The 13 waste water treatment plants in south/central Iraq are only partly functional. About half of all sewage is dumped directly into the rivers without treatment. Iraq is capable of carting away about a quarter of the solid waste that it carted prior to 1990 (34a). Sixty-nine percent of the population had adequate sanitation services in 1988 (4); this rose to 74.2% in 1996 (35). Sanitation and potable water levels were lowest in the southern governorates. More water and sanitation systems were destroyed or rendered useless in the northern governorates than in any other part of the country, during military campaigns against the Kurds in the 1980s, the insurrection in 1991, or during the postinsurrection refugee crisis (34a). The UN administration of this zone facilitated the actions of UN humanitarian organizations and about a dozen NGOs. Their actions left the northern governorates with the best water and sanitation systems in the country by the mid 1990s.

Health Services

In times of rapidly declining social conditions, health services can serve as a "safety net" to reduce the rise in excess mortality. Prior to the Gulf war, an estimated 97% of the urban and 78% of the rural population had effective access to curative services. By 1997, the capacity of the curative health system was greatly reduced. Although the doctor- and bed-to-population ratios remained nearly stable, the number of reported operations dropped by 70% nationally, the number of laboratory tests performed dropped by 60%, an estimated 30% of hospital beds were no longer in use (34a), about 75% of all hospital equipment no longer worked (8), and a quarter of the country's 1305 health centers closed. A reported 80% of all medical equipment was out of service (34a). Given the limited ability of the hospitals to function, average length of stay dropped by about 50%.Three hundred and sixty million dollars was reportedly spent in 1989 (11) and $500 million was spent in 1990 to import, and $200 million to produce, medicines and medical products. This fell to $50 million in 1991 (37), $22 million in 1995. With oil for food funds, it rose to more than $300 million in 1997. Per capita spending on health was about $3 in 1995 and $17 in 1996—still only about half the level of health spending prior to 1990 (34, 37).

Supplies to the health system were notably higher by late 1997 due to supplies provided via UN Security Council Resolution 986 funds (11). Use of public ambulatory health services rose 42% from March 1997 to March 1998, hospital stays became longer on average, and more lab tests and x-rays were performed per patient (38). In November 1998, an average of 44% of 18 essential medicines were available in health centers. Overall, 22% of all formulary medicines were found in hospitals and health centers, and 32% of medicines were available for patients registered with chronic diseases. While these levels are low, they are a considerable improvement over the levels available through 1996 (11).

Even with improved supply, the health system has responded slowly and inadequately to the changing disease profile and level of available technology in the country. Diarrhea has become the most common fatal pathology among under one- and under five-year-olds (34). Diarrhea should routinely be treated aggressively with oral rehydration, especially in poor countries. The

1996 Multiple Indicator Cluster Survey (MICS) demonstrated that while most mothers knew of oral rehydration, most health centers and mothers were applying it incorrectly. Only a third of all mothers, for example, continued to give food during diarrhea episodes (35, 36). The second most common fatal pathology among under five-year-olds is now acute respiratory infection. By 1996 only a third of Iraqi mothers were able to recognize the major warning signs of respiratory distress. These high rates of preventable mortality are unusual for a country like Iraq. Even after six years of embargo, its high rate of urbanization, relatively high literacy rates, access to doctors, and widespread mass media would be expected to be associated with lower rates of diarrhea and respiratory infection.

Rates of ever having breast fed reportedly rose from 89% in 1988 (31) to 94.7% in 1996 (35, 36). Breast feeding at 6 months of age rose slightly from 60% in 1988 (31) to 65.4% in 1996 (35, 36). In October 1997, 21% of all infants in South/Central Iraq were exclusively bottle fed, only 13% of those birth through four months were exclusively breast fed, and 34% of six- through nine-month-olds receive milk without any supplementary weaning foods. These rates are distressingly high, creating a large cohort of children at especially high risk for poor nutrition, depressed immunologic levels, and worsened diarrhea and acute respiratory infections. Especially when access to high quality foods is limited, access to curative medicines is inadequate, and the quality and quantity of water is poor, mobilization of the health and welfare systems to insure optimal maternal and child nutrition through improved weaning habits, expanded breast feeding, preferential access to food for women and children, and simple early intervention to reduce morbidity in diarrhea and upper respiratory infections are key actions for protecting health. Such mobilizations, education, and health promotion have not been sufficiently frequent or effective in Iraqi health, education, and social welfare systems in the 1990s. Some actions, such as including infant formula on the ration in 1998, even discouraged needed health actions like breast feeding. Bottle feedings among infants increased from 21% in 1996 to 31% in 1998; only 15% of infants were exclusively breast fed during the first six months, and the introduction of complementary semi-solid foods failed to reach a third of children aged six through nine months (64).

Nutritional promotion and education was stimulated by Nutrition Rehabilitation Units and Community Child Care Units (CCCUs). Twenty rehabilitation units were initiated in hospitals and health centers in 1995. There were 62 such units in 1998.

CCCUs are neighborhood social service centers were begun in 1996 with local resources and volunteers, including retired teachers, students, and community leaders. These centers screen children and educate mothers about health and nutrition. The CCCUs have screened 900,000 children of whom 250,000 were considered malnourished and 120,000 were referred for ongoing care to primary health care centers. The units also plan to provide supplementary foods to 600,000 pregnant and lactating women (64). The Iraqi Ministry of Education, the Federation of Iraqi Women, and the Federation of Iraqi Youth take part. The program grew from 100 centers in 1996 to 1333 in 1998. These centers are designed to distribute extra food rations to at-need children (based on weight), which are supposed to be accompanied by health education. Like

many such programs around the world, evaluators found that these centers provide relatively little education and health promotion. Child weighing and food distribution centers provide an excellent opportunity to promote the health of women and children. Hopefully as the CCCUs mature they will engage neighbors in more health education and promotion activities.

