VITAL AND HEALTH STATISTICS

Percutaneous Immediate Hypersensitivity to Eight Allergens

United States, 1976–80

This report describes the distribution of immediate cutaneous hypersensitivity reactions to eight selected unstandardized allergens for the civilian noninstitutionalized U.S. population ages 6–74 years. The rates of hypersensitivity, computed from data collected in the second National Health and Examination Survey (NHANES II) 1976–80, are presented by selected demographic and socioeconomic factors.

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Cooperation of the U.S. Bureau of the Census

Under the legislation establishing the National Health Survey, the Public Health Service is authorized to use, insofar as possible, the services or facilities of other Federal, State, or private agencies.

In accordance with specifications established by the National Center for Health Statistics, the U.S. Bureau of the Census participated in the design and selection of the sample and carried out the initial household interview stage of the data collection and certain parts of the statistical processing.

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Symbols

- - -	Data not available
. . .	Category not applicable
-	Quantity zero
0.0	Quantity more than zero but less than 0.05
Z	Quantity more than zero but less than 500 where numbers are rounded to thousands
*	Figure does not meet standard of reliability or precision
#	Figure suppressed to comply with confidentiality requirements

Percutaneous Immediate Hypersensitivity to Eight Allergens

by Peter J. Gergen, M.D., M.P.H., Division of Health Examination Statistics, National Center for Health Statistics, and Paul C. Turkeltaub, M.D., Office of Biologics Research and Review, Food and Drug Administration

Introduction

Allergic diseases are important causes of morbidity in the United States. The 1980–81 National Ambulatory Medical Care Survey reported that allergic rhinitis, asthma, and contact dermatitis or eczema were among the 15 most common diagnoses made by physicians in their patients 11–20 years of age. In addition, injections of allergenic extracts were the most common drug prescribed to those 11–14 years of age and the second most common drug prescribed to those 15–20 years of age.[1]

Estimates of the prevalence of allergic diseases have varied widely. A selection of studies that have attempted to estimate the prevalence of allergic disease is given in table A.[2–13] The majority of the estimates since 1960 fall in the 19–34-percent range.

Differences in data collection techniques prevent ready comparisons among the studies listed in table A. These differences include first, the lack of uniformity as to which diseases were included in the allergic syndrome. All of the studies included at a minimum asthma and various forms of rhinitis. Certain studies included varying numbers of other allergic diseases (such as eczema, food allergies, and urticaria) in their definitions.[2–6,8,10–11] Increasing the number of allergic diseases, however, did not necessarily yield an increase in the reported prevalence rate. Second, there was no uniformity in the definitions for the diseases (such as asthma and hayfever) that make up the allergic syndrome. And third, the ages of the subjects and geographic locations varied greatly among studies. Further studies using uniform criteria for the diagnosis

Table A. Selected studies on prevalence of allergies

Author of study	*Age group*	*Location*	*Study year*	*Size*		*Reported prevalence of allergy*
London[1]	Childhood	N.C.	1937	1,500		6.6
Crock[2]	Childhood	Tenn.	1954	1,225		14.0
Appel[3]	14 years or under	N.Y., Conn., Montreal	1961	2,169		23.7
	14 years or under	Conn.	1961	1,737		21.6
	14 years or under	N.Y.	1961	2,130		25.4
Freeman[4]	8th grade	Colo.	1964	960		25.3
	12th grade			1,275		31.0
Arbeiter[5]	5–15 years	Ind.	1967	1,842		24.1
Beck[6]	5–13 years	6 U.S. cities	1983	1,703	asthma	[7]4.4
					hay fever	[8]10.4
Hagy[9]	16–20 years	R.I.	1969	1,850		34.8
Maternowski[10]	Median 20 years	Mich.	1962	434		19.1
Van Arsdel[11]	Under 25 years	Wash.	1959	5,818		16.7
Sherry[12]	15–25 years	D.C.	1968	1,729		26.0
Smith[13]	Under 20 years	Iowa	1964	2,866		5.8
	20 years and over			3,098		11.0
Broder[14]	6–60 years and over	Mich.	1959–60	6,995	asthma	[7]4.1
					hay fever	[8]6.3

[1]See reference 2 at end of text.
[2]See reference 3 at end of text.
[3]See reference 4 at end of text.
[4]See reference 5 at end of text.
[5]See reference 6 at end of text.
[6]See reference 7 at end of text.
[7]Rate is indicative of asthma only.
[8]Rate is indicative of hay fever only.
[9]See reference 8 at end of text.
[10]See reference 9 at end of text.
[11]See reference 10 at end of text.
[12]See reference 11 at end of text.
[13]See reference 12 at end of text.
[14]See reference 13 at end of text.

of allergic disease are needed to clarify the actual prevalence rate.

The determination of whether a clinical syndrome may have an allergic etiology can be studied by the use of allergy skin tests. Introducing an allergen into the skin of an allergic individual will result in a cutaneous inflammatory reaction within 10 to 20 minutes. This immediate hypersensitivity is due to the release of inflammatory mediators from tissue mast cells and basophils that have attached to their cell surfaces IgE antibodies specifically directed against the allergen injected.[14,15] In reactive persons, the intensity of the cutaneous reaction is dependent on the dose of allergen injected.[16]

The size of the skin reaction, the dose of allergen required to produce a given skin reaction size, and the number of positive skin tests are associated with other laboratory and clinical indicators of immediate hypersensitivity. Positive skin tests are positively correlated with total serum IgE[17,18] and specific serum IgE levels.[19,20] Skin-test sensitivity is also highly correlated to basophil sensitivity[19] and tissue sensitivity (both bronchial[21,22] and nasal[23]) to the allergen.

Clinically, the skin test reaction has been demonstrated to have predictive diagnostic value. Persons with a history of an allergic syndrome occurring during allergen exposure and skin-test reactivity at low doses to that allergen are at a very high risk of experiencing a recurrence of the allergic syndrome when re-exposed to the allergen.[19,24] The degree and number of positive skin tests to a battery of allergens has been shown to be positively associated with the reported prevalence of allergic diseases (for example, hayfever, asthma, or atopic dermatitis) in the population.[25,26] Asymptomatic persons, who are skin-test positive, are at higher risk of developing an allergic syndrome (especially under the age of 40 years)[27] compared with persons who are skin-test negative.[28]

In summary, allergy skin testing is a useful method for evaluating the prevalence of immediate hypersensitivity. A clearer understanding of the prevalence of immediate hypersensitivity in the U.S. population will help advance our knowledge of allergic diseases.

Most studies of skin-test reactivity have been done on select populations who presented themselves at clinics or hospitals for evaluation of allergic symptoms. In a few studies researchers have attempted to evaluate groups living in defined geographic areas. The second National Health and Nutrition Examination Survey (NHANES II) offered the first opportunity to study skin-test reactivity in a systematic way on a national sample of the civilian noninstitutionalized population. Skin testing by the prick–puncture method was performed on all persons 6–74 years of age in NHANES II. Each participant was skin tested against eight allergens (house dust, alternaria, cat, dog, mixed giant and short ragweed, oak, perennial rye grass, and Bermuda grass), a positive control (histamine phosphate), and a negative control (50 percent glycerol saline). Positive reactions were based on a mean erythema diameter greater than or equal to 10.5 millimeters (mm) at the 20-minute reading.

This report will present the results of allergy skin testing carried out in NHANES II for the individual allergens and overall reactivity to at least one of the eight allergens by age, race, sex, income, education, and urbanization.

A variety of individuals can use the estimates in this report. Epidemiologists can compare the reactivity found in their local studies with a national sample. Researchers interested in the etiology of immediate hypersensitivity can use the results pointing out differing levels of reactivity between certain subgroups to plan studies on these subgroups to determine the reasons for these differences. And health services planners can use these results to identify the groups in which allergic conditions are likely to be the greatest problem.

Highlights

The following summary highlights the findings from prick–puncture skin testing performed on persons 6–74 years of age in NHANES II, 1976–80.

- The prevalence rate of skin-test reactivity to at least one of eight selected allergens was 20.2 percent for persons ages 6–74 years in the U.S. civilian noninstitutionalized population.
- Among the individual allergens, ragweed and rye grass had the highest individual rates of reactivity with approximately 10 percent of the population reacting to each one.
- The age-adjusted prevalence rate of skin-test reactivity to at least one of eight selected allergens in persons ages 6–74 years was higher in men (22.2 percent) than in women (18.4 percent).
- The age-adjusted prevalence rate of skin-test reactivity to at least one of eight selected allergens was higher in black persons (23.2 percent) than in white persons (19.5 percent), but this difference did not reach statistical significance.
- Peak reactivity to at least one of eight selected allergens occurred in the group 18–24 years of age. The peak reactivities were 33.3 percent for men and 25.2 percent for women. Reactivity rates were lower in the younger and older age groups.
- Ragweed allergen had higher rates of reactivity in high-pollen areas as compared with low-pollen areas (13.3 percent versus 7.2 percent).
- Skin-test reactivity was greater with higher income and education.
- Skin-test reactivity was greater in urban dwellers (22 percent) than in rural dwellers (16.5 percent).
- Skin-test reactivity was greatest in the Northeast (25.4 percent) and lowest in the South (14.2 percent).

Source and limitations of the data

NHANES II sample design and data collection

NHANES II, conducted between February 1976 and February 1980, was a probability sample (n = 27,801) selected to represent the U.S. civilian noninstitutionalized population (including Alaska and Hawaii) 6 months through 74 years of age. Certain groups of special interest were oversampled in the survey: Children 6 months through 5 years of age, adults 60–74 years of age, and persons living in low income areas.[29]

During the examination period, mobile examination centers were set up in 64 locations in the United States. The examination sites were selected from 1,924 primary sampling units (PSU's) into which the United States was divided. Each PSU is a standard metropolitan statistical area (SMSA), a county, or a group of two or three contiguous counties. The areas and persons for the survey were chosen by complex sampling techniques, in cooperation with the U.S. Bureau of the Census.

NHANES II consisted of two components. The household interview component involved the collection of socioeconomic and demographic information on the family, as well as a medical history questionnaire for each sample person. The U.S. Bureau of the Census performed the initial household interviews and aided in the scheduling of appointments for the examination component. The examination component was performed on the sample persons in mobile examination centers specially designed for this study. Examination teams were specifically trained to follow the study protocols. The requirement for standardizing the environment, equipment, materials, and methods minimized unwanted variation in the data collection resulting from changes in location, techniques, and materials over the course of the survey. The standardization also allowed the performance of the individual examiners to be evaluated.

The examination consisted of a series of tests and procedures that included

- A general medical examination and screening by a physician, including additional medical history information.
- Body measurements.
- A dietary interview.
- Selected diagnostic tests such as electrocardiograms and x rays.
- Laboratory tests on whole blood, serum, and urine specimens.

In NHANES II the total sample size was 27,801; of these sample persons, 25,286 (91.0 percent) were interviewed and 20,322 (73.1 percent) were examined. In the skin-test sample (6–74 years of age) there were 22,732 sample persons; 20,410 (89.8 percent) were interviewed and 16,204 (71.3 percent) were examined. Overall, 95.8 percent of the examined skin-test sample received 5 to 8 skin tests; 0.2 percent received 1 to 4 skin tests; and 3.9 percent received 0 skin tests. These percents remained fairly constant when examined using selected demographic variables (appendix I).

Skin testing procedures and allergenic extracts

To optimize the interpretation and replicability of the skin-test results, a number of variables must be controlled.[30,31] The following paragraphs describe the procedures used in NHANES II to optimize the interpretability and replicability of the skin-test results.

The most commonly employed methods of skin testing are the intradermal and prick–puncture tests.[32] The prick test was chosen for a variety of reasons. It is simple to perform and considered safer to use than the intradermal test in terms of potential for anaphylactic reaction because the prick–puncture method introduces only 0.01 to 0.0001 of the dose of extract used in the intradermal method.[33,34] It also has been recommended as the screening method of choice.[35]

The allergy skin test component consisted of a prick test with eight selected, commercially available, FDA-licensed allergens and two controls—positive and negative. Figure 1 shows the allergy skin test form.

The extracts used included indoor allergens (house dust, cat, dog) and outdoor allergens (alternaria, mixed giant and short ragweed, oak, perennial rye grass, Bermuda grass). The concentration of the extracts was 1:20 weight by volume (W/V) in 50 percent glycerol saline. The labeled value simply describes the weight of the starting material (such as pollen or dust) and the volume of the extracting solution used to make the final extract (that is, 1 gram of pollen in 20 milliliters (mL) of extraction fluid), and is not a measure of allergenic potency. The positive control was histamine phosphate and the negative control was 50 percent glycerol saline.

Two batteries of allergens, identical in type but differing in both method of manufacture and manufacturer, were used during the course of the survey as a result of a mixup in the purchase order at the beginning of the survey. The first

FORM HRA-12-29
(5-23-75)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS

ALLERGY TESTING

HEALTH AND NUTRITION EXAMINATION SURVEY II

Form Approved: O.M.B. No. 68-R1502

NOTICE – All information which would permit identification of the individual will be held in strict confidence, will be used only by persons engaged in and for the purposes of the survey, and will not be disclosed or released to others for any purpose.

a. Deck No. **309**

b. Examiner No. (101) ___ ___

c. Sex ☐ Male ☐ Female

NOTE – If examinee has a history of strong positive reactions to allergy tests, aspirin, or other drugs, consult doctor before giving allergy tests.

Line No.	Allergen (1)	Reading (2)	Wheal Length (mm) (3)	Wheal Width (mm) (4)	Confluent Yes (5)	Confluent No (6)	Flare Length (mm) (7)	Flare Width (mm) (8)	*Minutes (9)	**Test results (10)
1	House dust	First	(102) ___ ___	(103) ___ ___	(104) 1☐	2☐	(105) ___ ___	(106) ___ ___	(107) ___ ___	(108) ___ ___
		Second	(109) ___ ___	(110) ___ ___	(111) 1☐	2☐	(112) ___ ___	(113) ___ ___	(114) ___ ___	(115) ___ ___
2	Alternaria	First	(116) ___ ___	(117) ___ ___	(118) 1☐	2☐	(119) ___ ___	(120) ___ ___	(121) ___ ___	(122) ___ ___
		Second	(123) ___ ___	(124) ___ ___	(125) 1☐	2☐	(126) ___ ___	(127) ___ ___	(128) ___ ___	(129) ___ ___
3	Cat	First	(130) ___ ___	(131) ___ ___	(132) 1☐	2☐	(133) ___ ___	(134) ___ ___	(135) ___ ___	(136) ___ ___
		Second	(137) ___ ___	(138) ___ ___	(139) 1☐	2☐	(140) ___ ___	(141) ___ ___	(142) ___ ___	(143) ___ ___
4	Dog	First	(144) ___ ___	(145) ___ ___	(146) 1☐	2☐	(147) ___ ___	(148) ___ ___	(149) ___ ___	(150) ___ ___
		Second	(151) ___ ___	(152) ___ ___	(153) 1☐	2☐	(154) ___ ___	(155) ___ ___	(156) ___ ___	(157) ___ ___
5	Ragweed	First	(158) ___ ___	(159) ___ ___	(160) 1☐	2☐	(161) ___ ___	(162) ___ ___	(163) ___ ___	(164) ___ ___
		Second	(165) ___ ___	(166) ___ ___	(167) 1☐	2☐	(168) ___ ___	(169) ___ ___	(170) ___ ___	(171) ___ ___
6	Oak	First	(172) ___ ___	(173) ___ ___	(174) 1☐	2☐	(175) ___ ___	(176) ___ ___	(177) ___ ___	(178) ___ ___
		Second	(179) ___ ___	(180) ___ ___	(181) 1☐	2☐	(182) ___ ___	(183) ___ ___	(184) ___ ___	(185) ___ ___
7	Rye grass	First	(186) ___ ___	(187) ___ ___	(188) 1☐	2☐	(189) ___ ___	(190) ___ ___	(191) ___ ___	(192) ___ ___
		Second	(193) ___ ___	(194) ___ ___	(195) 1☐	2☐	(196) ___ ___	(197) ___ ___	(198) ___ ___	(199) ___ ___
8	Bermuda grass	First	(200) ___ ___	(201) ___ ___	(202) 1☐	2☐	(203) ___ ___	(204) ___ ___	(205) ___ ___	(206) ___ ___
		Second	(207) ___ ___	(208) ___ ___	(209) 1☐	2☐	(210) ___ ___	(211) ___ ___	(212) ___ ___	(213) ___ ___
9	Control (diluent)	First	(214) ___ ___	(215) ___ ___	(216) 1☐	2☐	(217) ___ ___	(218) ___ ___	(219) ___ ___	(220) ___ ___
		Second	(221) ___ ___	(222) ___ ___	(223) 1☐	2☐	(224) ___ ___	(225) ___ ___	(226) ___ ___	(227) ___ ___
10	Histamine	First	(228) ___ ___	(229) ___ ___	(230) 1☐	2☐	(231) ___ ___	(232) ___ ___	(233) ___ ___	(234) ___ ___
		Second	(235) ___ ___	(236) ___ ___	(237) 1☐	2☐	(238) ___ ___	(239) ___ ___	(240) ___ ___	(241) ___ ___

d. Was test satisfactory? (242) 1☐ Yes 2☐ No (Give reason) ⟶ _____

*Minutes from administration to reading record only if time differs from 10 minutes for first reading and 20 minutes for second reading.

**Test result Codes and Definitions

10 No reaction
11 Erythema between 5 and 21 mm in diameter
12 Erythema larger than 21 mm in diameter-no wheal
13 Wheal with or without surrounding erythema
14 Wheal with pseudopods and surrounding erythema
15 Test not given. Doctor's orders – cat, dog, or ragweed positive history of skin test
16 Test not given. Doctor's orders – cat, dog, or ragweed history of allergy
17 Both 15 and 16
18 Test not given – Doctor's orders (Specify) _____
19 Test not given – other reason (Specify) _____
20 Erythema between 1 and 4 mm in diameter

Sample number (100)

Figure 1. Allergy skin test form

allergens purchased were from a different manufacturer than originally intended. When replacement allergens were ordered during the survey, they were purchased from the initially designated manufacturer.

The first extracts were 1:20 W/V in 50 percent glycerin. The second extracts were freeze-dried and reconstituted with 50 percent glycerin to 1:20 W/V prior to use. After the completion of 38 stands with the first extracts, the type of allergenic extracts used was switched. During the remaining 26 stands, the second allergenic extracts were used exclusively in 4 stands. In 22 stands both the first and second extracts were used. The dual-use stands were carried out to compare the reactivity between the two allergen batteries. In these dual-use stands, study persons with odd case numbers received the first extracts; those with even case numbers received the second allergenic extracts. This selection process is equivalent to random assortment of the sample persons.

Ideally, allergens used for testing should be standardized,[36–38] to maximize comparability between studies. However, in 1976–80 when NHANES II was carried out, standardized allergens were not commercially available. Differences in allergenic potency can cause rates of reactivity to vary. With the use of two different batteries of allergens in NHANES II, the authors were able to evaluate the potential variability in skin-test reactivity due to differences in allergenic potency. This analysis was carried out by comparing rates of reactivity to the individual allergens in the dual-use stands. The results of this analysis are fully presented in appendix II. In brief, the sample persons receiving freeze-dried extracts had increased rates of reactivity for house dust, oak, and Bermuda grass as compared with those sample persons receiving the glycerinated extracts. The absolute increase in reactivity ranged from 3.5 percent to 4.7 percent. Only for the dog extract did the sample persons receiving the glycerinated extracts have a higher rate of reactivity (absolute increase: 2.2 percent). No differences in reactivity were found for alternaria, cat, ragweed, and rye grass. The small observed differences in reactivity demonstrated that variations in allergenic potency between the two allergen batteries had relatively small effects on the prevalence estimates of the NHANES II survey. The differential in reaction rates does not affect the subgroup comparisons made in this report as the two types of antigen extracts were used in a uniform manner across all examined subgroups except region. During the evaluation of regional rates of skin-test reactivity, the method of allergen manufacture was taken into account.

Fresh vials of antigen were provided at the beginning of each stand. All vials, opened or unopened, were discarded at the end of each stand. When not in use, the vials were stored at a temperature between 2–4 degrees centrigrade. During use, the vials were maintained in a cool state by placing them in a cold pack.

The recommended histamine-base concentration for prick skin testing is 1 milligram per milliliter (mg/mL).[32] In the first 48 stands, 0.1 mg/mL histamine base (0.275 mg/mL histamine phosphate) was used as the positive control. For the last 16 stands, 1 mg/mL histamine base (2.75 mg/mL histamine phosphate) was used. The increase in histamine concentration led to an increased rate of histamine reactivity. At the lower dose, the expected biologic variability of the response is so great as to make any comparisons meaningless. Thus the authors did not analyze the data collected on histamine reactivity in the first 48 stands. Interexaminer variability was examined only in the last 16 stands, which used 1.0 mg/mL histamine base.

The procedure for carrying out the allergy-skin testing was as follows.[39] The inside of either forearm was cleaned with alcohol and allowed to air-dry. Two rows of five dots each were made with a black marking pen on the forearm. The skin over the elbow and wrist was avoided. A drop of each allergen solution was placed next to a different dot until all 10 components had been used. The tip of a 25-gauge needle was held at approximately a 45-degree angle to the skin and was inserted simultaneously through the drop and top layers of the epidermis. The tip of the needle was then gently lifted as it was removed, resulting in a slight tenting of the skin.

As soon as the first puncture was made, a timer was set. At 10 minutes, the initial readings were taken and the timer reset for an additional 10 minutes. During the first reading, the length and width of the erythema and wheal for each antigen was measured with a millimeter ruler. The length was defined as the largest diameter parallel to the length of the arm. The length, therefore, did not necessarily represent the largest diameter of the wheal or flare. The width was the diameter perpendicular to the length. If one reaction overlapped another, "confluence" was checked for both antigens on the record sheet. If the wheal was greater than 6 mm in length or width, the antigen solution was wiped off. At 20 minutes, an identical set of readings was recorded. The times of the readings were noted only if they differed from 10 or 20 minutes. To enhance the demarcation of the border of the erythema, the area was wiped with alcohol and a bright light was used.

Before testing began, the study persons were asked if they had ever had a positive skin test or a history of allergy to cat, dog, or ragweed. If the study person gave a positive response to either question, the dog, cat, and ragweed allergens were not applied initially. At the 10-minute reading the physician reviewed the results of the remaining five antigens. If less than three showed a positive reaction, then dog, cat, and ragweed were applied to the other arm. If three or more antigens were positive, only ragweed was applied.

The allergy skin tests were both performed and read by a health technician. A physician was consulted only when there was doubt as to the safety of the test administration, or if the patient experienced an untoward reaction to the skin test.

Method of analysis

Analytic strategies

Although two readings were taken during the exam, only the second reading was used for analytic purposes. The criteria employed to select between the two readings were based on detection of the maximum amount of reactivity. The 20-minute reading found 18–25 percent more reactivity of the wheal and erythema, depending on the antigen, than the 10-minute reading. All of the increases were statistically significant. Thus, the 20-minute reading was chosen for the analysis.

The size of the wheal and erythema was determined by taking the average of the recorded length and width to compute the mean diameter. When only a length or width was recorded, this dimension was used as the mean diameter.

No uniformly agreed upon criteria exist to define a positive, percutaneous hypersensitivity reaction. In the NHANES II survey, the cutaneous response was quantified by measuring both the wheal and erythema at 10 and 20 minutes after allergen administration. The size distributions for the wheal and erythema reaction at 20 minutes for house dust are shown in figure 2. The size of the erythema reaction was larger than the wheal reaction. The size relationship between the wheal and erythema as demonstrated here was typical of the relationship found with the other allergens used in this study.

The size of both the wheal and erythema can be measured with similar precision.[40,41] However, the erythema response was chosen because of two important considerations. First, the precision of a bioassay is dependent upon the slope of its dose-response curve—the steeper the curve, the greater the precision.[42] The slope of the wheal dose-response curve is flat,[16] significantly flatter than the slope of the erythema dose-response curve.[40] Second, small reactions (less than 4 mm) are difficult to measure and highly variable.[43,44] Erythema reactions are usually larger than wheal reactions[45] (as was found in this study), and thus would have less of a tendency to fall within this unreliable range (see figure 2).

Systems for grading skin-test reactivity have been suggested for both the intradermal and prick–puncture test methods, as shown in table B.[32,46] No criteria are uniformly accepted or used. The flatter dose-response curve for the wheal is readily apparent by the grading criteria used in both systems. The 1+ reaction in the intradermal grading system has been used as a lower cutoff point for skin-test positivity.[32] Using this grading system, patients with 1+ to 2+ skin reactions at high dilutions of allergens have been shown to have high levels of specific IgE and a high correlation of symptoms following allergen exposure.[19]

Table B. Suggested grading systems for skin tests

	Intradermal[1]		*Prick*[2]	
Grade	*Erythema (mm)*	*Wheal (mm)*	*Erythema (mm)*	*Wheal (mm)*
0.....	< 5	< 5	Absent	Absent
+/-	5–10	5–10	(3)	(3)
1+.....	11–20	5–10	< 21	Absent
2+.....	21–30	5–10	> 21	Absent
3+.....	31–40	10–15	Present	Present (no pseudopods)
4+.....	> 40	> 15	Present	Present (pseudopods)

[1]See reference 32 at end of text.
[2]See reference 46 at end of text.
[3]Not part of the grading system.

NOTE: mm = millimeter.

A conservative approach, aimed at the selection of only the more reactive individuals, was taken in deciding upon a grading criteria for the erythema response in NHANES II. Because the prick test is 0.001 to 0.0001 times less sensitive than the intradermal test (due to the lesser amount of allergen introduced), the adoption of the lower limit of the intradermal criteria for a 1+reaction (≥10.5 mm) for a positive prick test in this study is a conservative cutoff point for establishing cutaneous reactivity to allergens. In support of this choice, others have used a 10 mm erythema reaction following a prick test as the threshold for detecting cutaneous allergic reactions.[47] Thus, intradermal criteria for the categorization of the erythema response were used.

