CENTERS FOR DISEASE CONTROL October 16, 1987 / Vol. 36 / No. 40

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

Progress in Chronic Disease Prevention

Community-Based Exercise Intervention — The Zuni Diabetes Project

The Zuni Indians of New Mexico, traditionally a physically active tribe noted for the grueling footrace that is a part of their heritage, have more recently experienced an increased prevalence of obesity and noninsulin-dependent diabetes mellitus (NIDDM)* (*1*). In response to this public health need, the Zuni Diabetes Project was initiated in July of 1983. The project is a community-based exercise program designed primarily to facilitate weight loss and improve glycemic control among patients with NIDDM (*2,3*). It began with two aerobics sessions per week and has grown to more than 48 sessions, offered 5 days a week, several times daily, in a variety of sites in the Zuni community. Ongoing sessions are offered for the general public as well as for individuals with NIDDM. Participants with NIDDM are recruited through personal invitations and recommendations from the medical staff and through a community advertisement campaign. A number of exercise-oriented community events, including footraces, are also offered throughout the year and are supported and sponsored by local agencies and businesses.

In October 1985, the Indian Health Service and CDC jointly evaluated the program (*3*). Participants were defined as individuals who had NIDDM and had attended at least one exercise session. Thirty patients met this definition. They represented 14% of the 220 persons participating in the exercise sessions and 7% of the 406 patients in the NIDDM registry as of September 1985.

A random start method was used to select a comparison group from the registry of patients with NIDDM. Nonparticipants were matched to participants on the basis of residence, age (±2 years), sex, health-care provider, and duration of NIDDM (±2 years). A total of 56 nonparticipants were selected, two nonparticipants for each participant with the exception of four for whom only one match could be found.

All patients were seen in the local clinic on a regular basis and had received similar verbal counseling and written instructions regarding medications, diet, and home exercise. Weight, height, hypoglycemic medications, fasting blood-glucose values, resting blood pressure, complications of diabetes (e.g., neuropathy, retinopathy, and

*Individuals are diagnosed as having NIDDM if their fasting blood-glucose level is ≥140 mg/dl on at least two occasions or if they have at least two oral 75-gm glucose-tolerance tests that result in a blood-glucose level ≥200 mg/dl after 2 hours.

Diabetes – Continued

amputation), and history or presence of other diseases (e.g., coronary heart disease, hypertension, renal disease, and stroke) were abstracted from the medical records of participants and nonparticipants.

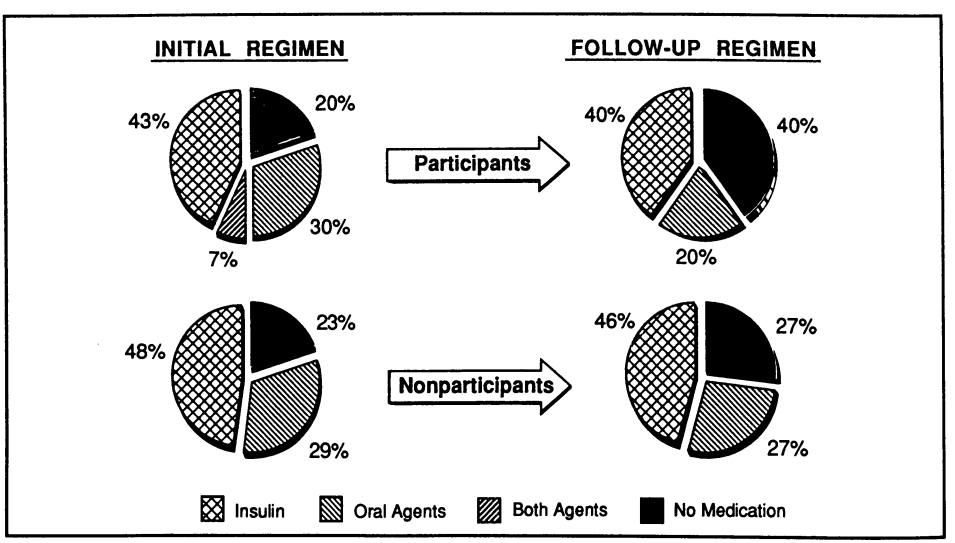
Participants and nonparticipants were of similar height, weight, and blood pressure and had similar lengths of follow-up and rates of major diabetic complications. The mean duration of program attendance was 37 weeks, with a mean of 1.7 exercise sessions per week and a range of 1 to 102 weeks. Thirty-three percent of the participants had engaged in exercise sessions for less than 3 months. The average length of follow-up was 50 weeks, with a range of 4 to 102 weeks. Forty-three percent of the participants had begun a home exercise program during the follow-up period; 18% of the nonparticipants had begun similar home programs.

The mean weight loss for participants was 4 kg (8.8 lb), which was significantly greater than the mean weight loss of 0.9 kg (2.0 lb) for nonparticipants. Participants' mean fasting blood-glucose values dropped significantly, from 238 mg/dl to 195 mg/dl. Nonparticipants experienced an insignificant drop, from 228 mg/dl to 226 mg/dl. The differences between the two groups were statistically significant. Thirty percent (9/30) of the participants developed normal fasting blood-glucose levels (≤140 mg/dl). In contrast, only 9% (5/56) of the nonparticipants developed normal blood-glucose levels.

The data showed evidence of a dose-response relationship when examined on the basis of duration of participation in the exercise sessions. That is, participants attending sessions for the longest period of time (>52 weeks) showed the greatest weight loss (mean 9 kg [19.8 lb]), whereas those participating <8 weeks had the least weight loss (mean 2 kg [4.4 lb]). There was a similar dose-response for fasting blood-glucose levels.

The pattern of hypoglycemic medication dosage over the study period was examined for alterations in the prescribed dose (Figure 1). Participants were two

FIGURE 1. Initial and follow-up regimens of hypoglycemic medication for participants and nonparticipants in the Zuni Diabetes Project – Zuni, New Mexico, 1985



Diabetes — Continued

times more likely than nonparticipants to have decreased their medication (rate ratio [RR] = 2.2; 95% confidence interval [CI], 1.3 to 3.7). During their exposure to the program, 7 of 24 participants (29%) were completely withdrawn from hypoglycemic agents, compared with 3 of 43 nonparticipants (7%) (RR = 4.2; 95% CI, 1.3 to 13.3).

Compared with all diabetics in the registry, participants were more likely to be younger and to be women. However, when stratified by age, duration of diabetes, and body mass index, the changes in weight, fasting blood-glucose levels, and hypoglycemic agent usage were no different from the unstratified results. These findings suggest that age, duration of diabetes, and body mass index did not influence the effect of participation on the metabolic outcomes.

Reported by: BE Leonard, RH Wilson, MD, Zuni Comprehensive Health Center, Indian Health Svc, Zuni; D Gohdes, MD, Diabetes Program, Indian Health Svc, Albuquerque; HF Hull, MD, State Epidemiologist, New Mexico Health and Environment Dept. Div of Health Education, Center for Health Promotion and Education, CDC.

Editorial Note: This study demonstrated that participation in a community-based exercise program can successfully facilitate weight loss in a group of individuals with NIDDM. Furthermore, participation decreased fasting blood-glucose values and decreased the need for insulin or oral hypoglycemic agents or both. According to the current literature, this is the largest group of patients with NIDDM enrolled in an evaluated community-based program.

