results of the ILCS. Indeed, if appropriately interpreted, the ILCS data can themselves be seen as supportive of this same general account of what has happened. The Working Group's interpretation of the 1997 census data is probably flawed. Almost certainly, there was a sharp rise in child mortality in Iraq in 1991. Almost certainly, a high level of child mortality was sustained in the country until at least the end of 2003. A reasonable estimate of the range of excess under-5 mortality during 1991-2003 is somewhere between 670,000 and 880,000 deaths.

For many reasons Iraq's recent history has not been conducive to demographic data collection. There are also grounds to suppose that pronouncements on mortality have sometimes been influenced by political interests on all sides. In this context another interesting divergence of estimation is that between the current UN estimate of life expectancy during 2000-2005 of 58.8 years, and the appreciably higher figure provided by the US Census Bureau for 2005 of 68.7 years (United Nations 2005; United States Census Bureau 2005). Accordingly, the paper also comments briefly on Iraqi mortality more generally. Although it is chiefly concerned with mortality, it will be necessary to consider fertility as well—since this is needed to estimate the number of child deaths.

The paper has five main parts. The first section presents a necessary brief modern history of Iraq. The second, also by way of background, comments briefly on recent population trends in the country. The third section deals with levels and trends in fertility and child mortality and is the heart of the piece. This section discusses the main sources of data on early age mortality and the context in which they were collected. It assembles an integrated account of child mortality levels and trends and argues that it represents the most plausible and consistent picture of what has occurred. The section also provides estimates of the number of excess child deaths during 1991-2003. The fourth section comments briefly on mortality at ages other than childhood, with particular reference to what has happened since the invasion of 2003. The paper's final part summarises the main conclusions and discusses their implications.

### **A brief modern history of Iraq**

Demographic trends in Iraq must be seen against the country's grim recent history (Table 1). Saddam Hussein became President in 1979. Two years later he launched a full-scale invasion of the contested oil-rich province of Khuzistan in southwestern Iran—leading to eight years of bloody, conventional warfare. It was towards the end of this conflict—in March 1988—that Iraqi forces used poison gas against the northeastern Kurdish town of Halabja, which had been seized by the Iranians. It is often said that a million men died during the Iran/Iraq war. But this number is suspiciously round. Most estimates of the number are lower, although the range is wide (see UNDP 2005b:41). One considered view of the information is that at least 105,000 Iraqi men were killed, with Iranian losses being far greater (Clodfelter 2002:653). Most of the fighting occurred away from populated areas. Saddam Hussein's government mixed political repression of its people with efforts to improve their social welfare (Marr 2004). And there is little doubt that, despite the war, the general socio-economic and health conditions of Iraq's population did not deteriorate at this time. Nevertheless at the end of the conflict the country was deep in debt, and this was one of the factors behind the attack on Kuwait just two years later (Towle 2005:172).

**Table 1: Selected events in the modern history of Iraq.**

Year	Month	Event
1979	July	Saddam Hussein becomes President of Iraq
1980-88		The Iran/Iraq war (September 1980 to August 1988)
1990	August 2	Iraq invades and annexes Kuwait
	August 6	Economic sanctions against Iraq are instigated under UNSCR 661
	September	Government of Iraq introduces food rationing for all households
1991	January 17	Start of first Gulf war to remove the Iraqi army from Kuwait
	February 28	Cease-fire following the liberation of Kuwait and the defeat of Iraq
	March 2	UN Security Council sets conditions for the lifting of sanctions
1992	September	Government of Iraq withdraws from the three northern governorates
1995	April 14	UNSC adopts Resolution 986 to set up the oil for food program (OFFP)
	May 20	Memorandum of understanding on UNSCR 986 between Iraq and the UN
1997	March	First food supplies under the OFFP arrive in Iraq
1998		Collapse of the UN process of weapons inspection
	December	US/UK bombing of Iraq (Operation Desert Fox)
1998-01		Iraqi restrictions on UN weapons inspectors; US/UK air strikes
2002	November	Return of the UN weapons inspectors
2003	March 19	Start of second Gulf war i.e. the invasion of Iraq by US/UK forces
	April 14	All major towns are brought under US control
	May 1	President Bush declares the end of major combat operations
	May 22	UNSC ends economic sanctions against Iraq
	December 13	US soldiers capture Saddam Hussein
2004	April 5-11	First major US-led offensive against anti-coalition forces in Falluja
	June 8	UNSCR 1546 'transfers full sovereignty to the interim Iraqi government'
	November	Second major US-led offensive against anti-coalition forces in Falluja
2005	January 30	Elections are held to form a transitional government
	December 15	Elections are held for a four-year parliament
<i>Note:</i> The list above draws on many sources and is not meant to be comprehensive. For alternative calendars see, for example, Knights (2004) and Working Group (2005).		

The invasion of Kuwait early in August of 1990 led almost immediately to the instigation of strict economic sanctions by the UN Security Council (UNSC). Since Iraq relied heavily on imports to feed its people—indeed, about 70 percent of food was imported—the government reacted very quickly by instigating a system of household food rationing, known as the Public Distribution System (PDS). There followed a period of five months before the start of the first Gulf war (Table 1). This was a time of mounting food shortages, increasing prices, and rising rates of malnutrition (e.g. see Harvard Study Team 1991; Rai 2004:63). The war itself lasted for just a few weeks, but especially through the aerial bombing campaign it badly affected Iraq's infrastructure (e.g. transport, electricity, water). The cease-fire was accepted by Saddam Hussein in March 1991. However, his regime faced major uprisings—especially among Kurds in the north of the country, and Shiites in the south. The latter rebellion was fiercely suppressed. But fighting with Kurdish forces continued, until in September of 1992 the Iraqi army withdrew completely from the three northern governorates of Dohouk, Erbil and Al-Sulaimaniya, leaving them to be administered separately as an autonomous region under UN auspices. That said, the economic sanctions originally imposed under UNSC Resolution 661 (UNSCR 661) remained in place with only minor modification. The Iraqi economy was very badly affected because the sanctions hit at its core—i.e. the capacity to export oil in exchange for a wide range of crucial imports.<sup>1</sup> The UNSC set as the main condition for

<sup>1</sup> Before the first Gulf war Iraq exported 2.5 million barrels of oil per day. Oil revenues constituted about two thirds of the country's total GDP and provided almost all of the funds of the central government budget (Garfield 1999:9). See also Working Group (2005, especially chapters 1 and 2).

the lifting of sanctions that Iraq should scrap its weapons of mass destruction (chemical, biological, nuclear) under close UN supervision.

Reports about the hard living conditions that were being experienced by the Iraqi people were common following the first Gulf war in 1991 (e.g. see Harvard Study Team 1991; Drèze and Gazdar 1991). But information about the extent and depth of the suffering became more frequent and forceful in the years that followed. It was increasingly clear that, on top of the damage that was done by the war, all basic aspects of life—food, health, water, sewage, transport, employment, education, etc—were being adversely affected by the operation of the economic sanctions. There was mounting international debate as to who was responsible for the distress—Saddam Hussein and his regime or governments, such as those of the US and UK, that were strong supporters of the sanctions. These developments led the UNSC to pass Resolution 986 in April of 1995. This was the first of several resolutions that were intended to ameliorate the situation in Iraq. It allowed the country to sell oil on the world market so that it could import basic supplies—especially of food and medicine—under UN supervision. But the process of negotiating with the Iraqi government and implementing UNSCR 986 was protracted. Consequently the first supplies of food and medicine delivered under the OFFP arrived respectively in March and May of 1997 i.e. after a delay of about two years. By early 1998, however, there were some signs of improvement in the condition of the Iraqi people. For example Garfield (1999:4) observed that '[s]ince March 1998 the oil for food program has greatly increased access to essential supplies and the mortality rate [among children under five years of age] has surely declined, but data are not yet available to estimate the magnitude of that decline.'

The period 1998-2001 appears to have been one of some limited improvement in the condition of the people. Due to the OFFP, the amount of food distributed each month to households through the PDS increased somewhat compared to earlier years. It was made easier for the country to import spare parts and equipment so that it could rehabilitate its oil-producing capacity. Saddam Hussein's regime also became more adept at circumventing the sanctions e.g. through covert oil sales to Syria. There were US/UK air strikes against military targets in Iraq. UN weapons inspectors came and went—the renewal of their access by the regime at times resembling a bargaining chip that enabled some slight further easing of the economic sanctions (Falk 2004:27).

The situation would probably have evolved slowly. But the attack on the United States on 11 September 2001 led to its transformation. In his State of the Union address of January 2002 President George W. Bush singled out Iraq as part of an 'axis of evil'. In the United States 'regime change' in Iraq became a leading topic of public debate (Marr 2004). The year 2002 involved increasing US preparations for an invasion, and a tightening of the imposition of the economic sanctions. In this context World Bank figures suggest that per capita GDP in Iraq fell from 1,068 US dollars in 2000 to 743 dollars in 2002 (World Bank 2006). In September of 2002 President Bush went to the United Nations to put the case for war. The US/UK invasion—the second Gulf war—took place early in 2003 and lasted for about a month. At the start of May 2003 President Bush declared that major combat operations were ended. And the UNSC lifted the economic sanctions later in that same month (Table 1). Nevertheless, given the invasion and upheaval that followed in its wake, 2003 was perhaps an even harder year for the Iraqi people than those that preceded it—for example per capita GDP is estimated to have fallen to just 479 US dollars (World Bank 2006).

It is clear that circumstances in Iraq have been anything but settled in the years since 2003. With very difficult living conditions, and a great deal of violence, life remains extremely hard. The previously mentioned Iraq Living Conditions Survey (ILCS) that was held in 2004 revealed a complex, troubled picture. Whereas in 1980 Iraq had been a land with living standards similar to the

best in West Asia, by 2004 it had fallen far behind. Moreover, almost all Iraqi households were still heavily dependent on the food rationing system for their basic supplies (UNDP 2005b:63).