For the purposes of this analysis, skin reactions were graded according to the mean diameter of their intradermal erythema criteria, as specified in table B as follows: 0 mm (negative); 0.5–10.4 mm (+ or −); 10.5–20.4 mm (1+); 20.5–30.4 mm (2+); 30.5–40.4 mm (3+); 40.5–99.5 mm (4+).

Statistical methods

The findings in this report are national estimates of skin-test reactivity in the U.S. civilian noninstitutionalized population 6–74 years of age as based on weighted observations. The weights were calculated as though the examined persons in each of the age, sex, and income classes were a random subsample of all sample persons (examined and nonexamined) in the same class.

Initial analyses of the data revealed a marked change in skin-test reactivity with age. Direct age standardization

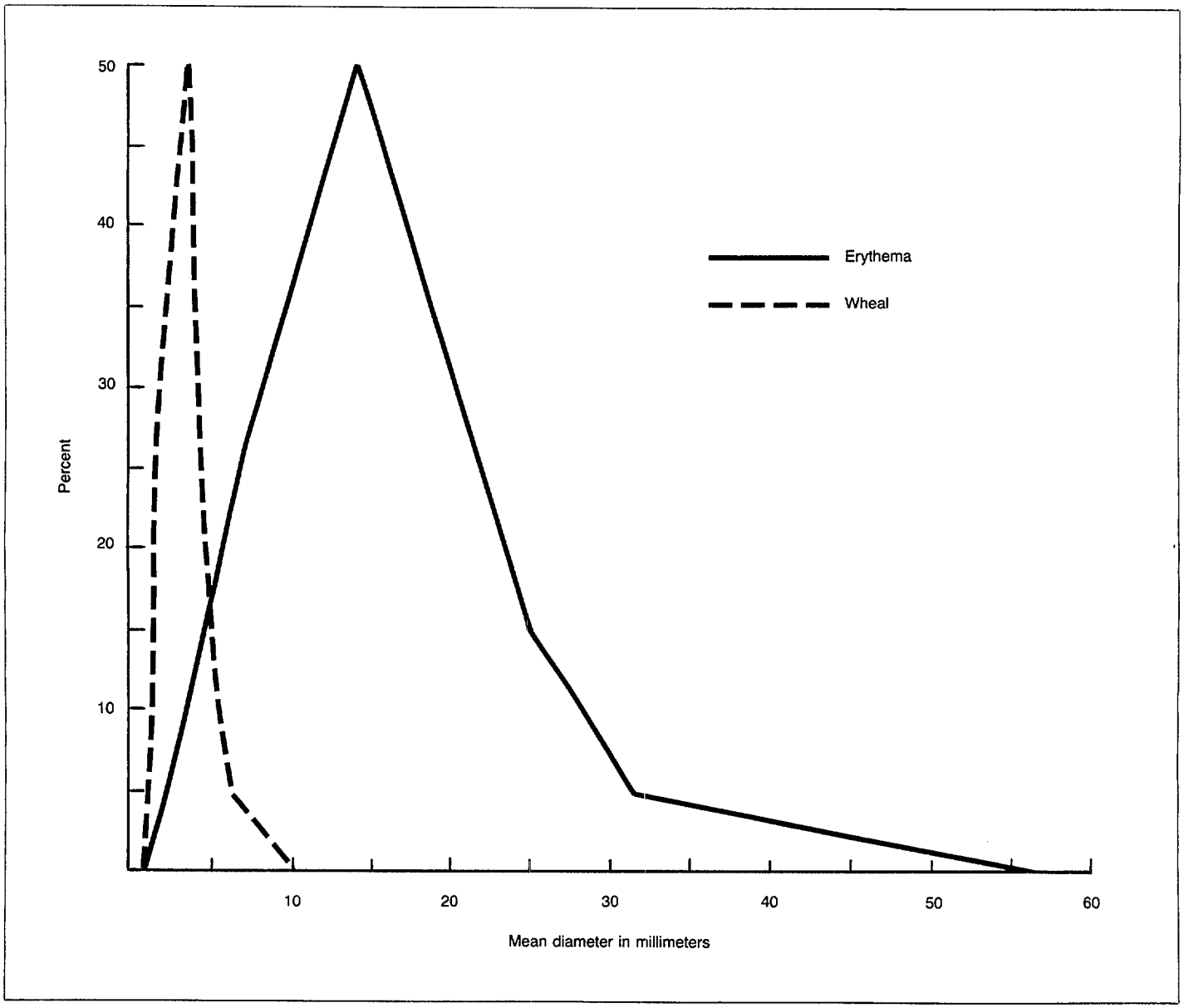


Figure 2. Size distribution for house dust at the 20-minute reading for persons ages 6–74 years: United States, 1976–80

was used to remove potential age confounding in the intergroup comparisons made for this report. The reference population used for standardization was the U.S. civilian noninstitutionalized population as of March 1, 1978, the midpoint of the NHANES II survey.

The region of the country in which the skin testing occurred was also found to be an important confounder for ragweed. Therefore, ragweed intergroup comparisons were adjusted for both age and region of the country.

Observed differences in skin-test reactivity by demographic and socioeconomic variables were tested for statistical significance. Most of the analyses presented here are based on *t*-tests comparing two population subgroups for means or prevalences of certain conditions or characteristics. The *t*-test consists of dividing the difference between the two means or prevalences by the standard error of the difference. The standard error of a difference of estimates can be calculated as follows. Let s be the standard error of the difference; s_1 and s_2 are the standard errors of the estimates x_1 and x_2. Then

$$s = \text{sqrt}\,(\text{sqr}\,(s_1) + \text{sqr}\,(s_2) - 2\,(\text{cov}(x_1,x_2))).$$

All the statistical testing in this report incorporate the calculated covariance in the estimation of the standard error of the difference. However, covariances are not given in this report because they would take a great deal of space. Readers, therefore, will have to perform their statistical testing without the use of the covariance term. Thus, when two groups or measures are positively or negatively correlated, the standard error of the difference computed without the benefit of the covariance terms will give an overestimate or underestimate, respectively, of the actual standard error of the difference. The use of this standard error will affect the calculated t statistic, either decreasing, if the calculated standard error is increased, or increasing it, if the calculated standard error is decreased.

This in turn could cause readers to come to differing conclusions concerning the statistical significance of a comparison if the p value is near 0.05. The standard errors given in this report will, however, allow readers to calculate confidence intervals around the point estimates.

The standard errors of means and proportions in this report, not requiring age-adjustment, are calculated by a replication technique that yields overall variability through observation of variability among random subsamples of the total sample, and which is appropriate to the complex survey design and estimation procedure.[48] The standard errors of means and proportions, requiring age-adjustment, were calculated by a two-stage method: First, SURREGR[49] to calculate the variance-covariance matrix using Taylor series linearization and second, passing the variance-covariance matrix into GENCAT[50,51] a program for generalized least-squares categorical data analysis. Unless otherwise specified, tests for statistical significance are two-sided tests and use a probability level of 0.05 as the limit of statistical significance.

Statistical notes on the sample design, including sample size and national population estimates, reliability of data, and sampling and measurements are included in appendix I. Sources of variation affecting the reliability of the skin-test data are discussed in appendix II. Demographic and socioeconomic terms are defined in appendix III.

Results

Overall prevalence

Detailed tables 1–30 present the percent positive, the population estimates of the number of positives in thousands, and the distribution of reactivity by age, race, and sex for the individual allergens. Table 31 presents the median values for the positive reactions by race and sex. These tables are presented as reference for readers wishing to compare their findings with the reactivity found in the various age-sex-race subgroups in NHANES II. Caution must be used when interpreting the skin-test results given for black persons in the detailed tables as many of the estimates are unstable because of small sample size. Despite this problem, the data are presented because no other data on skin-test reactivity in a sample of the U.S. black population exist. The analyses performed for this report are based on overall reactivity with age-adjustment and adjustment for region, when appropriate. The use of overall reactivity for all age groups combined allows stable estimates to be made for black persons during the subgroup analyses carried out in this report.

Table C presents the overall prevalence rates for positive skin-test reactivity to the allergens used in this study. The allergens were divided into two groups: Indoor allergens—house dust, cat, and dog; and outdoor allergens—alternaria, ragweed, oak, rye grass, and Bermuda grass.

Rye grass and ragweed elicited the most positive reactions with about 10 percent of the population reacting to each allergen. Reactivity to house dust, oak, Bermuda grass, alternaria, cat, and dog ranged from 2.3 percent to 6.2 percent. Outdoor aeroallergens, in general, caused a higher rate of reactivity than indoor aeroallergens (17.7 percent versus 7.6 percent, $p<0.001$).

Among persons who reacted to at least one allergen from the indoor allergen group, 84.4 percent reacted to house dust. The addition of either cat or dog to the house dust raised the percent positive to 92.9 percent and 93.8 percent, respectively. Among persons who reacted to at least one allergen from the outdoor allergen group, 59.3 percent reacted to either ragweed or rye grass separately. Reaction to ragweed and/or rye grass occurred in 88.1 percent. The addition of alternaria increased the reaction rate to 95.5 percent. Thus, it is possible to detect a majority of the skin-test reactors in the population by using only a small subset of the allergens (house dust, rye grass, and ragweed).

Table C. Percent of positive skin-test reaction for persons ages 6–74 years by allergen groups; with standard errors: United States, 1976–80

Allergen group	*Percent positive*[1]	*Standard error*
All allergens[2]	20.2	0.83
Indoor allergens[3]	7.6	0.62
House dust	6.2	0.66
Cat	2.3	0.26
Dog	2.3	0.25
Outdoor allergens[4]	17.7	0.74
Rye grass	10.2	0.56
Ragweed	10.1	0.57
Oak	4.7	0.36
Bermuda grass	4.4	0.42
Alternaria	3.6	0.26

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[2]At least one allergen positive.
[3]At least one indoor aeroallergen positive.
[4]At least one outdoor aeroallergen positive.

Variations in reactivity

Skin-test reactivity can be used to dichotomize a population into allergic and nonallergic groups. In addition, skin tests can also be utilized to study the variations in reactivity within the allergic group. The degree of reactivity can be ranked by the size of the reaction to allergenic skin tests and histamine. This section will examine the variations of reactivity in the skin-test-positive group.

Overall, 20.2 percent of the population had at least one positive skin test. An examination of the percent distribution of the number of positive skin tests revealed a rapid dropoff in the percent reactive as the number of positive skin tests increased (9.0 percent reacted to only one allergen whereas 0.9 percent reacted to 6–8 allergens—table D). The percent distribution of the number of positive skin tests did not change when dermatographism was controlled by eliminating all sample persons who reacted to the saline control.

The mean size of the positive reaction ranged from 22.6 mm for persons reacting to just one skin test to 26.6 mm for persons reacting to 6–8 skin tests. A positive relationship was found between the number of positive skin tests and the mean size of the allergic reaction ($p<0.05$).

The changing size of the histamine reaction with an increasing number of positive skin test reactions is shown in table E. The recommended histamine concentration for skin puncture testing is 1 mg/mL.[32] Only the last 16 stands of the survey, in which a 1 mg/mL histamine base was used,

Table D. Percent distributions and mean size of positive reaction for persons ages 6–74 years by number of positive skin tests; with standard errors: United States, 1976–80

Number of positive skin tests[1]	Percent distribution	Standard error	Mean size of positive reaction (mm)	Standard error
0	79.8	0.83	0	0
1	9.0	0.37	22.6	0.39
2	4.7	0.24	24.0	0.32
3	2.6	0.21	24.2	0.43
4	1.8	0.15	25.7	0.45
5	1.2	0.16	27.3	0.56
6–8	0.9	0.13	26.6	0.56

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.

NOTE: mm = millimeter.

Table E. Mean size of histamine reaction for persons ages 6–74 years by number of positive skin tests; with standard errors: United States, 1976–80

Number of positive skin tests[1]	Mean size of histamine (mm)[2,3]	Standard error
0	18.1	0.70
1	19.5	0.69
2	20.2	0.84
3	18.6	0.89
4	19.1	0.82
5	22.2	0.87
6–8	22.3	2.48

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Limited to stands using 1 mg/mL histamine base as the positive control.
[3]Mean diameter of the erythema reaction greater than 0 mm.

NOTES: mm = millimeter.
mg = milligram.
mL = milliliter.

Table F. Mean size of histamine reaction for persons ages 6–74 years by mean size of rye grass reaction; with standard errors: United States, 1976–80

Mean size of rye grass reaction	Mean size of histamine reaction (mm)[1,2]	Standard error
0–10.4 mm	18.4	0.70
10.5–30.4 mm	18.4	0.66
30.5–99.9 mm	20.3	0.94

[1]Limited to stands using 1 mg/mL histamine base as the positive control.
[2]Mean diameter of the erythema reaction greater than 0 mm.

NOTES: mm = millimeter.
mg = milligram.
mL = milliliter.

are included in analyses of histamine reactions. The previous 48 stands used a 0.1 mg/mL histamine base. At this lower dose, the expected biological variability of the response is so great as to make any comparisons meaningless. See appendix II for further details. The size of the histamine reaction ranged from 18.1 mm for persons with zero-positive skin tests to 22.3 mm for persons with 6–8 positive skin tests. Thus, a statistically significant positive relationship was found between the number of positive skin tests and the mean size of the histamine reaction.

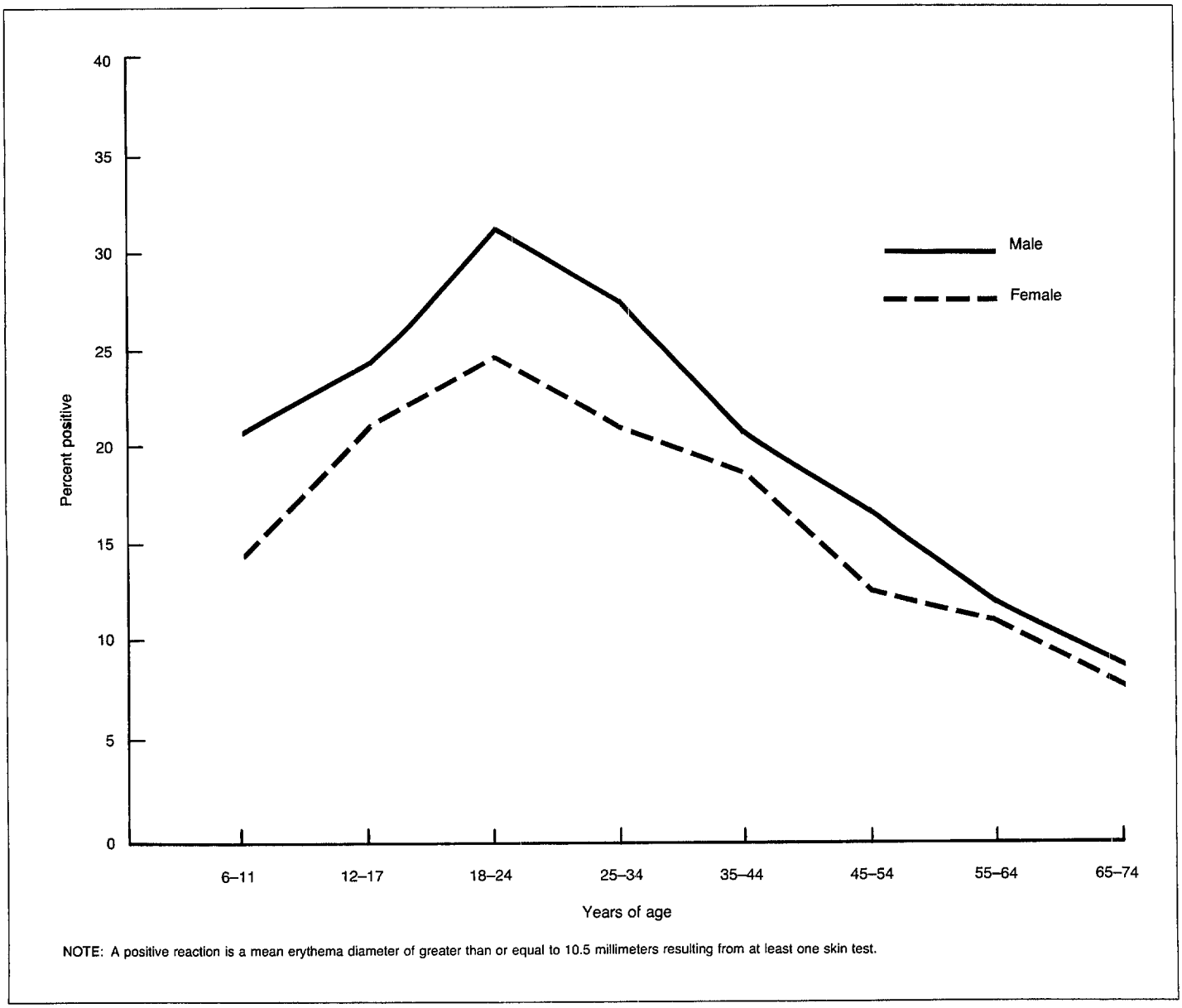
Next, the relationship between the size of the histamine and the size of the allergic reaction was examined (table F). Rye grass was chosen because it was one of the most reactive allergens in our study. No significant association was observed between the size of the histamine reaction and the size of the allergic reaction.

In summary, a statistically significant relationship existed between the number of positive skin tests and both the size of the positive allergic skin test and the size of the cutaneous histamine reaction. However, there was no relation between the size of the histamine reaction and the size of the allergen reaction.

Age

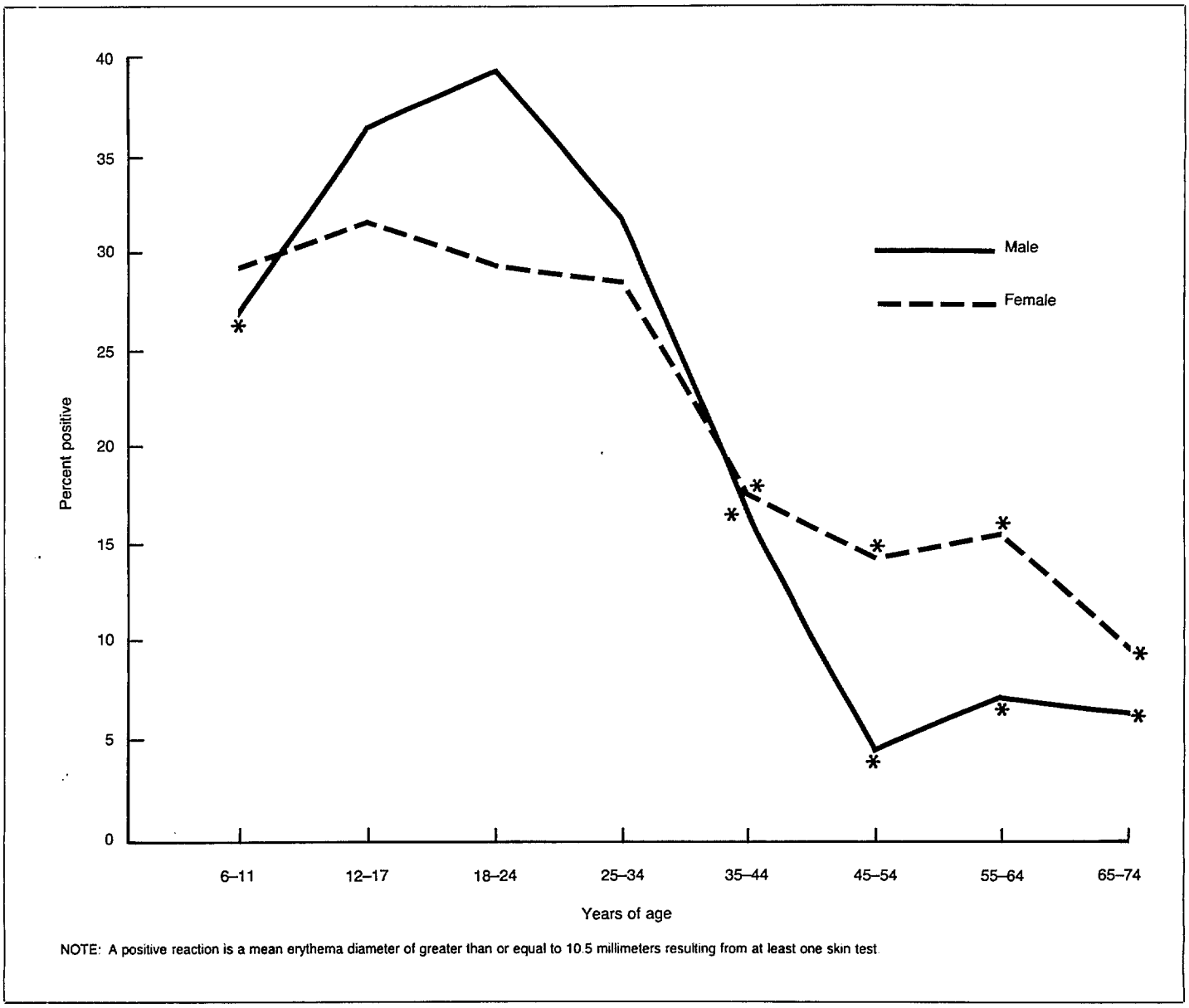
Reactivity to at least one allergen differed markedly with age. Peak reactivity occurred in the 18–24 years of age group (men—33.3 percent, women—25.2 percent). The differences in the prevalence rate of skin-test reactivity to at least one allergen by age, race, and sex are shown in figures 3 and 4. Figure 3 displays the percent of white persons who reacted to at least one allergen by age and sex. Reactivity peaked in the 18–24 years of age group for both white males and white females. The peak reactivities were 32.0 percent for white males and 24.3 percent for white females. Figure 4 displays the percent of black persons who reacted to at least one allergen by age and sex. Some point estimates, especially over age 34 years, are unstable because of small sample sizes, but the results are presented to show in general that changes in reactivity with age appeared to be similar in black and white persons. Reactivity peaked in the 18–24 years of age group for black males and in the 12–17 years of age group for black females. The peak reactivities were 39.5 percent for black males and 32.7 percent for black females.

On closer examination of tables 1–30, it is readily apparent that skin-test reactivity for each individual allergen differed in a similar manner with age. Peak reactivity was in the 12–24 years of age group for all of the allergens.



NOTE: A positive reaction is a mean erythema diameter of greater than or equal to 10.5 millimeters resulting from at least one skin test.

Figure 3. Overall skin-test reactivity by age and sex for white persons: United States, 1976–80



NOTE: A positive reaction is a mean erythema diameter of greater than or equal to 10.5 millimeters resulting from at least one skin test.

Figure 4. Skin-test reactivity by age and sex for black persons: United States, 1976–80

Pollination location and season

Not all the allergens tested in this survey are uniformly distributed throughout the United States. Likewise, not all allergens are present throughout the year in their respective geographic domains. Thus, the geographic location or season of the year in which the skin tests were performed could possibly affect the prevalence of reactivity to certain allergens. Therefore, the effects of geographic location and season on skin-test reactivity were further explored for the appropriate allergens.

The skin-test data from three pollen allergens (giant and short ragweed, oak, and Bermuda grass) were analyzed to determine the effects of intensity of pollen exposure on cutaneous reactivity. These allergens were chosen because they have different geographic distribution[52,53] and pollen intensities[54] in the United States.

The percent positive was compared between the high-pollen areas and the low-pollen areas for each antigen shown in table G. Only for ragweed did regionality appear to be important (13.3 percent in high-pollen areas versus 7.2 percent in low-pollen areas, $p<0.001$). The prevalence rates for skin-test reactivity were essentially identical between high- and low-pollen areas for oak and Bermuda grass.

Regarding seasonality, the skin-test data from two pollen allergens that have well-recognized pollen seasons were examined. The allergens and their pollination seasons are giant and short ragweed—August through October and oak—April through June. The analyses were carried out on data collected only within the high-pollen areas for the respective pollens to eliminate the potential for geographic confounding (table H). No statistically significant seasonal variation was noted. However, for both allergens the percent reacting was increased in the out season, with ragweed reaching marginal significance (11.6 percent in season versus 14.3 percent out of season, $p=0.06$).

Table G. Percent of positive skin-test reactions for persons ages 6–74 years by allergen and pollen area; with standard errors and *p* values: United States, 1976–80

Allergen and pollen area	*Percent positive*[1,2]	*Standard error*	*p value*[3]
Giant and short ragweed			
High-pollen area: Northeast and Midwest	13.3	0.66	
Low-pollen area: South and West	7.2	0.93	< 0.001
Oak			
High-pollen area: Northeast, Midwest, and South	4.6	0.46	
Low-pollen area: West	5.0	0.48	0.50
Bermuda grass			
High-pollen area: South	3.1	0.71	
Low-pollen area: Midwest	3.3	0.64	0.85

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[2]Age-adjusted to U.S. population, March 1, 1978.
[3]High pollen area versus low pollen area.

Table H. Percent of positive skin-test reactions for persons ages 6–74 years by allergen, geographic region, and pollen season; with standard errors and *p* values: United States, 1976–80

Allergen, geographic region, and pollen season	*Percent positive*[1,2]	*Standard error*	*p value*[3]
Giant and short ragweed, Northeast and Midwest only			
In season: Aug. 15 - Oct. 15	11.6	0.93	
Out of season: Oct. 16 - Aug. 14	14.3	0.90	0.06
Oak, Northeast, Midwest, and South			
In season: Apr. 15 - June 7	4.5	1.12	
Out of season: June 8 - Apr. 14	4.6	0.51	0.90

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[2]Age-adjusted to U.S. population, March 1, 1978.
[3]In season versus out of season.

These findings suggest that the change in the skin-test reaction may come after the pollen season. To investigate this further, the out season was divided into two parts (table J). The first part covered a period of time immediately following and of the same duration as the pollen season; the second part encompassed the remaining time in the out season. It appears that reactivity in the out season was highest in the period immediately following the pollen season. However, none of the differences reached statistical significance.