Because weight loss results in improved glucose tolerance and increased insulin sensitivity (*4,5*), intervention programs have recently focused on weight reduction as a method of improving metabolic control in patients with NIDDM. Studies have employed a variety of clinic-based intervention strategies for weight reduction, including increased exercise (*6-8*). Results from these studies have indicated average reductions in weight, ranging from 1 kg (2.2 lb) after 10 weeks of intervention to 5 kg (11 lb) after 6 months. One study showed weight loss of 6.4 kg (14.1 lb) after 4 months of intervention; however, after 16 months of follow-up, patients had gained back more than half of this weight (*6*). The Zuni Diabetes Project differs from other clinic-based intervention studies with defined termination points in that it is a continuous program. In addition, it reinforces exercise behavior by offering numerous exercise sessions and exposures to the exercise message throughout the community.

The Zuni community is unique because of its geographic location and the historical tradition of the Zuni as a socially close-knit people. Controlling for age, duration of diabetes, and body mass index did not alter the results; therefore, it appears that participation in the program and not these characteristics determined success. Thus, modifying the program to make it more appealing or accessible to men or to older persons may produce equivalent changes in weight, fasting blood-glucose levels, and hypoglycemic agent usage. In addition, the success of this community-based intervention suggests that it may be effective for the prevention and control of NIDDM in other community settings.

References

1. Long TP. The prevalence of clinically treated diabetes among Zuni reservation residents. Am J Public Health 1978;68:901-3.
2. Leonard B, Leonard C, Wilson R. Zuni Diabetes Project. Public Health Rep 1986;101:282-8.
3. Heath GW, Leonard BE, Wilson RH, Kendrick JS, Powell KE. Community-based exercise intervention: The Zuni Diabetes Project. Diabetes Care 1987;10:579-83.

Diabetes — Continued

4. Ohlson L-O, Larsson B, Svärdsudd K, et al. The influence of body fat distribution on the incidence of diabetes mellitus: 13.5 years of follow-up of the participants in the study of men born in 1913. Diabetes 1985;34:1055-8.
5. Karam JH. Obesity and diabetes in humans. In: Brodoff BN, Bleicher SJ, eds. Diabetes mellitus and obesity. Baltimore: Williams and Wilkins, 1982:294-300.
6. Wing RR, Epstein LH, Nowalk MP, Koeske R, Hagg S. Behavior change, weight loss, and physiological improvements in Type II diabetic patients. J Consult Clin Psychol 1985; 53:111-22.
7. Saltin B, Lindgärde F, Houston M, Hörlin R, Nygaard E, Gad P. Physical training and glucose tolerance in middle-aged men with chemical diabetes. Diabetes 1979;28(suppl 1):30-2.
8. Kaplan RM, Wilson DK, Hartwell SL, Merino KL, Wallace JP. Prospective evaluation of HDL cholesterol changes after diet and physical conditioning programs for patients with type II diabetes mellitus. Diabetes Care 1985;8:343-8.

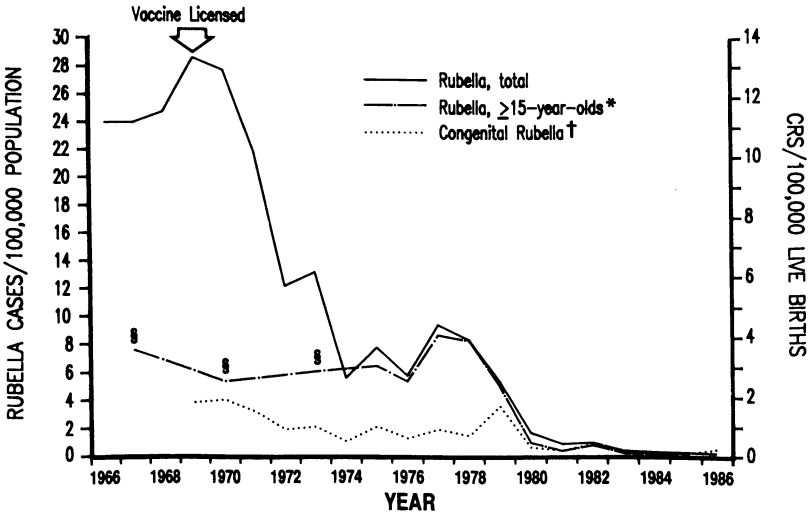
Epidemiologic Notes and Reports

Rubella and Congenital Rubella — United States, 1984-1986

Rubella

In 1986, 551 cases of rubella (0.23 cases/100,000 population) were reported in the United States. The incidence of rubella declined by 12% from the 1985 total (630) and has declined by 99% since 1969, the year of rubella vaccine licensure. The current total is the lowest since rubella became a nationally notifiable disease in 1966 (Figure 1).

FIGURE 1. Incidence rates of reported rubella cases and congenital rubella cases — United States, 1966-1986



*Includes proration of patients ≥15 years old for whom age was unreported.
†Rate per 10^5 births of confirmed and compatible cases of CRS by year of birth. Reporting for recent years is provisional, as cases may not be diagnosed until later in childhood.
§Average annual United States estimate based on data from Illinois, Massachusetts, and New York City for the 3-year-periods 1966-1968, 1969-1971, and 1972-1974. Age-specific data were not available for U.S. totals until 1975.

Rubella — Continued

In 1986, 18 of 52 reporting areas (50 states, the District of Columbia, and New York City) reported no rubella cases, compared with 15 reporting areas in 1985 and 13 in 1984. One hundred sixty-one counties (5%) reported rubella cases in 1986, compared with 219 (7%) in 1984.

Comparison of national data for 1984-1986 indicates that the reported age-specific incidence rates of rubella declined for virtually all age groups during the past 3 years (Table 1). Children <5 years of age continued to have the highest overall incidence rate (0.8/100,000) and accounted for 28% of all patients for whom age was reported during 1986. The incidence rate for persons <15 years old declined by 42% between 1984 and 1986. The rate for persons ≥15 years of age, who accounted for 58% of the cases in 1986, declined by 15% between 1984 and 1986 (0.20/100,000 and 0.17/100,000, respectively).

Long-term, age-specific data on the occurrence of rubella are available only from Illinois, Massachusetts, and New York City. In the 3-year period before vaccine licensure (1966-1968), the reported risk of acquiring rubella in these three locations was highest for children 5-9 years of age (Table 2). Children <10 years of age accounted for 60% of the cases, while only 23% of the total reported cases were among those ≥15 years of age. During 1975-1977, although incidence rates had declined for all age groups, the greatest decreases occurred among persons <15 years of age. Consequently, the highest incidence rates during this period were reported among 15- to 19-year-olds rather than 5- to 9-year-olds. Children <10 years of age accounted for only 24% of cases, while persons ≥15 years of age made up 62% of cases. Incidence rates were more than tenfold higher for 15- to 19-year-olds than for those ≥20. More recently (1984-1986), nationally reported incidence rates have declined by 95% or more for all age groups, with the greatest decreases occurring among persons <20 years of age. Persons ≥15 years of age, who accounted for the

TABLE 1. Age distribution of persons with reported rubella cases and estimated incidence rates* — United States, 1984-1986

Age Group (years)	1984			1985			1986			Rate Change (%) 1984-1986
	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	
<1	110	(16.2)	3.4	47	(8.6)	1.5	50	(10.5)	1.6	−52.9
1-4	114	(16.8)	0.9	69	(12.6)	0.6	79	(16.7)	0.6	−33.3
5-9	85	(12.5)	0.6	60	(11.0)	0.4	48	(10.1)	0.3	−50.0
10-14	44	(6.5)	0.3	23	(4.2)	0.2	21	(4.4)	0.1	−66.7
15-19	65	(9.6)	0.4	34	(6.2)	0.2	44	(9.3)	0.3	−25.0
20-24	115	(16.9)	0.6	69	(12.6)	0.4	80	(16.9)	0.5	−16.7
25-29	70	(10.3)	0.4	96	(17.6)	0.5	72	(15.2)	0.4	0.0
≥30	76	(11.2)	0.1	148	(27.1)	0.1	80	(16.9)	0.1	0.0
Total, known age	679	(90.3)	—	546	(86.7)	—	474	(86.0)	—	—
Total, unknown age	73	(9.7)	—	84	(13.3)	—	77	(14.0)	—	—
Total cases reported	**752**	**(100.0)**	**0.32**	**630**	**(100.0)**	**0.26**	**551**	**(100.0)**	**0.23**	**−33.3**

*Cases per 100,000 population (projected census data) derived from extrapolating the age distribution of patients with known age to total cases.

