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Update on Hepatitis B Prevention

INTRODUCTION

Hepatitis B virus (HBV) infection is a major cause of acute and chronic hepatitis, cirrhosis, and primary hepatocellular carcinoma in the United States and worldwide. Since 1982, a safe and effective hepatitis B (HB) vaccine manufactured from human plasma has been available in the United States. This vaccine has been recommended as preexposure prophylaxis for persons at high or moderate risk of HBV infection (*1*). In addition, the combination of HB vaccine and hepatitis B immunoglobulin (HBIG) has been recommended for postexposure prophylaxis in susceptible persons who have perinatal or needle-stick exposure to known HBV-positive persons or their blood.

This statement provides an update on HB vaccine usage and on its impact on disease incidence in the 5 years following its licensure. In addition, it provides both recommendations for using a new HB vaccine produced in yeast by recombinant DNA technology and an assessment of the need for HB vaccine booster doses for persons who have received the initial three-dose regimen. Basic recommendations on preexposure and postexposure usage of HB vaccine and on prevaccination serologic testing for susceptibility to hepatitis B are unchanged. Previous recommendations should be consulted for a complete discussion of the usage of HB vaccine (*1*).

PLASMA-DERIVED HB VACCINE

Patterns of Usage to Date

Since the plasma-derived HB vaccine became available in June 1982, 4,400,000 doses have been distributed in the United States, and an estimated 1,400,000 persons have completed the three-dose series (Merck Sharp & Dohme, unpublished data). During this 5-year period, vaccination programs and overall vaccine usage have focused primarily on three risk groups—persons who work in health-care professions and have exposure to blood, staff and clients of institutions for the developmentally disabled, and staff and patients in hemodialysis units. Although no precise figures are available, it is estimated that more than 85% of distributed vaccine has been used for these groups.

Development of vaccination programs for health-care workers has progressed steadily since vaccine licensure. Several surveys of hospitals in 1985 showed that

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between 49% and 68% of hospitals had established HB vaccination programs and that the number has increased steadily each year (CDC, unpublished data). Large hospitals (>500 beds) were most likely to establish programs (90%). However, by June 1985, 60% of hospitals with fewer than 100 beds also had begun vaccination programs. In 75% of the programs, vaccination was recommended for high-risk health-care workers (as defined by the hospital), and, in 77%, the hospital paid for these vaccinations. In addition, 70% of states had established programs for vaccinating health-care workers under state jurisdiction (CDC, unpublished data).

In spite of these programs, the actual use of vaccine in high-risk health-care professions has been modest. One statewide survey showed that, in hospitals with HB vaccine programs, only 36% of persons at high risk had actually received vaccine (CDC, unpublished data). In one survey in three large cities, only 24% of physicians had received vaccine (CDC, unpublished data). National surveys have shown higher rates of vaccination among dentists (44% in early 1986) and hemodialysis staff (an estimated 44% in 1985); however, even these rates fall well short of optimal coverage (CDC, unpublished data).

Development of vaccination programs has also progressed for several other groups at high risk of HBV infection. By mid-1985, 94% of states had established vaccination programs for the developmentally disabled in institutions under state jurisdiction, and 75% had programs for staff of such facilities (CDC, unpublished data). By 1986, an estimated 27% of the developmentally disabled had received HB vaccine (Merck Sharp & Dohme, unpublished data). In addition, wide-scale programs directed at vaccinating all susceptible persons were established in 1981 for Alaskan Natives and in 1985 for the population of American Samoa.

Nevertheless, there has been little progress in developing vaccination programs for other major risk groups, including parenteral drug abusers, homosexual men, and heterosexually active persons with multiple sexual partners. Few states have established programs for offering vaccine to any of these groups, and private usage of vaccine among these groups is believed to be limited.

Impact on Disease Incidence

The incidence of reported hepatitis B has increased steadily over the last decade. Hepatitis B is now the most commonly reported type of hepatitis in the United States. In 1978, 15,000 cases of clinical hepatitis B were reported to CDC, for an incidence rate of 6.9/100,000 population. At that time, CDC estimated that there were actually 200,000 persons with HBV infection and that 50,000 of these had clinically confirmed cases with jaundice. The incidence rate of reported disease increased 33%, to 9.2/100,000, in 1981, the year prior to vaccine availability. It continued to increase during the initial 4 years of vaccine availability, reaching a rate of 11.5/100,000 in 1985 (*2*). Based on a comparison with the overall infection rate estimated in 1978, the incidence of HBV infection in the United States is now estimated at over 300,000 cases per year.

The apparent lack of impact of HB vaccine on the incidence of hepatitis B is attributable to several factors. First, the majority of acute hepatitis B cases now occur in three groups: homosexual men, parenteral drug abusers, and persons acquiring disease through heterosexual exposure (*3*). None of these groups is being reached effectively by current HB vaccine programs. In contrast, fewer than 10% of cases occur in health-care workers, the institutionalized developmentally disabled, and other groups currently accounting for the bulk of vaccine usage. Finally, up to 30% of

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patients deny any of the recognized risk factors, even after careful questioning. No effective strategy has been devised to prevent disease among this group, although some are probably undisclosed members of the three major risk groups.

A reduction in the incidence of hepatitis B can be expected only if significant proportions of persons at high risk receive vaccine. Increased efforts are needed to develop programs to vaccinate persons in all high-risk groups and to increase compliance among those who are susceptible in areas where programs are established. To have any effect on the incidence of hepatitis B, use of HB vaccine in the United States must extend beyond the current groups of recipients.

NEW RECOMBINANT DNA HB VACCINE

Formulation

In July 1986, a new, genetically engineered HB vaccine (Recombivax HB®; Merck Sharp & Dohme) was licensed by the U.S. Food and Drug Administration. This vaccine, as formulated, has an immunogenicity comparable to that of the currently available plasma-derived vaccine (Heptavax B®; Merck Sharp & Dohme). The two vaccines are also comparably effective when given with HBIG to prevent perinatal HBV transmission. The new vaccine provides an alternative to the plasma-derived HB vaccine for almost all groups at risk of HBV infection.

The recombinant vaccine is produced by *Saccharomyces cerevisiae* (common baker's yeast) into which a plasmid containing the gene for the Hepatitis B surface antigen (HBsAg) subtype adw has been inserted (*4*). HBsAg is harvested by lysing the yeast cells and is separated from yeast components by hydrophobic interaction and size-exclusion chromatography. The purified HBsAg protein undergoes sterile filtration and treatment with formalin prior to packaging. The vaccine is packaged to contain 10μg HBsAg protein per ml, adsorbed with 0.5 mg/ml aluminum hydroxide; a 1:20,000 concentration of thimerosal is added as a preservative.

The recombinant HBsAg takes the form of 17-25 nm spherical particles, similar in appearance to human plasma-derived HBsAg. The recombinant particles differ in that the HBsAg is not glycosylated, whereas up to 25% of plasma-derived HBsAg is glycosylated. The vaccine contains more than 95% HBsAg protein. Yeast-derived protein can constitute up to 4% of the final product, but no yeast DNA is detectable in the vaccine.

Immunogenicity and Efficacy

The immunogenicity of the recombinant HB vaccine is comparable to that of the plasma-derived product (*5*). When given in a three-dose series (10μg per dose), recombinant HB vaccine induces protective antibodies (anti-HBs*) in over 95% of healthy adults 20-39 years of age. Studies comparing antibody responses of healthy adults show equal rates of seroconversion following the three doses of either the recombinant vaccine (10μg per dose) or the plasma-derived vaccine (20μg per dose). However, the geometric mean titers (GMT) of antibodies developed by recipients of the recombinant vaccine have ranged from equal to to 30% as high as those developed by recipients of the plasma-derived vaccine. The recombinant vaccine, like the plasma-derived vaccine, produces a somewhat lower antibody response in older adults than in younger adults (*5*).

In studies using three 5-μg doses of recombinant vaccine for children<12 years of age, over 99% of the recipients have developed protective levels of antibodies. Hemodialysis patients develop a poorer response to the recombinant vaccine than do

*Greater than 10 milli-International Units (mIU)/ml of anti-HBs, approximately equal to 10 sample ratio units by radioimmunoassay or positive by enzyme immunoassay.

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healthy adults. For example, in one study using three 40-μg doses of recombinant HB vaccine, only 64% of vaccine recipients developed protective levels of antibodies.