Table J. Percent of positive skin-test reactions for persons ages 6–74 years by allergen, geographic region, and pollen season; with standard errors: United States, 1976–80

Allergen, geographic region, and pollen season	*Percent positive*[1,2]	*Standard error*
Giant and short ragweed, Northeast and Midwest only		
In season: Aug. 15 - Oct. 15	11.6	0.93
Out of season: Oct. 16 - Jan. 15	16.4	2.60
Jan. 16 - Aug. 14	13.3	0.91
Oak, Northeast, Midwest, and South only		
In season: Apr. 15 - June 7	4.5	1.12
Out of season: June 8 - Sept. 15	5.5	0.68
Sept. 16 - Apr. 14	4.1	0.76

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[2]Age-adjusted to U.S. population, March 1, 1978.

Sex and race comparisons

Differences in skin-test reactivity by sex and race were examined and the results reported in table K. The results of the statistical testing done among the various subgroups are reported in table L. Given the changes in reactivity with age, the sex- and race-specific analyses were controlled for age. When examining ragweed, one must also control for region of the country in addition to age. The prevalence rate of skin-test reactivity to at least one allergen was higher in males as compared with females (22.2 percent versus 18.4 percent, $p<0.001$). (See figure 5.) When the difference in reactivity by sex was stratified by race, white males had a higher prevalence rate than white females (21.6 percent versus 17.5 percent, $p<0.001$—figure 6), but the prevalence rate in black males and females was approximately equivalent (23.2 percent versus 23.3 percent—figure 6). Examining individual allergens for all races, data showed that males had higher rates of reactivity than females for house dust, alternaria, ragweed, oak, rye grass, and Bermuda grass. The absolute increases ranged from 0.7 percent to 3.3 percent. Among white persons, males had higher rates of reactivity than females for house dust, ragweed, oak, rye grass, and Bermuda grass. The absolute increases ranged from 1 percent to 3.5 percent, $p<0.05$. Among black persons, females had a higher rate of reactivity than males for dog allergen (absolute increase=1.8 percent; $p=0.04$).

Differences in skin-test reactivity by race were examined. The prevalence rate of reactivity to at least one allergen was higher in black persons as compared with white persons for both sexes combined, but the difference was not statistically significant (23.2 percent versus 19.5 percent). Looking at the individual allergens by sex, data showed that black females had a higher rate of reactivity as compared with white females (23.3 percent versus 17.5 percent, $p=0.03$). Among males, the rate of reactivity was higher in black persons as compared

Table K. Age-adjusted prevalence rates of skin-test reactivity for persons ages 6–74 years by selected allergens, sex, and race; with standard errors: United States, 1976–80

Race and selected allergen	Both sexes		Male		Female	
	Percent positive[1,2]	Standard error	Percent positive[1,2]	Standard error	Percent positive[1,2]	Standard error
All races[3]						
All allergens[4]	20.2	0.83	22.2	1.08	18.4	0.87
House dust	6.2	0.62	6.8	0.81	5.6	0.64
Alternaria	3.6	0.26	4.1	0.38	3.2	0.92
Cat	2.3	0.26	2.2	0.30	2.5	0.27
Dog	2.3	0.25	2.3	0.30	2.3	0.25
Ragweed[5]	10.1	0.57	11.6	0.70	8.7	0.56
Oak	4.7	0.36	5.4	0.44	4.1	0.38
Rye grass	10.2	0.56	11.9	0.68	8.6	0.62
Bermuda grass	4.4	0.42	4.8	0.47	4.1	0.45
White						
All allergens[4]	19.5	0.80	21.6	1.01	17.5	0.79
House dust	5.9	0.58	6.5	0.65	5.4	0.62
Alternaria	3.6	0.27	3.9	0.41	3.2	0.32
Cat	2.3	0.27	2.1	0.31	2.4	0.28
Dog	2.2	0.24	2.3	0.29	2.0	0.22
Ragweed[5]	9.6	0.51	11.4	0.64	7.9	0.48
Oak	4.5	0.33	5.3	0.43	3.8	0.35
Rye grass	10.0	0.54	11.7	0.67	8.3	0.57
Bermuda grass	4.3	0.44	4.8	0.50	3.8	0.44
Black						
All allergens[4]	23.2	2.52	23.2	3.10	23.3	2.84
House dust	7.0	1.76	7.6	2.34	6.5	1.50
Alternaria	3.6	0.46	4.3	0.95	2.9	0.64
Cat	2.3	0.50	2.1	0.72	2.7	0.56
Dog	2.7	0.78	1.7	0.80	3.5	0.94
Ragweed[5]	13.0	2.17	12.5	2.56	13.5	2.23
Oak	5.5	1.14	5.5	1.46	5.5	1.25
Rye grass	10.4	1.39	11.5	1.73	9.5	1.62
Bermuda grass	4.8	0.82	4.1	1.04	5.5	1.06

[1] Age-adjusted to U.S. population, March 1, 1978.
[2] Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[3] Includes data for races not shown separately.
[4] Reaction to at least one of the allergens.
[5] Age and region adjusted.

Table L. *p* values of two-sided *t*-tests by selected allergens, sex, and race for persons ages 6–74 years: United States, 1976–80

Allergen	Male versus female			White versus black persons		
	All races[1]	White	Black	Both sexes	Male	Female
All allergens[2]	< 0.001	< 0.001	0.98	0.14	0.58	0.03
House dust	0.04	0.03	0.48	0.51	0.58	0.47
Alternaria	0.05	0.16	0.32	0.92	0.70	0.63
Cat	0.15	0.42	0.43	0.92	0.88	0.66
Dog	0.85	0.25	0.04	0.50	0.48	0.15
Ragweed	< 0.001	< 0.001	0.58	0.10	0.63	0.009
Oak	0.003	0.001	0.96	0.40	0.86	0.21
Rye grass	0.001	< 0.001	0.30	0.77	0.88	0.49
Bermuda grass	0.05	0.009	0.28	0.53	0.47	0.15

[1] Includes data for races not shown separately.
[2] Reaction to at least one of the allergens.

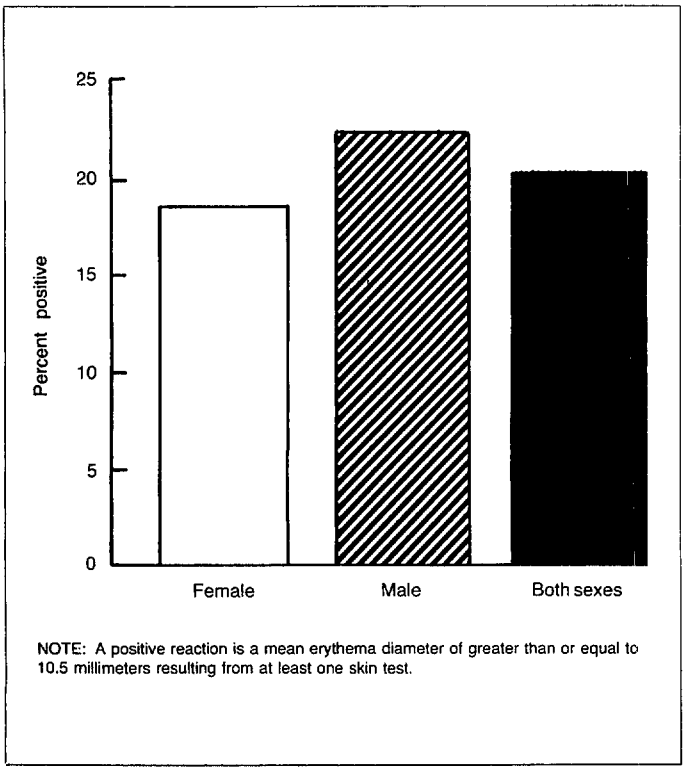


Figure 5. Age-adjusted skin-test reactivity by sex for persons ages 6–74 years: United States, 1976–80

with white persons, but it did not reach statistical significance (23.2 percent versus 21.6 percent, $p=0.52$). Data for the individual allergens showed that black persons had a tendency to have higher rates of reactivity than white persons, but none of the differences reached statistical significance except for black females as compared with white females for ragweed (13.5 percent versus 7.9 percent).

Socioeconomic status (SES)

The age-adjusted differences in skin-test reactivity between people living below poverty level and those living at or above poverty level are shown in table M. Overall reactivity was greater in persons living at or above the poverty level (21.0 percent versus 15.8 percent, $p<0.001$). Data for the individual allergens revealed that higher rates of reactivity existed for people living at or above the poverty level for alternaria, ragweed, oak, rye grass, and Bermuda grass. The absolute increases ranged from 1.3 percent to 3.7 percent.

The relationship between poverty and skin-test reactivity was further investigated by examining a more detailed income distribution and the effects of education. The prevalence rate for reactivity to at least one allergen increased from 15.3 percent with $0–5,999 income to 24.7 percent with $20,000 or more (table N). Controlling for age, there is a statistically significant positive relationship between reactivity and income.

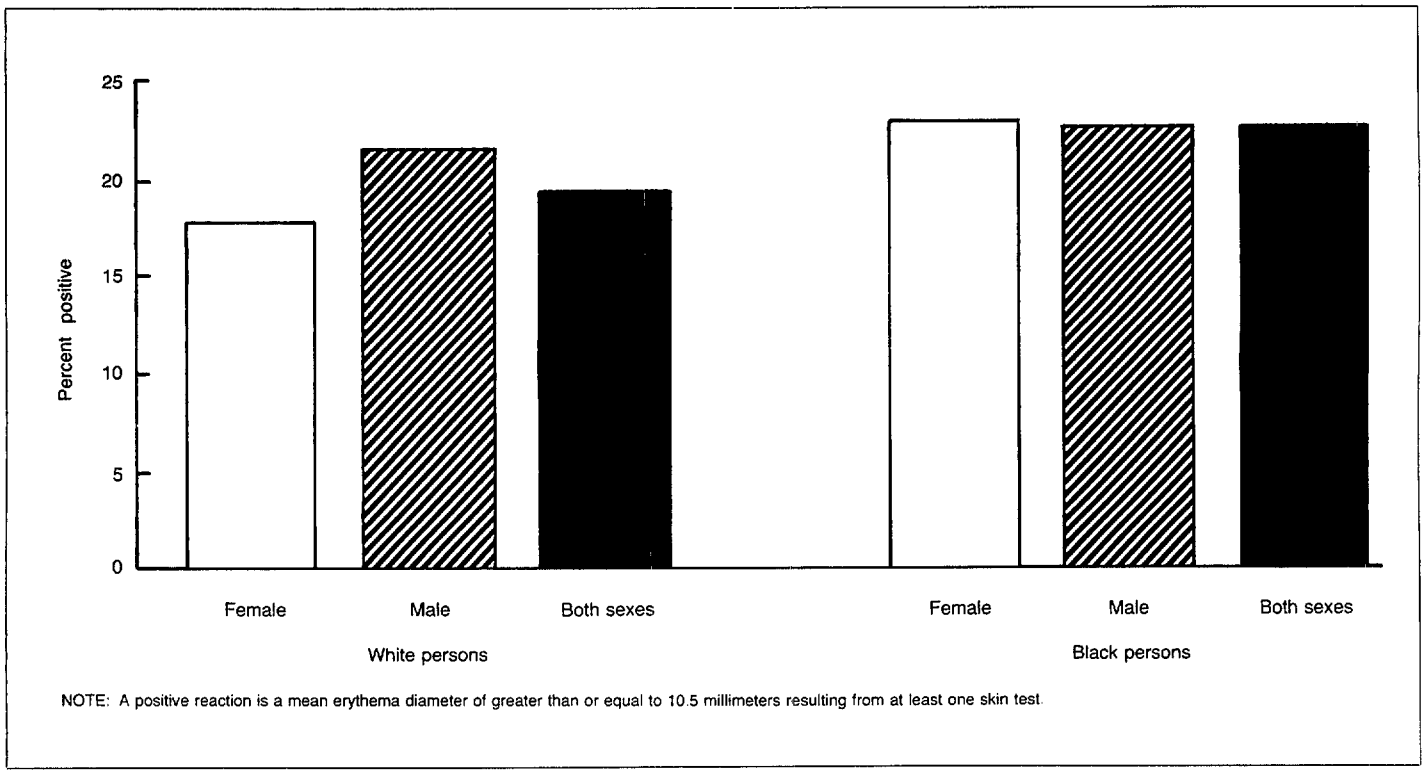


Figure 6. Age-adjusted skin-test reactivity by race and sex: United States, 1976–80

Table M. Skin-test reactivity for persons ages 6–74 years by poverty level and selected allergens; with standard errors and p values: United States, 1976–80

Allergen	Below poverty level		At or above poverty level		p value
	Percent positive[1,2]	Standard error	Percent positive[1,2]	Standard error	
All allergens[3]	15.8	1.51	21.0	0.85	< 0.001
House dust	5.3	0.95	6.3	0.65	0.12
Alternaria	1.9	0.35	4.0	0.30	< 0.001
Cat	1.8	0.44	2.4	0.28	0.18
Dog	2.5	0.56	2.3	0.25	0.82
Ragweed[4]	7.2	0.95	10.6	0.59	< 0.001
Oak	3.6	0.61	4.9	0.37	0.04
Rye grass	7.1	0.72	10.8	0.63	< 0.001
Bermuda grass	2.8	0.43	4.8	0.49	0.002

[1]Age-adjusted to U.S. population, March 1, 1978.
[2]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[3]Reaction to at least one of the allergens.
[4]Age and region adjusted.

Table N. Skin-test reactivity for persons ages 6–74 years by family income level; with standard errors: United States, 1976–80

Family income level	Percent positive[1,2]	Standard error
$0–$5,999	15.3	1.36
$6,000–$9,999	17.9	1.14
$10,000–$19,999	19.6	0.97
$20,000 or more	24.7	0.97

[1]Age-adjusted to U.S. population, March 1, 1978.
[2]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters to at least one allergen.

Table O. Skin-test reactivity for persons ages 6–74 years by education level; with standard errors: United States, 1976–80

Education level[1]	Percent positive[2,3]	Standard error
0–8 years	13.0	1.33
9–12 years	17.9	0.96
13 years or more	25.5	1.07

[1]Number of years attended by head of household for sample persons 19 years of age and under. Number of years attended by sample persons 20 years of age or over.
[2]Age-adjusted to the U.S. population, March 1, 1978.
[3]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters to at least one allergen.

Next, the effects of education on overall skin-test reactivity were examined (table O). Education level was defined in one of two ways depending on the age of the sample person. If the sample person was under 20 years of age, the education level of the head of the household was used. If the sample person was 20 years of age or over, the individual's education level was used. The prevalence rate for reactivity to at least one allergen increased with increasing education level (13.0 percent with 0–8 years of education to 25.5 percent with at least some college). Controlling for age, there is a statistically significant positive relationship between reactivity and educational level. The effects of income and education remained constant in males and females.

Residency

Urban or rural differences in skin-test reactivity are explored in table P. Higher rates of reactivity were noted in urban areas for all allergens. Overall reactivity was greater in the urban areas versus the rural areas (22.0 percent versus 16.5 percent, $p<0.001$). For the individual allergens, higher rates of reactivity occurred in urban dwellers for alternaria, cat, dog, ragweed, oak, and rye grass. The absolute increases ranged from 0.7 percent to 3.2 percent.

The increase in reactivity in urban areas was investigated further by subdividing residency into four parts: standard metropolitan statistical area (SMSA)–central city, SMSA–not central city, not SMSA–not rural, and not SMSA–rural (table Q). To control for race and income effects, this analysis was limited to white persons above the poverty level. Reactivity remained higher in the SMSA (21.1 percent and 23.5 percent) than outside SMSA areas (17.6 percent and 15.6 percent). The difference between areas in the central city and not in the central city within SMSA was not statistically significant. However, results suggest that the higher rates of reactivity in urban areas appear to lie outside of the central city.

Table P. Skin-test reactivity for persons ages 6–74 years by selected allergens and urban or rural residence; with standard errors and *p* values: United States, 1976–80

Selected allergen	Urban		Rural		*p* value
	Percent positive[1,2]	Standard error	Percent positive[1,2]	Standard error	
All allergens[3]	22.0	1.08	16.5	1.12	< 0.001
House dust	6.5	0.84	5.4	0.73	0.27
Alternaria	4.1	0.31	2.5	0.35	< 0.001
Cat	2.5	0.32	1.8	0.29	0.05
Dog	2.6	0.33	1.6	0.26	0.01
Ragweed[4]	10.8	0.79	8.5	0.72	0.02
Oak	5.1	0.46	3.9	0.42	0.05
Rye grass	11.2	0.74	8.0	0.65	< 0.001
Bermuda grass	4.7	0.51	3.9	0.49	0.18

[1]Age-adjusted to U.S. population, March 1, 1978.
[2]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.
[3]Reaction to at least one of the allergens.
[4]Age and region adjusted.

Table Q. Skin-test reactivity for white persons ages 6–74 years who are above the poverty level by place of residence; with standard errors: United States, 1976–80

Place of residence	Percent positive[1,2]	Standard error
SMSA		
Central city	21.1	1.74
Not central city	23.5	1.18
Not SMSA		
Not rural	17.6	1.46
Rural	15.6	1.43

[1]Age-adjusted to U.S. population, March 1, 1978.
[2]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters.

NOTE: SMSA = Standard metropolitan statistical area.

Geographic region

Reactivity to at least one allergen by geographic region of the country is examined in table R. The Northeast was consistently the highest area of reactivity (25.4 percent); the South was the lowest (14.2 percent); and the Midwest (20.6 percent) and West (20.6 percent) were in an intermediate position. The rates of overall reactivity by region were rerun excluding ragweed. This approach was used to determine if the difference seen could be explained by the geographic distribution of ragweed—an important factor in ragweed's reactivity. The removal of ragweed had little effect on the results other than that of lowering the rate of reactivity. The geographic ranking of reactivity remained unchanged if only the indoor allergens (house dust, cat, and dog) or only the outdoor allergens (alternaria, ragweed, oak, rye grass, and Bermuda grass) were examined. It was previously noted that for four allergens (house dust, dog, oak, and Bermuda grass) there was a difference in reactivity between the two types of allergens (based on manufacture) used in this study. Also, the use of the allergens was not uniform in all four regions (see appendix II for more detail). To examine the possibility that the interregional differences were due all or in part to differential allergen use, the four allergens in which there was a difference in reactivity were excluded and the regional analyses were rerun. The regional differences remained the same.

Table R. Skin-test reactivity for persons ages 6–74 years by allergen group and geographic region; with standard errors: United States, 1976–80

Allergen group and geographic region	Percent positive[1,2]	Standard error
All allergens		
Northeast	25.4	1.47
Midwest	20.6	1.87
West	20.6	1.10
South	14.2	2.40
Indoor allergens[3]		
Northeast	10.1	1.47
Midwest	8.1	1.21
West	6.5	0.90
South	6.0	1.65
Outdoor allergens[4]		
Northeast	22.2	1.32
Midwest	17.4	1.47
West	18.7	1.26
South	12.1	2.06

[1]Age-adjusted to the U.S. population, March 1, 1978.
[2]Mean diameter of the erythema reaction greater than or equal to 10.5 millimeters to at least one allergen.
[3]House dust, cat, dog.
[4]Alternaria, ragweed, oak, rye grass, Bermuda grass.

Discussion

The overall prevalence of skin reactivity to one or more of the eight allergens in this study is 20.2 percent. This is a conservative estimate of the prevalence of immediate hypersensitivity for a number of reasons. A conservative cutoff point was used to define a positive reaction. Also, approximately 11.3 percent of the eligible sample persons in NHANES II did not receive all eight allergen skin tests and histamine for a variety of reasons, such as a past history of allergies, a history of previous allergy shots, use of allergy medication, and patient refusal. These nontested individuals reported a higher rate of asthma, hayfever, and other allergies than the skin-tested individuals (table V). Thus, it is likely that the exclusion of these individuals from our survey decreased the rates of reactivity found. The loss of the nontested individuals did not introduce any significant amount of bias when making subgroup analyses as it was spread fairly evenly over all age, race, sex, urban or rural, and poverty level groups.

Prevalence rates for reactivity reported in the literature can be divided into two groups according to whether the population studied was or was not allergic. Studies completed on a wide variety of populations consisting of either random samples of communities or nonallergic persons are summarized in table S.[8,55–64] A wide range of prevalence rates of skin-test reactivity has been reported (5 percent to 64 percent). Studies conducted on allergic populations are summarized in table T.[8,26,57,59,60,62,65] The range of prevalence estimates is similar (27.1 percent to 87 percent), but the estimated rates of reactivity are higher. In both allergic and nonallergic populations, the rates of reactivity reported in international studies are higher than those reported in domestic studies. This increase in reported reactivity may be due to a variety of reasons, such as differences in allergens used, varying criteria for positivity, or true differences in reactivity. Our overall prevalence rate of 20.2 percent is approximately equal to the approximate mean value found in table S for domestic studies on nonallergic populations.

The reactivity of the U.S. population to the allergenic extracts tested was highest to pollens—16.5 percent, followed

Table S. Skin-test studies of community samples or nonallergic populations

Author of study	Location	Subjects	Years of age	Number of extracts	Type of test	Percent positive
		Domestic studies				
Curran[1]	Boston	100 nonallergic	16–60+	9	scratch	5.0
Hagy[2]	Providence	765 nonallergic	16–20	15	scratch	17.4
Lindblad[3]	Pittsburgh	100 nonallergic	16–81	5	intradermal	[4]24.0
Freidhoff[5]	Baltimore	115 random subjects from industrial plant	18–55	7	prick	24.3
Barbee[6]	Tucson	3102 community sample	3–75+	5	prick	34.0
		International studies				
Bandele[7]	Nigeria	100 nonallergic	10–60	22	not stated	10.0
Tan[8]	Singapore	50 nonallergic	10–73	21	prick	12.0
Haahtela[9]	Finland	708 sample of 9th graders	15–17	16	prick	49.0
Herxheimer[10]	London	100 nonallergic	5–75	12	prick	50.0
Haahtela[11]	Finland	295 nonallergic army conscripts	18–19	16	prick	50.0
Cserhati[12]	Hungary	300 nonallergic	2–16	20	prick	64.0

[1]See reference 55 at end of text.
[2]See reference 8 at end of text.
[3]See reference 56 at end of text.
[4]Results from 1:10 concentration.
[5]See reference 57 at end of text.
[6]See reference 58 at end of text.
[7]See reference 59 at end of text.
[8]See reference 60 at end of text.
[9]See reference 61 at end of text.
[10]See reference 62 at end of text.
[11]See reference 63 at end of text.
[12]See reference 64 at end of text.

by house dust—6.2 percent, animal allergens—3.8 percent, and mold—3.6 percent. Other studies have reported differing percents of reactors and/or different orders of relative reactivity to some of the allergens tested in NHANES II.[56,58,61,63–66] However, comparison of skin-test results between different studies must take into account the number and type of allergenic extracts used for testing, the method of test administration, the criteria for test positivity, the demographic and atopic characteristics of the populations tested, and the locales in which the testing was carried out.

The potency and composition of the allergenic extracts used to detect immediate hypersensitivity are critical determinants of the presence and degree of cutaneous reactivity to those extracts in allergic persons.[67–73] In the estimate of prevalences in NHANES II the effect resulting from the putative differences in allergenic potency and composition was determined by testing two batteries of allergens, manufactured by two different methods and obtained from different manufacturers (see appendix II). In the dual-use stands, where the two batteries of allergen extracts were applied by the same examiners to subsamples in the same locale, the absolute differences in estimated reactivity did not exceed 5 percent (table XII). The small observed differences in reactivity demonstrated that variations in potency between the two allergen batteries had relatively small effects on the prevalence estimates of the NHANES II study. Until standardized extracts are employed for large scale screening by standardized methods, the NHANES II prevalence estimates reflect the largest experience in estimating immediate cutaneous hypersensitivity in U.S. population; and these estimates have been shown to be relatively robust, in spite of differences in manufacture of the allergenic extracts used. The marked discrepancies between the prevalence estimates in NHANES II and many of the studies reported in table S thus may be attributable more to differences in skin-test technique and criteria for skin-test positivity rather than to differences in potency of the allergens used.

A positive relationship was found between the number of positive skin tests and the size of the histamine reaction. However, no significant association was found between allergic-reaction size and histamine-reaction size. This suggests that multiple positive allergy skin tests are required to influence histamine-reaction size. In prior studies,[58,74] researchers observed no association between histamine and allergen reactivity, suggesting that before acceptance of a causal association between histamine and allergen skin reactivity, local skin interactions due to proximity and intensity of positive allergen and histamine skin reactions[75,76] will need to be explored further.

The total number of positive skin tests appears to be associated with the degree of immune responsiveness, because a positive relationship was found between the number of positive skin tests and the intensity of the allergic response. Allergic persons with multiple positive allergen skin tests and/or larger skin reactions tend to have higher total and specific IgE levels.[23] This suggests that the association of allergen reaction size and multiple allergen reactivity may indicate immunological hyperresponsivity, as indicated by IgE, in this subset of the population. In contrast, no significant association exists between histamine skin-reaction size and total IgE in skin-test positive allergic patients.[23]

The use of positive and negative control skin-test solutions demonstrated that cutaneous reactivity was specifically related to the allergen, because the response to the diluent was uniformly less than 2 percent except for one examiner who reported 2.2 percent reactivity (table VI). Similarly, the prevalence rate of 91 percent of cutaneous reactivity to 1.0 mg/mL histamine base demonstrated cutaneous responsiveness to one inflammatory mediator of the immediate hypersensitivity reaction (histamine) in most patients, indicating end-organ

Table T. Skin-test studies of allergic populations

Author of study	*Location*	*Subjects*	*Years of age*	*Number of extracts*	*Type of test*	*Percent positive*
		Domestic studies				
Freidhoff[1]	Baltimore	262 reporting allergies	18–55	7	prick	55.0
Hagy[2]	Providence	478 reporting allergies	16–20	15	scratch	[3]63.9 [4]26.7
		International studies				
Bandele[5]	Nigeria	221 asthmatics	10–60	22	not stated	67.0
Tan[6]	Singapore	138 asthmatics	10–73	21	prick	69.0
Hendrick[7]	London	656 asthmatics	< 10–30 +	22	prick	84.0
Haahtela[8]	Finland	292 reporting allergies	15–17	16	prick	[9]87.0 [10]83.0 [11]69.0
Herxheimer[12]	London	300 with respiratory allergies	5–75	12	prick	95.0

[1]See reference 57 at end of text.
[2]See reference 8 at end of text.
[3]Asthma, hayfever, and/or nonseasonal allergic rhinitis.
[4]Other allergies.
[5]See reference 59 at end of text.
[6]See reference 60 at end of text.
[7]See reference 65 at end of text.
[8]See reference 26 at end of text.
[9]Asthmatics.
[10]Allergic rhinitis.
[11]Atopic dermatitis.
[12]See reference 62 at end of text.

responsiveness to this mediator. The optimal concentration of histamine base to be used as a positive control for prick testing is still in question[42] and differs between the United States[32] and Europe.[77] In this regard, NHANES II data relevant to the size of the cutaneous reaction to 1.0 mg/mL histamine base, as reported in table XI, can serve as reference values for histamine skin testing.