### Recent population trends

There is agreement regarding some of the broad facts of Iraq's recent demography. The birth rate is much higher than the death rate, and therefore the population has grown very rapidly. Indeed, as Table 2 shows it has probably doubled in size since Saddam Hussein came to power. The current annual rate of natural increase is thought to be around 2.7-3.0 percent.

**Table 2: Estimates of Iraq's population and corresponding average annual growth rates, 1970-2003**

	Iraqi Government (COSIT)		United Nations		US Census Bureau	
	Population (thousands)	Growth rate (percent)	Population (thousands)	Growth rate (percent)	Population (thousands)	Growth rate (percent)
1970	9,440	-	9,356	-	9,414	-
1980	13,300	3.43	12,962	3.26	13,233	3.41
1990	17,890	2.96	17,341	2.91	18,135	3.15
2000	24,086	2.97	23,224	2.92	22,676	2.23
2003	26,340	2.98	24,700	2.05	24,683	2.83

*Note:* COSIT denotes the Iraqi Central Office for Statistics and Information Technology.  
*Sources:* UNDP (2005b:42); United States Census Bureau (2005).

At the start of the present century total fertility per woman was somewhere between four and five births. For example, the UN estimate for 2000-2005 is 4.8 births and the US Census Bureau figure for 2005 is 4.3 (United Nations 2005; United States Census Bureau 2005). Consistent with high fertility, the population is very young. Official data suggest that in 2001 about 16.9 percent of the population were aged under five years, and about 43.8 percent were aged under fifteen (United Nations 2003b:168). The birth rate, however, has been falling and this has contributed to some decline in the rate of population growth. At the time of the US/UK invasion in 2003 Iraq's population was probably in the vicinity of 25 million (Table 2). And almost 70 percent of the population live in urban areas (United Nations 2004).

International migration, however, provides a significant source of uncertainty. Saddam Hussein's suppression of the Shiite uprising in the south, the forced expulsion of ethnic groups (especially Kurds) in areas remaining under Baghdad's control in the north, and the harsh effects of the UN sanctions—these and other factors fuelled a significant outflow of people in the 1990s. There are no precise figures, but it seems likely that Jordan, Syria and Iran may each have received several hundreds of thousands refugees (Romano 2005) and there was also migration to other places like the Gulf states, Saudi Arabia, and Lebanon. There was substantial movement into Turkey, much of it of Kurds from the autonomous northern region who then proceeded to seek refugee status and asylum in Europe. Data compiled by the Migration Policy Institute for ten countries—the US, Canada, Australia, plus seven in Europe—show a steep rise in the annual number of Iraqi migrants. For example in 1991 these countries received a combined total of about eleven thousand Iraqi migrants. By 2001, however, the annual figure had risen to fifty thousand. The cumulative total for these ten countries for 1991-2001 is 328,000 (Sirkeci 2004). So there is strong evidence of large-scale out-migration after 1991. Relatedly, between the 1987 and 1997 censuses the ratio of males to females in Iraq's population is reported to have fallen sharply from 1.06 to 0.99—and it is likely that



migration contributed to this (see Barringer 2003).<sup>2</sup> Uncertainty regarding the scale of this out-migration helps to account for the differences between the estimates of population shown for 2003 in Table 2.

Following the invasion in 2003 and the resulting collapse of Saddam Hussein's regime there appears to have been some return migration, especially from neighbouring countries (Romano 2005). However whether any net inflow of people has continued during more recent years must surely be questionable. The results of the ILCS conducted in 2004 revealed that ten percent of Iraqi households said that they had a close relative—i.e. a spouse, son, daughter, parent or sibling of any household member—living outside of the country. The figure for the northern Kurdish region was 22 percent (UNDP 2005b:56).

### **Fertility and child mortality**

As noted, both the UNICEF survey of 1999 and the ILCS of 2004 collected birth histories. Accordingly these surveys provide comparable data on fertility and child mortality and they constitute the point of departure here. The mortality estimates obtained by the International Study Team and the census CEB/CS data will be discussed later.

The UNICEF survey was conducted in two parts during the first half of 1999. The first part was undertaken in February/March in the south and centre of the country i.e. the area then under the control of the Iraqi government, with about 80 percent of the country's population. The second part was conducted in April/May in the autonomous northern region, with around 20 percent of the population. Both parts of the survey had representative sample designs. The respective sample sizes were 24,000 and 14,000 households. Considerable effort was spent on the training of field staff (supervisors, interviewers, etc). Several minor difficulties arose during the fieldwork (e.g. relating to flooding and security issues) that temporarily inhibited access to some areas, but these problems were resolved. Importantly, the UNICEF survey was focussed chiefly on estimating levels and trends in child mortality—with very little additional information being collected. The questionnaire, which was pre-tested thoroughly, used relevant parts of the Demographic and Health Surveys (DHS) core questionnaire. Crucially, ever-married women aged 15-49 living in the sample households were asked questions on the number of children that they had ever borne and the number of these children that were surviving (i.e. CEB/CS questions) *before* they were asked for their detailed birth history. In the south and centre of the country all the trained interviewers were women; the figure in the north was 80 percent. Finally, an independent expert review panel was set up to scrutinise the resulting data. It found no evidence that they had been manipulated in any way. Instead, the review panel concluded that the data were of high quality—with no suggestion of deficiencies that sometimes occur in such material, like omission or time displacement in the reporting of births and child deaths (see UNICEF 1999a; Ali and Shah 2000; Ali et al. 2003).<sup>3</sup>

The ILCS seems to be the only major socio-economic survey to have been undertaken in Iraq since the US/UK invasion (see UNDP 2005a,b,c). The survey involved interviewing a representative sample of about 21,000 households. Most of the fieldwork occurred between March and May of 2004 i.e. about one year after the invasion.<sup>4</sup> The survey questionnaires arose from the 'Multiple Indicator Rapid Assessment' approach developed by the FAFO research institute, and employed in

<sup>2</sup> Recall that the 1997 census did not cover three northern governorates. But ILCS data from 2004 suggest that there are particularly low ratios of men to women in the working ages in the north, almost certainly partly as a result of out-migration (see UNDP 2005b:44).

<sup>3</sup> The panel drew on expertise from UNICEF, DHS, Macro International and WHO (see UNICEF 1999).

<sup>4</sup> In the two northern governorates of Dahouk and Erbil the fieldwork took place in August.

similar surveys in Jordan, and in the West Bank and Gaza Strip (see FAFO 2004a,b). The ILCS household schedule contained a great many questions on socio-economic variables (e.g. on housing, infrastructure, health, education, employment, income, the environment, services, household assets, etc). It also contained questions on the demographic characteristics of household members—including on whether the mothers and fathers of household members were alive or dead and, in a later part of the schedule, on the deaths of regular household members during the previous 24 months. Following the household questionnaire, there was a second, individual questionnaire. This was for all ever married women in the household aged 15-54.<sup>5</sup> The individual questionnaire involved collecting a birth history and questions on the health of children. About 70 percent of the ILCS interviewers were women (Jon Pedersen, personal communication).

In the present context of estimating levels and trends of under-5 mortality and fertility, there is little doubt that the UNICEF survey is superior to the ILCS. After all, the main purpose of the UNICEF investigation was precisely to obtain data to provide such estimates. Moreover, given the international controversy that was raging in the 1990s about the state of children in Iraq, every effort was made to ensure that the quality of the UNICEF data was as good as it could be. The suggestion by the Independent Inquiry Committee's Working Group that the Iraqi government may somehow have fiddled with the data to show a sharp rise in mortality in 1991 is surely far-fetched. Even in normal circumstances such a deception would require considerable demographic expertise to carry off successfully. And this is even more true in view of the scrutiny of the data that was carried out by the independent review panel.

The ILCS, however, suffered from three particular problems. First, it was conducted in *extremely* difficult conditions. Indeed, perhaps no major national socio-economic survey has ever been undertaken in more dangerous circumstances.<sup>6</sup> Second, the ILCS was *not* aimed primarily at providing estimates of fertility and child mortality. Rather, it covered a huge range of topics in what the preface to the survey report describes as 'a long and taxing questionnaire' (UNDP 2005a:9). The median interviewing time per household was 83 minutes. Third, in the individual questionnaire of the ILCS women were *not* asked CEB/CS questions before they were asked for their birth history. Yet it is well known that including such questions ahead of the birth history is a key way of minimising the under-reporting of births—especially of those that subsequently died. This is because women are forced to commit themselves to a specified number of births and deaths before providing their detailed birth history. Interestingly, the ICLS report notes that soon after the raw data began to come in from the field in early 2004 it became apparent that child deaths were probably being under-reported in the birth histories. Therefore efforts were made immediately to improve their collection. However these efforts were deemed not to be sufficiently successful and it was finally decided 'to re-interview all households again with [a] small questionnaire' consisting of the birth history and parts of the labor force section (UNDP 2005b:50). The ILCS data that are examined below are those that come from the re-interviews, but it will be seen that their quality remains comparatively poor.

The fertility and early age mortality estimates arising from the UNICEF and ILCS investigations are summarized in Table 3. Figure 1 compares the total fertility rates (TFRs). It seems that total fertility in Iraq began to fall sometime in the 1980s, and that it has continued to fall since.<sup>7</sup> For the period when TFRs from the two sources overlap they suggest a similar rate of decline. However, the TFRs

<sup>5</sup> The inclusion of women aged 50-54 slightly reduces truncation (see the notes to Table 3). Questions on the basic demographic characteristics of household members and on parental survivorship appear only on pages 19-20 of the household questionnaire, while those on deaths in the previous 24 months are on page 48.

<sup>6</sup> The ILCS report notes that for security reasons the fieldwork had to be suspended at times and adds, perhaps with understatement, that it 'coincided with a rather turbulent period' (UNDP 2005a:12).