The recombinant HB vaccine has been shown to prevent HBV infection of vaccinated chimpanzees challenged intravenously with HBV of either adw or ayr subtypes. In studies of infants born to HBsAg- and HBeAg-positive mothers, the combination of HBIG (0.5 cc at birth) and recombinant HB vaccine (5μg in each of three doses) protected 94% of infants from developing the chronic carrier state, an efficacy equalling that of HBIG plus plasma-derived HB vaccine (*6*). The simultaneous administration of HBIG did not interfere with induction of anti-HBs antibody response by the recombinant HB vaccine.

There have been no large-scale efficacy trials of recombinant vaccine in adults. Nevertheless, the immunogenicity studies, the challenge studies using chimpanzees, and the efficacy trials of the HB vaccine and HBIG in infants born to mothers who are carriers of HBV strongly suggest that the efficacy of recombinant HB vaccine in adults is comparable to that of the plasma-derived product.

Safety

Because only the portion of the HBV viral genome that codes for the surface coat of the virus (HBsAg) is present in the recombinant yeast cells, no potentially infectious viral DNA or complete viral particles can be produced. No human or animal plasma or other blood derivative is used in the preparation of recombinant HB vaccine.

During prelicensure trials, approximately 4,500 persons received at least one dose, and 2,700 persons completed the vaccine series (*5*). Reported side effects were similar in extent and variety to those following administration of the plasma-derived vaccine. Seventeen percent of those vaccinated experienced soreness at the injection site, and 15% experienced mild systemic symptoms (fever, headache, fatigue, and nausea). To date, no severe side effects have been observed, nor have significant allergic reactions been reported. Although yeast-derived proteins may constitute up to 4% of the protein in the vaccine, no adverse reactions that could be related to changes in titers of antibodies to yeast-derived antigens occurred during clinical trials.

Early concerns about safety of plasma-derived HB vaccine, especially the concern that infectious agents such as human immunodeficiency virus (HIV) present in donor plasma pools might contaminate the final product, have proven to be unfounded (*7*). There are no data to indicate that the recombinant vaccine is potentially or actually safer than the currently licensed plasma-derived product.

Dosage and Schedule

The recombinant HB vaccine is given in a series of three doses over a 6-month period. The second dose is administered 1 month after the first, and the third dose, 5 months after the second. For normal adults and children>10 years of age, the recommended dose is 10μg (1 ml) intramuscularly in each of the three inoculations. Children<11 years of age should receive a 5-μg dose (0.5 ml) by the same schedule. Newborns of mothers who are carriers of HBsAg should receive the three-dose series (5μg per dose) by the same schedule; however, the first dose, which is given at birth, should be combined with a single dose of HBIG (0.5 ml) given intramuscularly at another site.

The recommended dose of recombinant HB vaccine for hemodialysis patients or other immunosuppressed persons is 40μg, which is identical to the dose of plasma-derived vaccine recommended for these groups. A specially formulated preparation

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(40μg HBsAg protein/ml adsorbed with 0.5 mg aluminum hydroxide) is being developed for these patients. At present, it is not advisable to administer the standard formulation of recombinant HB vaccine to these patients because this would require a large volume (4.0 cc), which is inconvenient for injection in the deltoid muscle, and would contain more aluminum hydroxide (2.0 mg) than currently recommended as an adjuvant in vaccines (1.25 mg per dose). Only plasma-derived vaccine should be used for these patients.

As with plasma-derived vaccine, recombinant HB vaccine should only be given to older children and adults in the deltoid muscle and to neonates or infants in the anterolateral thigh muscle. The vaccine should be stored at 2 C to 6 C (36 F to 43 F) and *should not be frozen*; freezing destroys the potency of this vaccine.

The response to vaccination by the standard schedule using one or two doses of plasma-derived vaccine followed by the remaining doses of recombinant vaccine has not been studied. However, because the immunogenicities of the two vaccines are similar, it is likely that the response will be comparable to that induced by three doses of either vaccine alone. The response to revaccination with the recombinant vaccine following nonresponse to an initial series of plasma vaccine has not been evaluated.

Indications for Use

The indications for use of the recombinant HB vaccine are identical to those for the plasma-derived product, except that the present formulation of the recombinant HB vaccine should not be used for hemodialysis patients or other immunosuppressed persons (Table 1) (*1*). For other groups, including persons with Down's syndrome, there are no data indicating that the recombinant HB vaccine is either superior or inferior to the plasma-derived HB vaccine for any preexposure or postexposure indication.

Precautions

The recombinant HB vaccine contains only noninfectious HBsAg particles; therefore, vaccination of a pregnant woman should entail no risk to either the woman or the fetus. Furthermore, HBV infection in a pregnant woman can result in severe disease for the mother and chronic infection of the newborn. Pregnancy should not be

TABLE 1. Persons for whom hepatitis B vaccine is recommended or should be considered*

Preexposure

Persons for whom vaccine is recommended:

- Health-care workers having blood or needle-stick exposures
- Clients and staff of institutions for the developmentally disabled
- Hemodialysis patients
- Homosexually active men
- Users of illicit injectable drugs
- Recipients of certain blood products
- Household members and sexual contacts of HBV carriers
- Special high-risk populations

Persons for whom vaccine should be considered:

- Inmates of long-term correctional facilities
- Heterosexually active persons with multiple sexual partners
- International travelers to HBV endemic areas

Postexposure

- Infants born to HBV positive mothers
- Health-care workers having needle-stick exposures to human blood

*Detailed information on recommendations for HB vaccination is available (*1*).

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considered a contraindication for women in high-risk groups who are eligible to receive this vaccine.

NEED FOR VACCINE BOOSTER DOSES

Long-Term Protection by Plasma-Derived HB Vaccine

In short-term efficacy studies, the plasma-derived HB vaccine provided protection against HBV infection for 85%-95% of vaccine recipients, including virtually all those who developed adequate levels of antibodies (see footnote on pg. 355) (*8,9*). A recent evaluation of the long-term protection afforded by this vaccine (>5 years) provides a basis for recommendations concerning the need for booster doses in previously vaccinated persons (*10*).

Currently available data indicate that vaccine-induced antibody levels decline significantly (*10*). Antibody may decrease to low levels for 30%-40% of vaccinated adults who initially develop adequate levels of antibody during the 5 years after vaccination, and it may become undetectable in 10%-15% of them. The duration of antibody persistence is directly related to the peak level achieved after the third dose of vaccine (*11*). The longer persistence of detectable levels of antibody observed in children and young adults (<20 years of age) is consistent with the higher peak response in these age groups.

Studies of the licensed plasma-derived HB vaccine in adults have demonstrated that, in spite of declining levels of antibody, protection against clinical (or viremic) HBV infection persists for >5 years (*10*). Although the risks of HBV infection appear to increase as antibody levels become low or undetectable, the resultant infections are almost always innocuous and do not cause detectable viremia, liver inflammation, or clinical illness. These infections are detected by serologic evidence of an increase of anti-HBs levels associated with the appearance of antibody to the hepatitis B core antigen (anti-HBc). To date, only one transient viremic infection has been recognized in a vaccine responder within 72 months after vaccination. This infection produced mild alanine aminotransferase elevation, but no clinical illness (*10*). Thus, among adults who have responded to the vaccine, protection against clinically significant HBV infection appears to outlast the presence of detectable anti-HBs and can persist for ≥2 years among vaccine recipients whose antibodies have declined to low or undetectable levels.

For infants born to mothers who are carriers of HBV, there are insufficient data to assess duration of antibody persistence and protection against clinically significant HBV infection with the U.S. plasma-derived vaccine. One study, in a developing country (Senegal) and using a different plasma-derived HB vaccine, has demonstrated that protection against viremic HBV infection can decline within 6 years in infants vaccinated between 6 months and 2 years of age (*12*). Firm data on the duration of protection among infants receiving the vaccines licensed in the United States will be necessary before recommendations on booster doses can be made for this group.

Postvaccination Testing of Response to Vaccine

When properly administered, HB vaccine produces anti-HBs in more than 90% of healthy persons. Testing for immunity following vaccination has been recommended only for persons in whom suboptimal response to vaccine is anticipated, including persons who received vaccine in the buttock or persons, such as hemodialysis patients, whose subsequent management depends on knowing their immune status (*1*). Revaccination, which has produced adequate antibody in only 30%-50% of persons who have not responded to primary vaccination in the deltoid, is not routinely recommended (*1,10*).