Because development of immediate hypersensitivity follows allergen exposure, the prevalence of immediate hypersensitivity to selected pollen allergens was evaluated with respect to the geographic distribution of the appropriate plants.[53] In all instances, the regions of "dense" and "sparse" pollen exposure are relative, because the plants were not entirely absent in any region.[54] Only ragweed had increased reactivity in areas reported to have high plant density.

Despite the reported differences in the geographic distribution and density of oak trees and Bermuda grass, no differences in the prevalence of skin reactivity to oak and Bermuda grass pollens were found in these regions. This lack of geographic variation in cutaneous reactivity parallels the airborne pollen data for grasses and oak. Similar peak levels of airborne grass and oak pollen have been found in regions with high and low densities of these plants.[54] However, a caution in interpreting pollen counts needs to be stressed. Grass pollen counts reflect all grasses—not just Bermuda grass, and oak pollen counts include data on all species of oak. Thus, regional differences among the species of these plants will be obscured by the pollen counts. In addition, Bermuda grass cross-reacts to some degree with other grasses. Thus, Bermuda grass may contain sufficient allergenic components that cross-react with other grasses[78] to obscure regional differences in the prevalence of Bermuda grass specific allergens. There is little previous study of regional differences in skin-test reactivity to a specific plant among areas with high- and low-pollen densities. Investigators in Sweden have found small differences in skin reactivity to selected tree allergens concordant with the density of the respective tree pollen sources.[79]

The effect of seasonality on prevalence of skin reactivity was examined because boosts in allergen-specific IgE and skin reactivity have been noted in allergic patients following natural exposure to the allergen.[80,81] Oak and ragweed, which have relatively well-defined seasons,[54] were selected for evaluating the effect of season of the year on the prevalence estimates. In neither instance was a statistically significant increase in the prevalence of reactivity noted during the season of exposure (table H). However, for both allergens, a small but statistically insignificant increase was noted in the period of time immediately following the pollen season (table J). This suggests a slight booster effect in skin-test reactivity that lags behind the pollen season, consistent with the immunological observations.[80]

Despite methodologic problems in comparing prevalence estimates of skin reactivity to specific allergens with other epidemiologic studies, the effects of age, race, and sex on prevalence of cutaneous immediate hypersensitivity should be more comparable because they reflect internal comparisons from the same study.

Age had an important influence on immediate hypersensitivity reactions. In general, the 12–24-year-old age group demonstrated peak reactivity to all allergens used in this study. Both the younger and older age groups were less reactive to the allergens tested. Diminished end-organ responsiveness to inflammatory mediators is one contributory mechanism in the decreased prevalence and degree of allergen skin-test reactivity in older individuals because there is age-associated loss of vascular bed, 50 percent reduction of mast cells, 35 percent reduction of venular cross-sections, and a reduction in histamine release observed in the skin of old adults.[82] The overall effect of age on allergen reactivity (greater than 10 percent absolute difference in prevalence at the extremes of age) is not explained solely by the inability of the skin to respond to histamine, because there is little or no decrease in the prevalence of reactivity to histamine with age until after age 55 (table XII), whereas the prevalence of allergen reactivity peaks in the second and third decades of life.

Another explanation for the effect of age on reactivity may be a link between immediate hypersensitivity and survival. In recent studies researchers reported a positive association between IgE levels and cardiovascular disease in men after adjusting for smoking, fasting glucose, blood pressure, and cholesterol.[83] In contrast, Vena et al. reported an inverse association between the reported history of allergic diseases and cancer.[84] However, no scientists have studied the question of survival as related to the presence of immediate hypersensitivity.

Several other studies have reported decreased prevalence of skin reactivity with age.[65,85,86] Peak skin-test reactivity previously has been reported to be highest in the 15–30-year-old age group,[87] 20–34-year-old age group,[86] the first half of the third decade,[58] and in people under the age of 40 years.[65]

Age changes seen in skin-test reactivity parallel the changes seen in IgE levels. The highest total IgE levels are noted in males 6–24 years of age and in females 6–14 years of age with a gradual fall off thereafter.[88] Similarly, the highest allergen specific IgE levels are found between 12 and 20 years of age.[80] The increase in IgE antibody levels during these years may reflect the higher proliferative capacity and number of clonable *T* and *B* cells seen in people 24–35 years of age, declining in later years.[89]

Consistent sex differences in prevalence of skin reactivity were also noted in NHANES II. Males demonstrated a higher prevalence of reactivity than females (22.2 percent versus 18.4 percent, $p<0.05$). However, females had higher rates of reactivity to 1 mg/mL histamine than males (92 percent versus 89.9 percent, $p<0.05$). Thus, the lower reactivity in females does not appear to be due to decreased end-organ reactivity to histamine. Researchers have also reported, in other studies, the tendency for males to have larger skin reactions at lower[56] or equal[61] concentrations of allergen or to have significantly more positive skin tests or a higher rate of reactivity to the allergens tested than females have.[61,90]

The male predominance in allergen skin-test reactivity is in keeping with the higher levels of total IgE[88,90] and earlier manifestations of allergic syndromes in males, with females not equaling the prevalences of males until the third

or fourth decade of life.[91–94] When tables 1–30 are examined for sex differences by age, females do not equal males in skin-test reactivity until approximately 45 years of age. Interestingly, cat and dog were the only allergens in which males and females of all races did not have a statistically significant difference in reactivity. This discrepancy in reactivity may be related to the higher frequency and intensity of domestic pet exposures for females to cat allergens,[95] which partially cross-react with dog allergens.[96] Because house dust may contain many allergens other than cat and dog allergens, such as dust mite and cockroach,[97] which were not included in the battery of skin-test allergens, the higher prevalence of reactivity to house dust among males is not inconsistent with the higher reactivity to cat and dog allergens among females.

No statistically significant differences were found in allergen skin-test reactivity by race, although black persons demonstrated a consistently higher rate of allergic skin reactivity than white persons. These findings are consistent with the observed higher total IgE levels in the U.S. black population versus the U.S. white population.[98] This higher reactivity to allergens in black persons was discordant with the lower degree of skin reactivity to histamine observed in black persons. If the lower rates of histamine reactivity in the black population represent an underreading of the skin-test reactions secondary to skin color, then the increased rates of allergen skin reactivity noted in the black population may be very conservative estimates of much higher prevalence rates of immediate hypersensitivity. Another explanation for the discordance between allergen and skin reactivity may be end-organ unresponsiveness to histamine (one of many inflammatory mediators released in the allergic reaction) in black persons.

Few researchers have compared racial differences in skin-test reactivity in the United States. Lindblad and others[56] found no difference between the races. Freidhoff and others[57] found black persons more reactive than white persons, but the difference reached significance ($p = .046$) only in women reporting allergies.

Socioeconomic factors were correlated with skin-test reactivity. Overall reactivity is greater in persons living at or above the poverty index than in those below the poverty index (21.0 percent versus 15.8 percent, $p<0.05$). Further analysis found overall reactivity increased as education level or family income increased.

Barbee et al.[58] found increasing skin-test reactivity with increasing income levels. Linna[99] found statistically significant increases in reactivity in white-collar children as compared with blue-collar children for grass pollens (in urban dwellers) and tree pollens (in urban and rural dwellers), but also a statistically significant increase in reactivity in blue-collar children for house dust. Reactivity to house dust mite also was found to be associated positively with family size, regardless of income. No controlling for family size was attempted in the Linna analyses. Thus, it is unclear whether the increase in reactivity in blue-collar children is due to larger family sizes.

Urban dwellers were more reactive than rural dwellers (22.0 percent versus 16.5 percent, $p<0.001$). The relationship between location of residency and reactivity was further analyzed by subdividing location into 4 parts: SMSA—central city, SMSA—not central city, not SMSA—not rural, and not SMSA—rural. After controlling for race and income, it appears that the urban hyperreactivity may be located outside of the central city. This suggests that factors in the urban environment, especially outside the central city, may potentiate immunologic (IgE) reactivity to aeroallergens.

Linna[99] found reactivity to tree pollens increased in urban blue-collar dwellers versus rural dwellers ($p<0.0001$) and house dust mite reactivity more common in rural blue-collar versus urban dwellers ($p<0.05$). Again, family size was not controlled for in the house-dust comparison. No differences in skin reactivity were found between white-collar workers in urban versus rural settings. Rhyne as quoted by Smith et al.[100] reported significantly less skin reactivity to ragweed (8.3 percent) and grass (6.7 percent) in rural children than in urban children (15.3 percent and 9.9 percent, respectively). Similarly, comparative studies of rural and urban populations suggest "the same or lower incidence" for rural populations.[100] The cause for this increased prevalence of reactivity in urban populations is not apparent, but may be related to pollutants in the urban environment, urban clustering of families with positive allergic histories, or cultural differences between urban and rural groups that may have an effect on the development of immediate hypersensitivity.

Increasing socioeconomic status (SES) levels as demonstrated by increasing income or education appear to be associated with increasing tendencies to develop cutaneous immediate hypersensitivity. Controlling for urbanization will not erase the effect of income or education on skin-test reactivity. Nor will control of income or education erase the effect of urbanization. This leads one to postulate that the development of cutaneous hypersensitivity may be dependent upon life styles involved in higher SES urbanized environments. It has been noted in animals and humans that exposure to an antigen early in life will promote the development of tolerance to this antigen.[101,102] It is possible that by growing up in an upper SES urbanized environment, exposure to the aeroallergens used for testing is reduced and tolerance is not developed as it would be in a lower SES environment. On the other hand, there may be some environmental factor that is associated with the upper SES lifestyle that makes people more susceptible to the development of hypersensitivity. Further research is needed to answer these questions.

Overall reactivity was examined according to geographic region. The Northeast had the most reactors, with the South containing the lowest number and the West and Midwest being in the middle. These differences could not be explained by the differential reactivity by region to ragweed. Controlling for urbanization, education, and income also could not explain the observed differences. One speculation as to the explanation for the observed differences in reactivity, at least for the outdoor aeroallergens, may be the prevailing winds in the continental United States during the year.[103] The 10-year (1951–60) mean surface wind direction in the United States for the spring (April), summer (July), and fall (October) was such that the prevailing winds in the Northeast were either from the South or the West; whereas in the South the prevailing

winds were from the Gulf of Mexico or the Atlantic Ocean. Thus, an individual in the Northeast would be exposed to heavier and more persistent aeroallergen loads secondary to pollens carried into the the Northeast from the West and South by the prevailing winds. In the South, on the other hand, an individual would be exposed to a lighter load of pollen because of the prevailing winds coming over large bodies of water where little pollen exists. This differential pollen exposure could be a partial explanation for the differing levels of reactivity in different geographic regions. A full exploration of these regional differences will require further study.