Rubella — Continued

majority (56%) of cases, had experienced a >95% reduction in their risk of acquiring rubella, relative to prevaccine years. Differences in attack rates between 15- to 19-year-olds and those >20 years of age were no longer observed.

Congenital Rubella Syndrome

Data on cases of congenital rubella syndrome (CRS) are available from reports submitted weekly to the *MMWR* Morbidity Surveillance System and from the National Congenital Rubella Syndrome Register (NCRSR) maintained by the Division of Immunization, Center for Prevention Services, CDC. The *MMWR* CRS reports are case counts with no accompanying data and are tabulated by year of report. The NCRSR contains clinical and laboratory information on cases of CRS that are reported by state and local health departments. The NCRSR cases are monitored by year of birth and are classified into six clinical categories, as follows:

1. CRS CONFIRMED—Defects present and one or more of the following:
   A. Rubella virus isolated.
   B. Rubella-specific immunoglobulin G (IgG) present.

(Continued on page 671)

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

Disease	40th Week Ending			Cumulative, 40th Week Ending		
	Oct. 10, 1987	Oct. 4, 1986	Median 1982-1986	Oct. 10, 1987	Oct. 4, 1986	Median 1982-1986
Acquired Immunodeficiency Syndrome (AIDS)	671	352	N	14,008	9,899	N
Aseptic meningitis	271	409	409	8,691	7,857	7,440
Encephalitis: Primary (arthropod-borne & unspec)	19	35	48	973	902	952
Post-infectious	-	-	1	84	87	87
Gonorrhea: Civilian	12,288	19,058	19,021	592,851	677,186	681,409
Military	203	383	383	12,570	12,771	16,582
Hepatitis: Type A	308	526	515	18,579	17,146	17,038
Type B	368	512	512	19,451	19,797	19,637
Non A, Non B	22	63	N	2,263	2,737	N
Unspecified	55	74	127	2,422	3,405	4,393
Legionellosis	16	20	N	671	574	N
Leprosy	10	7	4	156	202	193
Malaria	12	23	19	683	866	801
Measles: Total*	15	87	20	3,372	5,563	2,349
Indigenous	12	78	N	2,966	5,266	N
Imported	3	9	N	406	291	N
Meningococcal infections: Total	24	31	38	2,229	1,971	2,146
Civilian	24	31	38	2,228	1,969	2,131
Military	-	-	-	1	2	6
Mumps	80	263	41	10,606	3,906	2,573
Pertussis	26	180	51	1,903	2,638	1,886
Rubella (German measles)	1	6	11	305	453	625
Syphilis (Primary & Secondary): Civilian	562	535	535	26,756	20,224	21,501
Military	3	1	3	130	130	241
Toxic Shock syndrome	7	5	N	252	275	N
Tuberculosis	333	509	458	16,164	16,816	16,816
Tularemia	4	2	6	160	117	202
Typhoid Fever	2	12	10	247	242	294
Typhus fever, tick-borne (RMSF)	5	18	17	539	640	738
Rabies, animal	60	105	102	3,663	4,360	4,360

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1987		Cum. 1987
Anthrax	1	Leptospirosis (Hawaii 1)	18
Botulism: Foodborne	9	Plague	9
Infant	41	Poliomyelitis, Paralytic	-
Other	-	Psittacosis (Ore. 1)	68
Brucellosis (Tex. 2)	87	Rabies, human	-
Cholera	4	Tetanus (Ark. 1)	33
Congenital rubella syndrome	5	Trichinosis	32
Congenital Syphilis, <1 year	127	Typhus fever, flea-borne (endemic, murine) (Hawaii 1)	31
Diphtheria (Hawaii 1)	3		

*There were no cases of internationally imported measles reported for this week.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending October 10, 1987 and October 4, 1986 (40th 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	14,008	271	973	84	592,851	677,186	308	368	22	55	16	156
NEW ENGLAND	569	24	36	2	18,348	16,646	9	41	-	3	1	12
Maine	16	-	2	-	540	683	1	6	-	-	-	-
N.H.	13	4	2	-	306	436	-	-	-	-	-	2
Vt.	6	6	5	-	171	200	-	-	-	-	-	-
Mass.	355	12	17	1	6,494	6,853	2	24	-	2	1	9
R.I.	46	2	3	1	1,652	1,366	2	-	-	-	-	-
Conn.	133	-	7	-	9,185	7,108	4	11	-	1	-	1
MID. ATLANTIC	4,117	71	116	7	91,356	113,329	33	61	4	8	2	18
Upstate N.Y.	476	27	42	3	13,045	13,935	16	9	2	-	1	-
N.Y. City	2,364	3	9	-	46,981	64,102	10	20	-	4	1	18
N.J.	828	-	7	-	12,591	15,077	2	9	-	2	-	-
Pa.	449	41	58	4	18,739	20,215	5	23	2	2	-	-
E.N. CENTRAL	964	52	293	12	91,046	92,774	19	39	2	2	6	7
Ohio	199	12	128	5	20,377	22,545	6	13	1	-	4	2
Ind.	81	3	43	-	7,257	9,474	1	3	-	1	-	-
Ill.	472	4	25	7	28,361	22,849	7	9	-	1	-	1
Mich.	145	33	65	-	27,596	28,228	5	14	1	-	2	3
Wis.	67	-	32	-	7,455	9,678	-	-	-	-	-	1
W.N. CENTRAL	318	21	59	-	24,216	29,004	34	9	1	-	-	-
Minn.	80	11	37	-	3,695	4,154	7	3	-	-	-	-
Iowa	21	1	10	-	2,371	2,973	-	-	-	-	-	-
Mo.	164	1	-	-	12,620	14,508	14	6	1	-	-	-
N. Dak.	1	-	-	-	215	255	-	-	-	-	-	-
S. Dak.	2	3	-	-	477	613	-	-	-	-	-	-
Nebr.	16	-	10	-	1,564	2,233	8	-	-	-	-	-
Kans.	34	5	2	-	3,274	4,268	5	-	-	-	-	-
S. ATLANTIC	2,256	51	131	28	156,048	175,755	23	83	3	4	3	5
Del.	15	8	4	1	2,637	2,878	-	-	-	-	-	-
Md.	242	4	16	5	17,864	20,766	4	8	-	-	-	2
D.C.	306	-	-	-	10,442	13,104	-	3	-	-	-	-
Va.	155	13	30	2	11,509	14,443	6	6	-	-	-	-
W. Va.	19	-	44	-	1,088	1,760	-	1	-	-	-	-
N.C.	119	7	22	-	22,410	26,909	3	9	1	-	-	-
S.C.	55	4	-	-	12,597	15,213	-	12	1	-	-	1
Ga.	321	2	1	-	27,951	29,272	-	13	-	-	2	-
Fla.	1,024	13	14	20	49,550	51,410	10	31	1	4	1	2
E.S. CENTRAL	203	13	51	7	45,066	54,515	10	16	-	2	1	-
Ky.	36	6	24	1	4,568	6,044	6	1	-	-	-	-
Tenn.	31	3	11	-	15,796	20,820	-	11	-	-	-	-
Ala.	115	4	16	1	14,388	15,772	-	1	-	-	-	-
Miss.	21	-	-	5	10,314	11,879	4	3	-	2	1	-
W.S. CENTRAL	1,378	25	122	4	68,710	79,695	48	47	4	28	3	4
Ark.	26	-	2	2	7,756	7,540	5	6	-	-	-	-
La.	167	5	20	-	12,059	14,085	3	20	2	2	-	-
Okla.	72	-	20	1	7,424	9,159	6	-	-	1	1	-
Tex.	1,113	20	80	1	41,471	48,911	34	21	2	25	2	4
MOUNTAIN	378	7	38	4	15,838	20,003	95	54	7	7	-	2
Mont.	2	-	1	-	442	551	3	1	-	-	-	-
Idaho	5	1	-	-	565	664	4	1	-	-	-	1
Wyo.	3	-	1	-	336	432	-	-	-	-	-	-
Colo.	169	4	11	-	3,553	5,144	5	5	1	4	-	-
N. Mex.	27	-	5	-	1,722	2,155	10	4	-	-	-	-
Ariz.	115	-	15	1	5,393	6,504	53	26	6	2	-	-
Utah	21	2	1	3	484	848	16	3	-	1	-	-
Nev.	36	-	4	-	3,343	3,705	4	14	-	-	-	1
PACIFIC	3,825	7	127	20	82,223	95,465	37	18	1	1	-	108
Wash.	170	-	10	4	6,463	7,086	8	3	1	-	-	5
Oreg.	111	-	-	-	3,136	4,065	24	7	-	-	-	-
Calif.	3,470	-	112	16	70,648	81,241	-	-	-	-	-	81
Alaska	12	2	2	-	1,319	2,072	4	1	-	-	-	1
Hawaii	62	5	3	-	657	1,001	1	7	-	1	-	21
Guam	-	-	-	-	156	151	-	-	-	-	-	-
P.R.	84	-	1	1	1,568	1,856	1	5	1	3	-	5
V.I.	-	-	-	-	213	216	-	-	-	-	-	-
Pac. Trust Terr.	-	-	-	-	313	378	-	-	-	-	-	45
Amer. Samoa	-	-	-	-	66	39	-	-	-	-	-	-