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Vaccine program coordinators in hospitals may decide to test vaccine recipients serologically to assess their antibody responses, even though such postvaccination testing is not routinely recommended. Persons electing to do postvaccination testing should be aware of potential difficulties in interpreting the results. Serologic testing within 6 months of completing the primary series will differentiate persons who respond to vaccine from those who fail to respond. However, the results of testing undertaken more than 6 months after completion of the primary series are more difficult to interpret. A vaccine recipient who is negative for anti-HBs between 1 and 5 years after vaccination can be 1) a primary nonresponder who remains susceptible to hepatitis B or 2) a vaccine responder whose antibody levels have decreased below detectability but who is still protected against clinical HBV disease (*10*).

There is no need for routine anti-HBs testing 1 to 5 years after vaccination unless there has been a decision to provide booster doses for persons who are anti-HBs negative. This strategy is medically acceptable, but costly, and will prevent few additional cases of disease because of the excellent long-term protection already provided by the primary series of vaccine.

Recommendations for Booster Doses

Adults and children with normal immune status. For adults and children with normal immune status, the antibody response to properly administered vaccine is excellent, and protection lasts for at least 5 years. *Booster doses of vaccine are not routinely recommended, nor is routine serologic testing to assess antibody levels in vaccine recipients necessary during this period.* The possible need for booster doses after longer intervals will be assessed as additional information becomes available.

Hemodialysis patients. For hemodialysis patients, in whom vaccine-induced protection is less complete and may persist only as long as antibody levels remain above 10 mIU/ml, the need for booster doses should be assessed by semiannual antibody testing (*13*). Booster doses should be given when antibody levels decline below 10 mIU/ml.

Postexposure Prophylaxis of Persons Exposed to HBsAg Positive Needle Sticks

In vaccinated persons who experience percutaneous or needle exposure to HBsAg-positive blood, serologic testing to assess immune status is recommended unless testing within the previous 12 months has indicated adequate levels of antibody. If the exposed person is tested and found to have an inadequate antibody level, treatment with HBIG and/or a booster dose of vaccine is indicated, depending on whether vaccination has been completed and whether the person is known to have previously responded to HB vaccine. Detailed recommendations on prophylaxis in this situation are provided in the previous recommendations for HB vaccine (*1*).

Dosage

When indicated, HB vaccine recipients can be given booster doses of either plasma-derived or recombinant HB vaccine. Booster doses of either vaccine induce prompt anamnestic responses in over 90% of persons who initially respond to vaccine but subsequently lose detectable antibody (*14,15*). The booster dose for normal adults is 20μg of plasma-derived vaccine or 10μg of recombinant vaccine. For newborns and children<10 years of age, the dose is half that recommended for adults. For hemodialysis patients, a dose of 40μg of plasma-derived vaccine is recommended; a formulation of recombinant HB vaccine is not yet available for this

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group. Vaccine should be given in the deltoid muscle. Buttock injection does not induce adequate levels of antibody.

Precautions

Reported adverse effects following booster doses have been limited to soreness at the injection site. Data are not available on the safety of the vaccine for the developing fetus, but there should be no risk because both plasma-derived and recombinant HB vaccines are inactivated and do not contain live virus particles. Booster doses need not be withheld from pregnant women who are at ongoing risk of HBV infection.

References

1. ACIP. Recommendations for protection against viral hepatitis. MMWR 1985;34:313-24, 329-35.
2. CDC. Annual summary 1984: reported morbidity and mortality in the United States. MMWR 1986;33(54):125.
3. CDC. Hepatitis surveillance report no. 50. Atlanta, Georgia: US Department of Health and Human Services, Public Health Service, 1986:16-25.

(Continued on page 366)

TABLE I. Summary — cases specified notifiable diseases, United States

Disease	23rd Week Ending			Cumulative, 23rd Week Ending		
	June 13, 1987	June 7, 1986	Median 1982-1986	June 13, 1987	June 7, 1986	Median 1982-1986
Acquired Immunodeficiency Syndrome (AIDS)	493	148	N	7,947	5,437	N
Aseptic meningitis	145	107	131	2,141	1,987	1,852
Encephalitis: Primary (arthropod-borne & unspec)	16	11	19	356	342	399
Post-infectious	6	8	4	42	54	49
Gonorrhea: Civilian	15,276	16,201	16,201	347,885	366,576	366,576
Military	273	257	437	7,238	6,922	9,414
Hepatitis: Type A	447	363	366	10,866	9,623	9,623
Type B	483	425	467	11,131	11,107	10,848
Non A, Non B	68	74	N	1,354	1,548	N
Unspecified	44	64	129	1,404	2,124	2,405
Legionellosis	19	9	N	337	251	N
Leprosy	2	8	7	92	125	118
Malaria	8	33	15	310	355	330
Measles: Total*	62	387	66	2,225	3,627	1,385
Indigenous	57	366	N	1,958	3,441	N
Imported	5	21	N	267	181	N
Meningococcal infections: Total	46	30	61	1,546	1,381	1,528
Civilian	46	30	61	1,545	1,379	1,513
Military	-	-	-	1	2	6
Mumps	197	54	76	8,575	1,937	1,937
Pertussis	22	88	27	744	1,183	807
Rubella (German measles)	7	19	19	178	268	368
Syphilis (Primary & Secondary): Civilian	551	454	493	14,625	11,284	12,198
Military	2	1	4	78	90	152
Toxic Shock syndrome	8	2	N	133	156	N
Tuberculosis	418	444	472	8,855	8,922	9,141
Tularemia	1	2	11	48	33	64
Typhoid Fever	4	4	4	126	111	140
Typhus fever, tick-borne (RMSF)	26	31	32	113	140	159
Rabies, animal	94	111	120	2,238	2,509	2,509

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1987		Cum. 1987
Anthrax	-	Leptospirosis	8
Botulism: Foodborne	3	Plague	2
Infant (Calif. 3)	23	Poliomyelitis, Paralytic	-
Other	-	Psittacosis (Mich. 1)	42
Brucellosis (Iowa 1, Tenn. 1, Calif. 1)	47	Rabies, human	-
Cholera	-	Tetanus	13
Congenital rubella syndrome	3	Trichinosis	25
Congenital syphilis, ages < 1 year	-	Typhus fever, flea-borne (endemic, murine)	10
Diphtheria	1		