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Table 1. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to house dust allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,519	6.2	0.66	89.9	3.9	3.3	2.3	0.6	–
6–11 years	1,623	5.2	0.82	90.4	4.4	3.7	1.3	0.2	–
12–17 years	1,897	6.5	0.86	89.2	4.3	3.7	2.5	0.4	–
18–24 years	1,961	10.0	1.43	86.2	3.8	5.2	3.7	1.0	0.1
25–34 years	2,155	8.5	0.92	87.6	3.9	4.7	2.9	0.8	–
35–44 years	1,522	6.8	1.06	89.4	3.8	2.7	3.1	1.0	0.1
45–54 years	1,388	3.3	0.58	91.8	4.9	1.5	1.4	0.4	–
55–64 years	2,464	3.3	0.58	93.9	2.8	1.9	1.0	0.5	–
65–74 years	2,509	2.2	0.41	94.5	3.3	1.4	0.7	0.1	–
White									
All ages	13,267	5.9	0.58	90.3	3.8	3.1	2.1	0.6	–
6–11 years	1,317	4.7	0.70	91.3	4.0	3.1	1.4	0.2	–
12–17 years	1,545	6.2	0.89	90.0	3.8	3.3	2.6	0.3	–
18–24 years	1,663	9.5	1.30	86.7	3.8	4.8	3.5	1.2	0.1
25–34 years	1,831	8.0	0.86	88.4	3.6	4.7	2.6	0.8	–
35–44 years	1,321	6.6	1.10	89.2	4.2	2.7	2.8	1.0	0.1
45–54 years	1,209	3.4	0.64	91.5	5.0	1.5	1.5	0.4	–
55–64 years	2,183	3.3	0.62	93.8	2.9	1.9	0.9	0.5	–
65–74 years	2,198	2.0	0.41	94.6	3.4	1.2	0.7	0.1	–
Black									
All ages	1,942	7.2	1.83	89.0	3.7	4.7	2.4	0.2	–
6–11 years	268	5.8	1.60	88.1	6.1	4.3	1.1	0.3	–
12–17 years	308	8.0	2.34	86.6	5.4	5.9	1.4	0.7	–
18–24 years	251	13.5	4.63	83.0	3.5	8.9	4.6	–	–
25–34 years	272	8.9	2.57	87.3	3.8	6.1	2.8	–	–
35–44 years	166	*6.8	*2.53	91.7	1.5	2.0	4.8	–	–
45–54 years	155	*1.9	*1.15	94.9	3.2	0.8	1.1	–	–
55–64 years	253	*3.7	*1.44	94.4	1.8	2.4	1.3	–	–
65–74 years	269	*2.7	*1.07	94.8	2.4	2.5	0.2	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 2. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to house dust allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,534	6.8	0.79	89.0	4.2	3.2	2.7	0.8	0.1
6–11 years	823	6.7	1.15	88.5	4.9	4.3	2.0	0.4	–
12–17 years	999	6.8	0.92	88.6	4.6	3.8	2.7	0.3	–
18–24 years	943	11.0	1.83	85.4	3.6	5.0	4.3	1.6	0.1
25–34 years	1,038	9.7	1.26	86.4	3.9	4.7	4.0	0.9	0.1
35–44 years	718	7.7	1.48	87.2	5.1	2.1	4.1	1.4	0.1
45–54 years	663	3.3	0.92	92.4	4.3	1.3	1.3	0.7	–
55–64 years	1,187	2.6	0.80	94.2	3.1	1.4	0.5	0.7	0.1
65–74 years	1,163	2.1	0.54	94.1	3.8	1.3	0.7	0.1	–
White									
All ages	6,469	6.5	0.65	89.4	4.1	2.9	2.6	0.9	0.1
6–11 years	675	6.3	1.05	89.3	4.5	3.5	2.3	0.5	–
12–17 years	818	6.4	0.99	89.8	3.9	3.3	2.9	0.2	–
18–24 years	811	10.2	1.70	85.7	4.1	4.3	4.0	1.8	0.1
25–34 years	879	9.2	1.19	87.2	3.6	4.6	3.6	0.9	0.1
35–44 years	626	7.4	1.53	86.9	5.7	2.2	3.7	1.4	0.1
45–54 years	594	3.6	1.03	92.0	4.5	1.3	1.5	0.8	–
55–64 years	1,049	2.7	0.87	94.0	3.3	1.4	0.4	0.7	0.1
65–74 years	1,017	2.0	0.58	94.3	3.7	1.1	0.7	0.1	–
Black									
All ages	898	*7.9	*2.41	88.4	3.7	5.2	2.5	0.2	–
6–11 years	125	*5.9	*2.60	88.6	5.5	5.4	0.5	–	–
12–17 years	152	*8.5	*3.14	83.7	7.8	6.4	1.1	1.0	–
18–24 years	112	*17.5	*6.69	82.1	0.4	10.0	7.5	–	–
25–34 years	132	*8.5	*3.23	87.7	3.7	6.8	1.7	–	–
35–44 years	70	*7.8	*4.18	90.5	1.7	2.1	5.7	–	–
45–54 years	60	*1.1	*0.96	95.1	3.8	1.1	–	–	–
55–64 years	126	*3.0	*1.79	95.9	1.1	1.4	1.6	–	–
65–74 years	121	*3.5	*2.44	94.4	2.1	3.0	0.5	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 3. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to house dust allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,985	5.6	0.63	90.7	3.7	3.4	1.8	0.4	-
6–11 years	800	3.8	0.86	92.3	3.9	3.0	0.7	0.1	-
12–17 years	898	6.2	1.14	89.8	4.0	3.6	2.2	0.4	-
18–24 years	1,018	9.1	1.38	86.9	4.0	5.4	3.2	0.4	-
25–34 years	1,117	7.4	0.97	88.8	3.8	4.7	1.9	0.7	-
35–44 years	804	6.0	1.03	91.5	2.6	3.2	2.2	0.6	-
45–54 years	725	3.4	0.66	91.2	5.4	1.7	1.5	0.1	-
55–64 years	1,277	4.0	0.80	93.6	2.5	2.3	1.4	0.3	-
65–74 years	1,346	2.2	0.53	94.8	3.0	1.4	0.7	0.1	-
White									
All ages	6,798	5.3	0.61	91.1	3.6	3.2	1.7	0.4	-
6–11 years	642	3.2	0.83	93.4	3.5	2.7	0.5	-	-
12–17 years	727	6.0	1.23	90.3	3.7	3.4	2.2	0.4	-
18–24 years	852	8.7	1.37	87.7	3.6	5.2	3.0	0.5	-
25–34 years	952	6.9	0.91	89.5	3.5	4.7	1.5	0.7	-
35–44 years	695	5.8	1.11	71.4	2.8	3.1	2.0	0.7	-
45–54 years	615	3.3	0.71	91.1	5.5	1.7	1.5	0.1	-
55–64 years	1,134	3.9	0.86	93.6	2.5	2.3	1.3	0.3	-
65–74 years	1,181	2.0	0.51	94.9	3.1	1.3	0.7	0.1	-
Black									
All ages	1,044	6.7	1.56	89.5	3.8	4.2	2.3	0.2	-
6–11 years	143	*5.7	*2.20	87.6	6.7	3.3	1.8	0.7	-
12–17 years	156	7.5	2.19	89.6	2.9	5.3	1.7	0.5	-
18–24 years	139	*10.3	*4.46	83.7	6.0	8.0	2.3	-	-
25–34 years	140	9.2	2.88	87.0	3.8	5.5	3.7	-	-
35–44 years	96	*6.0	*2.08	92.7	1.4	1.9	4.0	-	-
45–54 years	95	*2.6	*2.04	94.8	2.6	0.6	2.0	-	-
55–64 years	127	*4.4	*1.68	93.1	2.6	3.3	1.1	-	-
65–74 years	148	*2.2	*0.91	95.2	2.6	2.2	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 4. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to alternaria allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,543	3.6	0.26	95.1	1.3	1.5	1.5	0.5	0.2
6–11 years	1,624	5.1	0.58	92.9	2.0	2.8	1.9	0.2	0.1
12–17 years	1,898	6.4	0.79	92.3	1.3	3.0	2.6	0.6	0.2
18–24 years	1,967	5.3	0.66	93.7	1.0	1.9	2.4	0.9	0.2
25–34 years	2,161	3.4	0.55	95.4	1.2	1.3	1.3	0.6	0.2
35–44 years	1,525	3.7	0.65	95.2	1.2	1.0	1.2	1.1	0.4
45–54 years	1,389	1.8	0.50	97.0	1.2	1.0	0.6	0.1	0.1
55–64 years	2,465	1.2	0.35	97.6	1.2	0.2	0.8	0.1	–
65–74 years	2,514	0.6	0.17	98.3	1.1	0.3	0.3	–	–
White									
All ages	13,287	3.5	0.27	95.2	1.3	1.4	1.4	0.5	0.2
6–11 years	1,319	4.7	0.58	93.4	1.9	2.6	1.7	0.3	0.1
12–17 years	1,545	6.0	0.90	92.8	1.2	2.4	2.7	0.6	0.3
18–24 years	1,669	5.3	0.65	93.8	0.9	1.9	2.3	0.9	0.2
25–34 years	1,834	3.4	0.64	95.4	1.2	1.1	1.3	0.7	0.3
35–44 years	1,324	3.9	0.67	94.9	1.3	1.0	1.3	1.1	0.4
45–54 years	1,210	1.8	0.55	96.8	1.4	1.1	0.5	0.2	0.1
55–64 years	2,184	1.2	0.38	97.5	1.4	0.2	0.9	0.1	–
65–74 years	2,202	0.6	0.18	98.3	1.1	0.2	0.3	–	–
Black									
All ages	1,945	4.0	0.46	94.9	1.1	2.1	1.5	0.4	–
6–11 years	267	*7.0	*2.49	90.3	2.7	4.5	2.5	–	–
12–17 years	309	7.7	1.44	90.4	1.9	5.6	1.7	0.4	–
18–24 years	251	*3.8	*1.41	94.5	1.8	0.9	2.1	0.7	–
25–34 years	275	3.5	0.82	95.8	0.7	2.0	1.5	–	–
35–44 years	166	*2.3	*1.29	97.7	–	0.4	0.3	1.6	–
45–54 years	155	*1.8	*1.24	98.2	–	–	1.8	–	–
55–64 years	253	*1.4	*0.69	98.6	–	0.8	0.2	0.4	–
65–74 years	269	–	–	99.7	0.3	–	–	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 5. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6-74 years, to alternaria allergen, by race and age: United States, 1976-80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1-10.4 mm (+/-)	10.5-20.4 mm (1+)	20.5-30.4 mm (2+)	30.5-40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,546	4.1	0.39	94.6	1.3	1.8	1.4	0.6	0.2
6-11 years	823	6.7	1.03	91.5	1.8	3.2	3.0	0.4	0.2
12-17 years	999	7.1	1.08	91.6	1.3	3.9	2.4	0.7	0.2
18-24 years	945	5.7	0.95	92.9	1.4	2.2	2.4	0.9	0.2
25-34 years	1,042	3.6	0.59	95.3	1.1	1.3	1.0	0.8	0.4
35-44 years	721	4.6	0.95	93.8	1.5	1.4	1.0	1.7	0.6
45-54 years	663	*1.5	*0.81	97.5	1.0	1.3	-	0.1	-
55-64 years	1,187	*1.3	*0.48	97.7	1.0	0.3	0.9	0.1	-
65-74 years	1,166	*0.3	*0.19	98.4	1.2	0.1	0.1	-	0.1
White									
All ages	6,478	3.9	0.41	94.8	1.3	1.6	1.4	0.7	0.3
6-11 years	676	5.9	0.84	92.4	1.7	2.8	2.5	0.5	0.2
12-17 years	817	6.1	1.13	92.6	1.3	2.7	2.5	0.7	0.3
18-24 years	813	6.1	1.06	92.7	1.2	2.4	2.5	0.9	0.2
25-34 years	881	3.4	0.62	95.4	1.2	1.1	1.0	0.9	0.5
35-44 years	629	4.8	1.03	93.5	1.6	1.3	1.1	1.6	0.7
45-54 years	594	*1.7	*0.91	97.2	1.1	1.5	-	0.2	-
55-64 years	1,049	*1.3	*0.52	97.6	1.2	0.2	1.0	-	-
65-74 years	1,019	*0.4	*0.21	98.4	1.2	0.1	0.1	-	0.1
Black									
All ages	900	5.0	1.05	94.0	0.9	3.0	1.5	0.5	-
6-11 years	124	*10.9	*5.42	87.2	1.9	6.3	4.6	-	-
12-17 years	153	9.9	2.15	88.4	1.6	8.0	1.2	0.7	-
18-24 years	112	*2.8	*1.23	94.8	2.4	0.7	2.1	-	-
25-34 years	134	*4.5	*2.13	95.4	-	2.5	2.0	-	-
35-44 years	70	*2.7	*2.54	97.3	-	-	-	2.7	-
45-54 years	60	-	-	100.0	-	-	-	-	-
55-64 years	126	*2.0	*1.26	98.0	-	1.1	-	0.9	-
65-74 years	121	-	-	100.0	-	-	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 6. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to alternaria allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,997	3.2	0.29	95.6	1.2	1.2	1.5	0.4	0.1
6–11 years	801	3.4	0.75	94.4	2.2	2.5	0.9	0.1	–
12–17 years	899	5.7	1.02	93.1	1.2	2.1	2.9	0.5	0.2
18–24 years	1,022	5.0	0.85	94.4	0.6	1.5	2.3	0.9	0.2
25–34 years	1,119	3.2	0.95	95.4	1.4	1.2	1.6	0.4	0.1
35–44 years	804	2.8	0.78	96.4	0.8	0.7	1.4	0.5	0.2
45–54 years	726	2.1	0.61	96.5	1.4	0.6	1.2	0.1	0.2
55–64 years	1,278	1.0	0.44	97.5	1.4	0.2	0.7	0.1	–
65–74 years	1,348	*0.8	*0.30	98.3	0.9	0.4	0.5	–	–
White									
All ages	6,809	3.1	0.32	95.6	1.2	1.1	1.5	0.4	0.1
6–11 years	643	3.5	0.88	94.4	2.1	2.5	1.0	0.1	–
12–17 years	728	5.9	1.12	93.0	1.0	2.0	3.0	0.6	0.3
18–24 years	856	4.5	0.75	94.9	0.6	1.3	2.1	0.9	0.2
25–34 years	953	3.3	1.05	95.4	1.2	1.2	1.7	0.4	0.1
35–44 years	695	3.0	0.89	96.1	1.0	0.7	1.5	0.6	0.2
45–54 years	616	2.0	0.65	96.4	1.6	0.7	0.9	0.2	0.2
55–64 years	1,135	*1.1	*0.49	97.3	1.6	0.2	0.8	0.2	–
65–74 years	1,183	*0.8	*0.31	98.2	1.0	0.3	0.5	–	–
Black									
All ages	1,045	3.1	0.60	95.6	1.3	1.4	1.4	0.3	–
6–11 years	143	*3.3	*1.63	93.3	3.4	2.8	0.6	–	–
12–17 years	156	*5.4	*1.94	92.4	2.2	3.2	2.2	–	–
18–24 years	139	*4.5	*2.26	94.2	1.3	1.0	2.2	1.3	–
25–34 years	141	*2.6	*1.69	96.1	1.3	1.5	1.1	–	–
35–44 years	96	*1.9	*1.09	98.1	–	0.7	0.6	0.6	–
45–54 years	95	*3.4	*2.32	96.6	–	–	3.4	–	–
55–64 years	127	*0.8	*0.46	99.2	–	0.4	0.4	–	–
65–74 years	148	–	–	99.4	0.6	–	–	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 7. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to cat allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,474	2.3	0.26	96.0	1.7	1.2	1.0	0.2	-
6–11 years	1,617	1.6	0.37	97.2	1.2	1.1	0.4	-	-
12–17 years	1,888	2.2	0.49	96.4	1.4	0.9	1.2	0.1	-
18–24 years	1,948	4.0	0.50	94.3	1.7	2.0	1.7	0.3	-
25–34 years	2,150	3.4	0.55	94.1	2.4	1.7	1.4	0.4	-
35–44 years	1,515	2.7	0.46	96.3	1.1	1.0	1.4	0.3	-
45–54 years	1,382	1.7	0.35	96.1	2.2	1.1	0.6	-	0.1
55–64 years	2,461	*0.7	*0.26	98.0	1.3	0.6	0.1	-	-
65–74 years	2,531	0.6	0.17	97.7	1.7	0.4	0.1	-	-
White									
All ages	13,229	2.2	0.27	96.1	1.7	1.1	0.9	0.2	-
6–11 years	1,313	1.6	0.41	97.2	1.2	1.2	0.4	-	-
12–17 years	1,537	2.2	0.52	96.4	1.4	0.8	1.3	0.1	-
18–24 years	1,653	4.1	0.52	94.3	1.7	2.1	1.6	0.3	-
25–34 years	1,825	3.2	0.55	94.5	2.3	1.6	1.4	0.3	-
35–44 years	1,315	2.6	0.49	96.3	1.2	0.9	1.3	0.4	-
45–54 years	1,205	1.4	0.35	96.3	2.3	0.7	0.6	-	0.1
55–64 years	2,180	*0.8	*0.30	97.8	1.4	0.7	0.1	-	-
65–74 years	2,201	0.6	0.18	97.6	1.8	0.4	0.1	-	-
Black									
All ages	1,939	2.4	0.53	96.4	1.2	1.3	0.9	0.2	-
6–11 years	267	*1.9	*0.90	96.9	1.3	1.2	0.7	-	-
12–17 years	306	*1.9	*0.95	96.7	1.4	1.3	0.6	-	-
18–24 years	248	*3.6	*1.31	94.3	2.1	1.3	1.9	0.3	-
25–34 years	273	*3.4	*1.30	95.2	1.3	1.6	1.1	0.7	-
35–44 years	166	*1.0	*1.05	98.4	0.6	-	1.0	-	-
45–54 years	155	*5.0	*2.34	94.1	0.9	4.6	0.4	-	-
55–64 years	253	*0.2	*0.19	99.0	0.8	-	0.2	-	-
65–74 years	269	-	-	99.7	0.3	-	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 8. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to cat allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,518	2.2	0.30	96.0	1.8	1.2	0.8	0.1	-
6–11 years	821	1.6	0.38	97.1	1.3	1.2	0.4	0.1	-
12–17 years	995	1.5	0.44	97.5	1.1	0.8	0.7	-	-
18–24 years	937	4.4	0.85	93.9	1.7	2.3	1.7	0.3	0.1
25–34 years	1,036	3.5	0.71	93.8	2.7	2.0	1.4	-	-
35–44 years	716	2.0	0.58	96.5	1.5	0.4	1.0	0.6	-
45–54 years	661	*1.8	*0.70	96.3	1.9	1.2	0.6	-	-
55–64 years	1,186	*0.4	*0.27	97.9	1.7	0.4	-	-	-
65–74 years	1,166	*0.2	*0.15	97.9	1.9	0.1	-	-	0.1
White									
All ages	6,455	2.2	0.32	96.1	1.8	1.2	0.8	0.1	-
6–11 years	674	1.9	0.48	96.8	1.3	1.4	0.4	0.1	-
12–17 years	815	*1.4	*0.43	97.3	1.3	0.6	0.8	-	-
18–24 years	807	4.5	0.90	93.8	1.7	2.5	1.7	0.3	0.1
25–34 years	876	3.4	0.84	94.3	2.4	1.9	1.4	0.1	-
35–44 years	624	1.7	0.48	96.5	1.8	0.4	0.6	0.7	-
45–54 years	592	*1.7	*0.77	96.3	1.9	1.1	0.7	-	-
55–64 years	1,048	*0.4	*0.31	97.8	1.8	0.4	-	-	-
65–74 years	1,019	*0.2	*0.17	97.7	2.0	0.1	-	-	0.1
Black									
All ages	896	2.0	0.68	96.9	1.1	1.1	0.7	0.1	-
6–11 years	124	*0.5	*0.57	97.6	1.8	0.5	-	-	-
12–17 years	152	*0.5	*0.48	99.5	-	0.5	-	-	-
18–24 years	110	*4.3	*2.31	93.3	2.5	1.5	2.1	0.7	-
25–34 years	133	*4.1	*1.54	94.9	1.0	3.2	0.9	-	-
35–44 years	70	*2.1	*2.31	97.9	-	-	2.1	-	-
45–54 years	60	*2.4	*1.38	95.7	1.9	2.4	-	-	-
55–64 years	126	-	-	98.4	1.6	-	-	-	-
65–74 years	121	-	-	100.0	-	-	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 9. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to cat allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,956	2.5	0.27	96.0	1.6	1.2	1.1	0.2	-
6–11 years	769	*1.6	*0.51	97.3	1.1	1.1	0.5	-	-
12–17 years	893	2.9	0.83	95.4	1.7	1.1	1.7	0.1	-
18–24 years	1,011	3.7	0.53	94.6	1.6	1.7	1.7	0.3	-
25–34 years	1,114	3.4	0.66	94.4	2.2	1.3	1.3	0.8	-
35–44 years	799	3.3	0.73	96.1	0.6	1.6	1.7	0.1	-
45–54 years	721	*1.7	*0.55	95.9	2.4	1.0	0.6	-	0.1
55–64 years	1,275	*1.1	*0.37	98.0	0.9	0.8	0.3	-	-
65–74 years	1,347	0.9	0.28	97.6	1.4	0.7	0.2	-	-
White									
All ages	6,774	2.3	0.28	96.1	1.6	1.1	1.1	0.2	-
6–11 years	639	*1.3	*0.58	97.5	1.2	1.0	0.3	-	-
12–17 years	722	3.0	0.91	95.5	1.5	0.9	1.9	0.2	-
18–24 years	846	3.6	0.61	94.7	1.7	1.7	1.5	0.4	-
25–34 years	949	3.1	0.59	94.7	2.2	1.3	1.3	0.5	-
35–44 years	691	3.3	0.77	96.1	0.5	1.3	1.9	0.1	-
45–54 years	613	*1.1	*0.40	96.2	2.7	0.3	0.6	-	0.2
55–64 years	1,132	*1.1	*0.42	97.8	1.0	0.9	0.3	-	-
65–74 years	1,182	0.9	0.29	97.5	1.6	0.7	0.2	-	-
Black									
All ages	1,043	2.7	0.60	96.0	1.3	1.5	1.0	0.2	-
6–11 years	143	*3.1	*1.65	96.1	0.7	1.8	1.4	-	-
12–17 years	156	*3.3	*1.80	93.9	2.9	2.1	1.1	-	-
18–24 years	138	3.1	0.92	95.1	1.9	1.2	1.9	-	-
25–34 years	140	*2.9	*1.55	95.5	1.6	0.4	1.3	1.2	-
35–44 years	96	-	-	98.8	1.2	-	-	-	-
45–54 years	95	*7.2	*4.18	92.8	-	6.4	0.8	-	-
55–64 years	127	*0.4	*0.36	99.6	-	-	0.4	-	-
65–74 years	148	-	-	99.6	0.4	-	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 10. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to dog allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,465	2.3	0.25	96.0	1.7	1.3	0.9	0.2	–
6–11 years	1,618	1.4	0.36	97.3	1.3	1.0	0.4	–	–
12–17 years	1,885	2.3	0.44	96.1	1.6	1.4	0.5	0.4	–
18–24 years	1,951	4.0	0.55	94.3	1.7	2.3	1.6	0.1	–
25–34 years	2,148	3.3	0.58	94.7	2.0	1.6	1.5	0.2	–
35–44 years	1,513	2.9	0.57	94.9	2.2	1.1	1.3	0.5	–
45–54 years	1,381	1.4	0.34	96.6	2.0	0.9	0.4	0.1	–
55–64 years	2,458	0.9	0.24	98.1	1.1	0.6	0.2	–	–
65–74 years	2,511	*0.6	*0.22	97.7	1.6	0.3	0.3	–	–
White									
All ages	13,225	2.2	0.24	96.1	1.8	1.2	0.8	0.2	–
6–11 years	1,314	1.4	0.36	97.5	1.2	0.9	0.4	–	–
12–17 years	1,533	2.1	0.46	96.3	1.6	1.2	0.4	0.5	–
18–24 years	1,656	4.1	0.54	94.4	1.5	2.5	1.5	0.1	–
25–34 years	1,825	2.9	0.51	95.0	2.1	1.3	1.5	0.2	–
35–44 years	1,315	2.5	0.54	94.9	2.5	1.1	1.1	0.3	–
45–54 years	1,205	1.3	0.36	96.6	2.1	0.8	0.4	0.1	–
55–64 years	2,177	0.9	0.25	98.0	1.2	0.6	0.2	–	–
65–74 years	2,200	*0.6	*0.23	97.6	1.7	0.3	0.3	–	–
Black									
All ages	1,934	2.7	0.77	96.2	1.1	1.6	0.9	0.1	–
6–11 years	267	*0.8	*0.63	97.6	1.6	0.8	–	–	–
12–17 years	309	*3.6	*1.29	95.6	0.9	2.8	0.8	–	–
18–24 years	248	*3.6	*1.45	94.6	1.7	1.6	2.0	–	–
25–34 years	271	*4.3	*1.71	94.6	1.2	2.5	1.5	0.2	–
35–44 years	164	*3.5	*1.53	96.2	0.4	0.8	1.7	1.0	–
45–54 years	154	*2.6	*1.28	95.7	1.7	2.6	–	–	–
55–64 years	253	*0.6	*0.53	99.4	–	0.4	0.2	–	–
65–74 years	268	–	–	99.1	0.9	–	–	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 11. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to dog allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,510	2.3	0.31	95.7	2.0	1.1	1.0	0.2	–
6–11 years	821	2.1	0.68	96.2	1.6	1.5	0.7	–	–
12–17 years	992	1.8	0.43	96.7	1.5	0.8	0.6	0.4	–
18–24 years	939	4.4	0.80	93.8	1.8	2.3	2.0	0.2	–
25–34 years	1,036	3.4	0.70	94.0	2.6	1.4	1.8	0.2	–
35–44 years	713	3.0	0.80	94.7	2.2	0.6	1.8	0.6	–
45–54 years	659	*0.9	*0.42	96.2	2.9	0.8	0.1	–	–
55–64 years	1,184	*0.7	*0.31	98.2	1.1	0.6	0.1	–	–
65–74 years	1,166	*0.4	*0.20	98.1	1.6	0.3	0.1	–	–
White									
All ages	6,450	2.3	0.30	95.6	2.1	1.2	1.0	0.2	–
6–11 years	674	2.1	0.67	96.5	1.4	1.3	0.8	–	–
12–17 years	811	2.0	0.51	96.7	1.4	0.8	0.6	0.5	–
18–24 years	809	4.7	0.86	93.7	1.6	2.6	1.9	0.2	–
25–34 years	877	3.3	0.73	93.8	3.0	1.3	1.8	0.2	–
35–44 years	623	*2.4	*0.82	94.9	2.6	0.7	1.5	0.2	–
45–54 years	591	*0.9	*0.46	96.1	3.0	0.8	0.2	–	–
55–64 years	1,046	*0.7	*0.34	98.0	1.2	0.6	0.1	–	–
65–74 years	1,019	*0.4	*0.22	97.8	1.8	0.3	0.1	–	–
Black									
All ages	893	*1.7	*0.78	97.2	1.1	0.7	0.6	0.3	–
6–11 years	124	*1.0	*1.09	96.9	2.1	1.0	–	–	–
12–17 years	153	*0.9	*0.17	98.5	0.6	0.5	0.5	–	–
18–24 years	110	*2.7	*1.43	95.1	2.2	0.5	2.2	–	–
25–34 years	132	*2.2	*1.17	97.4	0.4	1.7	–	0.5	–
35–44 years	68	*3.9	*2.89	96.1	–	–	1.8	2.1	–
45–54 years	59	*1.1	*0.97	96.0	2.8	1.1	–	–	–
55–64 years	126	*0.5	*0.45	99.5	–	0.5	–	–	–
65–74 years	121	–	–	100.0	–	–	–	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 12. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to dog allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,955	2.3	0.24	96.3	1.5	1.4	0.7	0.1	-
6–11 years	797	0.6	0.30	98.4	0.9	0.6	0.1	-	-
12–17 years	893	2.8	0.74	95.5	1.7	2.0	0.4	0.4	-
18–24 years	1,012	3.6	0.57	94.9	1.6	2.3	1.2	0.1	-
25–34 years	1,112	3.2	0.76	95.3	1.4	1.8	1.3	0.1	-
35–44 years	800	2.8	0.65	95.0	2.2	1.6	0.9	0.3	-
45–54 years	722	1.8	0.44	97.0	1.2	1.1	0.6	0.1	-
55–64 years	1,274	1.0	0.33	98.0	1.0	0.6	0.3	0.1	-
65–74 years	1,345	0.8	0.36	97.5	1.7	0.4	0.4	-	-
White									
All ages	6,775	2.0	0.22	96.5	1.5	1.2	0.7	0.2	-
6–11 years	640	0.7	0.33	98.4	0.9	0.6	0.1	-	-
12–17 years	722	2.3	0.72	95.9	1.9	1.5	0.3	0.5	-
18–24 years	847	3.6	0.53	95.0	1.4	2.4	1.1	0.1	-
25–34 years	948	2.5	0.62	96.2	1.2	1.3	1.2	0.1	-
35–44 years	692	2.6	0.70	94.9	2.5	1.5	0.8	0.4	-
45–54 years	614	1.6	0.42	97.1	1.2	0.8	0.7	0.2	-
55–64 years	1,131	*1.0	*0.36	97.9	1.1	0.6	0.3	-	-
65–74 years	1,181	*0.8	*0.38	97.5	1.7	0.3	0.5	-	-
Black									
All ages	1,041	3.6	0.94	95.3	1.1	2.4	1.2	-	-
6–11 years	143	*0.7	*0.72	98.2	1.1	0.7	-	-	-
12–17 years	156	*6.2	*2.51	92.6	1.2	5.2	1.1	-	-
18–24 years	138	*4.3	*1.75	94.3	1.4	2.4	1.9	-	-
25–34 years	139	*5.9	*2.48	92.4	1.7	3.2	2.7	-	-
35–44 years	96	*3.1	*1.58	96.2	0.7	1.4	1.7	-	-
45–54 years	95	*3.9	*2.32	95.3	0.8	3.9	-	-	-
55–64 years	127	*0.7	*0.61	99.3	-	0.3	0.4	-	-
65–74 years	147	-	-	98.5	1.5	-	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 13. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to oak allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,507	4.7	0.36	92.7	2.6	2.0	1.7	0.8	0.2
6–11 years	1,626	3.9	0.60	93.9	2.2	2.6	0.8	0.3	0.1
12–17 years	1,890	6.0	0.93	91.4	2.6	2.8	2.1	1.0	0.1
18–24 years	1,961	7.7	0.91	89.5	2.8	3.3	2.5	1.5	0.4
25–34 years	2,152	4.7	0.48	92.4	2.9	1.7	1.7	1.1	0.3
35–44 years	1,524	5.7	0.76	91.4	2.8	1.8	2.5	1.0	0.4
45–54 years	1,383	3.8	0.73	94.4	1.8	1.4	1.6	0.5	0.2
55–64 years	2,462	2.5	0.45	95.1	2.4	1.1	0.8	0.5	-
65–74 years	2,509	1.3	0.27	95.8	2.9	0.6	0.6	0.2	-
White									
All ages	13,265	4.5	0.33	92.9	2.6	1.9	1.7	0.8	0.2
6–11 years	1,321	3.5	0.61	94.5	2.1	2.6	0.4	0.3	0.1
12–17 years	1,541	5.7	0.85	91.4	2.9	2.8	2.0	0.9	-
18–24 years	1,664	7.4	0.88	89.8	2.8	3.1	2.5	1.5	0.3
25–34 years	1,827	4.5	0.54	92.7	2.8	1.7	1.7	1.0	0.2
35–44 years	1,324	5.5	0.77	91.7	2.8	1.4	2.5	1.2	0.3
45–54 years	1,207	3.8	0.77	94.3	1.9	1.2	1.9	0.5	0.2
55–64 years	2,182	2.5	0.53	95.1	2.3	1.1	0.9	0.6	-
65–74 years	2,199	1.1	0.24	95.9	2.9	0.5	0.5	0.2	-
Black									
All ages	1,932	5.8	1.23	92.1	2.1	2.6	1.8	0.9	0.5
6–11 years	267	5.5	1.56	92.2	2.2	2.1	2.6	0.5	0.3
12–17 years	306	7.8	2.27	90.3	1.9	3.1	2.4	2.0	0.3
18–24 years	250	10.4	2.81	88.5	1.0	5.4	2.2	1.8	1.1
25–34 years	273	*4.9	*1.69	91.1	4.0	1.6	1.5	1.3	0.6
35–44 years	165	*6.1	*2.35	91.3	2.5	2.2	3.1	-	0.8
45–54 years	152	*2.4	*1.28	97.2	0.4	2.4	-	-	-
55–64 years	252	*2.2	*1.19	96.1	1.7	1.9	0.4	-	-
65–74 years	267	*1.8	*0.90	95.9	2.3	1.0	0.9	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 14. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to oak allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,531	5.4	0.43	92.0	2.6	2.3	1.9	1.0	0.2
6–11 years	825	4.0	0.83	93.3	2.8	3.1	0.5	0.4	–
12–17 years	993	6.7	1.11	91.4	1.9	3.0	2.3	1.3	0.1
18–24 years	943	9.4	1.30	87.1	3.6	3.6	3.4	2.1	0.3
25–34 years	1,037	5.8	0.75	91.5	2.6	2.2	2.0	1.3	0.4
35–44 years	721	6.7	0.96	90.4	3.0	2.8	2.3	1.3	0.3
45–54 years	661	4.4	1.20	94.2	1.4	1.3	2.3	0.7	–
55–64 years	1,186	1.6	0.45	95.9	2.6	0.8	0.5	0.3	–
65–74 years	1,165	1.3	0.39	95.8	2.9	0.7	0.4	0.2	–
White									
All ages	6,469	5.3	0.43	92.1	2.7	2.2	1.9	1.1	0.1
6–11 years	678	3.7	0.85	93.2	3.1	3.0	0.3	0.4	–
12–17 years	813	6.3	0.93	91.9	1.9	2.8	2.2	1.2	0.1
18–24 years	812	9.8	1.43	86.7	3.6	3.9	3.3	2.1	0.4
25–34 years	878	5.6	0.83	91.7	2.7	2.1	1.9	1.3	0.4
35–44 years	629	6.4	1.19	90.7	3.0	2.3	2.4	1.5	0.1
45–54 years	593	4.5	1.31	93.9	1.5	1.1	2.6	0.8	–
55–64 years	1,048	1.7	0.50	95.8	2.5	0.8	0.6	0.3	–
65–74 years	1,018	*1.0	*0.36	96.0	3.0	0.4	0.4	0.2	–
Black									
All ages	895	5.9	1.45	92.6	1.5	2.6	2.1	0.7	0.5
6–11 years	124	*4.3	*1.96	94.3	1.4	2.1	2.1	–	–
12–17 years	152	10.1	3.20	87.3	2.6	4.6	2.8	2.0	0.6
18–24 years	111	*8.2	*2.63	90.4	1.4	1.9	4.3	2.0	–
25–34 years	132	*5.9	*2.22	91.3	2.8	2.3	2.3	0.5	0.9
35–44 years	70	*8.7	*3.64	90.3	1.0	4.8	2.1	–	1.7
45–54 years	59	*1.1	*0.97	98.9	–	1.1	–	–	–
55–64 years	126	*0.4	*0.39	99.6	–	0.4	–	–	–
65–74 years	121	*2.1	*1.63	96.8	1.2	1.4	0.7	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 15. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to oak allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,976	4.1	0.38	93.4	2.6	1.7	1.5	0.6	0.2
6–11 years	801	3.8	0.95	94.6	1.6	2.2	1.0	0.3	0.2
12–17 years	897	5.2	1.19	91.4	3.4	2.6	1.9	0.8	-
18–24 years	1,018	6.1	0.84	91.9	2.0	3.0	1.7	1.0	0.5
25–34 years	1,115	3.6	0.56	93.3	3.2	1.2	1.4	0.8	0.1
35–44 years	803	4.9	0.95	92.4	2.7	0.9	2.7	0.8	0.5
45–54 years	722	3.2	0.87	94.6	2.2	1.5	1.0	0.3	0.3
55–64 years	1,276	3.3	0.75	94.4	2.3	1.5	1.1	0.7	-
65–74 years	1,344	1.4	0.32	95.8	2.8	0.5	0.6	0.2	-
White									
All ages	6,796	3.8	0.35	93.7	2.5	1.6	1.4	0.6	0.2
6–11 years	643	3.2	0.91	95.8	1.0	2.3	0.6	0.2	0.2
12–17 years	728	5.2	1.32	90.9	3.8	2.8	1.9	0.6	-
18–24 years	852	5.2	0.81	92.8	2.0	2.3	1.8	0.9	0.2
25–34 years	949	3.5	0.59	93.7	2.8	1.3	1.4	0.7	0.1
35–44 years	695	4.6	0.89	92.7	2.7	0.6	2.6	0.9	0.6
45–54 years	614	3.1	0.78	94.6	2.3	1.3	1.2	0.2	0.4
55–64 years	1,134	3.3	0.89	94.5	2.2	1.4	1.2	0.8	-
65–74 years	1,181	1.2	0.33	95.9	2.9	0.5	0.5	0.2	-
Black									
All ages	1,037	5.7	1.38	91.7	2.6	2.7	1.6	1.0	0.5
6–11 years	143	*6.7	*2.30	90.2	3.0	2.1	3.0	1.0	0.6
12–17 years	154	*5.5	*1.98	93.3	1.2	1.4	2.1	2.0	-
18–24 years	139	12.2	3.96	87.0	0.8	8.1	0.5	1.6	2.0
25–34 years	141	*4.1	*2.21	91.0	4.9	1.0	0.9	1.9	0.4
35–44 years	95	*4.0	*2.43	92.2	3.8	-	4.0	-	-
45–54 years	93	*3.4	*2.35	95.8	0.8	3.4	-	-	-
55–64 years	126	*3.9	*2.20	92.9	3.2	3.2	0.7	-	-
65–74 years	146	*1.7	*1.07	95.2	3.1	0.7	1.0	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 16. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to rye grass allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,497	10.2	0.56	87.9	1.9	2.3	3.3	3.0	1.6
6–11 years	1,627	9.5	0.86	88.7	1.7	2.9	3.9	2.4	0.3
12–17 years	1,887	14.1	1.27	84.4	1.5	3.2	4.4	4.1	2.5
18–24 years	1,962	16.1	1.37	81.9	2.0	3.0	5.0	4.9	3.2
25–34 years	2,155	12.7	0.78	85.3	2.0	2.4	4.2	3.9	2.2
35–44 years	1,520	9.4	1.13	88.8	1.9	2.3	2.8	2.8	1.4
45–54 years	1,383	6.1	0.87	91.6	2.3	1.3	2.1	1.9	0.7
55–64 years	2,457	4.6	0.63	93.8	1.7	1.2	1.4	1.3	0.7
65–74 years	2,506	3.7	0.38	94.2	2.1	1.2	1.1	1.0	0.3
White									
All ages	13,253	9.9	0.53	88.1	2.0	2.2	3.1	3.0	1.7
6–11 years	1,323	8.6	0.94	89.6	1.9	2.8	3.3	2.1	0.3
12–17 years	1,538	12.9	1.31	85.4	1.7	2.5	3.7	4.0	2.8
18–24 years	1,664	15.9	1.31	81.8	2.3	3.1	4.5	5.0	3.2
25–34 years	1,829	12.8	0.80	85.1	2.0	2.4	4.2	3.9	2.3
35–44 years	1,319	9.5	1.11	88.4	2.1	2.3	2.5	3.1	1.6
45–54 years	1,206	6.1	0.91	91.8	2.1	1.4	2.1	1.8	0.8
55–64 years	2,179	4.8	0.68	93.4	1.7	1.2	1.4	1.4	0.7
65–74 years	2,195	3.7	0.37	94.3	2.0	1.1	1.2	1.1	0.4
Black									
All ages	1,934	11.4	1.45	87.5	1.1	2.6	4.6	3.1	1.1
6–11 years	266	14.0	2.04	85.3	0.7	2.7	6.9	4.4	-
12–17 years	306	22.0	2.79	77.3	0.7	7.4	8.0	5.4	1.2
18–24 years	251	16.4	3.82	83.3	0.3	2.2	6.8	4.1	3.3
25–34 years	274	10.2	1.88	87.9	1.9	1.3	3.5	3.5	1.9
35–44 years	166	*7.3	*2.39	92.7	-	2.4	3.3	0.9	0.7
45–54 years	153	*2.9	*1.41	92.8	4.3	0.5	0.4	2.1	-
55–64 years	250	*2.4	*0.87	97.6	-	0.9	1.2	-	0.2
65–74 years	268	*2.6	*0.95	96.1	1.3	0.8	0.9	0.8	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 17. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to rye grass allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,527	12.0	0.68	85.8	2.2	2.6	4.1	3.6	1.8
6–11 years	826	11.5	1.14	87.2	1.3	3.7	4.7	2.7	0.4
12–17 years	993	15.5	1.40	83.0	1.4	3.0	5.4	4.1	3.0
18–24 years	943	20.1	2.07	77.2	2.7	3.5	6.8	6.1	3.8
25–34 years	1,040	14.1	1.15	83.1	2.7	2.6	4.4	4.9	2.2
35–44 years	718	11.0	1.39	87.5	1.5	2.4	3.3	3.5	1.8
45–54 years	660	7.7	1.60	89.5	2.8	2.0	2.7	2.6	0.4
55–64 years	1,183	4.5	0.86	93.2	2.4	1.4	1.6	1.0	0.5
65–74 years	1,164	4.3	0.83	93.2	2.5	0.8	1.8	1.3	0.4
White									
All ages	6,463	11.8	0.67	85.9	2.3	2.5	3.8	3.7	1.9
6–11 years	679	11.0	1.23	87.6	1.4	3.8	4.6	2.4	0.2
12–17 years	813	14.3	1.35	84.1	1.6	2.2	4.7	4.2	3.3
18–24 years	811	19.9	1.96	77.1	2.9	3.9	5.7	6.3	4.0
25–34 years	879	14.1	1.18	83.0	2.8	2.5	4.4	4.8	2.3
35–44 years	626	11.3	1.43	87.0	1.7	2.3	3.0	3.9	2.1
45–54 years	592	7.9	1.68	89.4	2.7	2.1	2.5	2.9	0.4
55–64 years	1,046	4.7	0.93	92.8	2.5	1.4	1.7	1.1	0.5
65–74 years	1,017	4.3	0.81	93.2	2.5	0.6	1.9	1.3	0.5
Black									
All ages	897	12.6	1.70	86.5	0.9	3.1	5.0	3.4	1.1
6–11 years	124	12.2	3.03	87.3	0.5	2.6	5.0	4.6	–
12–17 years	152	23.2	4.13	76.1	0.7	8.1	8.9	4.4	1.8
18–24 years	112	18.2	4.91	81.1	0.6	0.9	9.1	5.4	2.8
25–34 years	134	13.5	2.93	84.9	1.6	1.8	4.4	5.4	1.9
35–44 years	70	*9.8	*3.89	90.2	–	4.5	3.3	1.3	0.7
45–54 years	59	*1.8	*1.28	95.0	3.2	1.0	0.8	–	–
55–64 years	125	*2.9	*1.58	97.1	–	2.0	0.9	–	–
65–74 years	121	*2.6	*1.95	96.6	0.8	–	1.4	1.2	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 18. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to rye grass allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,970	8.5	0.61	89.8	1.7	2.0	2.6	2.5	1.4
6–11 years	801	7.5	1.13	90.2	2.2	2.0	3.0	2.2	0.3
12–17 years	894	12.6	1.61	85.7	1.6	3.4	3.3	4.1	1.9
18–24 years	1,019	12.3	1.24	86.3	1.4	2.5	3.4	3.7	2.6
25–34 years	1,115	11.3	0.87	87.4	1.3	2.3	3.9	2.9	2.1
35–44 years	802	7.8	1.29	89.9	2.2	2.1	2.4	2.2	1.1
45–54 years	723	4.6	1.04	93.5	1.9	0.7	1.5	1.3	1.0
55–64 years	1,274	4.7	0.93	94.3	1.0	1.0	1.2	1.6	0.9
65–74 years	1,342	3.1	0.51	95.0	1.8	1.5	0.5	0.8	0.2
White									
All ages	6,790	8.2	0.56	90.1	1.7	1.9	2.4	2.4	1.5
6–11 years	644	6.1	1.11	91.6	2.3	1.8	2.1	1.9	0.3
12–17 years	725	11.5	1.76	86.7	1.8	2.8	2.7	3.8	2.2
18–24 years	853	12.1	1.29	86.2	1.7	2.4	3.3	3.8	2.5
25–34 years	950	11.6	0.93	87.2	1.2	2.2	4.1	3.1	2.2
35–44 years	693	7.9	1.23	89.7	2.5	2.3	2.0	2.3	1.1
45–54 years	614	4.4	1.02	94.1	1.6	0.6	1.8	0.8	1.2
55–64 years	1,133	5.0	1.01	94.0	1.0	1.1	1.2	1.7	0.9
65–74 years	1,178	3.3	0.53	95.1	1.6	1.6	0.5	0.9	0.3
Black									
All ages	1,037	10.4	1.71	88.3	1.3	2.3	4.1	2.9	1.1
6–11 years	142	15.8	3.78	83.4	0.8	2.9	8.7	4.2	–
12–17 years	154	20.7	3.16	78.5	0.8	6.7	7.2	6.3	0.6
18–24 years	139	14.9	4.41	85.1	–	3.2	4.9	3.1	3.7
25–34 years	140	*7.6	*2.89	90.2	2.2	0.9	2.9	2.0	1.9
35–44 years	96	*5.2	*2.49	94.8	–	0.7	3.4	0.6	0.6
45–54 years	94	*3.8	*2.34	91.0	5.2	–	–	3.8	–
55–64 years	125	*1.9	*0.80	98.1	–	–	1.5	–	0.4
65–74 years	147	*2.6	*1.44	95.8	1.6	1.4	0.6	0.6	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 19. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6-74 years, to Bermuda grass allergen, by race and age: United States, 1976-80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1-10.4 mm (+/-)	10.5-20.4 mm (1+)	20.5-30.4 mm (2+)	30.5-40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,523	4.4	0.42	93.9	1.7	1.5	1.8	1.0	0.2
6-11 years	1,628	3.0	0.47	95.7	1.3	1.6	1.2	0.3	-
12-17 years	1,894	6.7	1.10	91.7	1.6	2.5	2.5	1.4	0.3
18-24 years	1,964	7.0	0.99	91.1	1.8	2.0	3.1	1.8	0.2
25-34 years	2,155	5.2	0.52	92.7	2.0	1.7	2.1	1.2	0.2
35-44 years	1,523	4.7	0.92	93.7	1.6	1.4	1.9	0.9	0.5
45-54 years	1,385	3.1	0.63	94.9	2.0	0.8	1.3	0.8	0.2
55-64 years	2,464	2.0	0.40	96.6	1.4	0.7	0.8	0.5	-
65-74 years	2,510	1.2	0.26	97.3	1.5	0.5	0.4	0.3	-
White									
All ages	13,277	4.2	0.43	94.0	1.8	1.4	1.7	1.0	0.2
6-11 years	1,323	2.6	0.45	96.0	1.4	1.4	0.9	0.3	-
12-17 years	1,543	6.6	1.20	91.5	1.8	2.3	2.3	1.7	0.3
18-24 years	1,667	6.6	0.92	91.6	1.8	1.8	3.0	1.6	0.2
25-34 years	1,831	5.3	0.57	92.7	1.9	1.9	2.1	1.1	0.2
35-44 years	1,323	4.3	0.92	93.9	1.7	1.2	1.8	1.0	0.3
45-54 years	1,207	2.7	0.68	95.1	2.1	0.5	1.0	0.9	0.2
55-64 years	2,184	2.1	0.45	96.3	1.6	0.7	0.9	0.5	-
65-74 years	2,199	1.2	0.30	97.2	1.5	0.5	0.3	0.3	-
Black									
All ages	1,937	5.1	0.88	93.8	1.1	1.8	2.1	1.0	0.2
6-11 years	267	*4.4	*1.37	95.2	0.4	1.9	2.1	0.5	-
12-17 years	308	6.4	1.67	92.7	0.9	3.1	3.0	0.3	-
18-24 years	250	*10.7	*3.65	87.2	2.2	2.7	5.0	2.9	-
25-34 years	272	4.3	0.98	93.5	2.2	0.7	1.3	2.3	-
35-44 years	165	*5.4	*1.92	94.0	0.6	1.7	2.2	-	1.6
45-54 years	154	*2.8	*1.44	96.2	1.0	2.4	0.4	-	-
55-64 years	253	*0.6	*0.38	99.4	-	0.2	0.2	0.2	-
65-74 years	268	*0.2	*0.21	98.8	0.9	0.2	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 20. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to Bermuda grass allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,538	4.9	0.48	93.2	2.0	1.4	2.2	0.9	0.2
6–11 years	826	3.4	0.65	95.1	1.5	1.7	1.5	0.1	–
12–17 years	996	7.0	1.18	91.2	1.7	2.0	3.0	1.5	0.5
18–24 years	944	7.9	1.48	89.8	2.3	1.7	4.0	1.9	0.3
25–34 years	1,039	6.4	0.75	91.5	2.2	2.4	2.8	0.9	0.3
35–44 years	721	4.6	0.91	93.3	2.1	0.8	2.7	0.7	0.5
45–54 years	660	*3.5	*1.20	94.3	2.2	0.6	1.5	1.4	–
55–64 years	1,187	*1.3	*0.39	97.0	1.7	0.7	0.4	0.1	0.1
65–74 years	1,165	*1.2	*0.36	96.8	2.0	0.6	0.4	0.2	–
White									
All ages	6,475	4.8	0.51	93.2	2.0	1.4	2.2	1.0	0.2
6–11 years	679	3.2	0.66	95.2	1.6	1.9	1.2	0.2	–
12–17 years	815	6.9	1.22	91.2	2.0	1.8	2.6	1.7	0.7
18–24 years	813	7.8	1.53	90.1	2.1	1.5	4.2	1.8	0.3
25–34 years	880	6.6	0.81	91.4	2.0	2.6	2.7	1.0	0.3
35–44 years	629	4.3	0.97	93.5	2.2	0.7	2.5	0.8	0.3
45–54 years	592	*3.3	*1.25	94.4	2.2	0.4	1.3	1.6	–
55–64 years	1,049	*1.4	*0.44	96.7	1.9	0.8	0.5	0.1	0.1
65–74 years	1,018	1.3	0.39	96.7	2.0	0.7	0.5	0.2	–
Black									
All ages	896	4.3	1.08	93.9	1.8	1.2	2.0	0.8	0.3
6–11 years	124	*3.2	*1.93	96.8	–	0.6	2.6	–	–
12–17 years	153	*6.4	*2.38	92.7	0.9	2.3	3.5	0.6	–
18–24 years	111	*8.5	*4.32	87.2	4.3	2.1	2.8	3.6	–
25–34 years	132	*4.2	*1.94	92.4	3.3	1.0	2.2	1.0	–
35–44 years	70	*6.4	*3.23	92.3	1.3	2.0	1.7	–	2.7
45–54 years	59	–	–	97.9	2.1	–	–	–	–
55–64 years	126	–	–	100.0	–	–	–	–	–
65–74 years	121	–	–	98.6	1.4	–	–	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 21. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to Bermuda grass allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,985	4.1	0.44	94.5	1.4	1.5	1.4	1.0	0.1
6–11 years	802	2.6	0.69	96.4	1.0	1.4	0.8	0.5	-
12–17 years	898	6.4	1.28	92.1	1.5	3.0	2.0	1.4	-
18–24 years	1,020	6.3	0.94	92.4	1.3	2.3	2.3	1.6	0.1
25–34 years	1,116	4.1	0.58	93.9	1.9	1.1	1.5	1.5	0.1
35–44 years	802	4.7	1.14	94.1	1.2	1.9	1.2	1.1	0.4
45–54 years	725	2.8	0.68	95.4	1.8	1.0	1.1	0.2	0.4
55–64 years	1,277	2.6	0.65	96.2	1.2	0.6	1.2	0.8	-
65–74 years	1,345	1.2	0.35	97.7	1.1	0.4	0.3	0.4	-
White									
All ages	6,802	3.7	0.43	94.7	1.5	1.4	1.3	1.0	0.2
6–11 years	644	2.0	0.66	96.9	1.1	1.0	0.6	0.4	-
12–17 years	728	6.4	1.40	91.9	1.6	2.8	2.0	1.6	-
18–24 years	854	5.5	0.87	93.0	1.5	2.1	1.7	1.5	0.1
25–34 years	951	4.0	0.58	94.1	1.9	1.2	1.4	1.2	0.1
35–44 years	694	4.3	1.09	94.4	1.3	1.6	1.1	1.3	0.4
45–54 years	615	2.1	0.58	95.8	2.0	0.7	0.8	0.3	0.5
55–64 years	1,135	2.8	0.72	95.9	1.3	0.7	1.3	0.8	-
65–74 years	1,181	*1.2	*0.40	97.6	1.2	0.4	0.2	0.5	-
Black									
All ages	1,041	5.8	1.08	93.7	0.6	2.3	2.2	1.1	0.1
6–11 years	143	*5.7	*1.83	93.6	0.7	3.1	1.6	1.0	-
12–17 years	155	*6.4	*2.38	92.7	0.9	3.9	2.5	-	-
18–24 years	139	*12.4	*4.01	87.2	0.5	3.2	6.7	2.4	-
25–34 years	140	*4.3	*2.10	94.3	1.4	0.5	0.5	3.3	-
35–44 years	95	*4.6	*2.46	95.4	-	1.5	2.5	-	0.6
45–54 years	95	*5.3	*2.68	94.7	-	4.4	0.8	-	-
55–64 years	127	*1.1	*0.69	98.9	-	0.3	0.4	0.4	-
65–74 years	147	*0.4	*0.37	99.0	0.6	0.4	-	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 22. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to ragweed allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	15,450	10.1	0.57	86.9	3.0	3.6	3.7	2.1	0.6
6–11 years	1,620	8.7	0.70	88.6	2.8	4.7	2.5	1.2	0.3
12–17 years	1,883	12.0	1.03	85.0	3.0	4.0	4.9	2.2	0.8
18–24 years	1,951	14.5	1.13	82.4	3.1	5.2	4.7	3.4	1.1
25–34 years	2,140	12.6	0.79	84.2	3.2	3.7	5.6	2.7	0.6
35–44 years	1,513	10.7	1.04	86.1	3.2	3.7	3.2	2.6	1.2
45–54 years	1,380	7.3	0.97	89.8	2.8	2.9	2.7	1.6	0.1
55–64 years	2,454	5.7	0.66	91.3	2.9	2.0	2.3	1.0	0.4
65–74 years	2,509	4.5	0.48	92.2	3.3	1.6	1.7	1.0	0.2
White									
All ages	13,214	9.7	0.51	87.2	3.1	3.4	3.6	2.1	0.6
6–11 years	1,316	7.5	0.62	89.3	3.1	3.9	2.2	1.2	0.2
12–17 years	1,531	11.9	0.98	85.3	2.9	3.7	5.0	2.3	0.9
18–24 years	1,656	13.9	0.98	82.8	3.3	5.0	4.7	3.2	0.9
25–34 years	1,816	12.1	0.86	84.6	3.3	3.5	5.5	2.5	0.7
35–44 years	1,313	10.4	1.04	86.6	3.0	3.3	2.8	3.0	1.2
45–54 years	1,207	7.2	1.04	90.0	2.8	2.9	2.6	1.5	0.1
55–64 years	2,176	5.7	0.66	91.3	2.9	2.1	2.4	1.0	0.2
65–74 years	2,199	4.4	0.51	92.2	3.4	1.4	1.8	1.0	0.3
Black									
All ages	1,930	13.5	2.34	84.2	2.4	5.2	4.7	2.5	1.1
6–11 years	267	15.0	2.47	84.4	0.6	8.2	4.6	1.6	0.6
12–17 years	309	14.8	3.25	82.1	3.1	5.9	5.4	2.5	0.9
18–24 years	248	21.1	4.40	77.5	1.4	8.1	5.3	5.0	2.8
25–34 years	273	17.1	3.39	79.8	3.1	5.1	6.8	4.8	0.4
35–44 years	166	11.3	2.95	84.8	4.0	4.6	5.5	-	1.2
45–54 years	150	4.8	1.41	92.1	3.1	1.0	3.2	0.6	-
55–64 years	250	*6.3	*3.02	92.1	1.7	1.3	1.4	1.2	2.4
65–74 years	267	5.4	1.17	92.6	2.1	2.7	1.5	1.2	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 23. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to ragweed allergen, by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,508	11.6	0.70	85.3	3.1	4.0	4.4	2.6	0.7
6–11 years	822	9.6	1.09	87.9	2.5	5.1	2.8	1.5	0.2
12–17 years	991	12.8	1.34	84.3	2.9	4.7	4.1	2.8	1.2
18–24 years	939	17.6	1.62	79.3	3.1	7.3	5.6	3.5	1.3
25–34 years	1,032	14.8	1.14	81.7	3.4	3.2	7.7	3.3	0.5
35–44 years	716	11.8	1.50	85.1	3.1	3.1	3.4	3.7	1.6
45–54 years	659	9.2	1.66	87.8	3.1	3.4	3.3	2.4	–
55–64 years	1,183	5.8	0.99	90.8	3.4	1.7	2.9	1.2	–
65–74 years	1,166	5.1	0.74	91.4	3.5	1.7	2.0	1.1	0.3
White									
All ages	6,447	11.6	0.65	85.3	3.2	3.6	4.5	2.8	0.7
6–11 years	675	8.7	1.14	88.6	2.7	4.0	2.8	1.6	0.3
12–17 years	810	13.0	1.24	84.2	2.7	4.4	4.4	3.0	1.2
18–24 years	808	17.6	1.46	79.3	3.1	6.7	6.0	3.7	1.2
25–34 years	873	14.9	1.31	81.4	3.7	3.3	7.7	3.4	0.5
35–44 years	624	11.7	1.53	85.5	2.8	2.3	3.4	4.3	1.7
45–54 years	592	9.1	1.65	87.5	3.3	3.4	3.3	2.5	–
55–64 years	1,046	6.0	1.10	90.6	3.4	1.8	3.0	1.3	–
65–74 years	1,019	5.2	0.76	91.0	3.8	1.6	2.2	1.2	0.3
Black									
All ages	895	12.7	2.91	85.2	2.1	6.3	3.9	1.6	0.9
6–11 years	124	14.1	3.60	85.5	0.4	9.7	3.2	1.2	–
12–17 years	153	14.4	4.57	82.2	3.4	7.5	3.6	2.3	1.0
18–24 years	111	21.7	6.01	75.8	2.6	13.0	4.3	2.4	2.1
25–34 years	133	17.2	4.17	80.8	2.0	3.8	8.7	3.7	1.0
35–44 years	70	*9.5	*4.04	86.1	4.4	4.8	3.0	–	1.7
45–54 years	58	*3.5	*1.88	95.2	1.4	2.1	1.3	–	–
55–64 years	125	*4.6	*2.41	95.4	–	1.1	3.0	–	0.5
65–74 years	121	*3.7	*2.80	95.6	0.8	1.3	1.1	1.2	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 24. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6-74 years, to ragweed allergen, by race and age: United States, 1976-80