<sup>7</sup> Note the hint of a brief peak in fertility in 1990 which might possibly be linked to the end of the Iran/Iraq war.

of the ILCS are generally about 85 percent those of the UNICEF survey—the implication being that births were under-reported in the ILCS. In view of the problems already noted with the ILCS, this is not surprising. Given that the TFRs from the ILCS are about 85 percent those of the UNICEF survey, an adjustment factor of 1.1765 is required to bring the former in line with the latter.<sup>8</sup> The ILCSa (i.e. adjusted) figures shown in Figure 1 and Table 3 have been pro-rated upwards by this amount. The adjusted rates suggest that by 2003 the TFR in Iraq was about 4.5 births per woman.

Turning to early age mortality, Figure 2 compares the annual child (i.e. under-5) mortality rates obtained by Ali and colleagues from the two parts of the UNICEF survey i.e. the first part covering the south and centre of Iraq, and the second part covering the north. The rates shown are estimates of the probability of dying between birth and the fifth birthday (i.e.  ${}_5q_0$  values in life table terminology). The authors did not have access to the CEB/CS data from the 1997 census at the time of their analysis. It is worth noting, however, that they compare the levels and trends of their under-5 death rates with estimates obtained from earlier surveys and conclude, quite fairly, that '[f]or the period before 1990, the estimates from the 1999[UNICEF] survey appear to be in reasonably good agreement with those from other sources ...' (Ali et al. 2003:222).<sup>9</sup>

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<sup>8</sup> The figure of 85 percent is a compromise between 87 percent for 1985-93 and 83 percent for 1994-98. The slight deterioration in birth coverage indicated for the more recent period may be significant in the context of the worsening in ILCS coverage of child deaths from 1991 onwards that is discussed in the text below.

<sup>9</sup> The 'other sources' are: the 1974 Iraq Fertility Survey; the 1987 Census of Iraq; the 1990 Immunization and Diarrhoea Disease Survey; and the 1989 Gulf Child Health Survey. The death rates from the 1989 GCHS are the most divergent and are clearly underestimates.

**Table 3: Estimates of fertility and early age mortality from the UNICEF survey and the ILCS.**

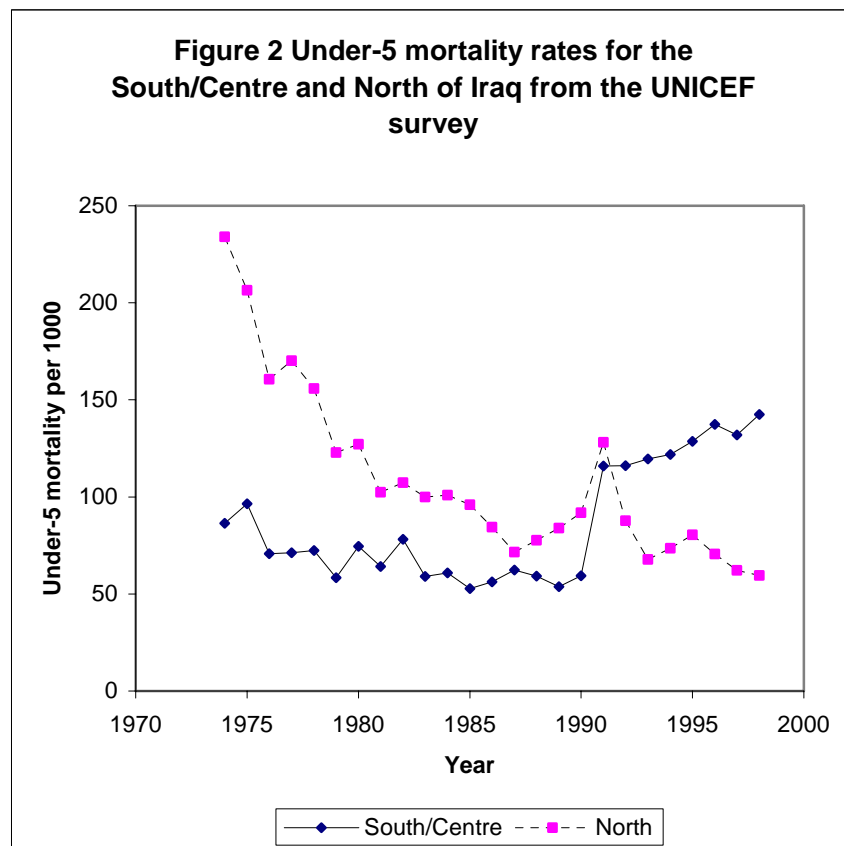
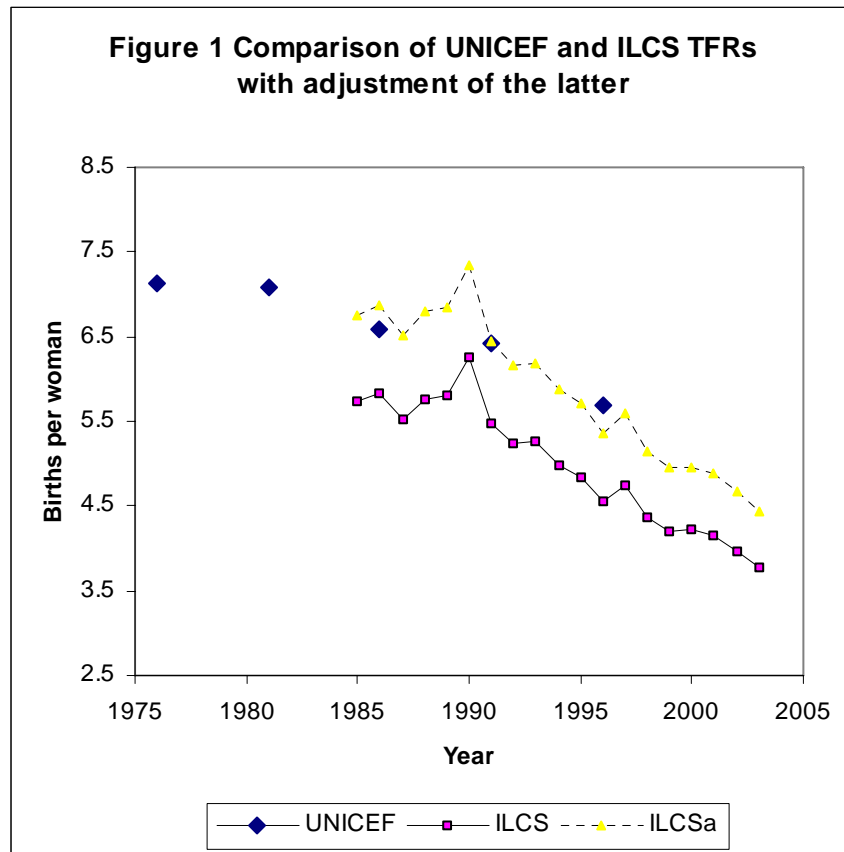
Year	Total fertility rate (TFR)			Child (under-5) mortality			Infant (under-1)mortality		
	UNICEF	ILCS	ILCSa	UNICEF	ILCS	(v)/(iv)	UNICEF	ILCS	(viii)/(vii)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
1974				115.9			78.7		
1975				118.5			75.3		
1976	7.14			88.7			64.1		
1977				91.0			63.2		
1978				89.1			62.5		
1979				71.3			54.8		
1980				85.1	53	62.3	64.5	35	54.3
1981	7.09			71.7	45	62.8	51.6	28	54.3
1982				83.9	40	47.7	62.9	27	42.9
1983				67.2	40	59.5	52.1	29	55.7
1984				68.9	45	65.3	53.7	33	61.5
1985		5.74	6.75	61.4	41	66.8	50.4	26	51.6
1986	6.59	5.84	6.87	62.0	30	48.4	48.5	17	35.1
1987		5.53	6.51	64.1	43	67.1	53.2	32	60.2
1988		5.77	6.79	62.9	43	68.4	50.9	32	62.9
1989		5.81	6.84	59.8	32	53.5	45.0	23	51.1
1990		6.25	7.35	65.9	36	54.6	52.0	26	50.0
1991	6.43	5.47	6.44	118.4	38	32.1	99.6	27	27.1
1992		5.23	6.15	110.4	40	36.2	92.9	29	31.2
1993		5.26	6.19	109.2	32	29.3	91.5	22	24.0
1994		4.99	5.87	112.2	35	31.2	93.9	27	28.8
1995		4.85	5.71	119.0	38	31.9	97.2	31	31.9
1996	5.69	4.55	5.35	124.1	37	29.8	100.2	29	28.9
1997		4.75	5.59	117.9	35	29.7	96.9	28	28.9
1998		4.37	5.14	125.9	44	34.9	100.8	35	34.7
1999		4.21	4.95		41			32	
2000		4.22	4.96		37			30	
2001		4.16	4.89		34			28	
2002		3.97	4.67		40			33	
2003		3.78	4.45		46			37	

*Note:* The UNICEF TFRs are quinquennial and they have been allocated to the central years of the five-year periods to which they correspond most closely. To address the issue of truncation and obtain ILCS TFRs for 1985-93 it was assumed that the age specific fertility rate (asfr) at 45-49 was equal to the average rate holding during 1994-98, and that during 1985-88 the asfr at 40-44 was equal to the average rate holding in 1989-93. As stated in the text, the ILCSa (i.e. adjusted) TFRs in column (ii) were pro-rated by 1.1765. The child mortality figures shown are life table  ${}_5q_0$  values, expressed per thousand live births.

*Sources:* Columns (i), (iv) and (vii) Ali et al. (2003:219); columns (ii), (v) and (viii) Pedersen (personal communication), but see also UNDP (2005b:49-52; 2005c:15).