*Five of the 62 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending June 13, 1987 and June 7, 1986 (23rd Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis(Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1987	1987	Cum. 1987	Cum. 1987	Cum. 1987	Cum. 1986	1987	1987	1987	1987	1987	Cum. 1987
UNITED STATES	7,947	145	356	42	347,885	366,576	447	483	68	44	19	92
NEW ENGLAND	363	7	16	2	11,200	7,889	6	33	2	5	-	8
Maine	13	2	1	-	336	417	1	4	-	-	-	-
N.H.	9	-	-	-	190	213	-	1	-	-	-	2
Vt.	4	-	2	-	89	113	1	1	-	-	-	-
Mass.	223	3	9	1	4,133	3,541	3	25	1	5	-	5
R.I.	27	-	3	1	873	764	1	2	1	-	-	-
Conn.	87	2	1	-	5,579	2,841	-	-	-	-	-	1
MID. ATLANTIC	2,369	13	43	3	56,384	60,162	32	46	8	4	1	5
Upstate N.Y.	313	2	16	2	7,267	7,177	21	20	6	-	1	-
N.Y. City	1,329	5	4	-	30,354	34,703	4	21	-	4	-	5
N.J.	504	6	4	-	6,955	7,915	7	5	2	-	-	-
Pa.	223	-	19	1	11,808	10,367	-	-	-	-	-	-
E.N. CENTRAL	497	10	99	4	49,676	50,101	27	42	2	2	9	2
Ohio	72	1	42	4	10,982	11,256	3	11	1	1	5	1
Ind.	42	1	8	-	4,019	5,480	-	2	-	1	-	-
Ill.	263	1	11	-	15,252	13,025	14	9	-	-	-	-
Mich.	82	7	31	-	15,322	15,010	10	20	1	-	4	-
Wis.	38	-	7	-	4,101	5,330	-	-	-	-	-	1
W.N. CENTRAL	183	4	15	-	13,998	15,654	24	23	1	2	-	-
Minn.	46	1	9	-	2,207	2,263	1	6	-	-	-	-
Iowa	13	-	1	-	1,366	1,623	3	2	-	-	-	-
Mo.	87	3	-	-	7,155	8,025	6	10	1	1	-	-
N. Dak.	1	-	-	-	127	139	-	-	-	-	-	-
S. Dak.	2	-	-	-	267	332	-	-	-	-	-	-
Nebr.	10	-	3	-	806	1,127	-	1	-	-	-	-
Kans.	24	-	2	-	2,070	2,145	14	4	-	1	-	-
S. ATLANTIC	1,297	33	46	16	91,080	94,215	28	94	13	5	4	5
Del.	9	1	1	1	1,349	1,484	-	3	1	-	-	-
Md.	152	4	7	3	10,767	10,731	8	14	3	-	-	2
D.C.	185	-	-	-	5,961	7,157	-	-	-	-	-	-
Va.	91	-	18	2	6,771	7,728	2	8	1	3	2	-
W. Va.	7	1	5	-	710	1,054	-	2	-	-	-	-
N.C.	53	5	8	-	13,947	15,115	1	16	3	1	2	-
S.C.	32	3	-	-	7,660	8,362	1	14	-	-	-	1
Ga.	197	1	-	-	15,579	16,607	8	10	1	-	-	-
Fla.	571	18	7	10	28,336	25,977	8	27	4	1	-	2
E.S. CENTRAL	86	19	19	4	25,761	30,249	1	34	2	-	1	-
Ky.	19	2	9	1	2,631	3,453	1	6	1	-	-	-
Tenn.	8	-	3	-	8,965	11,793	-	22	1	-	-	-
Ala.	51	17	7	-	8,228	8,547	-	2	-	1	-	-
Miss.	8	-	-	3	5,937	6,456	-	4	-	-	-	-
W.S. CENTRAL	743	24	36	2	39,407	45,302	37	45	5	8	3	4
Ark.	20	1	-	1	3,784	4,197	1	2	-	-	2	-
La.	103	-	5	-	7,267	8,038	4	7	-	-	-	-
Okla.	36	5	12	1	4,341	5,260	6	3	2	-	-	-
Tex.	584	18	19	-	24,015	27,807	26	33	3	8	1	4
MOUNTAIN	194	15	12	1	9,129	10,979	124	45	8	4	1	-
Mont.	2	-	-	-	212	310	2	1	-	-	-	-
Idaho	4	-	-	-	326	364	5	1	-	-	-	-
Wyo.	2	-	-	-	187	261	-	-	-	-	-	-
Colo.	90	6	1	-	1,943	2,884	19	5	1	3	-	-
N. Mex.	15	2	1	-	941	1,120	8	6	1	-	-	-
Ariz.	41	2	8	1	3,203	3,609	81	24	4	1	-	-
Utah	12	-	-	-	304	475	2	2	1	-	-	-
Nev.	28	5	2	-	2,013	1,956	7	6	1	-	1	-
PACIFIC	2,215	20	70	10	51,250	52,025	168	121	27	14	-	68
Wash.	99	-	6	1	3,653	4,141	59	30	8	3	-	2
Oreg.	54	-	-	-	1,938	2,095	21	18	4	1	-	-
Calif.	2,012	18	60	9	44,433	43,884	85	69	15	10	-	53
Alaska	6	-	2	-	809	1,303	2	-	-	-	-	-
Hawaii	44	2	2	-	417	602	1	4	-	-	-	13
Guam	-	-	-	-	94	56	-	-	-	-	-	-
P.R.	62	-	-	1	987	997	-	9	-	-	-	5
V.I.	-	-	-	-	96	99	-	-	-	-	-	-
Pac. Trust Terr.	-	-	-	-	219	158	-	-	-	-	-	38
Amer. Samoa	-	-	-	-	40	19	-	-	-	-	-	-

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 13, 1987 and June 7, 1986 (23rd Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1987	1987	Cum. 1987	1987	Cum. 1987	Cum. 1986	Cum. 1987	1987	Cum. 1987	1987	Cum. 1987	Cum. 1986	1987	Cum. 1987	Cum. 1986
UNITED STATES	310	57	1,958	5	267	3,627	1,546	197	8,575	22	744	1,183	7	178	268
NEW ENGLAND	22	5	73	-	123	28	141	-	20	1	19	62	-	1	5
Maine	-	-	3	-	-	-	7	-	-	-	1	2	-	1	-
N.H.	1	-	49	-	102	-	13	-	8	-	2	25	-	-	1
Vt.	-	5	7	-	14	-	8	-	2	-	3	3	-	-	1
Mass.	9	-	1	-	4	24	72	-	1	1	5	16	-	-	-
R.I.	4	-	-	-	1	2	11	-	2	-	-	1	-	-	2
Conn.	8	-	13	-	2	2	30	-	7	-	8	15	-	-	1
MID. ATLANTIC	29	7	388	-	40	1,150	182	8	139	1	106	100	-	7	27
Upstate N.Y.	12	-	15	-	8	41	67	4	61	-	80	67	-	5	19
N.Y. City	3	7	347	-	12	234	15	-	-	-	-	3	-	1	5
N.J.	8	-	6	-	3	856	34	2	37	1	6	7	-	1	3
Pa.	6	-	20	-	17	19	66	2	41	-	20	23	-	-	-
E.N. CENTRAL	12	-	210	-	16	689	200	100	4,934	1	83	181	1	20	41
Ohio	6	-	1	-	4	8	76	-	63	-	26	68	-	-	-
Ind.	2	-	-	-	-	-	22	-	635	-	1	19	-	-	-
Ill.	1	-	85	-	12	412	29	84	2,319	-	5	23	1	19	37
Mich.	3	-	23	-	-	14	60	15	710	1	27	20	-	1	3
Wis.	-	-	101	-	-	251	13	1	1,207	-	24	51	-	-	1
W.N. CENTRAL	10	4	123	5	20	178	70	24	1,128	4	42	62	-	1	8
Minn.	5	2	12	5§	18	34	24	4	653	-	8	27	-	-	-
Iowa	2	-	-	-	-	18	3	11	337	-	6	9	-	1	-
Mo.	3	2	111	-	1	13	20	1	17	3	16	5	-	-	1
N. Dak.	-	-	-	-	-	16	1	-	6	-	1	2	-	-	1
S. Dak.	-	-	-	-	-	-	1	8	72	-	2	7	-	-	-
Nebr.	-	-	-	-	-	1	2	-	2	-	-	2	-	-	-
Kans.	-	-	-	-	1	96	19	-	41	1	9	10	-	-	6
S. ATLANTIC	54	4	66	-	5	455	261	8	184	3	160	455	-	11	2
Del.	1	4	20	-	-	1	4	-	-	-	-	215	-	1	-
Md.	11	-	-	-	-	27	25	-	17	-	6	95	-	2	-
D.C.	6	-	-	-	1	-	5	-	-	-	-	-	-	-	-
Va.	12	-	-	-	-	43	44	-	51	2	36	15	-	1	-
W. Va.	-	-	-	-	-	2	-	2	27	-	32	5	-	-	-
N.C.	7	-	1	-	1	2	34	5	9	1	62	18	-	-	-
S.C.	3	-	-	-	-	301	27	-	11	-	-	7	-	-	-
Ga.	2	-	-	-	-	64	50	-	36	-	17	72	-	1	-
Fla.	12	-	45	-	3	15	72	1	33	-	7	28	-	6	2
E.S. CENTRAL	4	-	2	-	-	3	68	30	1,131	1	12	20	-	2	1
Ky.	1	-	-	-	-	-	13	-	202	-	1	1	-	2	1
Tenn.	1	-	-	-	-	1	23	25	893	-	3	5	-	-	-
Ala.	-	-	-	-	-	-	26	5	36	1	6	14	-	-	-
Miss.	2	-	2	-	-	2	6	-	-	-	2	-	-	-	-
W.S. CENTRAL	20	-	176	-	2	555	107	5	666	1	44	86	-	5	49
Ark.	1	-	-	-	-	283	11	-	278	-	2	3	-	2	-
La.	-	-	-	-	-	1	10	5	195	1	11	4	-	-	-
Okla.	3	-	1	-	1	12	16	N	N	-	31	51	-	-	-
Tex.	16	-	175	-	1	259	70	-	193	-	-	28	-	3	49
MOUNTAIN	10	26	404	-	14	251	56	17	167	4	67	108	3	19	8
Mont.	-	18	115	-	1	7	1	-	4	-	3	5	3	3	-
Idaho	1	-	-	-	-	1	5	-	3	-	18	26	-	1	-
Wyo.	-	-	-	-	2	-	-	-	-	-	2	1	-	1	-
Colo.	1	-	5	-	-	6	18	2	25	2	19	30	-	-	-
N. Mex.	-	7	280	-	9	25	3	N	N	1	5	10	-	-	-
Ariz.	6	1	4	-	1	212	20	10	122	1	19	24	-	4	1
Utah	-	-	-	-	-	-	6	-	6	-	1	12	-	10	4
Nev.	2	-	-	-	1	-	3	5	7	-	-	-	-	-	3
PACIFIC	149	11	516	-	47	318	461	5	206	6	211	109	3	112	127
Wash.	8	-	1	-	-	69	59	2	30	1	29	42	-	-	5
Oreg.	4	-	2	-	33	5	20	N	N	-	14	8	-	1	-
Calif.	133	11	513	-	10	224	371	3	159	1	82	56	3	78	120
Alaska	3	-	-	-	-	-	4	-	5	1	3	1	-	-	-
Hawaii	1	-	-	-	4	20	7	-	12	3	83	2	-	33	2
Guam	-	-	2	-	-	3	4	-	5	-	-	-	-	1	2
P.R.	1	-	404	-	-	18	2	-	5	-	12	6	-	2	58
V.I.	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-
Pac. Trust Terr.	-	-	1	-	-	-	1	-	4	-	1	-	-	1	-
Amer. Samoa	-	-	-	-	-	2	-	-	3	-	-	-	-	-	-