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending October 10, 1987 and October 4, 1986 (40th 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	683	12	2,966	3	406	5,563	2,229	80	10,606	26	1,903	2,638	1	305	453
NEW ENGLAND	47	-	114	-	156	96	189	2	45	3	128	132	-	1	9
Maine	2	-	3	-	-	13	10	-	-	-	26	2	-	1	-
N.H.	2	-	61	-	102	43	18	-	9	2	29	68	-	-	1
Vt.	-	-	11	-	15	-	15	2	5	-	4	3	-	-	1
Mass.	18	-	22	-	32	35	93	-	13	-	42	29	-	-	4
R.I.	7	-	1	-	1	2	14	-	2	1	2	6	-	-	2
Conn.	18	-	16	-	6	3	39	-	16	-	25	24	-	-	1
MID. ATLANTIC	83	-	520	-	57	1,705	283	13	206	6	224	170	-	11	32
Upstate N.Y.	31	-	26	-	14	100	100	5	92	4	128	107	-	9	24
N.Y. City	7	-	441	-	19	672	22	-	10	-	8	10	-	1	5
N.J.	22	-	32	-	7	909	51	3	55	-	13	17	-	1	3
Pa.	23	-	21	-	17	24	110	5	49	2	75	36	-	-	-
E.N. CENTRAL	45	8	311	-	25	1,059	332	18	6,055	1	193	342	-	36	74
Ohio	12	-	1	-	4	10	112	-	84	-	55	145	-	-	1
Ind.	4	-	-	-	-	30	36	-	922	1	16	26	-	-	-
Ill.	7	8	144	-	18	669	78	7	2,504	-	14	37	-	25	64
Mich.	17	-	29	-	-	59	85	11	914	-	45	32	-	9	8
Wis.	5	-	137	-	3	286	21	-	1,631	-	63	102	-	2	1
W.N. CENTRAL	22	-	208	-	22	339	92	6	1,351	-	119	391	-	1	13
Minn.	8	-	19	-	20	49	27	-	774	-	13	44	-	-	1
Iowa	5	-	-	-	-	134	3	5	405	-	48	19	-	1	1
Mo.	5	-	188	-	1	31	26	-	25	-	30	18	-	-	1
N. Dak.	-	-	1	-	-	25	1	-	6	-	11	5	-	-	1
S. Dak.	-	-	-	-	-	-	2	-	90	-	3	14	-	-	-
Nebr.	3	-	-	-	-	1	5	1	4	-	1	7	-	-	-
Kans.	1	-	-	-	1	99	28	-	47	-	13	284	-	-	9
S. ATLANTIC	115	-	129	-	12	709	361	5	246	3	282	701	1	16	6
Del.	1	-	32	-	-	1	5	-	-	-	5	227	-	2	-
Md.	26	-	5	-	2	35	35	-	25	1	16	159	-	2	-
D.C.	15	-	-	-	1	2	7	-	1	-	-	-	-	1	-
Va.	23	-	1	-	-	60	59	-	70	-	48	35	-	1	-
W. Va.	2	-	-	-	-	2	2	1	34	1	47	23	-	-	-
N.C.	10	-	2	-	3	4	46	-	17	1	114	66	-	1	-
S.C.	5	-	2	-	-	301	35	1	14	-	-	18	-	-	-
Ga.	4	-	-	-	1	93	72	-	40	-	23	122	-	1	-
Fla.	29	-	87	-	5	211	100	3	45	-	29	51	1	8	6
E.S. CENTRAL	12	-	3	-	3	67	113	4	1,237	3	39	47	-	3	4
Ky.	1	-	-	-	-	6	20	-	214	-	1	5	-	2	4
Tenn.	1	-	-	-	-	56	47	4	963	2	11	18	-	1	-
Ala.	5	-	1	-	3	2	38	-	60	1	21	23	-	-	-
Miss.	5	-	2	-	-	3	8	N	N	-	6	1	-	-	-
W.S. CENTRAL	48	-	405	-	4	647	160	27	911	7	241	216	-	11	63
Ark.	1	-	-	-	-	283	20	-	281	-	12	15	-	2	-
La.	1	-	-	-	-	4	21	22	386	1	45	13	-	-	-
Okla.	4	-	2	-	1	39	19	N	N	6	133	105	-	5	-
Tex.	42	-	403	-	3	321	100	5	243	-	51	83	-	4	63
MOUNTAIN	31	-	481	-	19	329	73	5	206	-	157	234	-	24	23
Mont.	-	-	127	-	1	8	4	-	6	-	6	13	-	8	2
Idaho	2	-	-	-	-	1	5	-	5	-	42	40	-	1	-
Wyo.	1	-	-	-	2	-	-	-	-	-	5	4	-	1	1
Colo.	7	-	5	-	4	10	22	-	28	-	55	62	-	-	-
N. Mex.	3	-	313	-	9	38	5	N	N	-	11	20	-	4	2
Ariz.	14	-	34	-	1	258	24	4	153	-	30	56	-	10	14
Utah	1	-	-	-	1	12	9	1	10	-	8	35	-	-	3
Nev.	3	-	2	-	1	2	4	-	4	-	-	4	-	202	229
PACIFIC	280	4	795	3	108	612	626	-	349	3	520	405	-	2	15
Wash.	19	-	34	-	7	163	70	-	46	2	77	137	-	2	1
Oreg.	5	4	7	3§	80	12	26	N	N	1	60	12	-	127	208
Calif.	252	-	754	-	17	409	516	-	281	-	178	241	-	2	-
Alaska	3	-	-	-	-	-	5	-	7	-	10	2	-	69	5
Hawaii	1	-	-	-	4	28	9	-	15	-	195	13	-	1	3
Guam	-	-	2	-	-	5	4	-	5	-	-	-	-	3	60
P.R.	1	18	755	-	-	36	5	-	11	-	16	13	1	1	-
V.I.	-	-	-	-	-	-	-	-	12	-	-	-	1	1	2
Pac. Trust Terr.	-	-	1	-	-	-	1	-	5	-	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 October 10, 1987 and October 4, 1986 (40th 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	26,756	20,224	7	16,164	16,816	160	247	539	3,663
NEW ENGLAND	468	357	1	496	550	1	26	7	7
Maine	1	15	-	22	34	-	1	-	3
N.H.	3	10	-	17	25	-	-	-	-
Vt.	2	8	-	10	15	-	1	-	-
Mass.	218	197	-	275	298	1	14	4	-
R.I.	9	18	1	45	40	-	3	-	1
Conn.	235	109	-	127	138	-	7	3	3
MID. ATLANTIC	5,044	2,890	-	2,857	3,381	-	28	17	317
Upstate N.Y.	181	148	-	383	476	-	8	7	52
N.Y. City	3,735	1,630	-	1,371	1,774	-	2	5	-
N.J.	522	506	-	527	581	-	18	1	13
Pa.	606	606	-	576	550	-	-	4	252
E.N. CENTRAL	737	712	3	1,861	2,009	3	28	48	140
Ohio	84	101	2	338	354	1	8	33	14
Ind.	50	87	-	181	227	-	4	-	17
Ill.	393	351	-	820	853	-	8	7	40
Mich.	157	139	1	437	479	-	5	5	26
Wis.	53	34	-	85	96	2	3	3	43
W.N. CENTRAL	149	167	-	462	511	57	9	52	790
Minn.	14	28	-	93	119	-	4	-	188
Iowa	25	6	-	32	41	4	2	1	223
Mo.	70	88	-	255	252	35	3	18	51
N. Dak.	-	6	-	6	9	1	-	-	92
S. Dak.	10	6	-	23	23	9	-	1	184
Nebr.	10	12	-	18	12	2	-	3	16
Kans.	20	21	-	35	55	6	-	29	36
S. ATLANTIC	9,198	6,134	1	3,502	3,254	5	26	203	1,034
Del.	61	48	-	34	36	1	-	2	-
Md.	488	357	-	311	237	-	3	44	348
D.C.	281	244	-	128	113	-	2	-	39
Va.	233	281	-	354	271	2	6	17	294
W. Va.	10	18	-	82	97	-	1	7	51
N.C.	532	394	1	385	440	2	2	72	8
S.C.	578	534	-	361	424	-	-	33	46
Ga.	1,300	1,159	-	611	530	-	-	26	166
Fla.	5,715	3,099	-	1,236	1,106	-	12	2	82
E.S. CENTRAL	1,476	1,386	-	1,406	1,496	7	3	89	241
Ky.	14	60	-	334	336	2	2	9	117
Tenn.	572	476	-	383	444	1	1	56	57
Ala.	384	423	-	424	469	1	-	15	67
Miss.	506	427	-	265	247	3	-	9	-
W.S. CENTRAL	3,350	4,027	2	1,908	2,112	61	19	109	499
Ark.	204	188	-	231	290	29	2	12	106
La.	624	681	-	211	346	3	-	-	12
Okla.	121	103	-	179	198	26	4	84	29
Tex.	2,401	3,055	2	1,287	1,278	3	13	13	352
MOUNTAIN	538	470	-	389	400	15	13	12	308
Mont.	9	6	-	11	21	2	-	10	137
Idaho	5	11	-	17	19	1	-	-	8
Wyo.	2	2	-	-	-	-	-	1	66
Colo.	91	106	-	40	45	4	-	-	7
N. Mex.	48	54	-	73	77	1	9	-	3