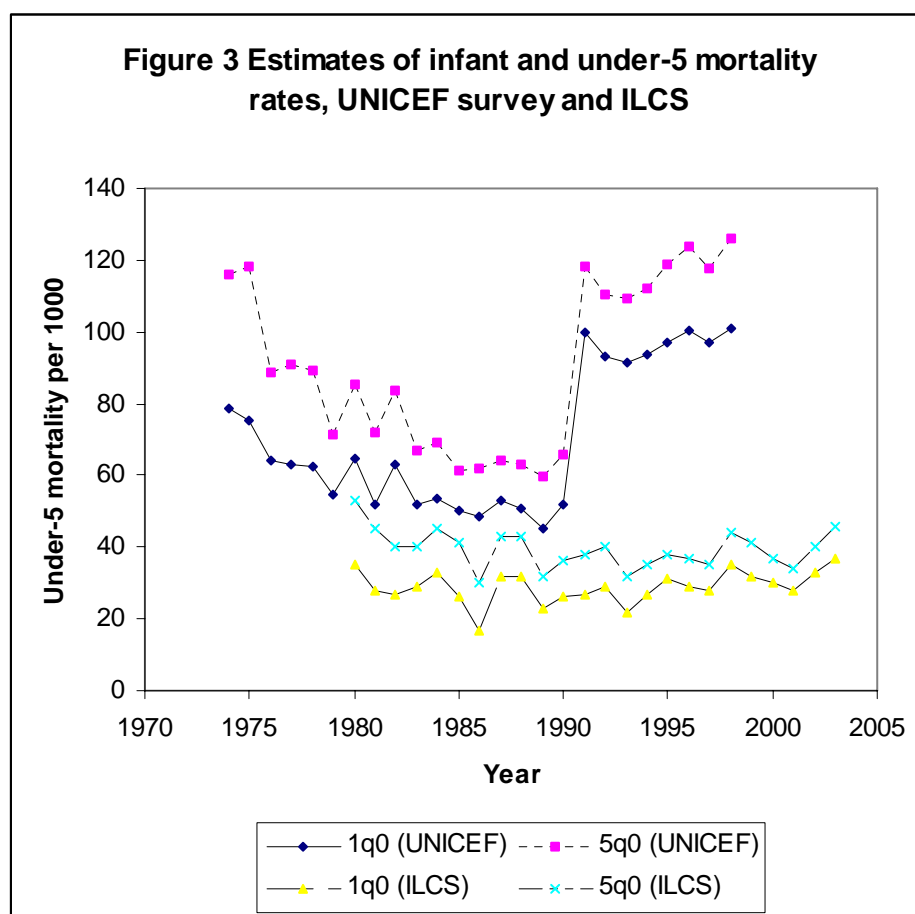
Figure 2 suggests two quite different responses of child mortality to the events that followed the invasion of Kuwait in August 1990—responses that can plausibly be viewed as reflecting what is often thought have occurred with respect to events on the ground. Thus in the south and centre of Iraq—i.e. the bulk of the country that remained under the control of the government in Baghdad—early age mortality seems to have been shifted onto a wholly different level as a result of the conflict and its consequences, including the economic sanctions. The under-5 mortality rate in the south and centre of the country fell from about 90 child deaths per thousand live births in the mid-1970s to an estimated figure of about 53 in 1989. The estimates suggest that there may have been a slight rise in 1990 to 59—perhaps an early reflection of the effects of the sanctions.<sup>10</sup> But in 1991

<sup>10</sup> This would be consistent with a re-analysis of the 1991 IST data by Garfield (1999:12) which suggests that the sanctions may have adversely affected child mortality during the last months of 1990.



the rate abruptly doubled to about 116. It then rose further during the 1990s to reach 142 by 1998 (Ali et al. 2003:222).

In contrast, in the north of Iraq the effect on early age mortality appears to have been more short-lived (see Figure 2). After declining substantially from much higher levels during most of the 1970s and 1980s, the under-5 mortality rate in the north increased in the years after 1987—probably reflecting social disruption consequent upon fighting in the region as part of the Iran/Iraq war and Saddam Hussein's related oppression of Kurds.<sup>11</sup> The rate peaked sharply at 128 in 1991 i.e. the year of the first Gulf war. It fell in 1992, and then declined further in the years that followed the withdrawal of the Iraqi army from the north. There is little doubt that conditions in the three predominantly Kurdish governorates of the autonomous region improved after 1992—helped by international relief agencies and, later, food and other supplies delivered readily under the OFFP. By 1998 the estimated child death rate in the north was only about 59 per thousand (see Ali et al. 2003:222).



With this as background, Figure 3 compares the annual child (i.e. under-5) and infant (i.e. under age 1) mortality rates for Iraq derived from the UNICEF survey and the ILCS and given in Table 3. Several points arise. First, in relation to both sets of estimates, it is clear that most child mortality is accounted for by infant mortality i.e. mortality occurring during the first year of life. Only a modest proportion of child mortality is accounted for by mortality at ages 1-4. Second, and relatedly, the trend in child mortality is dominated by the trend in infant mortality. Again, this is true for both sets of estimates. Third, the ILCS mortality rates are *much* lower than the UNICEF rates. Thus whereas we have seen that only a modest adjustment is required to bring the TFRs of the ILCS up to the

<sup>11</sup> Many Kurdish villages were erased as part of the ensuing *al-Anfal* operation. Recall that the Halabja massacre occurred in 1988 (see Marr 2004).

level of the UNICEF rates, the corresponding adjustment needed in relation to child mortality is far greater. A strong implication—reflected in the ILCS report (see UNDP 2005b:50-51)—is that, despite having re-collected all of the birth histories, the resulting data are still very deficient in the reporting of early age deaths. As noted, this may reflect the broad focus of the ILCS, the difficult circumstances in which it took place, and that it did not ask CEB/CS questions of women ahead of the birth history. Fourth, while increasing marginally in the 15 years before the survey, the ILCS mortality rates do not show an abrupt rise in 1991. In this context it is notable that, if the UNICEF child mortality rates are decomposed into infant mortality rates and the mortality rates of children aged 1-4, then only a modest rise is indicated for ages 1-4.<sup>12</sup> Put differently: most of the sharp rise in the child mortality rate indicated by the UNICEF survey data for 1991-98 is due to a rise in the mortality of children aged under one, but this is not reflected in the ILCS data.

Several questions arise from these comparisons. In particular, is the rise in mortality in 1991 indicated by the UNICEF data real? If it is, then why was it largely restricted to infants? Finally, can the UNICEF and ILCS data be reconciled?

It was suggested above that it is fanciful to argue that the UNICEF data were fiddled. There are, however, other grounds that support the occurrence of a sharp rise in early age mortality starting from 1991. As noted, the circumstances that affected the survival chances of children (e.g. in relation to food, birth weight, nutritional status, drinking water, the prevalence of diarrhoeal and respiratory infections, etc) definitely underwent a sharp deterioration at this time.<sup>13</sup> Child death rates derived from hospital data also suggest a sharp rise—although such rates are difficult to calculate and are unlikely to be representative; moreover it is certainly possible to believe that death rates computed from hospital data may have been biased upwards by the political interests of the Iraqi government (see Garfield 1999:34; Working Group 2005:135).

Most importantly, however, the International Study Team survey of 1991 provides strong independent support for the occurrence of an abrupt rise in child mortality. Despite very difficult working conditions, the survey appears to have been well done—for example, all of the interviewers were fluent in Arabic and most were women (see Ascherio et al. 1992). The IST survey collected what were in effect 'partial' birth histories from women living in about eight thousand households scattered around Iraq. The histories were collected from women aged 15-49, and were 'partial' in that births occurring before January 1985 were not included. The analysis related to 16,076 births and just 768 child deaths. The resulting estimates suggest that the under-5 mortality rate rose from an average of about 43 child deaths per thousand births during 1985-90 to 128 per thousand in 1991. The corresponding estimated rise in the infant mortality rate was from 33 to around 93 (Ascherio et al. 1992). The UNICEF mortality rates in Table 3 suggest that the IST survey probably underestimated the level of child mortality during 1985-90. Thus the average UNICEF under-5 death rate for 1985-90 is 63 compared to the IST estimate of 43. This may help to explain why the IST results imply a larger rise in mortality (closer to threefold than twofold). However, when allowance is made for the much smaller sample size of the IST survey, the resulting appreciably larger confidence intervals that attach to its estimates, and the particular period to which the IST rise in mortality pertains (i.e. the first eight months of 1991, which includes the six weeks of the first Gulf war itself) then the two sets of estimates are reasonably similar in what they portray.

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<sup>12</sup> According to the UNICEF rates of Ali et al. (2003) the probability of dying between the first and fifth birthdays (i.e.  ${}_4q_1$  in life table terminology) rose for 0.0147 to 0.0279 between 1990 and 1998.

<sup>13</sup> See Garfield (1999) for an informed consideration of a wide range of variables that may have adversely affected child mortality.

Yet if the abrupt rise in child mortality is real, why is there no sign of it in the ILCS data? And why did it mostly reflect a rise in the mortality of infants as opposed to older children?

### *The role of the PDS*

In all probability, the answer to both these questions lies in a hugely important feature of Iraqi life that started suddenly in September 1990—namely, the distribution to households of food rations (e.g. rice, wheat flour, pulses, cooking oil, salt and tea) plus a few other basic supplies (e.g. soap and detergent) through the Public Distribution System (PDS) (e.g. see Drèze and Gazdar 1991; Food and Agriculture Organization 1997; Garfield and Waldman 2003; Working Group 2005).

Recall that the PDS was established in response to the massive and abrupt drop in food availability that followed the imposition of the UN economic sanctions. It has been extraordinarily important for the bulk of the population that remained living under the control of the government in Baghdad. The early 1990s did see food shortages in the northern autonomous region, but in subsequent years food there has generally been in better supply. However, the rationing system has been crucial for the food security of most Iraqi households living in the rest of the country. In the early years of the PDS most of the food that could be distributed was grown in Iraq. But from 1997 supplies of food also became available through the OFFP. Although estimates vary, Table 4 shows that in most years the calorie content of the ration has been extremely limited. Indeed, for most of the 1990s it was barely enough to prevent starvation.

**Table 4: Estimates of the number of calories available per person, per day, in the Iraqi food ration, 1990-2003**

Pre-1990	1991	1992	1993	1995	1996	1997	1999	2002	2003
3,315	1,300	1,770	1,654	1,093	1,295	2,030	2,150	2,215	2,215
<i>Notes:</i> The figure for the pre-1990 level pertains to an estimate of total calorie availability. The figures for 1991 and subsequent years are ration only; it is estimated that an additional 500 calories per person may have been available in other ways, e.g. through the market. All the figures should be regarded as only broadly indicative.									
<i>Source:</i> Garfield and Waldman (2003).									