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable U: Unavailable †International §Out-of-state

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 13, 1987 and June 7, 1986 (23rd Week)

Reporting Area	Syphilis (Civilian) (Primary& Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1987	Cum. 1986	1987	Cum. 1987	Cum. 1986	Cum. 1987	Cum. 1987	Cum. 1987	Cum. 1987
UNITED STATES	14,625	11,284	8	8,855	8,922	48	126	113	2,238
NEW ENGLAND	232	223	-	285	294	-	11	1	2
Maine	1	15	-	15	26	-	1	-	1
N.H.	2	7	-	8	10	-	-	-	-
Vt.	1	6	-	6	10	-	-	-	-
Mass.	111	113	-	151	138	-	8	1	-
R.I.	6	13	-	24	19	-	1	-	1
Conn.	111	69	-	81	91	-	1	-	-
MID. ATLANTIC	2,730	1,575	1	1,561	1,772	-	16	2	164
Upstate N.Y.	94	79	1	243	268	-	6	1	13
N.Y. City	1,963	889	-	757	855	-	-	-	-
N.J.	281	298	-	268	333	-	10	-	5
Pa.	392	309	-	293	316	-	-	1	146
E.N. CENTRAL	413	464	4	1,057	1,099	1	17	13	70
Ohio	48	60	3	200	185	1	6	11	-
Ind.	27	52	-	113	121	-	4	-	10
Ill.	233	255	-	405	489	-	4	-	26
Mich.	78	73	1	297	252	-	2	2	10
Wis.	27	24	-	42	52	-	1	-	24
W.N. CENTRAL	63	112	-	262	254	12	7	5	501
Minn.	7	18	-	63	61	-	2	-	117
Iowa	11	6	-	17	21	3	2	-	150
Mo.	27	59	-	144	130	8	3	1	24
N. Dak.	-	2	-	1	4	-	-	-	61
S. Dak.	7	1	-	9	10	-	-	-	107
Nebr.	7	11	-	12	5	-	-	-	14
Kans.	4	15	-	16	23	1	-	4	28
S. ATLANTIC	4,923	3,337	1	1,844	1,728	3	11	37	618
Del.	40	20	-	18	19	1	-	-	-
Md.	268	196	-	160	131	-	2	11	215
D.C.	148	148	-	57	56	-	-	-	24
Va.	119	188	-	180	159	1	1	-	196
W. Va.	5	8	-	54	50	-	1	2	24
N.C.	272	215	-	197	218	1	1	9	2
S.C.	335	297	-	162	200	-	-	11	32
Ga.	705	666	-	288	261	-	-	3	93
Fla.	3,031	1,599	1	728	634	-	6	1	32
E.S. CENTRAL	861	748	-	697	794	3	1	16	181
Ky.	6	33	-	200	195	1	-	1	90
Tenn.	368	278	-	163	227	1	1	10	51
Ala.	210	246	-	234	262	-	-	3	40
Miss.	277	191	-	100	110	1	-	2	-
W.S. CENTRAL	1,827	2,347	1	1,021	1,069	15	7	34	327
Ark.	88	117	-	114	133	5	1	2	72
La.	326	386	-	121	186	2	-	-	8
Okla.	77	65	1	102	103	8	2	31	14
Tex.	1,336	1,779	-	684	647	-	4	1	233
MOUNTAIN	312	282	1	204	209	8	5	4	170
Mont.	7	3	-	8	10	1	-	3	86
Idaho	3	5	-	17	5	1	-	-	-
Wyo.	1	-	-	-	-	-	-	1	42
Colo.	46	78	-	-	15	1	-	-	-
N. Mex.	30	33	-	37	45	1	5	-	1
Ariz.	147	116	-	126	99	3	-	-	36
Utah	14	4	1	6	20	1	-	-	1
Nev.	64	43	-	10	15	-	-	-	4
PACIFIC	3,264	2,196	-	1,924	1,703	6	51	1	205
Wash.	31	57	-	115	91	2	3	-	-
Oreg.	120	46	-	54	59	2	-	-	-
Calif.	3,104	2,075	-	1,635	1,440	1	46	1	203
Alaska	2	-	-	27	27	1	-	-	2
Hawaii	7	18	-	93	86	-	2	-	-
Guam	2	1	-	23	30	-	-	-	-
P.R.	447	363	-	127	127	-	-	-	32
V.I.	3	-	-	1	1	-	-	-	-
Pac. Trust Terr.	83	142	-	80	23	-	12	-	-
Amer. Samoa	2	-	-	-	3	-	1	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending June 13, 1987 (23rd Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	641	462	112	40	9	17	53
Boston, Mass.	190	124	38	16	4	7	19
Bridgeport, Conn.	46	34	5	5	-	2	1
Cambridge, Mass.	28	22	4	1	-	1	5
Fall River, Mass.	26	21	5	-	-	-	-
Hartford, Conn.	55	32	13	7	2	1	4
Lowell, Mass.	29	25	4	-	-	-	2
Lynn, Mass.	10	6	3	1	-	-	1
New Bedford, Mass.	23	18	3	1	1	-	-
New Haven, Conn.	50	35	9	4	-	2	4
Providence, R.I.	57	42	12	1	-	2	6
Somerville, Mass.	11	10	1	-	-	-	-
Springfield, Mass.	39	33	5	1	-	-	3
Waterbury, Conn.	28	23	5	-	-	-	4
Worcester, Mass.	49	37	5	3	2	2	4
MID. ATLANTIC	2,715	1,691	559	312	72	81	96
Albany, N.Y.	53	36	11	3	1	2	-
Allentown, Pa.	9	7	2	-	-	-	-
Buffalo, N.Y.	99	65	20	7	2	5	4
Camden, N.J.	24	11	8	3	1	1	-
Elizabeth, N.J.	23	17	4	2	-	-	1
Erie, Pa.†	27	19	6	2	-	-	-
Jersey City, N.J.	59	41	10	6	-	2	1
N.Y. City, N.Y.	1,580	947	322	223	48	40	50
Newark, N.J.	67	25	19	17	4	2	1
Paterson, N.J.	28	17	5	5	-	1	2
Philadelphia, Pa.	314	185	73	25	9	22	15
Pittsburgh, Pa.†	70	48	16	4	2	-	1
Reading, Pa.	12	8	4	-	-	-	-
Rochester, N.Y.	112	95	11	2	3	1	10
Schenectady, N.Y.	30	25	5	-	-	-	1
Scranton, Pa.†	21	16	4	1	-	-	1
Syracuse, N.Y.	116	78	29	6	1	2	5
Trenton, N.J.	23	12	8	1	-	2	-
Utica, N.Y.	16	15	-	-	1	-	1
Yonkers, N.Y.	32	24	2	5	-	1	3
E.N. CENTRAL	2,353	1,531	489	174	71	87	86
Akron, Ohio	67	43	16	5	1	2	-
Canton, Ohio	31	23	7	1	-	-	2
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	160	104	39	7	3	7	17
Cleveland, Ohio	136	76	39	13	6	2	1
Columbus, Ohio	168	108	28	12	5	15	5
Dayton, Ohio	130	86	30	7	4	3	-
Detroit, Mich.	294	170	59	41	14	9	9
Evansville, Ind.	52	41	8	1	-	2	-
Fort Wayne, Ind.	58	39	12	3	2	2	2
Gary, Ind.	12	6	2	2	1	1	-
Grand Rapids, Mich.	63	46	10	4	-	3	3
Indianapolis, Ind.	137	91	25	9	7	5	3
Madison, Wis.S	42	28	10	1	2	1	2
Milwaukee, Wis.	122	89	18	8	1	6	1
Peoria, Ill.	46	28	12	3	3	-	2
Rockford, Ill.	37	30	5	-	-	2	7
South Bend, Ind.	51	34	11	5	-	1	5
Toledo, Ohio	108	78	17	3	8	2	8
Youngstown, Ohio	75	49	16	4	4	2	3
W.N. CENTRAL	740	508	134	50	27	21	50
Des Moines, Iowa	78	59	12	4	2	1	5
Duluth, Minn.	19	14	3	2	-	-	1
Kansas City, Kans.	32	13	10	2	6	1	1
Kansas City, Mo.	115	67	34	6	3	5	8
Lincoln, Nebr.	36	27	5	-	2	2	3
Minneapolis, Minn.	100	83	9	7	-	1	5
Omaha, Nebr.	99	75	13	5	3	3	8
St. Louis, Mo.	140	89	26	12	9	4	10
St. Paul, Minn.	47	32	10	4	-	1	2
Wichita, Kans.	74	49	12	8	2	3	7
S. ATLANTIC	1,096	661	242	108	46	37	43
Atlanta, Ga.	134	79	34	12	6	3	2
Baltimore, Md.	137	90	24	12	7	4	7
Charlotte, N.C.§	89	57	21	7	2	2	3
Jacksonville, Fla.	119	70	31	8	7	3	7
Miami, Fla.	113	53	31	18	6	5	1
Norfolk, Va.	49	22	16	4	3	4	2
Richmond, Va.	68	41	17	5	2	3	3
Savannah, Ga.	51	29	8	8	2	4	6
St. Petersburg, Fla.	80	68	6	4	2	-	2
Tampa, Fla.	74	45	13	8	2	5	6
Washington, D.C.	158	89	37	21	6	4	3
Wilmington, Del.	24	18	4	1	1	-	1
E.S. CENTRAL	839	507	215	56	30	31	36
Birmingham, Ala.	136	75	34	17	4	6	3
Chattanooga, Tenn.	72	44	21	6	-	1	3
Knoxville, Tenn.	92	54	27	7	1	3	5
Louisville, Ky.	115	76	27	4	4	4	1
Memphis, Tenn.	172	97	48	13	7	7	12
Mobile, Ala.	56	36	14	-	5	1	5
Montgomery, Ala.	61	46	10	3	2	-	-
Nashville, Tenn.	135	79	34	6	7	9	7
W.S. CENTRAL	1,328	787	324	126	45	44	49
Austin, Tex.	55	30	14	5	3	3	1
Baton Rouge, La.	46	30	11	2	1	2	3
Corpus Christi, Tex.	50	30	12	3	2	2	1
Dallas, Tex.	195	111	48	24	6	6	3
El Paso, Tex.	47	29	10	3	4	1	2
Fort Worth, Tex	82	50	12	10	3	7	-
Houston, Tex.§	308	176	74	34	13	11	7
Little Rock, Ark.	72	43	18	4	1	5	11
New Orleans, La.	116	67	34	9	4	2	-
San Antonio, Tex.	192	119	47	19	3	4	4
Shreveport, La.	59	36	17	4	1	1	6
Tulsa, Okla.	106	66	27	9	4	-	11
MOUNTAIN	583	388	105	42	13	34	23
Albuquerque, N. Mex.	84	63	10	7	1	3	-
Colo. Springs, Colo.	41	33	4	2	2	-	6
Denver, Colo.	93	62	15	9	-	7	3
Las Vegas, Nev.	67	43	16	4	-	3	3
Ogden, Utah	23	20	1	2	-	-	4
Phoenix, Ariz.	104	54	29	11	4	6	2
Pueblo, Colo.	16	13	2	1	-	-	-
Salt Lake City, Utah	50	25	11	2	4	8	-
Tucson, Ariz.	105	75	17	4	2	7	5
PACIFIC	1,960	1,299	381	164	69	43	90
Berkeley, Calif.	19	16	2	1	-	-	1
Fresno, Calif.	61	33	15	8	2	3	5
Glendale, Calif.	26	22	3	1	-	-	1
Honolulu, Hawaii	64	39	14	6	1	4	6
Long Beach, Calif.	93	58	22	4	6	3	5
Los Angeles Calif.	561	387	97	50	19	5	14
Oakland, Calif.§	77	49	18	4	3	3	5
Pasadena, Calif.	32	23	8	-	1	-	4
Portland, Oreg.	128	92	22	8	5	1	4
Sacramento, Calif.	151	96	26	18	7	4	2
San Diego, Calif.	164	98	33	14	8	11	11
San Francisco, Calif.	167	96	42	24	3	1	6
San Jose, Calif.	180	124	33	13	7	3	15
Seattle, Wash.	133	88	27	11	5	2	8
Spokane, Wash.	43	33	7	1	-	2	1
Tacoma, Wash.	61	45	12	1	2	1	2
TOTAL	12,255††	7,834	2,561	1,072	382	395	526