Ariz.	250	195	-	207	185	3	3	-	67
Utah	22	15	-	18	28	2	-	1	7
Nev.	111	81	-	23	25	2	1	-	13
PACIFIC	5,796	4,081	-	3,283	3,103	11	95	2	327
Wash.	77	126	-	195	158	4	7	-	-
Oreg.	223	88	-	92	104	4	1	-	-
Calif.	5,482	3,842	-	2,789	2,665	2	81	2	324
Alaska	3	-	-	56	41	1	-	-	3
Hawaii	11	25	-	151	135	-	6	-	-
Guam	2	1	-	26	34	-	-	-	-
P.R.	705	699	-	222	271	-	-	-	53
V.I.	7	1	-	2	1	-	-	-	-
Pac. Trust Terr.	185	211	-	134	58	-	19	-	-
Amer. Samoa	2	-	-	-	5	-	1	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending October 10, 1987 (40th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	633	443	100	51	17	22	48
Boston, Mass.	178	110	28	26	5	9	17
Bridgeport, Conn.	35	24	8	1	-	2	3
Cambridge, Mass.	21	17	3	-	1	-	1
Fall River, Mass.	22	20	1	-	-	1	-
Hartford, Conn.	56	36	13	3	2	2	5
Lowell, Mass.	19	13	4	1	1	-	2
Lynn, Mass.	21	14	5	2	-	-	-
New Bedford, Mass.	30	24	4	2	-	-	1
New Haven, Conn.	37	26	6	4	-	1	1
Providence, R.I.	42	28	6	4	3	1	2
Somerville, Mass.	7	3	2	1	-	1	-
Springfield, Mass.	57	43	8	2	2	2	7
Waterbury, Conn.	40	33	4	1	2	-	6
Worcester, Mass.	68	52	8	4	1	3	3
MID. ATLANTIC	2,830	1,862	563	282	63	60	114
Albany, N.Y.	59	46	9	4	-	-	4
Allentown, Pa.	15	12	3	-	-	-	-
Buffalo, N.Y.	108	76	20	6	3	3	6
Camden, N.J.	42	21	11	5	2	3	1
Elizabeth, N.J.	18	12	2	4	-	-	-
Erie, Pa.†	39	31	5	3	-	-	5
Jersey City, N.J.	58	39	8	7	3	1	3
N.Y. City, N.Y.	1,431	907	290	170	35	29	52
Newark, N.J.	71	33	18	15	4	1	1
Paterson, N.J.	35	24	7	1	3	-	1
Philadelphia, Pa.	491	323	110	34	9	15	16
Pittsburgh, Pa.†	41	25	13	1	-	2	1
Reading, Pa.	34	24	6	3	1	-	3
Rochester, N.Y.	124	100	13	7	1	3	9
Schenectady, N.Y.	33	26	6	1	-	-	1
Scranton, Pa.†	30	25	4	1	-	-	1
Syracuse, N.Y.	103	67	22	11	1	2	4
Trenton, N.J.	45	31	7	6	1	-	3
Utica, N.Y.	21	13	7	1	-	-	-
Yonkers, N.Y.	32	27	2	2	-	1	3
E.N. CENTRAL	2,325	1,542	464	170	71	78	79
Akron, Ohio	55	33	12	3	4	3	-
Canton, Ohio	41	29	8	3	1	-	1
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	150	97	33	10	5	5	12
Cleveland, Ohio	144	97	20	15	4	8	1
Columbus, Ohio	128	74	34	9	5	6	-
Dayton, Ohio	105	64	28	9	1	3	3
Detroit, Mich.	261	142	51	35	17	16	4
Evansville, Ind.	62	48	11	3	-	-	4
Fort Wayne, Ind.	38	24	9	2	2	1	1
Gary, Ind.§	12	9	3	-	-	-	-
Grand Rapids, Mich.	75	53	14	2	4	2	5
Indianapolis, Ind.	178	111	47	8	7	5	1
Madison, Wis.§	37	26	7	2	2	-	3
Milwaukee, Wis.	149	119	20	3	3	4	-
Peoria, Ill.	50	42	7	1	-	-	9
Rockford, Ill.	44	35	6	1	2	-	7
South Bend, Ind.	57	45	6	5	1	-	5
Toledo, Ohio	85	65	11	6	2	1	5
Youngstown, Ohio	90	67	12	8	1	2	2
W.N. CENTRAL	833	574	167	37	26	29	57
Des Moines, Iowa	57	40	8	5	-	4	4
Duluth, Minn.	23	17	4	1	-	1	1
Kansas City, Kans.	37	22	5	3	2	5	4
Kansas City, Mo.	107	75	21	6	4	1	14
Lincoln, Nebr.	22	18	2	-	2	-	1
Minneapolis, Minn.	204	153	40	7	2	2	14
Omaha, Nebr.	96	63	17	6	6	4	5
St. Louis, Mo.	143	89	38	5	4	7	4
St. Paul, Minn.	88	65	17	-	3	3	5
Wichita, Kans.	56	32	15	4	3	2	5
S. ATLANTIC	1,083	681	222	98	38	43	53
Atlanta, Ga.	154	92	31	21	4	6	5
Baltimore, Md.	135	83	29	11	7	5	8
Charlotte, N.C.	80	59	12	3	4	2	6
Jacksonville, Fla.	117	81	23	5	3	5	6
Miami, Fla.	89	42	25	7	4	11	1
Norfolk, Va.	49	33	8	3	2	3	3
Richmond, Va.	84	50	23	8	1	2	6
Savannah, Ga.	42	31	9	1	-	1	4
St. Petersburg, Fla.	73	50	16	5	2	-	4
Tampa, Fla.	58	41	11	5	-	-	6
Washington, D.C.	182	101	34	28	11	8	3
Wilmington, Del.	20	18	1	1	-	-	1
E.S. CENTRAL	706	464	141	56	21	24	39
Birmingham, Ala.	121	75	23	8	7	8	1
Chattanooga, Tenn.	59	43	14	2	-	-	6
Knoxville, Tenn.	75	51	15	5	1	3	4
Louisville, Ky.	111	72	22	7	3	7	6
Memphis, Tenn.	161	101	34	19	4	3	12
Mobile, Ala.	56	40	8	7	1	-	3
Montgomery, Ala.	51	39	9	2	-	1	4
Nashville, Tenn.	72	43	16	6	5	2	3
W.S. CENTRAL	1,218	725	285	115	35	58	60
Austin, Tex.	60	39	7	9	3	2	6
Baton Rouge, La.	32	25	4	1	-	2	2
Corpus Christi, Tex.	36	23	13	-	-	-	1
Dallas, Tex.	178	105	48	16	3	6	7
El Paso, Tex.	67	43	17	2	2	3	9
Fort Worth, Tex.	85	54	16	7	3	5	4
Houston, Tex.§	308	176	74	34	13	11	7
Little Rock, Ark.	71	45	14	4	4	4	5
New Orleans, La.	113	62	27	10	-	14	-
San Antonio, Tex.	159	93	38	19	5	4	13
Shreveport, La.	39	21	11	6	1	-	3
Tulsa, Okla.	70	39	16	7	1	7	3
MOUNTAIN	655	409	148	57	28	12	27
Albuquerque, N. Mex.	107	65	17	15	9	-	2
Colo. Springs, Colo.	40	24	12	1	2	1	7
Denver, Colo.	107	65	30	8	2	2	7
Las Vegas, Nev.	96	59	24	6	6	1	2
Ogden, Utah	14	11	2	-	-	1	2
Phoenix, Ariz.	109	69	21	13	1	5	4
Pueblo, Colo.	29	21	6	1	1	-	1
Salt Lake City, Utah	41	28	5	3	4	1	-
Tucson, Ariz.	112	67	31	10	3	1	2
PACIFIC	1,924	1,248	386	178	50	55	107
Berkeley, Calif.	20	13	5	1	-	1	2
Fresno, Calif.	86	58	13	9	1	5	8
Glendale, Calif.	28	21	5	1	1	-	1
Honolulu, Hawaii	66	34	22	5	1	4	10
Long Beach, Calif.	57	35	14	3	3	2	1
Los Angeles Calif.	571	371	115	53	16	10	17
Oakland, Calif.	112	73	22	9	6	2	5
Pasadena, Calif.	23	16	4	2	-	1	-
Portland, Oreg.	130	85	20	16	3	6	3
Sacramento, Calif.	130	83	30	12	3	1	10
San Diego, Calif.	152	99	32	12	5	4	9
San Francisco, Calif.	162	101	31	24	2	4	7
San Jose, Calif.	170	115	35	12	4	4	22
Seattle, Wash.	128	85	21	12	3	7	3
Spokane, Wash.	51	32	12	3	2	2	6
Tacoma, Wash.	38	27	5	4	-	2	3
TOTAL	12,207††	7,948	2,476	1,044	349	381	584