Race and age	Sample size	Positive skin-test reaction[1] Percent	Standard error	Percent distribution of erythema reaction[2] 0 mm	0.1-10.4 mm (+/-)	10.5-20.4 mm (1+)	20.5-30.4 mm (2+)	30.5-40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,942	8.6	0.54	88.4	3.0	3.3	3.1	1.6	0.6
6-11 years	798	7.8	1.09	89.2	3.0	4.2	2.2	1.0	0.3
12-17 years	892	11.1	1.31	85.7	3.2	3.2	5.7	1.7	0.5
18-24 years	1,012	11.5	1.24	85.4	3.1	3.3	3.9	3.3	1.0
25-34 years	1,108	10.4	0.92	86.6	3.0	4.1	3.6	2.0	0.7
35-44 years	797	9.6	1.15	87.1	3.2	4.4	2.9	1.6	0.8
45-54 years	721	5.6	0.95	91.8	2.6	2.4	2.2	0.8	0.2
55-64 years	1,271	5.6	0.94	91.8	2.6	2.3	1.8	0.9	0.7
65-74 years	1,343	4.1	0.62	92.8	3.2	1.5	1.4	0.9	0.2
White									
All ages	6,767	7.9	0.47	89.1	3.0	3.1	2.8	1.4	0.5
6-11 years	641	6.4	0.94	90.1	3.5	3.9	1.5	0.8	0.1
12-17 years	721	10.7	1.31	86.3	3.0	3.1	5.6	1.5	0.5
18-24 years	848	10.3	1.24	86.2	3.5	3.3	3.6	2.8	0.7
25-34 years	943	9.4	1.01	87.8	2.8	3.7	3.2	1.6	0.8
35-44 years	689	9.1	1.20	87.6	3.3	4.3	2.2	1.8	0.8
45-54 years	615	5.3	0.99	92.3	2.4	2.5	2.0	0.6	0.2
55-64 years	1,130	5.5	0.97	92.0	2.5	2.4	1.9	0.8	0.4
65-74 years	1,180	3.7	0.67	93.2	3.1	1.3	1.4	0.8	0.3
Black									
All ages	1,035	14.1	2.14	83.3	2.6	4.2	5.4	3.2	1.2
6-11 years	143	15.9	4.36	83.3	0.7	6.8	5.9	2.1	1.2
12-17 years	156	15.2	3.53	82.1	2.7	4.3	7.4	2.8	0.7
18-24 years	137	20.6	5.27	78.9	0.5	4.1	6.1	7.0	3.4
25-34 years	140	17.0	3.97	79.1	3.9	6.0	5.4	5.6	-
35-44 years	96	12.7	3.46	83.7	3.6	4.5	7.6	-	0.7
45-54 years	92	*6.0	*2.06	89.4	4.7	-	4.9	1.1	-
55-64 years	125	*7.8	*3.81	89.1	3.1	1.4	-	2.3	4.0
65-74 years	146	6.6	1.97	90.4	3.0	3.7	1.7	1.1	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 25. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to ragweed allergen (high pollen regions—Northeast and Midwest), by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,613	13.2	0.67	83.6	3.1	4.5	5.1	3.0	0.7
6–11 years	783	13.3	1.10	83.3	3.3	7.4	3.8	1.8	0.4
12–17 years	912	16.0	1.55	80.7	3.3	5.1	7.4	3.1	0.5
18–24 years	1,015	19.4	1.60	77.7	2.9	6.4	6.7	4.9	1.4
25–34 years	1,061	15.5	0.85	81.4	3.1	4.3	7.2	3.2	0.7
35–44 years	752	13.7	1.46	84.2	2.1	4.7	3.6	4.0	1.5
45–54 years	689	10.1	1.76	86.6	3.3	3.0	4.1	2.7	0.2
55–64 years	1,216	6.7	0.97	89.4	3.9	2.0	2.9	1.6	0.3
65–74 years	1,185	5.7	0.70	91.1	3.2	1.7	2.3	1.6	0.1
White									
All ages	6,703	13.0	0.66	83.9	3.2	4.2	4.9	3.2	0.7
6–11 years	648	11.8	1.01	84.4	3.8	6.2	3.2	1.9	0.4
12–17 years	772	15.6	1.54	81.5	2.9	4.6	7.1	3.4	0.5
18–24 years	907	19.2	1.52	77.9	2.9	6.2	6.9	4.8	1.3
25–34 years	929	15.1	0.91	81.6	3.2	4.3	6.7	3.3	0.8
35–44 years	665	13.4	1.54	84.4	2.2	4.4	3.1	4.5	1.4
45–54 years	617	10.3	1.91	86.3	3.4	3.2	4.1	2.8	0.2
55–64 years	1,089	7.2	1.06	88.8	4.0	2.1	3.1	1.7	0.3
65–74 years	1,076	5.8	0.74	90.9	3.4	1.6	2.3	1.8	0.2
Black									
All ages	849	15.8	2.26	82.1	2.1	6.6	6.9	1.7	0.6
6–11 years	129	21.6	4.12	77.6	0.8	12.8	7.7	1.2	-
12–17 years	130	19.8	4.16	77.5	2.8	9.2	9.3	1.3	-
18–24 years	100	21.3	5.29	76.7	2.0	9.3	4.6	5.2	2.2
25–34 years	120	19.3	3.25	78.2	2.5	3.9	12.0	3.3	-
35–44 years	79	15.8	3.89	83.3	1.0	6.5	6.7	-	2.5
45–54 years	67	*6.1	*2.64	90.6	3.3	1.1	5.0	-	-
55–64 years	122	*2.0	*1.41	95.0	3.1	0.8	1.1	-	-
65–74 years	102	5.0	1.54	93.4	1.6	2.9	2.1	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 26. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to ragweed allergen (high pollen regions—Northeast and Midwest), by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	3,691	15.3	0.80	81.5	3.2	5.1	5.7	3.8	0.8
6–11 years	397	15.3	1.52	81.4	3.3	7.9	4.8	2.0	0.5
12–17 years	471	17.4	1.33	79.7	2.9	6.7	6.0	3.8	0.9
18–24 years	499	22.0	2.39	75.8	2.2	8.4	7.6	4.9	1.2
25–34 years	501	18.9	0.99	77.5	3.5	4.2	9.7	4.5	0.5
35–44 years	365	14.8	2.18	83.0	2.1	4.3	2.8	5.2	2.5
45–54 years	336	12.2	2.87	84.5	3.3	3.2	4.9	4.2	–
55–64 years	585	7.0	1.51	88.5	4.5	1.8	3.5	1.7	–
65–74 years	537	7.0	1.15	88.7	4.3	2.0	2.6	2.0	0.3
White									
All ages	3,280	15.3	0.83	81.4	3.3	4.7	5.7	4.1	0.8
6–11 years	338	13.5	1.71	82.6	3.9	6.2	4.5	2.3	0.6
12–17 years	404	17.2	1.51	80.0	2.8	6.0	6.1	4.1	1.1
18–24 years	452	21.8	2.22	76.1	2.1	7.6	7.9	5.2	1.2
25–34 years	441	18.7	1.01	77.8	3.4	4.6	9.1	4.5	0.5
35–44 years	328	15.5	2.31	82.3	2.2	4.1	3.2	5.8	2.4
45–54 years	313	13.1	2.98	83.4	3.6	3.3	5.3	4.5	–
55–64 years	520	7.5	1.66	87.6	4.9	2.0	3.6	1.9	–
65–74 years	484	7.5	1.28	87.8	4.7	2.2	2.8	2.2	0.4
Black									
All ages	380	16.2	2.85	81.9	1.9	8.3	6.0	1.2	0.7
6–11 years	54	*24.9	*6.64	75.1	–	16.5	7.5	0.9	–
12–17 years	61	20.3	4.28	77.3	2.4	12.8	5.9	1.6	–
18–24 years	44	*25.3	*10.12	71.9	2.9	17.7	5.0	1.1	1.5
25–34 years	53	25.4	3.74	69.2	5.4	1.1	19.6	4.7	–
35–44 years	32	*8.7	*5.81	89.2	2.2	4.7	–	–	4.0
45–54 years	22	*	*	*	*	*	*	*	*
55–64 years	65	*2.2	*2.26	97.8	–	–	2.2	–	–
65–74 years	49	*1.1	*1.08	98.9	–	–	1.1	–	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 27. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to ragweed allergen (high pollen regions—Northeast and Midwest), by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	3,922	11.3	0.74	85.6	3.1	3.9	4.5	2.3	0.6
6–11 years	386	11.4	1.90	85.2	3.4	6.8	2.9	1.5	0.2
12–17 years	441	14.6	2.11	81.7	3.7	3.5	8.7	2.3	-
18–24 years	516	16.8	2.04	79.6	3.6	4.5	5.9	4.9	1.6
25–34 years	560	12.2	1.37	85.0	2.8	4.3	4.9	2.1	0.9
35–44 years	387	12.7	1.77	85.3	2.0	5.1	4.3	2.8	0.5
45–54 years	353	7.9	1.60	88.7	3.3	2.8	3.4	1.3	0.4
55–64 years	631	6.4	1.33	90.2	3.4	2.1	2.4	1.4	0.5
65–74 years	648	4.7	0.83	92.9	3.4	1.4	2.0	1.4	-
White									
All ages	3,423	10.7	0.69	86.2	3.1	3.8	4.0	2.3	0.6
6–11 years	310	10.0	1.79	86.2	3.7	6.3	2.0	1.5	0.3
12–17 years	368	14.0	1.97	83.0	3.1	3.1	8.2	2.6	-
18–24 years	455	16.5	2.07	79.9	3.6	4.8	5.9	4.4	1.4
25–34 years	488	11.6	1.61	85.3	3.1	4.1	4.4	2.0	1.1
35–44 years	337	11.4	1.88	86.3	2.3	4.8	3.0	3.2	0.3
45–54 years	304	7.6	1.67	89.3	3.1	3.2	2.8	1.1	0.5
55–64 years	569	6.9	1.47	89.9	3.2	2.2	2.6	1.6	0.6
65–74 years	592	4.5	0.87	93.2	2.4	1.1	1.9	1.5	-
Black									
All ages	469	15.5	2.38	82.3	2.3	5.2	7.7	2.0	0.6
6–11 years	75	*19.0	*6.79	79.6	1.5	9.7	7.8	1.5	-
12–17 years	69	*19.3	*6.81	77.6	3.1	6.2	12.1	1.0	-
18–24 years	56	18.0	2.71	80.8	1.3	2.3	4.2	8.6	2.8
25–34 years	67	*15.7	*6.15	83.6	0.8	5.6	7.6	2.5	-
35–44 years	47	21.3	5.10	78.7	-	7.9	12.0	-	1.4
45–54 years	45	*8.5	*3.91	85.9	5.5	-	8.5	-	-
55–64 years	57	*1.7	*1.43	92.0	6.3	1.7	-	-	-
65–74 years	53	*8.0	*2.84	89.2	2.8	5.0	2.9	-	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 28. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for persons ages 6–74 years, to ragweed allergen (low pollen regions—South and West), by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	7,837	7.2	0.91	89.8	3.0	2.8	2.5	1.3	0.6
6–11 years	837	4.6	0.74	93.2	2.3	2.3	1.4	0.8	0.2
12–17 years	971	8.5	1.37	88.6	2.8	3.0	2.9	1.5	1.2
18–24 years	936	9.8	1.63	86.8	3.3	4.1	2.8	2.0	0.9
25–34 years	1,079	10.0	1.27	86.7	3.3	3.2	4.2	2.1	0.5
35–44 years	761	7.9	1.49	87.9	4.2	2.9	2.8	1.4	0.9
45–54 years	691	4.9	0.96	92.8	2.3	2.8	1.5	0.5	–
55–64 years	1,238	4.8	0.82	93.1	2.0	2.0	1.8	0.5	0.5
65–74 years	1,324	3.4	0.61	93.2	3.4	1.5	1.1	0.4	0.3
White									
All ages	6,511	6.5	0.78	90.5	3.0	2.6	2.4	1.0	0.5
6–11 years	668	3.6	0.65	93.9	2.5	1.8	1.2	0.6	–
12–17 years	759	8.5	1.32	88.7	2.8	3.0	3.1	1.2	1.2
18–24 years	749	8.3	1.15	87.9	3.8	3.7	2.4	1.5	0.6
25–34 years	887	9.3	1.38	87.5	3.3	2.8	4.3	1.7	0.5
35–44 years	648	7.5	1.46	88.7	3.8	2.2	2.5	1.6	1.1
45–54 years	590	4.2	0.93	93.5	2.3	2.7	1.2	0.3	–
55–64 years	1,087	4.4	0.76	93.8	1.9	2.2	1.7	0.4	0.1
65–74 years	1,123	3.0	0.65	93.6	3.4	1.3	1.2	0.1	0.4
Black									
All ages	1,081	*11.7	*3.66	85.7	2.6	4.2	3.1	3.1	1.4
6–11 years	138	9.3	2.22	90.3	0.4	4.3	1.9	2.0	1.1
12–17 years	179	*11.2	*4.83	85.5	3.3	3.6	2.7	3.4	1.5
18–24 years	148	21.0	6.54	78.0	1.1	7.3	5.7	4.8	3.1
25–34 years	153	*15.5	*5.51	81.0	3.5	5.9	3.0	5.9	0.8
35–44 years	87	*7.5	*4.31	86.0	6.5	3.1	4.4	–	–
45–54 years	83	*3.9	*1.72	93.1	3.0	0.9	1.9	1.0	–
55–64 years	128	*10.3	*4.37	89.3	0.3	1.7	1.7	2.4	4.6
65–74 years	165	5.6	1.64	92.1	2.3	2.6	1.1	1.9	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 29. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for males ages 6–74 years, to ragweed allergen (low pollen regions—South and West), by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/–)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	3,817	8.3	1.13	88.6	3.1	3.0	3.2	1.6	0.6
6–11 years	425	4.7	1.14	93.5	1.8	2.7	1.1	1.0	–
12–17 years	520	9.0	2.15	88.1	2.9	3.0	2.6	2.0	1.4
18–24 years	440	13.2	2.25	82.7	4.1	6.1	3.6	2.0	1.3
25–34 years	531	11.2	1.94	85.4	3.4	2.4	6.0	2.4	0.5
35–44 years	351	9.1	2.16	87.0	3.9	2.0	3.9	2.3	0.8
45–54 years	323	6.2	1.88	90.9	2.9	3.7	1.8	0.8	–
55–64 years	598	4.7	1.14	93.0	2.3	1.6	2.4	0.7	0.1
65–74 years	629	3.4	0.88	93.9	2.7	1.4	1.5	0.3	0.2
White									
All ages	3,167	7.9	1.01	89.0	3.1	2.6	3.2	1.6	0.6
6–11 years	337	4.3	1.12	94.0	1.6	2.0	1.3	1.0	–
12–17 years	406	9.2	1.93	88.2	2.7	2.9	2.9	2.0	1.4
18–24 years	356	12.8	1.80	83.0	4.2	5.8	3.8	2.0	1.2
25–34 years	432	11.3	2.29	84.7	4.0	2.1	6.4	2.4	0.4
35–44 years	296	7.9	2.25	88.7	3.4	0.6	3.6	2.8	0.9
45–54 years	279	5.2	1.53	91.7	3.0	3.5	1.3	0.4	–
55–64 years	526	4.6	1.30	93.5	1.8	1.6	2.3	0.7	–
65–74 years	535	3.0	0.80	94.1	2.9	1.0	1.6	0.1	0.2
Black									
All ages	515	*10.4	*4.49	87.4	2.3	5.0	2.6	1.8	1.0
6–11 years	70	*5.9	*2.81	93.3	0.8	4.5	–	1.4	–
12–17 years	92	*10.8	*7.02	85.1	4.1	4.4	2.2	2.7	1.6
18–24 years	67	*19.4	*8.14	78.2	2.4	10.1	3.8	3.1	2.4
25–34 years	80	*12.5	*6.22	87.5	–	5.4	2.5	3.1	1.6
35–44 years	38	*10.2	*5.86	83.6	6.2	4.9	5.3	–	–
45–54 years	36	*4.0	*2.41	93.9	2.2	1.8	2.1	–	–
55–64 years	60	*7.3	*3.78	92.7	–	2.3	4.0	–	1.1
65–74 years	72	*5.3	*4.93	93.5	1.3	2.2	1.2	1.9	–