Changes in Health Status

Data from the Iraqi Ministry of Health suggests a rapid worsening of the health conditions of Iraqi children (See table 3). These data reflect the experiences of only that shrinking portion of the population which uses public medical care services. They can only be used to indicate general trends as they are based on incomplete and changing levels of coverage of the population. These data suggest a rapid deterioration of the health status of the population. Low-weight births, children treated for malnutrition, and the reported number of illnesses which are associated with contaminated water all rose rapidly from 1990 through 1994, and subsequently stabilized at high levels by 1995.

Table 3: Ministry of Health Data (11, 14, 17)

Description	Year							
	1990	1991	1992	1993	1994	1995	1996	1997
Percent Registered Births Under 2.5 Kgs.	4.5	10.8	17.6	19.7	21.1	22.1	22.6	23
(Totals below are in actual figures)								
Children In Treatment Programs for Malnutrition	0	1000	10,600	12,500	13,900	17,900	20,200	20800
Reported Cases of Cholera	0	0	1217	976	825	1345	1216	831
Reported Cases of Typhoid	?	22,000	175,000	193,000	227,000	244,000	266,000	152000
Reported Cases of Giardiasis	?	1130	5010	5960	6020	5880	6890	5850

Education/Literacy

According to Iraqi government sources, there was a 20% increase in the primary school drop-out rate in the early 1990s. The proportion of the population which was literate grew rapidly in the 1980s; it is then estimated to have fallen from 73% of the population above age 15 years in 1987 to 60% in 1993 (37). Illiteracy among ever-married women under 50 years was 50% in 1989 (31); in the northern governorates it was 64% in 1996 (36). Data from the MICS study suggest that adult literacy for the country overall was 68% in 1996. Female literacy and school enrollment rates were lowest in the southern governorates.

Immunizations

The supplies and equipment needed to assure effective infrastructure for immunizations, supply of vaccines, and organization in government-run health facilities deteriorated in the early 1990s and immunization coverage declined. Immunization coverage levels, which fell during the early 1990s, returned to presanction levels by 1996 (31). Estimates of measles immunization levels during the 1980s varied from 37% to 78% of two year olds (31).

Most importantly, coverage declined from 82% of the under 2 year olds in 1988 to 73% in 1992. Diphtheria, pertussis, tetanus (DPT) coverage similarly declined from 86% to 69% in the same period. By 1993 the Ministry of Health once again gave priority to immunization coverage. By 1995 measles coverage was estimated at 95% and DPT coverage was estimated at 89% (34). Immunization coverage levels, which fell during the early 1990s, returned to or exceeded presanction levels by 1996. Estimates of measles immunization levels during the 1980s varied from 37% to 78% of twelve-month-olds to twenty-three-month-olds (31); according to the 1996 MICS study (described below) it was 79.9% (35, 36). It was lowest in the southern governorates.

Income and Food Prices

A rapid decline in the GDP and its most important component, export earnings from the petroleum sector, led to a rapid rise in inflation and in food prices for goods not purchased via ration, and a rapid decline in per capita product. Prior to the Gulf war 62% of Iraq's GNP was generated by petroleum sales. Unauthorized oil sales, the stimulation of some import substitution industries, and the hope of an influx of capital and goods via oil for food led to an easing of the economic decline by 1996. The purchasing power of an Iraqi salary by the mid 1990s was about 5% of its value prior to 1990 (34).

Table 4: Economic and Nutrition-Related Data from Non-Iraqi Government Sources

Description	Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
GDP, U.S. Dollar estimate (41)	3508			1500	1036		540		
Value of 1 U.S. Dollar in Dinars on Black Market (42)				90	510	4095	1575	1200	
Grain Production in Millions of Tons (34a)	3.5	2.7	3.0	3.2	2.8	2.5	3.0	2.2	
Per capita calories available on the ration (39, 40)	1225	1300	1700	1770	1130	1500	1275		2030
FAO Average Estimated Caloric Intake (39, 40)	3150	2310	2270	2279	2283	2268	2277	2463	

Nutrition

Undernutrition is both a poor health outcome and, especially among children, a risk factor for elevated mortality. Prior to the Gulf war, local production supplied an estimated 30% of the country's foodstuffs. In 1989 Iraq imported over $2 billion in foodstuffs (61).

The Iraqi Ministry of Trade supplied about 343,000 metric tons of basic grains per month prior to September 1990. About 3375 calories per capita per day were available in this prewar, presanction period (39). In the region, only Turkey had higher calorie availability levels. With the imposition of sanctions, the amount of grain distributed by the government declined to 182,000 metric tons per month during September to December 1990 and 135,500 metric tons per month during 1991 (12). The rationing system provided essential goods at highly subsidized prices. Rationing of wheat, rice, oil, and sugar began in September 1990, following the imposition of prewar sanctions (See table 4). The ration provided per capita calories per day varying from 900 to 1300 during September 1990 through June 1991 (12). It then was gradually raised to 1770 calories, providing about 70% of essential needs. The ration was reduced to about 1100 calories in October 1994 due to the inability of the government to import or produce adequate goods, returned to about 1500 calories in 1995, fell to 1275 calories in December 1996, and rose to 2030 as of March 1998 with oil for food deliveries