*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.

Rubella – Continued

C. Infant's rubella IgG antibody titer persists above and beyond that expected from passive transfer of maternal antibody (i.e., infant's rubella IgG titer does not fall off at the expected rate of one twofold dilution/month).

2. CRS COMPATIBLE – Laboratory data insufficient for confirmation and any two complications listed in A or one from A and one from B:
   A. Cataracts and congenital glaucoma (either or both count as one), congenital heart disease, loss of hearing, pigmentary retinopathy.
   B. Purpura, splenomegaly, jaundice, microcephaly, mental retardation, meningoencephalitis, radiolucent bone disease.
3. CRS POSSIBLE – Some compatible clinical findings that do not fulfill the criteria for a compatible case.
4. CONGENITAL RUBELLA INFECTION ONLY – No defects present but laboratory evidence of infection.
5. STILLBIRTHS – Stillbirths that are thought to be secondary to maternal rubella infection.
6. NOT CRS – One or more of any of the following inconsistent laboratory findings for a child without evidence of an immunodeficiency disease:
   A. Rubella antibody titer absent in a child ≤24 months.
   B. Rubella antibody titer absent in mother.
   C. Rubella antibody titer decline in an infant consistent with the normal decline of passively transferred maternal antibody after birth. (The expected rate of decline of maternal antibodies is one twofold dilution/month.)

Infants are diagnosed as having confirmed cases when both defects and laboratory evidence of rubella infection are present. Cases that satisfy only selected clinical criteria in the absence of laboratory confirmation are designated as compatible. Since the NCRSR cases are classified by year of birth, data are considered provisional for any given year and are subject to updating because of delayed reporting. This summary updates previous reports on surveillance of CRS in the United States.