The PDS works through a network of local agents, such as grocery stores. Every household is entitled to a monthly ration for each of its members and the ration is the same irrespective of age, sex or any other characteristic. The sole exception relates to infants who from the start in 1990 were entitled to a ration of infant formula (i.e. breastmilk substitute) provided that the mother could produce a certificate stating that she was unable to breastfeed (see Drèze and Gazdar 1991). However, once a child reached its first birthday, and was no longer an infant, it was entitled to exactly the same ration as all other household members. In circumstances of extreme food scarcity, the rationing system provided a very strong incentive for the inclusion of new births on the ration cards. Not surprisingly, a survey conducted in 2000 found that virtually all births were registered in the rationing system (see UNICEF 2002:8).

If the sharp rise in child mortality indicated by the UNICEF rates is real then the failure of the ILCS death rates to show a similar sharp rise around 1991 must be indicative of a sudden deterioration in the level of reporting of child deaths by women in the ILCS. In this context Table 3 shows that during 1980-90 the ILCS under-5 mortality rates were about 60 percent those of the UNICEF survey, but that during 1991-98 their relative coverage fell to about 32 percent. The corresponding figures for the infant mortality rates are 53 and 29 percent. To account for such a sudden discontinuity in the reporting level of early age deaths a response error is required that begins abruptly in 1991 and is subsequently sustained. The obvious explanation is that in the collection of



the birth histories for the ILCS, women were especially reluctant to mention the deaths of children that had occurred since 1991—since the names of many of these children had doubtless remained on ration cards and been used to obtain food and other essential supplies. This sort of problem is well known to relief agencies working in many situations. And there is no doubt that the food rationing system in Iraq has been inflated by the non-reporting of deaths. This was exemplified, for example, in the public debate that took place regarding whether the ration card system could serve as a basis for voter registration in the Iraqi elections that occurred in 2005 (e.g. see Global Policy Forum 2004). The problem was also highlighted by a US/Iraqi research team that undertook a small household survey of deaths in 2004 (see Roberts et al. 2004:1862). It is worth stressing too that the adult women who provided the birth histories for the ILCS are precisely those family members who are usually responsible for the management of food within Iraqi households (see Bhatia, Kavar and Shahin 1994:214-16).<sup>14</sup>

The reason why the mortality of infants was especially badly affected in 1991 and later years probably also relates to the food rationing system. Shortly after the first Gulf war it was realized that there had probably been a marked decline in breastfeeding in Iraq. For instance, the International Study Team noted this, and also remarked that '[g]overnment rations of [infant] formula were insufficient for basic requirements, and mothers whose breast milk was inadequate often resorted to solutions of sugar and water or sometimes the water left after cooking the family's rice' (see Harvard Study Team 1992:979). The fact that the PDS provided mothers with—usually very inadequate—quantities of breastmilk substitute almost certainly had a deleterious effect upon breastfeeding patterns. It deterred women from the exclusive breastfeeding of their infants during the first few months of life and encouraged bottle-feeding. It was particularly unwise—and hazardous for infants—because water supplies were frequently contaminated due to damage inflicted during the first Gulf war.<sup>15</sup> The great concern of international agencies like UNICEF and FAO that the food rationing system should *not* provide women with infant formula was reflected in the Memorandum of Understanding (MOU) agreed by the UN and the Iraqi government in 1995 and which eventually led to OFFP supplies being distributed through the PDS (see Table 1). The MOU specifically stated that households with an infant should be able to choose to have the basic food ration rather than the infant formula. For a while this seems to have applied and about 75 percent of households chose to take the basic ration, but unfortunately the option was not maintained (see Food and Agricultural Organization 1997:11).

One last conclusion can be adduced from comparing the ILCS and UNICEF mortality rates in Table 3. It is that, although the ILCS rates are very deficient in level, they nevertheless share some features of the short run variation that is shown by the UNICEF rates. Both sets of rates suggest a similar, rather modest decline in early age mortality during the pre-sanctions period from 1980 to 1990 (see also Figure 3). This is significant since it helps to confirm the suggestion that the Iran/Iraq war may have indirectly slowed the pace of child mortality decline in the 1980s. In addition, there is some similarity in the annual fluctuations of death rates in the period since the UN economic sanctions came into force. Thus Figure 4 compares the annual ILCS and UNICEF infant mortality rates for years 1991-98. Although there are only eight observations, variation in the ILCS rates corresponds quite well to variation in the UNICEF measures ( $R$  square = 0.45;  $F$  = 0.07).<sup>16</sup>

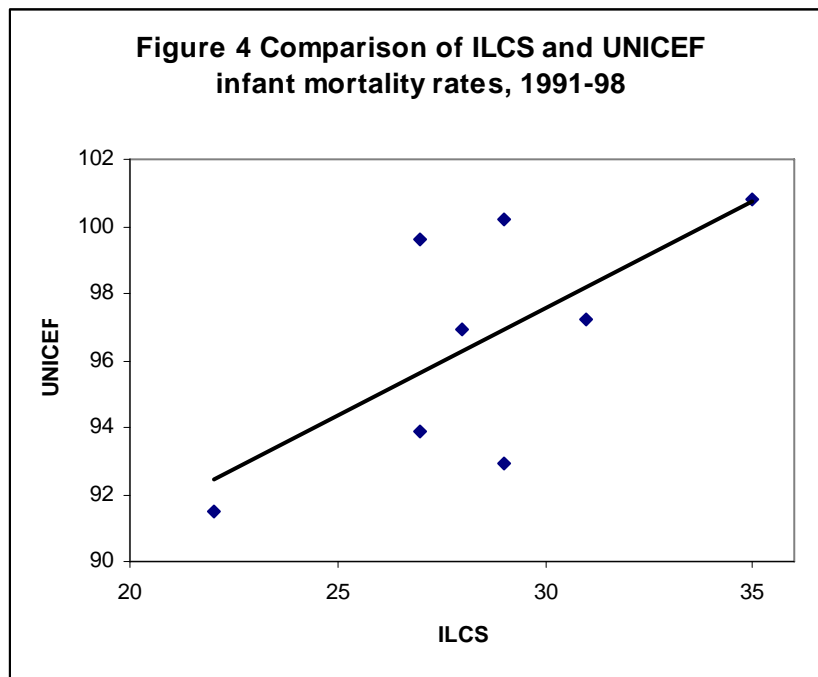
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<sup>14</sup> The under-reporting of child deaths by women starting from 1991 may have been reinforced by several aspects of the ILCS household questionnaire. This used the timing of the start of the UN sanctions to help people to assess the date from which their economic circumstances had worsened (question HE42) and it included several questions (HE44 to HE47) on the household's food ration. These questions were asked before the collection of the birth histories (see FAFO 2004a,b).

<sup>15</sup> In a predominantly flat land, water and sewage management were badly disrupted by damage to pumping systems.

<sup>16</sup> For the under-5 death rates the correspondence is a little weaker ( $R$  square = 0.35;  $F$  = 0.12).

This is significant because it suggests that the ILCS can provide an idea of trends in child mortality trends in the years after 1998—for when it is the only data source available.



### *The Working Groups study*

It will be recalled that the Working Group study for the Independent Inquiry Committee established by the UN Secretary General concluded (i) that it was unlikely that there was a sharp rise in child mortality in Iraq in 1991, (ii) that any rise in mortality during the early 1990s was probably modest—the Group's own estimates of under-5 mortality rates for 1986-90 and 1991-96 are respectively 85 and 95 deaths per thousand live births, (iii) that it was possible that the Iraqi government had tampered with the 1999 UNICEF survey results, and (iv) that the ILCS data could largely be ignored (see Working Group 2005:50-55 and 129-136). Enough has been said to cast considerable doubt on these conclusions. But it will also be recalled that in arriving at its own estimates the Working Group placed most weight on its interpretation of data provided by children ever born/children surviving (CEB/CS) questions, especially from the 1997 census. Accordingly it is to these data—summarized in Table 5—which we now briefly turn.

**Table 5: CEB/CS data and associated estimates of child mortality from 1987 and 1997 censuses.**

Age group	1987				1997			
	CEB	CS	Date	$_{5q_0}$	CEB	CS	Date	$_{5q_0}$
15-19	0.170	0.150	1986.7	176.5	0.118	0.103	1996.7	177.1
20-24	1.088	0.989	1985.5	112.8	0.815	0.728	1995.6	128.2
25-29	2.573	2.375	1983.8	84.8	2.031	1.834	1993.9	105.7
30-34	4.263	3.929	1981.8	80.5	3.491	3.167	1991.9	95.4
35-39	5.785	5.284	1979.5	83.0	4.825	4.393	1989.6	88.1
40-44	6.460	5.807	1977.0	90.1	5.887	5.296	1987.0	92.9
45-49	6.715	5.879	1974.1	100.8	6.482	5.787	1983.8	91.8
Notes: For both censuses the Working Group gives CEB/CS data that are both unadjusted and adjusted for non-response (see Working Group 2005:147). However, for reasons alluded to in the text and footnote 18, plus considerations of space, the CEB/CS data for 1987 given above are those adjusted for non-response, while those for 1997 are the unadjusted data (although any adjustment made by the Working Group is inevitably limited). Both censuses appear to have taken place in October. The dates and child mortality rates (i.e. $_{5q_0}$ values) shown above were obtained from the CEB/CS data using standard indirect estimation techniques (see United Nations 1983:73-81). For reasons mentioned in footnote 17, the time referenced estimates of child mortality for 1987 were derived assuming a West model age pattern of early age mortality, while those for 1997 assumed an East model. However, it should be stressed that both the 1987 and, still more, the 1997 data shown above have big limitations as indicators of levels and trends in child mortality. The data and associated child mortality estimates are provided here chiefly for reasons of completeness.								
Source: Working Group (2005:147).								