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 30. Sample size, percent positive, standard errors of percent positive, and percent distributions of the erythema reaction for females ages 6–74 years, to ragweed allergen (low pollen regions—South and West), by race and age: United States, 1976–80

Race and age	Sample size	Positive skin-test reaction[1]		Percent distribution of erythema reaction[2]					
		Percent	Standard error	0 mm	0.1–10.4 mm (+/-)	10.5–20.4 mm (1+)	20.5–30.4 mm (2+)	30.5–40.4 mm (3+)	40.5 and more (4+)
All races[3]									
All ages	4,020	6.2	0.79	90.9	2.9	2.7	1.9	1.0	0.6
6–11 years	412	4.5	1.09	92.8	2.8	1.9	1.7	0.6	0.3
12–17 years	451	8.1	1.60	89.2	2.8	2.9	3.1	1.1	1.0
18–24 years	496	6.8	1.44	90.5	2.7	2.3	2.1	1.9	0.6
25–34 years	548	8.8	1.18	88.0	3.2	4.0	2.4	1.9	0.5
35–44 years	410	6.9	1.48	88.7	4.3	3.7	1.7	0.4	1.1
45–54 years	368	3.6	1.00	94.6	1.9	2.0	1.2	0.4	-
55–64 years	640	5.0	1.35	93.3	1.8	2.5	1.3	0.4	0.9
65–74 years	695	3.4	0.90	92.7	3.9	1.6	0.8	0.5	0.5
White									
All ages	3,344	5.2	0.66	91.9	2.9	2.6	1.6	0.5	0.5
6–11 years	331	*2.9	*0.89	93.7	3.4	1.6	1.1	0.2	-
12–17 years	353	7.7	1.75	89.3	2.9	3.0	3.2	0.5	1.0
18–24 years	393	4.2	1.17	92.4	3.4	1.8	1.2	1.2	-
25–34 years	455	7.3	1.13	90.2	2.5	3.4	2.1	1.1	0.6
35–44 years	352	7.1	1.55	88.7	4.2	3.8	1.5	0.5	1.3
45–54 years	311	*3.2	*1.01	95.1	1.7	1.9	1.2	0.2	-
55–64 years	561	4.1	1.30	94.0	1.9	2.6	1.2	-	0.2
65–74 years	588	*2.9	*1.01	93.2	3.9	1.5	0.8	0.1	0.5
Black									
All ages	566	13.0	3.26	84.1	2.9	3.4	3.5	4.2	1.8
6–11 years	68	13.0	4.26	87.0	-	4.0	3.9	2.7	2.3
12–17 years	87	11.6	3.43	86.0	2.4	2.6	3.2	4.4	1.4
18–24 years	81	*22.2	*7.92	77.8	-	5.2	7.2	6.1	3.7
25–34 years	73	18.3	5.63	74.9	6.8	6.4	3.4	8.5	-
35–44 years	49	*5.1	*4.04	88.2	6.8	1.4	3.6	-	-
45–54 years	47	*3.7	*2.32	92.4	3.9	-	1.7	2.0	-
55–64 years	68	*12.6	*5.03	86.8	0.6	1.2	-	4.2	7.2
65–74 years	93	*5.8	*2.60	91.1	3.1	2.9	1.0	1.8	-

[1]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[2]Figures may not add to 100 percent because of rounding.
[3]Includes data for races not shown separately.

NOTE: mm = millimeter.

Table 31. Median size of positive skin-test reaction to individual allergens for persons ages 6–74 years, by race and age: United States, 1976–80

Individual allergen	All races[1]			White			Black		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
	Median in millimeters								
House dust	20.0	20.5	19.0	20.0	21.0	19.0	18.5	18.0	18.5
Alternaria	22.0	21.5	22.5	22.5	22.0	22.5	20.0	20.0	21.0
Cat	20.0	20.0	21.0	20.5	20.0	21.0	18.0	17.0	19.5
Dog	20.0	20.5	19.0	20.0	20.0	20.0	17.0	23.0	17.0
Ragweed — all regions	24.0	25.0	23.0	24.5	25.0	22.5	23.0	20.5	25.0
Ragweed — high pollen regions[2]	25.0	25.0	24.0	25.0	25.5	24.0	22.5	20.0	24.0
Ragweed — low pollen regions[3]	23.0	23.5	22.5	22.5	24.0	20.5	26.0	21.5	27.5
Oak	23.0	23.0	23.0	23.0	23.5	23.0	22.5	22.5	20.5
Rye grass	29.0	29.0	29.0	29.5	29.5	30.0	27.5	27.5	27.0
Bermuda grass	24.0	25.0	23.5	25.0	25.5	23.5	23.5	25.0	23.5

[1]Includes data for races not shown separately.
[2]Northeast, Midwest.
[3]South, West.

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Appendix I
Statistical notes

Introduction

This report is based on data collected in the second National Health and Nutrition Examination Survey (NHANES II) from February 1976 through February 1980. NHANES II, conducted by the National Center for Health Statistics (NCHS), was a survey of the U.S. civilian noninstitutionalized population (including Alaska and Hawaii) 6 months through 74 years of age. Both interview and examination procedures were used to collect a broad spectrum of demographic, socioeconomic, and morbidity data and related medical and nutritional information. During household interviews, demographic, socioeconomic, and some medical history data were obtained for sample persons. Dietary interview, medical examination, and related clinical tests and procedures were performed in specially designed mobile examination centers (MEC's) that were transported to each sample location to provide standardized conditions and equipment.

Survey design

NHANES II utilized a stratified, multistage probability sample design. In hierarchical order, the stages of selection were as follows: Primary sampling units (PSU's—a PSU is a county or a small group of contiguous counties), segments (a segment is a cluster of eight households), households, and finally, sample persons.

Four hundred sixty-one primary sampling units were formed in the first design stage from the PSU's of the National Health Interview Survey (NHIS), another major survey program of NCHS. These units were counties, groups of small contiguous counties, or, in some New England States, areas defined by minor civil divisions. PSU's were stratified into a total of 64 strata on the basis of region, population size, median income, and other social and demographic characteristics that varied with region. One PSU was selected from each strata using a modified Goodman-Kish controlled-selection technique.[104] These 64 PSU's represented the geographic locations visited by the MEC's during the survey period.

The second stage of the design consisted of the selection of clusters of households (segments) within enumeration districts (ED's). An ED is a geographical area that contains approximately 300 housing units. The U.S. Bureau of the Census had the major responsibility for selecting households and sample persons within each of the PSU's. Three sampling frames of housing units were used to select the sample within each of the PSU's. The list frame consisted of all housing units based on the 1970 Census of the Population. An area frame was used in areas with "rapid" growth (housing units built prior to 1970) and in areas with "slow" growth (all housing units regardless of year built). A new construction frame was used to supplement the list frame for all places built since 1970 and in about half of the places in the area sample that were experiencing rapid growth.

ED's within each PSU were stratified into poverty and nonpoverty strata. The poverty strata contained ED's with 13 percent or more of persons below the poverty level, and the nonpoverty strata contained ED's with less than 13 percent of persons below the poverty level, as determined by the 1970 Census. To oversample persons with low incomes, segments were drawn from the poverty strata with an average of 2.3 times the probability that segments were drawn from the nonpoverty strata. Sampling fractions were determined within PSU's by a mathematical model to ensure an adequate and manageable sample size and to minimize the variance of the estimated proportion of persons below the poverty level. To ensure sampling reliability, clusters of 16 listed addresses were drawn from the sampling frames and then systematically subsampled at a rate of 1 out of 2 to produce a final set of eight household address listings.

At the third stage of sampling, the interviewer made a list of all eligible sample persons within the selected households. Using instructions and a worksheet in the interview folder with the following sampling rates, the interviewer selected sample persons to be examined so that the younger and older age groups were oversampled, ensuring that approximately one person per sample household was selected:

Age	*Rate*
6 months–5 years	3/4
6–59 years	1/4
60–74 years	3/4

After a person was selected, the interviewer conducted a medical history interview and then phoned the field office to make an appointment for the examination. The sample scheduled to receive skin testing included all sample persons 6–74 years of age. Table I shows the number of examined persons and population estimates at the midpoint of the survey in the skin-test sample by race according to sex and age.

NOTE: A list of references follows the text.

Table I. Number of examined persons in the allergy skin-test sample and estimated population, by race, sex, and age: Second National Health and Nutrition Examination Survey, 1976–80

Sex and age	All races[1]		White		Black	
	Sample size	Estimated population in thousands[2]	Sample size	Estimated population in thousands[2]	Sample size	Estimated population in thousands[2]
Both sexes						
All ages	16,204	186,692	13,841	160,785	2,040	21,269
6–11 years	1,725	20,880	1,397	17,264	288	3,094
12–17 years	1,975	24,084	1,610	20,027	321	3,435
18–24 years	2,054	27,448	1,738	23,362	268	3,406
25–34 years	2,237	32,752	1,901	28,457	284	3,499
35–44 years	1,589	23,651	1,379	20,392	173	2,527
45–54 years	1,453	23,032	1,264	20,235	162	2,259
55–64 years	2,556	20,350	2,262	18,242	264	1,760
65–74 years	2,615	14,496	2,290	12,906	280	1,288
Male						
All ages	7,840	90,441	6,726	78,099	942	9,864
6–11 years	885	10,646	725	8,768	136	1,554
12–17 years	1,039	12,241	853	10,133	157	1,718
18–24 years	988	13,275	846	11,442	121	1,533
25–34 years	1,067	15,895	901	13,864	139	1,546
35–44 years	745	11,367	653	9,808	70	1,112
45–54 years	690	11,114	617	9,865	62	1,044
55–64 years	1,227	9,607	1,086	8,642	129	801
65–74 years	1,199	6,297	1,045	5,576	128	555
Female						
All ages	8,364	96,250	7,115	82,686	1,098	11,404
6–11 years	840	10,234	672	8,496	152	1,540
12–17 years	936	11,843	757	9,893	164	1,717
18–24 years	1,066	14,173	892	11,919	147	1,873
25–34 years	1,170	16,856	1,000	14,494	145	1,953
35–44 years	844	12,284	726	10,584	103	1,415
45–54 years	763	11,918	647	10,369	100	1,215
55–64 years	1,329	10,743	1,176	9,601	135	959
65–74 years	1,416	8,198	1,245	7,329	152	733

[1]Includes other races not shown separately.
[2]Estimated population as of the midpoint of the survey, March 1, 1978.

A more complete description of the survey design is included in "Plan and Operation of the Second National Health and Nutrition Examination Survey, 1976–80," *Vital and Health Statistics*, Series 1, No. 15.[29]

Estimation procedures

Because the design of NHANES is a complex multistage probability sample, national estimates are derived through a multistage estimation procedure. The procedure has three basic components: (1) inflation by the reciprocal of the probability of selection, (2) adjustment for nonresponse, and (3) poststratification by age, sex, and race. A brief description of each component is as follows:

- *Inflation by the reciprocal of the probability of selection*—The probability of selection is the product of the probabilities of selection from each stage of selection in the design—PSU, segment, sample person, and subsample.
- *Adjustment for nonresponse*—The estimates are inflated by a multiplication factor that brings estimates based on examined persons up to a level that would have been achieved if all sample persons had been examined. The nonresponse adjustment factor was calculated by dividing the sum of the reciprocals of the probability of selection for all selected *sample* persons within each of five income groups (less than $6,000; $6,000–9,999; $10,000–14,999; $15,000–24,999, and $25,000 and more), three age groups (6 months–5 years; 6–59 years; 60–74 years), four geographic regions, and within or outside standard metropolitan statistical areas (SMSA's) by the sum of the reciprocals of the probability of selection for *examined* sample persons in the same income, age, region, and SMSA groups. The percent distribution of the nonresponse adjustment factors is shown in table II.
- *Poststratification by age, sex, and race*—The estimates were ratio adjusted within each of 76 age-sex-race cells to independent estimates, provided by the U.S. Bureau of the Census, of the population as of March 1, 1978, the approximate midpoint of the survey. The ratio adjustment used a multiplication factor in which the numerator was the U.S. population and the denominator was the

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Table II. Percent distribution of nonresponse-adjustment factors: Second National Health and Nutrition Examination Survey, 1976–80

Size of factor	Percent distribution
Total	100.0
1.00–1.24	26.8
1.25–1.49	54.8
1.50–1.74	10.9
1.75–1.99	4.4
2.00–2.49	2.2
2.50–2.99	0.9

sum of the weights adjusted for nonresponse for examined persons. This ratio estimation procedure brings the population estimates into close agreement with the U.S. Census Bureau's estimates of the U.S. civilian noninstitutionalized population, and in general reduces sampling errors of NHANES II estimates.

Nonresponse bias

In any health examination survey there exists the potential for three levels of nonresponse: (1) Household interview nonresponse, (2) examination nonresponse, and (3) item nonresponse. Household interview nonresponse is defined as the proportion of those sample persons who do not complete the household medical history questionnaire. Examination nonresponse is the proportion of those sample persons who initially respond to the household demographic questions and some or all of the medical history questionnaire, but who subsequently do not come to the examination center. Item nonresponse results from sample persons who do not complete some portion of either the household interview questionnaires or the examination protocol. Intense efforts were undertaken during NHANES II to develop and implement procedures and inducements that would reduce all types of nonresponse and thereby reduce the potential for bias in the survey estimates. These procedures are discussed in *Vital and Health Statistics* Series 1, No. 15.[29]

In NHANES II the total sample size was 27,801; of these sample persons, 25,286 (91.0 percent) were interviewed and 20,322 (73.1 percent) were examined. In the skin-test sample (6–74 years of age), there were 22,732 sample persons; 20,410 (89.8 percent) were interviewed and 16,204 (71.3 percent) were examined. Overall, 95.8 percent of the examined sample received 5 to 8 skin tests, 0.2 percent received 1 to 4 skin tests, and 3.9 percent received 0 skin tests. These percents remained fairly constant when examined by selected demographic variables (see table III).

A comparison of the 1976 National Health Interview Survey (NHIS)[105] and NHANES II[106] suggests that there is no large nonresponse bias in some health-related variables (such as perceived health status, diabetes, and heart attacks) because of the close agreement on selected interview items in NHANES II data with comparable items in the 1976 NHIS data. The 1976 NHIS data were used for the comparison because the nonresponse was low (4 percent) and assumed to be randomly distributed. The health-related variables compared did not include allergies. This study is nonetheless important for this report because it demonstrated that little bias was introduced into the NHANES II examined sample by the approximately 27 percent dropout rate, at least regarding the variables examined.

The potential bias (in terms of allergy-related variables), which may have been introduced by the loss of 4,206 sample persons between the interview and examination stages of NHANES II for the skin-test sample, was investigated. The reported prevalence of allergies (asthma, hayfever, and other allergies) in the interviewed nonexamined were compared with the interviewed examined sample persons in tables IV and V. The nonexamined sample persons reported fewer allergies than the examined sample persons, but the differences were small, ranging from 1 percent to 1.8 percent. These differences remained fairly constant when examined by selected demographic variables (age, race, sex, whether urban or rural, and poverty level). Because the dropouts had similar allergic histories as compared with the examined sample persons, their loss does not introduce an important bias into the skin-test sample.

Evidence from earlier studies also suggests no substantial nonresponse bias. An analysis of data on examined and nonexamined (but interviewed) persons was done using the first 35 stands of NHANES I.[107] It was found that the two groups were quite similar with respect to health characteristics that were being compared. In another study of examined and nonexamined persons selected for participation in NHANES I, no differences were found between the two groups with respect to health-related variables.[108] In another study[109] factors relating to response in Cycle I of the National Health Examination Survey of 1960–62 were investigated. Researchers found that 36 percent of the nonexamined persons in that survey viewed themselves as being in excellent health compared with 31 percent of examined persons. A self-appraisal of being in poor health was made by 5 percent of nonexamined persons and by 6 percent of those who were examined. A different study of Cycle I[110] comparisons between two extreme groups (those who participated in the survey with no persuasive effort and those who participated only after a great deal of persuasive effort) showed that differences between the two groups generally had little effect on estimates based on numerous selected examination and questionnaire items. This finding was interpreted as evidence that no large bias exists between the two groups for the items investigated and was offered as further support for the belief that there is little bias introduced to the findings because of differences in health characteristics between examined and nonexamined persons.