Recent declines in rates of CRS recorded by NCRSR have paralleled the decline in overall rubella incidence and, more specifically, the incidence for persons ≥15 years

TABLE 2. Age distribution of persons with reported rubella cases and estimated incidence rates* – Illinois, Massachusetts, and New York City, 1966-1968,† 1975-1977,† and United States, 1984-1986†

Age Group (years)	1966-1968§			1975-1977§			Total U.S. 1984-1986¶			Rate Change (%) 1966-1986
	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	
<5	1,294	(21.6)	63.3	160	(9.8)	9.8	156	(27.6)	0.9	−98.6
5-9	2,304	(38.5)	101.3	233	(14.2)	11.6	64	(11.3)	0.4	−99.6
10-14	1,020	(17.1)	44.0	229	(13.9)	11.2	29	(5.1)	0.2	−99.6
15-19	759	(12.7)	35.7	634	(38.7)	27.4	48	(8.5)	0.3	−99.3
≥20	601	(10.2)	3.7	384	(23.4)	2.3	269	(47.5)	0.2	−95.7
Total	**5,978**	**(100.0)**	**24.3**	**1,640**	**(100.0)**	**6.7**	**566**	**(100.0)**	**0.2**	**−99.0**

*Reported number of cases per 100,000 population. Patients of unknown age excluded.
†Average annual figures over 3-year period. 1966-1968 represents prevaccine years.
§National age-specific data were not available prior to 1975 and were not consistently reported (i.e., more than 75% of cases) until 1980.
¶Total U.S. data (1985 population projections) are used for the period 1984-1986. Because the overall number of reported rubella cases is currently small, fluctuations introduced by epidemics in New York City in 1984 (*1*)and 1985 (*2*) would have skewed the data for this period.

Rubella – Continued

of age (Figure 1). During 1979-1986, the reported rate of rubella among persons in this age group declined 96%, from 4.8 to 0.2 cases/100,000 population. Similarly, reported data showed that 57 confirmed and compatible cases of CRS occurred in 1979 and that only two such cases occurred in 1985 (a 96% decline)* (Table 3).

Twelve cases of CRS were reported in 1986, reversing a consistent downward trend since 1982. Eight cases were reported to the New York City (NYC) Department of Health 8-10 months after the peak of a rubella outbreak in NYC (*2*). As of September 1987, NCRSR has received reports of two cases of CRS among children born in 1987.

Reported by: Surveillance, Investigations, and Research Br, Div of Immunization, Center for Prevention Svcs, CDC.

Editorial Note: The primary goal of rubella vaccination programs is to prevent congenital rubella infection (CRI), which can result in miscarriages, abortions, stillbirths, and congenital rubella syndrome (CRS) in infants. When rubella vaccine was licensed in 1969, the United States adopted a policy of universal immunization of children. The focus of this rubella vaccination strategy was to control rubella in preschool- and young school-aged children, who are the primary sources of rubella transmission. This strategy was designed to reduce and even to interrupt circulation of the virus, thereby reducing the risk of exposure for susceptible pregnant women. Vaccinated children would be protected immediately, and immunity was expected to persist through their childbearing years (*3*). Accordingly, children of both sexes were the primary target group for vaccination.

Secondary emphasis was placed on vaccinating susceptible adolescents and adults, especially women. By 1977, vaccination of children ≥12 months of age had resulted in marked declines in reported rubella incidence in children and had interrupted the characteristic 6- to 9-year rubella epidemic cycle. However, this

*Cases reported to the *MMWR* have been reclassified by date of birth rather than date of report and stratified into confirmed and compatible cases. Annual totals may change as a result of delayed diagnoses and reporting.

TABLE 3. Annual totals and incidence rates of congenital rubella syndrome (CRS) reported to the National Congenital Rubella Syndrome Registry (NCRSR)* – United States, 1969-1986

Year	NCRSR Cases†	Incidence Rate§	Year	NCRSR Cases†	Incidence Rate§
1969	62	1.72	1978	30	0.90
1970	67	1.80	1979	57	1.63
1971	44	1.24	1980	14	0.39
1972	32	0.98	1981	10	0.28
1973	30	0.96	1982	12	0.33
1974	22	0.70	1983	7	0.19
1975	32	1.02	1984	2	0.05
1976	22	0.69	1985	2	0.05
1977	29	0.87	1986	12	0.32

*Confirmed and compatible cases only, reported by year of birth. Data are provisional because of delayed reporting.
†The following imported cases are excluded: 1984 (1), 1985 (1), 1986 (2).
§Cases per 100,000 live births per year.

Rubella – Continued

strategy had a minimal effect on rubella incidence in persons ≥15 years (Figure 1). Moreover, after some initial decreases, reported incidence rates of CRS stabilized (Figure 1, Table 3). Serologic surveys of various postpubertal populations carried out during the 1970s and early 1980s found rates of rubella susceptibility comparable to those of the prevaccine years: 10% to 20% of persons surveyed lacked serologic evidence of immunity to rubella (*4*).

Beginning in 1977, intensified efforts were initiated to vaccinate all children and susceptible postpubertal females. The number of doses of rubella vaccine distributed in the public sector to persons ≥15 years of age more than doubled between 1978 and 1986 (CDC, unpublished data). Among persons ≥20 years of age, there was a greater than 15-fold increase. In spite of the greater use of vaccine in this age group, only a small proportion of the susceptible groups have been vaccinated.

The success of the rubella control program is apparent. In the period 1979-1985, the reported incidence rates of CRS and of rubella among persons ≥15 years of age declined by approximately 96%, to all-time low levels. Because reported rubella cases are currently few in number, small year-to-year changes should be interpreted with caution. Incidence rates of rubella in children <15 years of age have, however, continued their downward trend. As the highly immune cohorts of young children enter the childbearing years, CRS can be expected to continue to decrease in this country.

Despite the success of the U.S. rubella immunization program, there is still cause for continuing concern. In 1986, 58% of reported rubella cases occurred among persons ≥15 years of age (41% of all cases occurred in the 15- to 29-year age group). Furthermore, with one exception, there is little evidence from serologic studies to show that rates of susceptibility to rubella among adults have declined appreciably since prevaccine years (*4-6*).

The New York City experience during 1985-1986 demonstrated that urban areas may be at highest risk because both identification and immunization of susceptible young adults are particularly difficult in such settings. The continued occurrence of rubella in childbearing-aged populations means that potentially preventable cases of CRS will continue to occur during the next 10 to 30 years. Such concerns led CDC to announce an initiative in February 1985 to hasten elimination of rubella and CRS by targeting susceptible childbearing-aged populations for vaccination (*7*).

The reported figure for CRS cases is believed to underestimate the actual total. CDC estimates of CRS incidence rates are derived primarily from the NCRSR reporting system, which is a passive system. Passive surveillance, by its nature, results in underreporting of actual disease incidence and in selective reporting of severe and obvious CRS (e.g., cardiac or eye defects) recognized early in life. Mild CRS cases (e.g., mental or auditory defects) are often reported later, if at all. Infants with CRI and no obvious anomalies at birth are also likely to be underreported: 18 such infants have been reported to NCRSR since 1969 (*8*). These congenitally infected but apparently normal infants are also important because they reflect the failure to identify and to vaccinate susceptible women of childbearing age. Current CRS surveillance also does not measure other outcomes of CRI, such as miscarriages, induced abortions, or stillbirths. Because of the limitations of current CRS surveillance, it is important that all specialists who treat children with congenital anomalies continue to consider CRS in the differential diagnosis and report all suspected cases

Rubella – Continued

to their state health departments. More intensified CRS surveillance will be necessary to monitor further reductions in morbidity.