As the Working Group acknowledges, there are several well-known methodological difficulties involved in translating CEB/CS data into estimates of levels and trends in early age mortality (see also United Nations 1983, 1990). The CEB/CS questions themselves are very basic. They provide no information on the dates of birth or the dates of death of children. Child mortality estimates based on the reports of younger women tend to be biased upwards due to the operation of various demographic and socio-economic selection effects (e.g. women aged 15-19 are young and are overwhelmingly having first births, and both these considerations are likely to involve an enhanced risk of child death). On the other hand, estimates based on the reports of older women can be too low, since such women may be more likely to under-report children who have died. Also, the resulting data aggregate births and child deaths across *very* broad ranges of both age and time (e.g. the births and child deaths reported by women aged 35-39 could have occurred over a wide range of ages and at any point during the previous twenty years). Indeed, inasmuch as *time* enters into the analysis of CEB/CS data, it does so primarily through the *ages* that are reported by the women respondents. Furthermore, estimates of child mortality from CEB/CS data involve selecting a particular model age pattern of mortality, which is then assumed to remain constant. For these reasons CEB/CS data provide a weak basis for estimating child mortality in circumstances of rapid and complex change. Because the data aggregate across age and time they inevitably tend to obscure a major discontinuity. Similarly, because analysis of such data assumes a particular model age pattern, it is hard for it to handle circumstances of an abrupt pattern change—e.g. a sharp rise in infant mortality, with a more modest increase at older childhood ages.

The CEB/CS data and attendant child mortality estimates summarized in Table 5 suffer from all these difficulties. Since there is reason to believe that the pattern of early age mortality in Iraq changed around 1991, different age patterns were used in deriving the mortality estimates and the attendant dates from the 1987 and 1997 data.<sup>17</sup> However, this brings little benefit given the

<sup>17</sup> The sharp rise in infant mortality compared to mortality at ages 1-4 suggests a move from a West to an East model age pattern (see Ali et al. 2003: 221 and Working Group 2005:154). Indeed the relationship approaches the so-called

magnitude of the other problems with the data. Notice, in particular, the *very* large rises in child mortality indicated by the reports of younger women (i.e. those aged 25-29, 20-24 and 15-19, which on average refer to time periods up to four years before the censuses). The data for both 1987 and 1997 imply such rises—but these are almost certainly spurious and mostly reflect the operation of strong selection effects.

Although not obvious from Table 5, there is another major difficulty with these Iraqi CEB/CS census data. This relates to a feature of the data that the Working Group is much concerned with—since it makes a 'huge difference' to the resulting estimates of child mortality (Working Group 2005:130). But it is a feature that the Working Group fails to explain. The problem is that, to quote the Group, there was: 'a substantial level of non-response, not to the question about the number of children ever born, but to the question about the number of children surviving. The treatment of this non-response has a considerable effect on the estimates of child mortality derived from the data' (Working Group 2005:51). The difficulty is much greater for 1997 than for 1987. Thus whereas in the 1987 census only 1.5 percent of ever-married women failed to answer the question on the number of children surviving, in 1997 this figure rose markedly to 3.5 percent. In fact the Working Group's analysis of the 1997 data leads to an appreciably higher estimate of child mortality in the early 1990s, if it is assumed that those women who did not respond were those whose children had died.<sup>18</sup> But the Working Group regards this possibility as unlikely, and instead favours the view that most of the women who did not respond had lost no children. To be specific, the assumption favoured by the Working Group (2005:130) is that 'for women none of whose children had died the interviewer simply put a dash in the relevant box ... under this assumption most of the "missings" would have lost no children'. This helps to explain why the Working Group's estimate of the rise in child mortality in the early 1990s is so modest, and why its associated estimates of excess child mortality are so low.

Yet, of course, there is a ready explanation for why Iraqi women were less inclined to answer the census question on the number of surviving children in 1997. In all likelihood, many of the women who did not respond were precisely those who had lost one or more of their children in the previous few years. But the names of these dead children were still on the ration cards. Moreover, for precisely the same reason it appears probable that—analogous to what seems to have happened in the ILCS—some of the women who *did* answer the question inflated their number of surviving children (i.e. they failed to report fully about those that had died). In short, the CEB/CS data from the 1997 census probably reflect a systematic tendency to overstate child survivorship for readily understandable reasons. The substantially increased level of non-response to the 1997 census question on surviving children, as revealed in the Working Group report, constitutes further evidence that the household food rationing system worked to produce a downward bias in the reporting of child deaths.

### *Child mortality, an integration*

It remains to assemble an integrated account of child mortality trends in Iraq during recent decades. The rationale that is used here stems directly from the preceding discussion. The UNICEF under-5 mortality rates derived by Ali et al. (2003) provide the benchmark. These rates may under-estimate

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Chilean pattern in which extremely high infant mortality is thought to reflect early weaning and high mortality from respiratory disease (see United Nations 1982).

<sup>18</sup> This explains why in Table 5 the 1997 CEB/CS data shown are those that the Working Group did not adjust for non-response; for 1987, however, the data shown are those adjusted for non-response.

child mortality a little—perhaps especially for more distant years in the 1970s and 1980s—but they are unlikely to be overestimates.<sup>19</sup>

The ILCS under-5 mortality rates in Table 3 are then adjusted in two steps. Recall that the argument has been that the logic of the food rationing system means that women were particularly reluctant to report child deaths if they had occurred in 1991 or a more recent year. It follows that, starting in 1991, there was an abrupt and sustained fall in the level of reporting of child deaths in the ILCS birth histories collected in 2004. Thus whereas during 1980-90 the ILCS rates were 59.66 percent of the UNICEF rates, during 1991-98 the average level fell to 31.90 percent (Table 3). Therefore starting from 1991 the ILCS rates must be adjusted upwards by 1.87 (i.e.  $59.66/31.90$ ) to correct for an abrupt decline in the level of death reporting. The ILCSa series in Figure 5 show the results. Notice that although the adjustment is sizeable in proportional terms, it is modest in absolute terms, and leaves the adjusted figures well below those of the UNICEF rates. This brings us to the second adjustment—which is needed to address the fact that for several reasons the *general* level of reporting of child deaths in the ILCS was poor. Again, the UNICEF under-5 mortality rates for 1980-90 serve as the benchmark. They imply that an upward adjustment of the ILCS rates of 1.67 (i.e.  $100/59.66$ ) is required. The ILCSa\* series in Figure 4 show the results of this second adjustment. Note, however, that even without the second adjustment there is a clear correspondence between the trends in the ILCSa and the UNICEF series.<sup>20</sup>

The integration in Figure 5 suggests that child mortality in Iraq was falling quite rapidly in the 1970s. However, there was a distinct slowing in the pace of decline at around the time that Saddam Hussein became President. Both time series indicate that child mortality continued to fall in the 1980s, but that it did so at a much slower pace. There then followed the sharp rise in child mortality following the invasion of Kuwait. Both time series indicate that, with the UN economic sanctions in full force, child mortality rose somewhat further in the early and mid-1990s, reaching a peak in 1998. The adjusted death rates from the ILCS suggest that circumstances improved somewhat between 1998 and 2001. Indeed, it seems possible that in 2001 child mortality may have been lower than in any year since 1991. But the death rate then increased in 2002, and again in 2003.

### *Excess child deaths during 1991-2003*

There are too many unknowns to come to more than a very rough estimate of the scale of excess child mortality in Iraq since 1991. Recall, for example, that there is considerable uncertainty even about the size of Iraq's population. Estimates of excess mortality are usually made in relation to specific events (e.g. famines or wars) that are both relatively short in duration and comparatively discreet in time. That said, even in such cases the matter of determining the volume of excess deaths is rarely straightforward.

<sup>19</sup> In fact, the estimates of child mortality in Table 5 derived from the 1987 census reports of older women aged 30-49 (i.e. those not affected by selection effects of the type mentioned in the text) are very similar to the UNICEF estimates given in Table 3—suggesting that the UNICEF rates for around the period 1974-82 are *not* underestimates. Arguably this is the most useful conclusion that can be drawn from the figures in Table 5.

<sup>20</sup> For purposes of estimating excess child deaths the same two adjustments were made with respect to the ILCS infant mortality rates in Table 3. In this case the two adjustment factors implied are 1.79 and 1.90 respectively, and the results are very similar to those shown in Figure 5.

**Table 6: Estimates of excess child deaths in Iraq under three counterfactuals.**

Period	Estimates of actual numbers/rates			Counterfactual - 1			Counterfactual - 2			Counterfactual - 3		
	Births (000s)	Child mortality rate (sq 0)	Child deaths per month	Child mortality rate (sq 0)	Child deaths per month	Excess deaths per period (000s)	Child mortality rate (sq 0)	Child deaths per month	Excess deaths per period (000s)	Child mortality rate (sq 0)	Child deaths per month	Excess deaths per period (000s)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)
<b>1986-90</b>	3,918	62.3	3,877	62.3	3,877	0	62.3	3,877	0	62.3	3,877	0
<b>1991-95</b>	4,423	114.2	8,192	62.3	4,427	225.9	50.8	3,606	275.2	56.6	4,016	250.5
<b>1996-00</b>	4,493	122.0	8,941	62.3	4,529	264.7	41.9	3,053	353.3	52.1	3,791	309.0
<b>2001-03</b>	2,825	125.2	9,658	62.3	4,720	177.8	35.5	2,701	250.0	48.9	3,710	213.9
<b>Total</b>	15,659	-	-	-	-	668.4	-	-	878.5	-	-	773.5

*Notes:* Note that 2001-03 is a period of three years. The child mortality rates for years 1999-2003 used in framing the second counterfactual were respectively: 40.2, 38.6, 37.0, 35.5 and 34.0 per thousand; the corresponding infant mortality rates were 33.5, 32.2, 30.8, 29.6 and 28.3 per thousand (see also Ali et al. 2003:223). The simple and illustrative nature of this exercise is reflected, for example, in the fact that the number of births stays the same in each set of calculations.