*Mortality data in this table are voluntarily reported from 121 cities in the United states, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

**Pneumonia and influenza.

†Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

§Data not available. Figures are estimates based on average of past 4 weeks.

TABLE V. Estimated years of potential life lost before age 65 and cause-specific mortality, by cause of death — United States, 1985

Cause of mortality (Ninth Revision ICD)	YPLL for persons dying in 1985*	Cause-specific mortality, 1985† (rate/100,000)
ALL CAUSES (Total)	11,844,475	874.8
Unintentional Injuries§ (E800-E949)	2,235,064	38.6
Malignant neoplasms (140-208)	1,813,245	191.7
Diseases of the heart (390-398,402,404-429)	1,600,265	325.0
Suicide, homicide (E950-E978)	1,241,688	20.1
Congenital anomalies (740-759)	694,715	5.5
Prematurity¶ (765, 769)	444,931	2.9
Sudden infant death syndrome (798)	313,386	2.0
Cerebrovascular disease (430-438)	253,044	64.0
Chronic liver diseases and cirrhosis (571)	235,629	11.2
Pneumonia and influenza (480-487)	168,949	27.9
Acquired Immunodeficiency Syndrome (AIDS)**	152,595	2.3
Chronic obstructive pulmonary diseases (490-496)	129,815	31.2
Diabetes mellitus (250)	128,229	16.2

*For details of calculation, see footnotes to Table V, *MMWR* 1987;36:56.
†Cause-specific mortality rates as reported in the National Center for Health Statistics' *Monthly Vital Statistics Report* are compiled from a 10% sample of all deaths.
§Equivalent to accidents and adverse effects.
¶Category derived from disorders relating to short gestation and respiratory distress syndrome.

ACIP: Hepatitis B — Continued

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Nutritional Status of Minority Children — United States, 1986

The Pediatric Nutrition Surveillance System (PNSS) was established by CDC in 1974 to monitor the nutritional status of children who are under 60 months of age and from high-risk, low-income families participating in certain programs designed to improve the health of young children. These programs include the Special Supplemental Food Program for Women, Infants, and Children (WIC); the Early Periodic Screening, Diagnosis, and Treatment Program (EPSDT); and publicly funded maternal- and child-health clinics. Participation in the PNSS has grown to include 33 states, the District of Columbia, and Puerto Rico.

Preliminary data show that over 800,000 children under 60 months of age visited one of these programs for the first time in 1986. Of these, 49.6% were white; 34.1%, black; 13.3%, Hispanic; 1.5%, American Indian/Alaskan Native; and 1.0%, Asian/Pacific Islander. Most data were collected through WIC (77.3%) and EPSDT (21.9%). The National Center for Health Statistics (NCHS), CDC, growth reference population was used to calculate the age- and ethnic-specific prevalence of short stature (defined as height-for-age [H/A] lower than the fifth percentile), underweight (defined as weight-for-height [W/H] lower than the fifth percentile), and overweight (defined as W/H above the 95th percentile) (*1*).