As with other adult immunizations, creative approaches are necessary to enhance rubella immunization levels in the childbearing-aged population. At present, 10 states still do not require proof of rubella immunity for postpubertal elementary and secondary school students. Since many susceptible persons are no longer in school, school laws alone are insufficient to ensure immunity. Only nine states and the District of Columbia require proof of immunity for college entry. Requiring proof of immunity to rubella as a condition for college entry can minimize the risk of rubella outbreaks in this population (*9*).

One way to reach susceptible postpubertal women is to offer rubella vaccine at any encounter with the health-care system. This approach should include postpartum and postabortion vaccination and follow-up vaccination of susceptible individuals identified through pre-employment, premarital, or prenatal screening. The family planning clinic setting is an ideal place to offer vaccine and may represent one of the few contacts that hard-to-reach individuals have with the health-care delivery system. An analysis of CRS surveillance indicates that one-third to one-half of mothers delivering CRS infants had had a previous live birth (*10*). Postpartum vaccination would have prevented more than half of the CRS cases that occurred in NYC during 1986 (*2*). These data suggest that both postpartum vaccination and use of rubella vaccine in family planning clinics could have an important impact on the overall occurrence of reported CRS.

Because younger mothers of CRS infants (those 15 to 19 years of age) are less likely to have had a previous pregnancy, susceptible persons need to be identified and immunized in any of a variety of settings: in school, at the workplace, or within the health-care system (*10*). School-based immunization programs remain a potentially effective means of vaccinating younger susceptible women. Physicians and other health-care personnel should offer rubella vaccine whenever they encounter a potentially susceptible woman lacking contraindications for vaccination.

Following a university-based rubella outbreak in 1985, investigators developed a method for quantitating missed opportunities for rubella vaccination (*11*). A missed opportunity was defined as a situation in which either recommendations of the Immunization Practices Advisory Committee or state legislation called for rubella vaccination of an individual, but it did not occur. The investigators identified missed opportunities for rubella vaccination at the time of primary or secondary school entry, during the postpartum period, at college matriculation, and prior to employment in a health-care setting. Analysis of missed opportunities identifies specific gaps in current rubella vaccination strategies that allow susceptible persons to remain at risk for disease. Such analysis can be applied to outbreak cases, sporadically occurring cases, and even to groups of susceptible adults without rubella illness. Immunization programs faced with limited resources can use the findings from such analysis to focus on gaps in implementation that are contributing the most to the problem.

Shortly after rubella vaccine licensure, concern about the vaccine's teratogenic potential hindered vaccination of childbearing-aged women. While no CRS-like defects have been detected in 267 infants born to susceptible mothers vaccinated during pregnancy (*12*), pregnancy remains a contraindication to rubella vaccination. However, routine pregnancy testing prior to vaccination is not recommended. After

Rubella — Continued

asking susceptible female patients if they are pregnant, practitioners should have no hesitation about giving nonpregnant women rubella vaccine.

Concerns about rubella vaccine-associated joint reactions have also impeded vaccination of susceptible adults. Whereas mild, transient arthritis/arthralgia following vaccination is common, persistent or chronic arthritis/arthropathy is rare. The small risk of chronic joint symptoms should not interfere with the current strategy of vaccinating susceptible women (*13,14*). Studies of large numbers of vaccinees have found that vaccination of already immune persons (from either natural disease or vaccination) does not induce joint reactions (*15,16*).

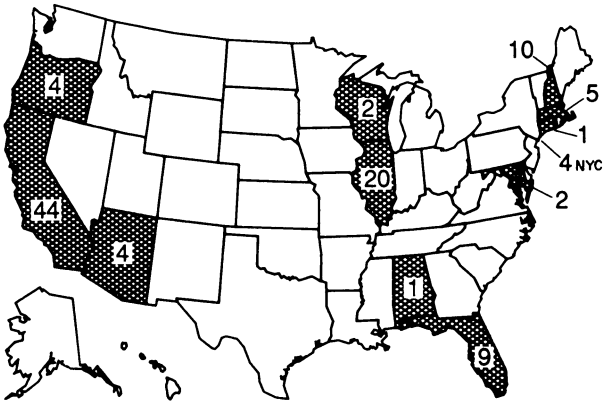
Rubella control efforts in the United States have been very successful. Elimination of rubella and CRI is a more difficult task but appears feasible with intensification of efforts.

References

1. CDC. Rubella outbreak among office workers—New York City. MMWR 1985;34:455-9.
2. CDC. Rubella and congenital rubella syndrome—New York City. MMWR 1986;35:770-4,779.
3. Orenstein WA, Bart KJ, Hinman AR, et al. The opportunity and obligation to eliminate rubella from the United States. JAMA 1984;251:1988-94.
4. Bart KJ, Orenstein WA, Preblud SR, Hinman AR. Universal immunization to interrupt rubella. Rev Infect Dis 1985;7(suppl 1):S177-84.
5. Witte JJ, Karchmer AW, Case G, et al. Epidemiology of rubella. Am J Dis Child 1969; 118:107-11.
6. Crowder M, Higgins HL Jr, Frost JJ. Rubella susceptibility in young women of rural East Texas: 1980 and 1985. Tex Med 1987;83:43-7.
7. CDC. Elimination of rubella and congenital rubella syndrome—United States. MMWR 1985;34:65-6.
8. CDC. Rubella and congenital rubella—United States, 1983. MMWR 1984;33:237-42,247.
9. CDC. Immunization practices in colleges—United States. MMWR 1987;36:209-12.
10. Preblud SR, Williams NM, Orenstein WA, Bart KJ, Hinman AR. Elimination of congenital rubella infection from the United States [Abstract]. Program and abstracts of the 113th meeting of the American Public Health Association, Washington, DC, November 17-21, 1985.
11. Robertson SE, Cochi SL, Bunn GA, Morse DL, Preblud SR. Preventing rubella: assessing missed opportunities for immunization. Am J Public Health 1987;77:1347-9.
12. CDC. Rubella vaccination during pregnancy—United States, 1971-1986. MMWR 1987; 36:457-61.
13. Preblud SR, Orenstein WA, Lopez C, Herrmann KL, Hinman AR. Postpartum rubella immunization [Letter]. J Infect Dis 1986;154:367-8.
14. Tingle AJ. Postpartum rubella immunization [Reply]. J Infect Dis 1986;154:368-9.
15. Lerman SJ, Nankervis GA, Heggie AD, Gold E. Immunologic response, virus excretion, and joint reactions with rubella vaccine: a study of adolescent girls and young women given live attenuated virus vaccine (HPV-77:DE-5). Ann Intern Med 1971;74:67-73.
16. Landrigan PJ, Stoffels MA, Anderson E, Witte JJ. Epidemic rubella in adolescent boys: clinical features and results of vaccination. JAMA 1974;227:1283-7.

Rubella — Continued

FIGURE I. Reported measles cases — United States, Weeks 36-39, 1987



The *Morbidity and Mortality Weekly Report* is prepared by the Centers for Disease Control, Atlanta, Georgia, and available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 783-3238.

The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333.

Director, Centers for Disease Control
James O. Mason, M.D., Dr.P.H.
Director, Epidemiology Program Office
Carl W. Tyler, Jr., M.D.

Editor
Michael B. Gregg, M.D.
Managing Editor
Gwendolyn A. Ingraham

☆U.S. Government Printing Office: 1988-530-111/60037 Region IV

**DEPARTMENT OF
HEALTH & HUMAN SERVICES**
Public Health Service
Centers for Disease Control
Atlanta, GA 30333

**FIRST-CLASS MAIL
POSTAGE & FEES PAID
PHS/CDC
Permit No. G-284**

Official Business
Penalty for Private Use $300

HHS Publication No. (CDC) 88-8017