Nevertheless, using the estimates of fertility and early age mortality that have been derived here, Table 6 summarises the results of some simple calculations regarding the volume of excess child deaths. The procedures used were essentially those employed in previous work on the issue. The time periods used for presentational purposes in Table 6 were chosen because they allow comparison of the quinquennium immediately before the UN economic sanctions really came into force (i.e. 1986-90) with later periods. Column (i) gives estimates of the numbers of births occurring in Iraq in each period. The figures were derived using quinquennial estimates of the numbers of births made by the United Nations (2005). The UN birth numbers were adjusted using ratios of the ILCSa (i.e. adjusted) TFRs in Table 3 to corresponding UN estimates of the TFR, and annual estimates of the number of births occurring were then obtained using standard interpolation coefficients. It is worth noting that the UN has revised its estimates of the number of births occurring in Iraq quite significantly in recent years—a fact that serves to underscore the rough nature of results from the present exercise.<sup>21</sup> Column (ii) of Table 6 gives average child death rates based on the present analysis i.e. summary estimates of what actually occurred. In calculating annual figures within each time period, for years 1986-98 the death rates used were simple averages of the UNICEF and ILCSa\* values shown in Figure 5; and for years 1999-2003 the ILCSa\* rates were used because they are the only ones available. Precisely the same procedure was employed in relation to infant mortality rates. Annual estimates of single year of age mortality rates within the age group 1-4 were then arrived at through interpolation. Estimates of the annual number of deaths occurring under age five in each year were then obtained by projecting the estimated number of births in each year forward by single years of age. For convenience, column (iii) gives estimates of the average number of child deaths occurring per month within each time period (see also Working Group 2005:55).

Three illustrative counterfactuals, all conducted on a single year basis, are summarised in the remaining columns of Table 6. In the first counterfactual, death rates corresponding to an average under-5 mortality rate of 62.3 per thousand estimated here for the period 1986-90 were held constant until the end of 2003. The resulting excess child mortality figure for the thirteen years of 1991-2003 shown in column (vi) is 668,000. As noted, previous estimates of excess child deaths in Iraq have incorporated such a 'constant' counterfactual. But, of course, other things being equal it

<sup>21</sup> For example the UN estimate of births occurring during 1990-95 used by Ali et al. (2003:223) was 3.662 million, whereas the UN estimate for the same period in the source used here is 3.910 million. For the coefficients used to get annual births from quinquennial figures see Carrier and Hobcraft (1971).

will produce an underestimate of the volume of deaths to the extent that the child mortality rate might have continued to decline if the country's tragic history—here starting with the invasion of Kuwait—had not occurred. After all, child death rates did fall in all the neighbouring countries (see United Nations 2005). Accordingly, the second counterfactual assumes that child mortality rates would have continued to fall. Essentially it is an extension of that of Ali et al (2003) who examined estimates of child mortality in Iraq for the entire period 1960-90 and produced a counterfactual based on the continuation of the long run downward trend.<sup>22</sup> Column (ix) shows that this produces an estimate of about 878,000 excess child deaths. However it might be argued that this counterfactual will produce an overestimate. After all, both time series in Figure 5 suggest that the pace of child mortality decline slowed appreciably in the 1980s. Therefore the third counterfactual in Table 6 represents the middle course i.e. it is the average of the death rates used in the other two. To provide some perspective, this counterfactual implies that by 2001-03 Iraq would have experienced the same under-5 death rate as the UN estimates for Turkey during 2000-05 i.e. a rate of 49 per thousand. Column (xii) shows that this implies roughly 773,000 excess child deaths over the thirteen years.

### **Mortality at other ages**

Although child mortality has been the main concern of this paper, some words are in order regarding mortality at other ages and among other sections of Iraq's population.

There are no firm estimates of how many Iraqi soldiers and civilians died as a result of the first Gulf war and the subsequent fighting in the north and south of the country in 1991 and 1992 (e.g. see Daponte 1993; Heidenrich 1993; Keaney and Cohen 1993). About all that can be said is that there were thousands—possibly tens of thousands—of military and other combatant deaths. There were also civilian deaths caused, for example, by the aerial bombing campaign. The sharp fall in the ratio of males to females in the population between the 1987 and 1997 censuses may partly reflect the loss of fighting men, although as previously intimated it is probably more indicative of male outmigration.

Putting these direct losses due to the conflicts of 1991-92 on one side, it is hard to believe that the doubling of the child mortality rate that occurred from 1991 onwards was unaccompanied by rises in death rates at other ages. The damage done to Iraq's infrastructure, increases in communicable diseases, plus the effects of the economic sanctions, must at least have had an adverse effect on the mortality of vulnerable groups like the elderly and those with chronic health problems (see Garfield 1999). Also, although estimates vary, there are good grounds to consider that the level of maternal mortality rose—certainly, estimates for Iraq since 1991 have been much higher than those for most neighbouring countries (see UNICEF 1999b; UNDP 2005b:51-53; Working Group 2005:125). That said, reliable data on the extent of such mortality increases do not exist.

Coming forward to the US/UK invasion of early 2003 and the events that it set in train, again it is unlikely that the scale of direct losses among the Iraqi military will ever be known with any accuracy (Horton 2004; Rai 2005; Cockburn 2006). But if evidence on the point is required, three different data sources indicate that—compared to the years immediately before the invasion—there has been a very considerable increase in deaths from violence. The conclusion is evident despite any limitations of the numbers.

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<sup>22</sup> The regressions employed were on the logits of the  $_{5q_0}$  values (see Ali et al. 2003:218). For the death rates used to extend this counterfactual to 2003 see the notes to Table 6.

One data source that shows this is the Iraq Body Count (IBC).<sup>23</sup> This ground-breaking project uses news agency reports to trace the course and characteristics of violent civilian deaths that can be attributed to the invasion and the events that it has unleashed. The IBC endeavours to exclude the deaths of all types of combatant. Almost certainly, it understates the volume of civilian deaths—since many go unrecorded in the reports of the major international news organisations on which it relies (see Sloboda and Dardagan 2005). Nevertheless, the IBC has entries on between 5,600 and 8,150 civilian deaths for the short period around the invasion itself (i.e. March and April of 2003). For the period from the invasion until mid-2006, there are entries on about forty thousand deaths, with the suggestion of a rising trend. There is little doubt that most of these deaths would not have occurred without the invasion and the violent phenomena—such as military operations against insurgents, criminal killings and inter-ethnic conflict—that have followed in its wake. Before the invasion deaths due to criminal activities were uncommon in Iraq, but with the subsequent deterioration in law and order they have increased a lot. It is worth noting too that, at least in the years immediately before the invasion, the number of deaths that might be described as being 'political' in nature appears to have been relatively small.<sup>24</sup>

The second data source that shows a large rise in violent deaths is the previously mentioned household survey of deaths undertaken by a US/Iraqi research team in September 2004 (see Roberts et al. 2004). The aim was to assess whether mortality in general—of military personnel, of other combatants, or of civilians—had been affected by the invasion. For reasons of safety the sample size was kept small, with just under one thousand households in thirty clusters being interviewed. The interviewers were both men and women and most were medical doctors. Essentially the survey compared the number of deaths reported by households for the year before the invasion with the number reported for the following 18 months. For the pre-invasion period 46 deaths were reported—giving an estimated annual crude death rate of about 5.0 per thousand (95 percent CI 3.7-6.3). For the post-invasion period 142 deaths were reported—giving a death rate of 12.3 (95 percent CI 1.4-23.2). However, one of the survey's sample clusters was in the town of Falluja where there had been a major military operation against insurgents. Accordingly the authors note that if Falluja is excluded then the estimated post-invasion death rate is 7.9 (95 percent CI 5.6-10.2). On this basis they produce an estimate of 98,000 excess deaths for the 18 post-invasion months (95 percent CI 8,000-194,000). For present purposes, however, it is notable that the rise in mortality was largely due to violence. Thus whereas only one violent death was reported for the pre-invasion period, for the post-invasion period 73 such deaths were reported—52 in the Falluja cluster, but 21 elsewhere. Even without Falluja, a major rise in violent deaths is indicated. Interestingly, the one other type of death for which a rise was found related to infants. For the pre-invasion period 8 infant deaths were reported compared to 21 in the post-invasion period. It is suggested that infant mortality may have been raised in 2003 and 2004 partly because in a dangerous times women are less likely to travel to hospital to give birth (see Roberts et al. 2004).

The third data source which suggests a big rise in deaths from violence is the ILCS (see UNDP 2005b). Recall that this survey was conducted about one year after the invasion and that its household schedule contained a question on deaths in the household during the previous 24 months. Where a death was reported, respondents were asked to ascribe its cause to one of five broad

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<sup>23</sup> For further details visit <<[www.iraqbodycount.org](http://www.iraqbodycount.org)>>. The IBC derives from a previous initiative by Marc Herold of the University of New Hampshire to help gauge civilian deaths in the case of the conflict in Afghanistan (Sloboda and Dardagan 2005:224). IBC data have acquired a reputation for integrity and are used, for example, by the World Bank (see World Bank 2006). It seems likely that projects of this kind will be an increasing source of quasi-demographic data in situations of violent conflict.

<sup>24</sup> For example: "pre-invasion estimates supplied by Amnesty International through their annual Human Rights Monitoring Reports [show] that judicial and extra-judicial executions by the Iraqi regime numbered in the 'hundreds' up until 2000 and in the 'scores' in 2001 and 2002" (Iraq Body Count, 2005: Fact sheet 3).



groups—one of which was 'war related'.<sup>25</sup> The resulting data suggest that there were about 24,000 'war related' deaths in the year following the invasion (95 percent CI 18,000-29,000).

For various reasons, the figures on excess/violent mortality from these three sources are not directly comparable. This is partly because that they relate to different categories of people and different types of death. The IBC data, for example, exclude the deaths of combatants and are restricted to civilians who have died through clearly violent means (e.g. 'air attack', 'roadside bomb', 'suicide car bomb', 'found decapitated', 'gunfire', etc). On the other hand, the data from the survey undertaken by the US/Iraqi research team relate to deaths from all causes, and include the deaths of at least some people who may have been combatants.<sup>26</sup> Lastly, the 'war related' deaths of the ILCS data appear to pertain to deaths that were brought about by directly violent means (i.e. they exclude deaths that may be attributable to conflict in less direct ways) and they probably include the deaths of some soldiers and other combatants as well as civilians.