The prevalence of short stature was greater than the 5% expected for all age and ethnic groups as compared with the NCHS reference population (Figure 1). Asian/Pacific Islander children had the highest prevalence of short stature, and the

Nutritional Status — Continued

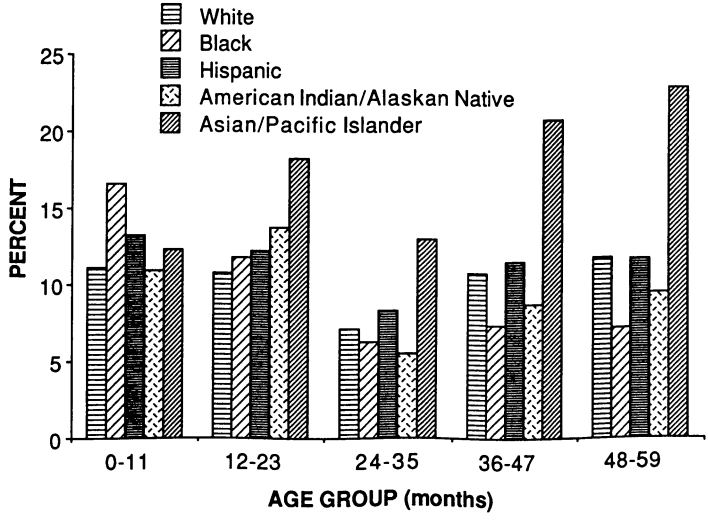
prevalence tended to increase with age, reaching 22.9% at 48-59 months. Blacks had the lowest prevalence of short stature, except during infancy.

The prevalence of underweight was generally less than the 5% expected and tended to decrease with age in all ethnic groups except Asians/Pacific Islanders (Figure 2). Hispanics had the highest rate (8.1%) in the 0- to 11-month age group, whereas, in the older age groups, rates were highest for Asians/Pacific Islanders. The lowest rates in all age groups occurred among American Indian/Alaskan Native children.

In most instances, the rate of overweight exceeded the 5% expected when compared with the reference population (Figure 3). Overall, the highest rates occurred before 24 months of age, and the lowest, during the ages 24-35 months. Hispanics had the highest prevalence of high W/H in all but the 0- to 11-month age group.

Reported by: Family Health Svcs, Alabama Dept of Public Health. Div of Nutrition Svcs, Arkansas Dept of Health. Office of Nutrition Svcs, Arizona Dept of Health Svcs. WIC Program, Colorado Dept of Health. Nutrition Section, Connecticut Dept of Health Svcs. WIC State Agency, District of Columbia Dept of Human Svcs. WIC and Nutrition Svcs, Florida Dept of Health and Rehabilitation Svcs. Office of Nutrition, Georgia Dept of Human Resources. Nutrition Br, State of Hawaii Dept of Health. WIC Program, Iowa State Dept of Health. WIC Program, Idaho Dept of Health and Welfare. Nutrition Svcs, Illinois Dept of Public Health. WIC Program, Indiana State Board of Health. WIC Program, Kansas Dept of Health and Environment. WIC Program, Kentucky Dept of Human Resources. Nutrition Section, Louisiana Dept of Health and Human Resources. WIC Dept, Maine Dept of Human Svcs. Nutrition Dept, Detroit Health Dept; Bur of Community Svcs, Michigan Dept of Public Health. WIC Program, Mississippi State Dept of Health. Nutrition and Child Health Bur, Montana State Dept of Health and Environmental Sciences. Nutrition and Dietary Svcs Br, North Carolina Div of Health Svcs. WIC Program, Nebraska Dept of Health. WIC Program, New Hampshire Dept of Health and Welfare. Maternal and Child Health, New Jersey Dept of Health. Nutrition Section, New Mexico Dept of Health and Environment. WIC Program, Nevada Dept of Health. Div of Nutrition, Ohio State Dept of Health. Nutrition Div, Oklahoma State Dept of Health. WIC Program, Oregon State Health Div. WIC Program, Commonwealth of Puerto Rico Dept of Health. Office of Nutrition Svcs, Rhode Island Dept of Health. Nutrition Svcs and

FIGURE 1. Prevalence of short stature, by age and ethnic group — Pediatric Nutrition Surveillance System, 1986



Nutritional Status — Continued

WIC Program, Tennessee Dept of Health and Environment. WIC Program, Utah Dept of Health. Nutrition Svcs, Vermont Dept of Health. WIC Program, Wyoming Dept of Health and Social Svcs. Div of Nutrition, Center For Health Promotion and Education, CDC.

Editorial Note: These results reflect nutritional status among children from low-income families enrolled in certain publicly supported health programs in 1986. The prevalence of both short stature and overweight among these children exceeded the 5% expected in each category. However, the prevalence of low W/H for most age and

FIGURE 2. Prevalence of underweight, by age and ethnic group — Pediatric Nutrition Surveillance System, 1986

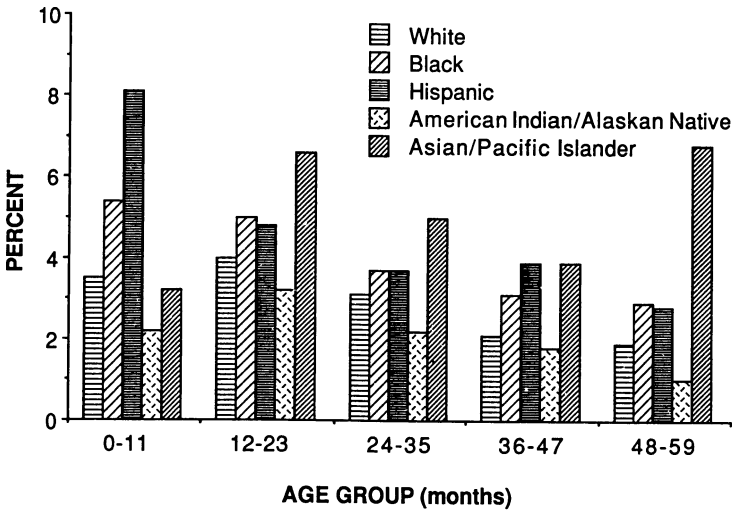
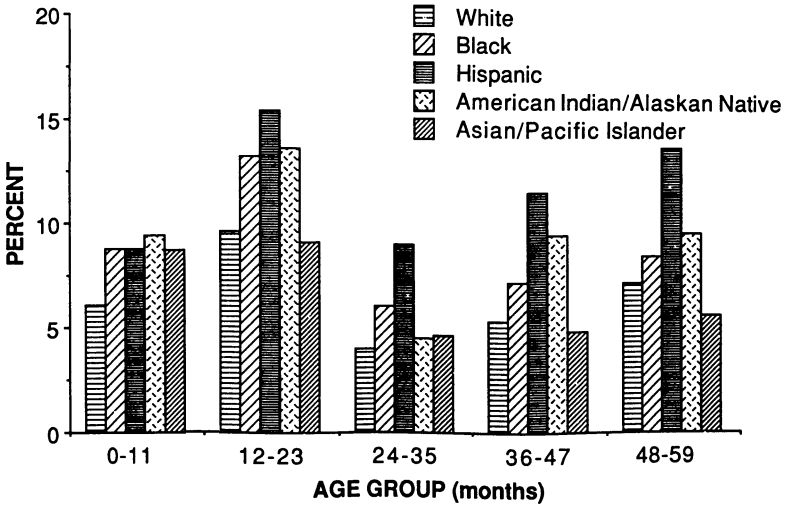


FIGURE 3. Prevalence of overweight, by age and ethnic group — Pediatric Nutrition Surveillance System, 1986



Nutritional Status — Continued

ethnic groups was lower than expected, suggesting that underweight is not generally a common health problem in the PNSS population. The Hispanic population of Puerto Rico represented about 38% of all Hispanics in the PNSS, and their inclusion tended to increase the overall rate of underweight among Hispanics, especially among 0- to 11-month-old children.

All ethnic groups showed a marked drop in the prevalence of both short stature and overweight at age 2. This observation is most likely an artifact resulting from the recognized discontinuity of the NCHS reference curves at age 24 months (*2*). Consequently, any comparison of the prevalence of short stature or overweight among children below 24 months with those above 24 months should be made with caution.

Asian/Pacific Islander children more than 1 year of age were consistently shorter than the children in other ethnic groups. More than one in five Asian/Pacific Islander children over 3 years of age were below the fifth percentile for H/A. This high prevalence of short stature may reflect nutritional deficits as well as genetic factors among Southeast Asian refugee children.

The prevalence of short stature was lowest among blacks, especially among those more than 23 months old; however, they had the highest prevalence before 1 year of age. The high prevalence among children below 12 months of age was most likely due to the higher rate of low birthweight in this group. The low prevalence after 12 months of age may reflect improved nutritional status as well as genetically based differences in the growth potential of black children (*3*). In all ethnic groups, the overall prevalence of short stature among children less than 1 year old was higher than reported in previous years (*4*). This difference occurred because a change in the criteria used to edit data for the PNSS caused a greater proportion of low birthweight infants to be included in 1986 than in previous years.

As previously observed, rates of overweight were generally highest among Hispanic children. Overweight was also relatively prevalent among American Indians/Alaskan Natives, although not to the extent observed previously (*4*). While the cause of high W/H in Hispanic children is not well explained, it may not reflect obesity (*5*). Differences in body proportions and other genetically based factors may play a role (*5*).

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Premature Mortality Due to Congenital Anomalies — United States, 1984

Congenital anomalies were the fifth leading cause of years of potential life lost before age 65 (YPLL) in 1985 and accounted for 694,715 YPLL, or about 6%, of all YPLL (Table V, page 365). In 1984, the latest year for which detailed mortality data are available, they also ranked fifth. This report analyzes the 1984 data* on YPLL attributable to selected types of congenital anomalies by race (white, all other).

The leading cause of premature mortality was congenital anomalies of the cardiovascular system, such as transposition of the great vessels. They accounted for 44% of YPLL due to congenital anomalies. Defects of the nervous system such as spina bifida, accounted for 15.2%, and respiratory-system and chromosomal defects, such as Down's syndrome, each accounted for about 9% of all YPLL due to congenital anomalies. There were only minor variations by race in the proportional distributions of YPLL by type of anomaly (Table 1).

Reported by: Birth Defects and Genetic Diseases Br, Div of Birth Defects and Developmental Disabilities, Center for Environmental Health, CDC.

Editorial Note: YPLL statistics understate the full public health impact of congenital anomalies. This is, in part, because anomalies in infants who die shortly after birth may not be diagnosed, and the infants' deaths are, therefore, not attributed to congenital anomalies. Perhaps more importantly, YPLL statistics are based only on live-born infants. This leads to underestimation because a substantial number of babies with anomalies are stillborn and an even greater number of malformed fetuses are aborted spontaneously.

Improvements in the care of individuals with some types of congenital anomalies may reduce YPLL in the future. Primary prevention is the ultimate goal, however, because many who now survive infancy with congenital anomalies face a lifetime of morbidity. Such prevention will require the discovery of the causes of anomalies, which are known to operate during the first trimester of pregnancy at the time of embryogenesis and organogenesis.

*The data for this report were obtained from detailed mortality computer tapes available from the National Center for Health Statistics, CDC.

TABLE 1. Years of potential life lost (YPLL) before age 65 due to congenital anomalies*, by race — United States, 1984

	YPLL					
	White		Other		Total	
Type of Anomaly	No.	(%)	No.	(%)	No.	(%)
Nervous	84,868	(15.3)	19,765	(14.9)	104,633	(15.2)
Cardiovascular	239,847	(43.2)	62,948	(47.3)	302,795	(44.0)
Respiratory	49,181	(8.9)	11,517	(8.7)	60,698	(8.8)
Digestive	10,982	(2.0)	3,575	(2.7)	14,557	(2.1)
Urinary	29,299	(5.3)	5,314	(4.0)	34,613	(5.0)
Chromosomal	49,042	(8.8)	10,757	(8.1)	59,799	(8.7)
All other	91,782	(16.5)	19,214	(14.4)	110,996	(16.1)
Total	**555,001**	**(100.0)**	**133,090**	**(~100.0)**	**688,091**	**(~100.0)**

*As classified by the International Classification of Diseases, 9th Revision (ICD-9).

Self-Study Training Offered by CDC

The following self-study courses are available from CDC's Training and Laboratory Program Office:

*Community Hygiene** (3010-G). For persons needing a general knowledge of sanitary science and the application of various principles related to preventing and controlling both acute and chronic environmental diseases in the community.

Basic Mathematics (3011-G). For sanitarians or public health practitioners who must convert from one system of measurement to another, determine chemical dosages, and calculate the areas and volumes of common geometric forms.

Communicable Disease Control (3012-G). For persons concerned with preventing and controlling communicable diseases prevalent in the United States. This course also covers the host, agent, and environment as factors in the disease process.

Vectorborne Disease Control (3013-G). For persons needing a practical competence in vectorborne disease control. Only descriptive taxonomy is covered, but taxonomic keys and other aids are included in the study manuals.

Waterborne Disease Control (3014-G). For persons dealing with procedures and factors intended to prevent and control waterborne diseases. This course is not a technical presentation on water treatment; it emphasizes principles of disease control that will provide a safe product.

Environmental Protection (3015-G). Primarily for professional health workers studying factors influencing the development or existence of environmental problems. The course may also be useful to graduate and undergraduate students who wish to specialize in an environmental field.

Foodborne Disease Control (3016-G). Primarily for professional health workers who need to be highly competent in the area of food sanitation. The course will also be useful to food-service managers and to graduate and undergraduate students who wish to specialize in environmental health.

Water Fluoridation (3017-G). For water-plant operators working in all systems, particularly those involved with testing the fluoride content of water, maintaining equipment, and purchasing chemicals.

Microbial Ecology of Foods (3018-G). Primarily for professional health workers whose jobs require competence in food safety. The course is appropriate for inspectors, laboratory personnel, consultants, program managers, and students—either at the upper undergraduate level or in postgraduate work. It is also useful to food industry personnel involved in quality assurance.

Principles of Epidemiology (3030-G). For state and local public health personnel responsible for disease surveillance or investigation. The course includes concepts, principles, and methods generally useful in surveillance and investigation of communicable diseases.

Reported by: Div of Training, Training and Laboratory Program Office, CDC.

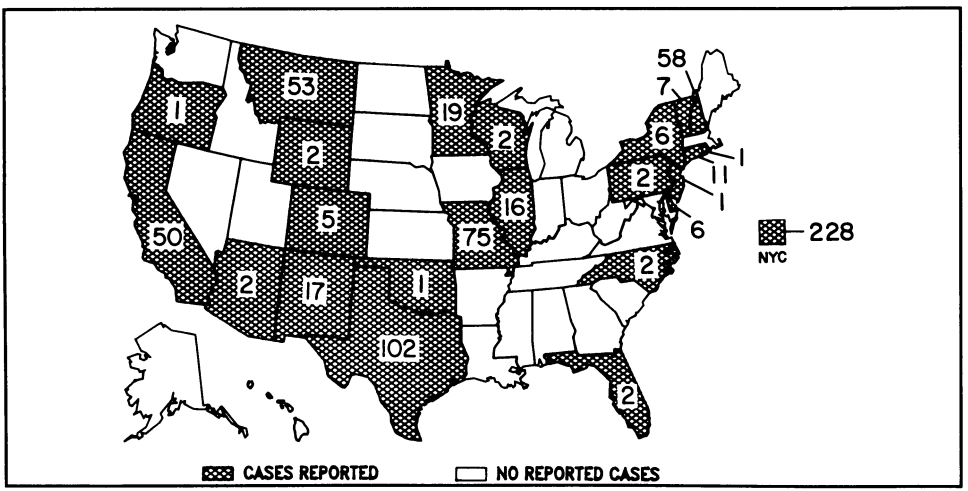
Further information may be obtained from the Division of Training, Training and Laboratory Program Office, CDC (telephone 404/329-3153).

*Not available until October 1, 1987.

Erratum: Vol. 36, No. 22

p. 337 In the article entitled "Smokeless Tobacco Use in the United States—Behavioral Risk Factor Surveillance System, 1986", the credits should have included the following: *Reported by: Dental Disease Prevention Activity, Center for Prevention Svcs, CDC.*

FIGURE I. Reported measles cases — United States, weeks 19-22, 1987



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