However, the main point is that all three sources indicate that Iraq has experienced a large increase in deaths from violence. Women and children have suffered substantially in this. But most violent deaths—something in the region of 80-90 percent—have been of adult men.<sup>27</sup> In this context, as previously noted, the ILCS household schedule included questions on the survivorship status of the mothers and fathers of household members. In estimating levels and trends in adult mortality from the resulting data there are problems analogous to those mentioned in relation to the analysis of CEB/CS data (e.g. selection effects, lack of dating, aggregation across age and time). Moreover, reliable estimation of trends in adult mortality from such information is only feasible where mortality has changed regularly with time—something that probably does not apply in the case of Iraq. Moreover, given what has been said about the conditions in which the ILCS was conducted, it is quite possible that the survivorship status of parents was overstated.<sup>28</sup> Nevertheless, while the resulting estimates are crude, they suggest that while the level of adult female mortality may have been fairly stable in the decade or so before the survey was conducted in 2004, there was a very marked rise in the mortality of adult males (see UNDP 2005b:54-55).

The difficulties of estimating the level of mortality at ages beyond childhood are immense. But if the number of excess child deaths during 1991-2003 was somewhere between 668,000 and 878,000, then the total number of excess deaths was certainly appreciably greater if account is taken of mortality at other ages. Recall that, while they certainly constitute an especially vulnerable section of the population, only about 17 percent of Iraq's people in 2001 were aged under five. If, as has been argued here, the child death rate in 2001-2003 was about 125 deaths per thousand, then life expectation at birth in the country was probably lower than the estimate of 68.7 years provided by the US Census Bureau for 2005. Routine demographic extrapolations certainly support this view. Thus assuming a West model age pattern of mortality, an under-5 mortality rate of 125 per thousand implies a life expectancy at birth of about 56 years; and assuming a South Asian model implies a

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<sup>25</sup> The others were: 'disease', 'traffic accident', 'during pregnancy or within 40 days', and 'other (specify)' (see FAFO 2004a).

<sup>26</sup> For a death to be recorded it had to be that of someone who had resided in the household for at least the previous two months. Two of the 73 violent deaths reported for the post-invasion period were thought to be of anti-coalition combatants (see Roberts et al. 2004:1861).

<sup>27</sup> An analysis of the first two years of IBC data concluded that women and children (i.e. those aged 17 years and less) comprised about 18 percent of deaths, and that about 80 percent of adult deaths were male (Iraq Body Count 2005). The US/Iraqi research team results indicate that women aged 15-59 and children (i.e. those aged under 15) comprised about 28 percent (i.e. 6/21) of all violent deaths (excluding Falluja). Also, 88 percent (i.e. 38/43) of violent deaths to persons aged 15-59 years were male (Roberts et al. 2004:1860). In the ILCS 12 percent of deaths 'due to warfare' were of children aged below 18 (UNDP 2005b:54).

<sup>28</sup> Even in normal circumstances this can happen, particularly in relation to fathers who tend to be more mobile; it can also occur with respect to children who have been adopted (see United Nations 1983).

figure of about 60.<sup>29</sup> These figures are sufficiently similar to the World Bank estimate of 61 for 2002 (World Bank 2006) and the United Nations estimate of 58.8 years for 2000-2005 (United Nations 2005).

## Discussion

While demographic data for Iraq are certainly patchy and mixed, they are far from being useless. Just as one can gain an impression of the subject of a jigsaw puzzle even though some of its parts are damaged or missing, so piecing together the different kinds of information that exist in this case can provide valuable insight as to what has occurred. Of course, elements of triangulation and *bricolage* are required. A narrow demographic analysis is insufficient, by itself. Instead, numerical data must be interpreted against the social, economic, and political conditions from which they originate. This point applies at different levels and in many ways. For example, national governments influence demographic statistics and at the other end of the spectrum in circumstances where food is very scarce and distributed mainly through a household rationing system, women have a strong interest in underreporting child deaths—there are several good reasons to consider that this has happened in Iraq.

The picture of early age mortality that emerges from this work is fairly clear and quite well supported (Figure 5). Most survey data suggest that the under-5 death rate in Iraq fell quite briskly during the 1970s. In the middle of that decade the child death rate was either around or a little above 100 per thousand, but by the end of the decade it had fallen to about 80. However, the pace of the decline slowed markedly in the 1980s. Both the UNICEF and the ILCS data suggest that such a slowdown occurred and in all likelihood it was indirectly related to the Iran/Iraq war that had been started by Saddam Hussein. There is no good reason to doubt the estimates of Ali et al. (2003) from the UNICEF survey that prior to the first Gulf war the child death rate in Iraq was around 60-65 per thousand. Nor are there good grounds to question that the ensuing conflict and hardship caused a very sharp rise in under-5 mortality in 1991. The main component behind this increase in child mortality was a rise in the mortality of infants. There is good reason to believe that this was caused largely by a sudden deterioration in breastfeeding patterns, among other things. The under-5 mortality rate then rose further during the 1990s. Again, both the UNICEF and the ILCS data show a similar picture in this respect, and they both suggest that the highest under-5 death rate happened in 1998. The effects of the economic sanctions during most of the 1990s may have had an adverse effect that was cumulative and as assets were run down, so people may have become even more dependent on the food rations system.

In any case, the rates in Figure 5 suggest that by 1998 the child death rate had doubled compared to the level holding before 1991. There then appears to have been a modest improvement child mortality in the period 1998-2001. Although their level has admittedly been adjusted a lot, the ILCSa\* rates imply a drop in under-5 mortality from about 138 per thousand in 1998 to about 107 in 2001. Of course, these are very rough estimates. Nevertheless the decline that is indicated is both monotonic and appreciable. It occurs when the UN Oil for Food Program seems at last to have had a beneficial effect—recall Garfield's observation that this was so. The Working Group (1995:178) judged that it could not conclude anything about the effects of the OFFP on under-5 mortality, but that is not the position taken here. With other developments, such as increased circumvention of the

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<sup>29</sup> For the models used see United Nations (1990). The Working Group's estimate of the under-5 mortality for 1991-96 of 95 per thousand would imply life expectancies of 60 and 65 years respectively with these two models. The West model is often used to extrapolate beyond childhood when other data are lacking. But the South Asian model might be justified since it is partly based on data for Iran and Kuwait and a similar mortality age pattern appears in Turkish data (United Nations 1982:3-13).

economic sanctions, the OFFP may well have begun to have a beneficial effect on child mortality during the late 1990s. Finally in this picture, the ILCS data suggest that the child death rate rose in 2002, and rose further still in 2003. Again, such a trend is very plausible given what we know about events on the ground. Notice that the mortality rates based on ILCS data for the invasion year of 2003 are especially high (the ILCSa\* figure is 144). It seems unlikely that this is mere coincidence. Recall too that the US/Iraqi research team survey results are also suggestive of a further rise in infant mortality in the eighteen months after the invasion.

More generally, there has been a huge increase in mortality from violence as a result of the 2003 invasion and the events that it has unleashed. The present estimate of the child mortality rate for 2001-2003 of 125 deaths per thousand live births is very close to the United Nations estimate of 124 for 2000-2005. The overall level of life expectancy in Iraq cannot be known with precision, but the UN figure of around 59 years is probably not too far from the mark.

As was noted at the start of the paper, previous estimates of the scale of excess child mortality in Iraq that have been derived from direct data on the subject have varied widely. The estimate of the IST of roughly 46,900 for the first eight months of 1991 was a reasonable first attempt but it pertained to a special time period and was probably too high—since it underestimated mortality during its baseline reference period (i.e. 1985-90). On the other hand, the Working Group's estimated range of between 45,000 and 68,000 excess child deaths for the six years of 1991-96 is unreasonably low. There is no suggestion here that the Working Group's figures were influenced by political considerations. However, there is strong argument that its analysis was based on a misreading, and over-reliance, of the 1997 census CEB/CS data. An equally important criticism of the Working Group's analysis is that in considering the available data there is virtually no reference to the context from which they arose. To reiterate, particularly in situations where data are patchy and mixed, a narrow technical analysis is not enough. Turning to the estimates obtained from the UNICEF survey data made by Ali and colleagues, there are no strong reasons to question the general range of excess child deaths they imply for 1991-98—namely, somewhere between 380,000 and 480,000. Inasmuch as criticism of these numbers is fair, it is merely that the higher number of the range arises from a counterfactual that embodies a long run rate of decline in child mortality that may be too great. Finally, the present work has extended the time period to 2003 and in developing its counterfactuals it has tried to take some account of the slowing of the rate of child mortality decline in the 1980s. The resulting estimated range of excess under-5 deaths for the entire period 1991-2003 is between about 670 and 880 thousand, with a central figure of 670 thousand. The crude nature of these figures should require no further emphasis but it is clear that there has been a very large volume of excess child mortality.

In concluding, perhaps the best single criticism of the present exercise might be to question its point. Thus it was noted above that estimates of excess mortality are usually made with respect to events for which it is possible to discern some sort of start and some sort of end—for example, a famine or a war. However in the case of mortality in Iraq in the years that have followed the invasion of Kuwait, a very real problem is that there is no clear 'end' in sight. Therefore fair comment on any exercise such as this is that the resulting estimate of overall excess mortality is almost inevitably set to rise as year follows year. An alternative—arguably more valid—way of looking at what has happened is to say that the mortality trajectory of the country has been shifted onto an entirely new plane. For example the current UN estimate of life expectancy of around 59 contrasts with their estimate of 65 years for 1985-90 (United Nations 2005). While life expectancy in all the neighbouring countries has risen since 1990, these figures suggest that in Iraq it has fallen by about six years. Besides the HIV/AIDS belt in sub-Saharan Africa, no country has a record as bad as this.

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