Within the group of examined subjects scheduled for skin testing, additional losses occurred secondary to sample persons not receiving all eight allergen skin tests and histamine, the criteria used for inclusion in the analyses. In the examined skin-test sample, 1,822 subjects (11.3 percent) did not meet these criteria for a variety of reasons, such as a past history of allergies, a history of previous allergy shots, the use of allergy medication, and because of patient refusal. These nontested individuals reported a higher rate of asthma, hayfever,

NOTE: A list of references follows the text.

Table III. Sample size and percent response for allergy skin-test subsample, by selected characteristics: Second National Health and Nutrition Examination Survey, 1976–80

Selected characteristics	Sample size	Interviewed[1] percent	Examined percent	Sample size	Skin test[2,3] 0	1–4	5–8
Total	22,732	89.8	71.3	16,204	3.9	0.2	95.8
Age							
6–11 years	2,085	94.2	82.7	1,725	5.5	0.3	94.2
12–17 years	2,438	94.5	81.0	1,975	3.6	0.4	96.0
18–24 years	2,713	93.5	75.7	2,054	4.2	0.2	95.6
25–34 years	3,031	91.5	73.8	2,237	3.3	0.4	96.4
35–44 years	2,236	89.7	71.1	1,589	3.8	0.4	95.8
45–54 years	2,149	86.8	67.6	1,453	4.3	0.4	95.3
55–64 years	3,868	86.1	66.1	2,556	3.5	0.1	96.4
65–74 years	4,212	86.2	62.1	2,615	3.8	0.1	96.1
Sex							
Female	11,946	90.1	70.0	8,364	4.3	0.2	95.5
Male	10,786	89.4	72.7	7,840	3.6	0.3	96.2
Race							
White	19,472	89.6	71.1	13,841	3.9	0.2	95.9
Black	2,807	91.5	72.7	2,040	4.5	0.3	95.2
Other	453	87.4	71.3	323	3.7	-	96.3
Geographic region							
Northeast	5,499	86.2	65.7	3,615	4.3	0.1	95.7
Midwest	6,029	90.8	71.8	4,332	3.7	0.1	96.2
South	6,043	91.7	72.2	4,362	4.5	0.5	95.0
West	5,161	90.1	75.5	3,895	3.3	0.2	96.5
Residence							
Urban	14,937	88.0	69.4	10,360	4.5	0.3	95.2
Rural	7,795	93.3	75.0	5,844	3.0	0.1	96.8
Poverty level							
Below poverty level	3,213	96.7	76.9	2,472	4.4	0.2	95.3
At or above poverty level	17,219	94.9	76.1	13,101	3.8	0.2	96.0
Unknown	2,300	41.5	27.4	631	5.5	0.2	94.6
Family income							
0–$5,999	4,116	96.2	74.1	3,049	4.7	0.3	95.1
$6,000–$9,999	4,432	94.9	74.0	3,278	3.3	0.2	96.4
$10,000–$14,999	4,005	94.9	77.5	3,105	3.4	0.1	96.4
$15,000–$24,999	5,147	95.4	79.1	4,073	4.0	0.3	95.6
$25,000 or more	2,734	94.4	75.7	2,070	4.0	0.2	95.8
Unknown	2,298	41.5	27.4	629	5.2	0.2	94.6

[1]Completed medical history interview.
[2]Number of skin tests received.
[3]Figures do not add to 100 because of rounding.

Table IV. Reported prevalence of selected allergies for persons ages 6–74 years, by interviewed-nonexamined versus interviewed-examined sample persons: Second National Health and Nutrition Examination Survey, 1976–80

Selected allergy	Interviewed: Nonexamined Sample size	Nonexamined Percent[1]	Nonexamined Standard error	Interviewed: Examined Sample size	Examined Percent[1]	Examined Standard error	p value
Asthma	4,206	5.5	0.38	16,204	6.5	0.32	<0.05
Hayfever	4,206	8.0	0.61	16,204	9.1	0.34	0.06
Other allergies	4,206	9.6	0.54	16,204	11.4	0.36	<0.05

[1]Age-adjusted to U.S. population, March 1, 1978.

Table V. Reported prevalence of selected allergies for persons ages 6–74 years, by examined nonskin-tested versus examined skin-tested sample persons: Second National Health and Nutrition Examination Survey, 1976–80

Selected allergy	Examined						p value
	Nonskin-tested			Skin-tested			
	Sample size	Percent[1]	Standard error	Sample size	Percent[1]	Standard error	
Asthma	1,822	14.2	1.49	14,382	5.4	0.33	<0.05
Hayfever	1,822	18.0	1.63	14,382	7.9	0.39	<0.05
Other allergies	1,822	17.8	1.62	14,382	10.7	0.38	<0.05

[1]Age-adjusted to U.S. population, March 1, 1978.

and other allergies than the skin-tested individuals (table V). Thus, it is likely that the exclusion of these individuals from our survey decreased the rates of reactivity found. Their absence did not introduce any significant amount of bias when making subgroup analyses, as it was spread fairly evenly over all age, race, sex, urban or rural, and poverty-level groups.

Standard deviations

The standard deviation is the square root of the sample variance. It is a measure of dispersion of sample observations about the sample mean. If the observations are distributed normally (that is, as in a Gaussian distribution), then the standard deviation is useful in describing how an individual observation compares with the sample mean: One standard deviation above and below the mean includes approximately 68 percent of the observations; two standard deviations, approximately 95 percent; and two and a half standard deviations, approximately 99 percent.

Standard errors

Because the statistics presented in this report are based on a sample, they will differ somewhat from the figures that would have been obtained had a complete census been taken using the same survey instruments, instructions, interview and examination personnel, and procedures. The probability design of this survey permits the estimation of standard errors that are appropriate for the estimates shown in this report.

The standard error is primarily a measure of sampling variability, that is, the variation that might occur by chance because only a sample of the population is surveyed. As calculated for this report, the standard error also reflects part of the variation that arises in the measurement process. It does not include estimates of any bias that might be contained in the data. The chances are about 68 in 100 that an estimate based on a sample using the same procedures and instruments would differ from the value obtained from a complete census by less than the standard error. The chances are about 95 in 100 that the difference would be less than twice the standard error and about 99 in 100 that it would be less than two and a half times as large.

The estimates of sampling variability for the detailed tables in this report were calculated using the pseudoreplication method, a balanced half-sample replication technique that is based on variability among random subsamples of the total sample.[48] The estimates of standard errors for the age-adjusted values in the text were calculated by a two-stage method: First, SURREGR[49] was used to calculate the variance-covariance matrix using Taylor series linearization, and second, the variance-covariance matrix was passed into GENCAT,[50,51] a program for generalized least-squares categorical data analysis. It should be noted that the estimates of standard errors are themselves subject to error that may be large if the number of sample persons on which an estimate is based is small or if these persons are concentrated in a few strata.

Data limitations and reliability

The criteria for reliability of estimates shown in this report consisted of the following: (1) that the sample size on which the estimate is based be at least 30 persons; and (2) that the estimated coefficient of variation (that is, the standard error of the mean divided by the mean) be less than 30 percent. Thus, if the sample size was too small or if the variation regarding the mean was too large, an asterisk was placed next to the value on the table. Estimates with asterisks are considered neither precise nor stable enough to meet reliability standards. However, the values are shown to give an impression of the observed distribution and to permit users to combine data into useful categories.

Analytic methodology

The procedure used in this report for testing the significance of the difference between two means or two rates consisted of dividing the difference between the two means or rates by the standard error of the difference; that is, a t-statistic was computed. The standard error of a difference of estimates can be calculated as follows: Let s be the standard error of the difference, s_1 and s_2 the standard errors of the estimates x^1 and x^2, then

$$s = \mathrm{sqrt}\,(\mathrm{sqr}\,(s_1) + \mathrm{sqr}\,(s_2) - 2(\mathrm{cov}(x_1,x_2))).$$

All statistical testing in this report used the calculated covariance in the estimation of the standard error of the difference. However, covariances are not given in this report because they would take a great deal of space. Readers, therefore,

NOTE: A list of references follows the text.

will have to perform their statistical testing without the use of the covariance term. Thus, where the two groups or measures are correlated positively or negatively, the standard error of the difference computed without the benefit of the covariance term will give an overestimate or underestimate, respectively, of the actual standard error of the difference. The use of this standard error will affect the calculated *t*-statistic, either decreasing it, if the calculated standard error is increased, or increasing it, if the calculated standard error is decreased. This in turn could cause the reader to come to differing conclusions concerning the statistical significance of a finding, if the *p* value is near 0.05. The standard errors given in this report will, however, allow the reader to calculate confidence intervals around point estimates. Unless otherwise specified, tests for statistical significance are two-sided tests and use a *p* value of 0.05 as the limit for statistical significance.

Appendix II
Data quality

Inter-examiner variability

More than 31 temporary and permanent examiners participated in the NHANES II skin-test examination. Each examiner was assigned a separate identification number except for the temporary examiners, who shared numbers 75 through 79. Thirteen examiner numbers, including the temporary ones, accounted for 95.7 percent of the skin-test eligible sample persons. These examiners will be referred to as the major examiners in this section. Variability in the reporting of skin-test reactivity was investigated within this group of 13 examiners. Inter-examiner variability was estimated by evaluating the responses in the population to the negative and positive control skin-test solutions. Because replicate skin testing was not performed, intra-examiner variability could not be evaluated.

Ideally, the response of the study participants to the negative control (diluent) should be zero. However, because approximately 2 percent of the general population is dermographic (having the tendency to form elevated reddish marks secondary to any manipulation of the skin), the anticipated prevalence of reactivity to the diluent is not zero.[111] Two cut points based on mean erythema diameter at the 20-minute reading were used to define reactivity for the diluent: Greater than 0 millimeters and greater than or equal to 10.5 millimeters. Overall reactivity was 0.7 percent and 0.3 percent respectively (table VI). No examiner reported over 2 percent reactivity to the diluent except Examiner 16, who reported 2.2 percent reactivity at the greater than the 0 mm cutoff. Thus, it appears that there was no excessive reactivity within the negative control.

The positive control (histamine phosphate) was used in two concentrations during the survey. For the first 48 stands, 0.1 mg/mL histamine base was used. During the last 16 stands, the histamine base concentration was changed to 1.0 mg/mL to increase the rate of reactivity to the positive control. The recommended histamine base concentration for prick–puncture skin testing is 1 mg/mL.[32] At the lower concentration, the expected biologic variability of the histamine response is so great that it makes any analyses of this data meaningless. Therefore, the inter-examiner variability was examined only within the stands using 1.0 mg/mL histamine base. Table VII lists major examiner participation by stand and histamine use.

NOTE: A list of references follows the text.

Table VI. Size of reaction to the negative control (diluent) at the 20-minute reading and number of tests given, for persons ages 6–74 years, by examiner number: United States, 1976–80

Examiner number	Number of tests given	Size of reaction: > 0 mm[1]	Size of reaction: ≥ 10.5 mm[2]
		Percent	Percent
Total	15,066	0.7	0.3
2	847	0.5	0
5	972	0.2	0.2
6	1,918	0.6	0.4
7	1,339	0.1	0.1
9	2,371	0.3	0.2
13	450	0.7	0.7
15	1,128	0.3	0.1
16	820	2.2	0.5
17	885	0.8	0.2
18	647	0.3	0.3
20	562	0.2	0.2
21	430	1.9	1.6
75–79[3]	2,697	1.2	0.3

[1]Mean erythema diameter greater than 0 mm.
[2]Mean diameter of the erythema reaction greater than or equal to 10.5 mm.
[3]Temporary examiner numbers.

NOTE: mm = millimeter.

Table VII. Major examiners for persons ages 6–74 years, by stand and histamine base use: United States, 1976–80

	Total survey	0.1 mg/mL histamine base	1.0 mg/mL histamine base
Stands	64	48	16
Number of sample persons[1]	16,204	11,612	4,592
Major examiners	2,5,6,7, 9,13,15,16, 17,18,20,21, 75–79[2]	2,5,6,7, 9,13,15,16, 17,18, 75–79[2]	6,9,17,18, 20,21, 75–79[2]
Percent of exams done by major examiners	95.7	96.1	92.3

[1]Total number of sample persons within the stands regardless of examiner.
[2]Temporary examiner numbers.

The erythema reaction was used to measure inter-examiner variability because the analyses of allergenic reactivity were based on the erythema reaction. Reactivity to histamine was defined as a mean erythema diameter at the 20-minute reading of greater than 0 mm. The purpose of the positive control was to establish cutaneous end-organ reactivity to one important inflammatory mediator of the immediate hypersensitivity reaction (histamine). Thus, no cut point other than the presence or absence of a reaction was felt to be appropriate.

Table VIII. Prevalence of skin-test reactivity to 1.0 mg/mL histamine base at the 20-minute reading and number of tests given for persons ages 6–74 years, by major examiners: United States, 1976–80

Examiner number	Number of tests given	Percent positive[1]
Total	4,125	90.6
20	564	81.6
18	328	86.3
75–79[2]	1,566	89.4
21	426	93.7
9	570	93.9
17	285	98.2
6	386	98.7

[1]Mean erythema diameter greater than 0 millimeters.
[2]Temporary examiner numbers.

Table IX. Change in reactivity to 1.0 mg/mL histamine base at the 20-minute reading by chronological order for selected examiners for persons ages 6–74 years: United States, 1976–80

Examiner number	First half[1]		Second half	
	Number of tests given	Percent positive[2]	Number of tests given	Percent positive[2]
6	121	96.7	265	99.6
9	324	94.8	246	92.7
17	82	100.0	203	97.5
20	380	75.5	184	94.0
21	80	90.0	346	94.5

[1]Eight stands in each half.
[2]Mean diameter of the erythema reaction greater than 0 millimeters.

The prevalence of skin reactivity by major examiner for 1.0 mg/mL histamine base is presented in table VIII. Inter-examiner differences in reporting reactivity to histamine ranged from 81.6 percent to 98.7 percent.

In any examination performed repeatedly over an extended period of time, techniques can change unintentionally. The authors examined the data for this "drift" in technique by looking at the reported results over time for selected examiners. The stands using 1.0 mg/mL histamine were divided in half, based on chronological order (8 stands in each half, table IX). Note that the prevalence of reactivity, although not consistent for each examiner, was generally equivalent between the halves except for Examiner 20, whose reported rate of reactivity increased from 75.5 percent to 94 percent.

In summary, within the stands using 1.0 mg/mL histamine base when comparisons were made among the reported rates of reactivity and among the change in rates over time, no major differences in reporting the histamine reaction were seen among examiners.

Skin color

An important factor influencing the detection of a skin-test reaction is skin color. In dark-skinned individuals it may be difficult to see the reaction, and consequently the measurements will be less accurate. The percent positive and mean size of the erythema and wheal reaction at the 20-minute reading to 1.0 mg/mL histamine base by race and sex were examined to see if skin color played a role in the reading of the skin-test reaction (table X). Regarding the erythema reaction, the histamine reactivity for black persons as compared with white persons was slightly lower in both percent positive (83.6 percent versus 92.2 percent, respectively) and mean size of the positives (17.8 millimeters versus 18.4 millimeters, respectively), but in no case did this difference reach statistical significance. A similar finding was noted for the wheal reaction: Black persons again had a lower rate of reactivity (90.9 percent versus 95.4 percent, respectively) and a smaller size (4.2 millimeters versus 4.4 millimeters, respectively) than white persons, but in no case did this difference reach statistical significance.

The observed tendency for a lower rate of reactivity in black persons may be due, in part, to hyporesponsiveness to histamine and/or the tendency to underread the dimensions of the erythema and wheal reaction in dark-skinned individuals. No data on skin color were available in the population tested. Thus, the relation between skin color and cutaneous reactivity cannot further be evaluated.

Histamine reactivity

The size of the wheal and erythema reactions to 1.0 mg/mL histamine are shown in table XI. The data collected on skin-test reactivity to 1.0 mg/mL histamine base in the NHANES II skin-test sample can be used by others as a population standard for histamine reactivity.

Variations in histamine reactivity by age, sex, urban or rural, and poverty level were examined in stands using 1.0 mg/mL histamine (table XII). Reactivity rates were fairly constant within the age groupings used in this study. They ranged from 92.7 percent in persons 6–11 years of age to 86.1 percent in persons 65–74 years of age. The rate of reactivity dropped slightly in the age groups 55 years and over, but this change did not reach statistical significance. Females had a higher rate of reactivity than males (92.0 percent versus 89.9 percent). No difference in reactivity was noted for urban or rural residency or for poverty status.

Method of allergen manufacture

Allergens selected for NHANES II were purchased initially from a single U.S. Food and Drug Administration (FDA) licensed manufacturer (Nelco Labs) as 1:20 weight per volume (W/V) extracts in 50 percent glycerin. Later in the survey 1:20 W/V freeze-dried extracts, obtained from a different FDA licensed manufacturer (Greer Labs), were used. The use of two different sets of allergens allowed the researchers to determine the variability in the prevalence estimates because of differences in allergenic potency between two commercially available allergenic extracts. The use of the glycerinated and freeze-dried extracts are described fully in the Source and limitations of the data section. In brief, the glycerinated extracts were used exclusively in 38 stands. Freeze-dried extracts were used exclusively in 4 stands and both extracts were used in 22 stands. To estimate the variability in the prevalence of allergic skin reactivity due to differences in allergenic potency between the two batteries of allergens, reactivity rates were compared in the 22 stands in which both extracts were

Table X. Percent positive and size of erythema and wheal reaction at the 20-minute reading for 1.0 mg/mL histamine base for persons ages 6–74 years, by race and sex: United States, 1976–80

Reaction, race, and sex	Sample size	Percent positive[1,2]	Standard error	p value	Mean[1,2] in mm	Standard error	p value
Erythema reaction							
White:							
Both sexes	3,801	92.2	0.94	...	18.4	0.55	...
Male	1,862	91.6	1.48	...	18.2	0.74	...
Female	1,939	92.9	0.79	...	18.7	0.43	...
Black:							
Both sexes	608	83.6	5.87	0.15	17.8	0.62	0.45
Male	289	79.3	8.39	0.20	17.4	0.88	0.45
Female	319	87.7	3.73	0.15	18.3	0.50	0.58
Wheal reaction							
White:							
Both sexes	3,801	95.4	1.42	...	4.4	0.11	...
Male	1,862	95.4	1.57	...	4.6	0.12	...
Female	1,939	95.4	1.56	...	4.2	0.10	...
Black:							
Both sexes	608	90.9	3.69	0.15	4.2	0.23	0.33
Male	289	91.7	4.11	0.30	4.4	0.31	0.54
Female	319	90.6	3.57	0.15	4.0	0.17	0.20

[1]Mean erythema or wheal diameter greater than 0 mm mean diameter.
[2]Age-adjusted to U.S. population, March 1, 1978.

NOTE: mm = millimeter.

Table XI. Size of wheal and erythema reaction in millimeters at the 20-minute reading for 1.0 mg/mL histamine base for persons ages 6–74 years, by sex: United States, 1976–80

Reaction and sex	Sample size	Mean	Median	Standard deviation	Percent distribution 5	10	25	50	75	90	95
Wheal											
Both sexes	4,199	4.4	4.5	1.65	2.0	2.5	3.0	4.5	5.0	6.5	7.0
Male	2,039	4.5	4.5	1.72	2.0	2.5	3.0	4.5	5.5	6.5	7.5
Female	2,160	4.2	4.0	1.57	2.0	2.5	3.0	4.0	5.0	6.0	7.0
Erythema											
Both sexes	3,992	18.4	18.5	8.55	4.5	6.5	12.0	18.5	24.5	29.5	32.5
Male	1,915	18.2	18.0	8.76	4.5	6.0	11.0	18.0	24.5	30.0	32.5
Female	2,077	18.7	19.0	8.36	4.5	7.5	12.5	19.0	24.5	29.5	32.0

used. In these 22 stands the sample persons were divided into two groups based on their sample numbers. Those with odd sample numbers received glycerinated extracts and those with even sample numbers received freeze-dried extracts. This selection process was equivalent to random assortment of the sample persons. It was necessary to limit the analyses to these stands, to control for a number of potential confounders (such as geography, examiner, age, race, and sex) for skin-test reactivity.

Reactivity to the two batteries of allergens was determined based on the mean diameter of the erythema reaction at the 20-minute reading. (See table XIII.) A mean diameter of the erythema reaction greater than 0 mm was considered positive. The freeze-dried extracts had increased rates of reactivity for house dust, oak, and Bermuda grass ($p<0.05$). The absolute increase in reactivity ranged from 3.5 percent through 4.7 percent. Only for the dog extract did the glycerinated extracts have a higher rate of reactivity (absolute increase 2.2 percent, $p<0.05$). No differences in reactivity were found for alternaria, cat, ragweed, and rye grass. In the dual-use stands, the distribution of reaction sizes are equivalent for all allergens except Bermuda grass, where the freeze-dried allergen produced larger reactions than the glycerinated extract ($p<0.05$). The small observed differences in reactivity demonstrated that variations in allergenic potency between the two allergen batteries had relatively small effects on the prevalence estimates of the NHANES II survey.

In the absence of standardized extracts, it is not possible

Table XII. Prevalence of skin-test reactivity to 1.0 mg/mL histamine base at the 20-minute reading for persons ages 6–74 years, by selected characteristics: United States, 1976–80

Selected characteristic	Sample size	Percent positive[1]	Standard error	p value
Age				
All ages	4,443	91.0	2.33	...
6–11 years	425	92.7	2.26	...
12–17 years	502	91.9	2.49	...
18–24 years	642	92.5	2.08	...
25–34 years	671	93.1	1.45	...
35–44 years	439	91.5	2.46	...
45–54 years	370	90.6	4.24	...
55–64 years	696	85.7	3.74	...
65–74 years	698	86.1	3.18	...
Sex[2]				
Male	2,167	89.9	1.35	...
Female	2,276	92.0	1.06	0.03
Residence[2]				
Urban	2,391	90.3	2.76	...
Rural	2,052	91.9	2.25	0.75
Poverty level				
Below poverty income ratio (PIR)[2,3]	767	87.5	2.35	...
At or above PIR[2]	3,512	91.4	1.05	0.08

[1]Mean diameter of the erythema reaction greater than 0 millimeters.
[2]Age-adjusted to U.S. population, March 1, 1978.
[3]Poverty income ratio.

Table XIII. Prevalence of skin-test reactivity for persons ages 6–74 years, by selected allergens and allergen manufacture in stands using both batteries of extracts: United States, 1976–80

Selected allergen	Glycerinated[1]		Freeze-dried[2]		p value
	Percent positive[3]	Total[4]	Percent positive[3]	Total[4]	
House dust	10.3	2,871	15.0	2,922	<0.001
Alternaria	5.8	2,873	5.5	2,926	0.60
Cat	5.0	2,863	5.5	2,918	0.44
Dog	6.5	2,863	4.3	2,914	<0.001
Ragweed	15.5	2,861	16.8	2,919	0.17
Oak	7.2	2,868	10.7	2,926	<0.001
Rye grass	12.0	2,871	12.7	2,930	0.43
Bermuda grass	5.8	2,872	9.6	2,925	<0.001

[1]Manufacture: Nelco labs, N.Y. (1:20 w/v in 50 percent glycerin).
[2]Manufacture: Greer labs, Lenoir, N.C. (freeze-dried, reconstituted with 50 percent glycerin, 1:20 w/v, prior to use).
[3]Reactivity is mean diameter of the erythema reaction greater than 0 millimeters at 20-minute reading.
[4]Total number of skin-tested individuals.

to ascertain whether the rate observed would be equivalent to the rates with standardized extracts. Because this study was performed with unstandardized extracts, it can be assumed that some of the observed rates are lower than would be found with currently available standardized extracts. To determine the precise discrepancy in rates, if any, a replicate study with standardized extracts must be performed. The methodological concern with the observed difference in rates of reactivity for this report lies in the possibility of the unequal use of the two allergen batteries from different manufacturers within differing levels of the variables examined in the analyses. If this occurred, any difference found between groups could possibly be explained, at least to a partial degree, by a difference in allergen potency between the batteries. The use of the two batteries of extracts was evaluated by age, race, sex, family income, poverty level, region, whether urban or rural, and head of household education. No differential usage was noted except for region. The glycerinated extracts were used on approximately 80 percent of the sample persons in the Northeast, South, and West, and on only approximately 50 percent of the sample persons in the Midwest. Thus, during inter-regional comparisons, it is necessary to account for the differential use of the two types of extracts among the regions.

Appendix III
Definition of terms

Age—Two ages were recorded for each examinee: Age at last birthday prior to the time of examination and age at the time of the Census interview. The age criterion for inclusion in the sample used in this survey was defined as age at the time of Census interview. The adjustment and weighting procedures used to produce national estimates were based on age at the interview. Data in the detailed tables and text of the report also are shown by age at the time of interview.

Race—For each individual the observed race was recorded as "white," "black," or "other." Other includes Japanese, Chinese, American Indian, Korean, Eskimo, and all races other than white and black. Persons of Mexican descent were included with "white" unless definitely known to be American Indian or of another race. Black persons and persons of mixed black and other parentage were recorded as black. When persons of mixed racial background were uncertain about their race, the race of the father was recorded.

Sex—Sex was recorded by the interviewers and examiners.

Poverty Index—The poverty index was determined by the poverty income ratio (PIR). Poverty statistics published in U.S. Bureau of the Census reports[112–116] were based on the poverty index developed by the Social Security Administration (SSA) in 1969.

The two components of the PIR are as follows: Numerator—the total income of the household as defined by the median income for income groups with incomes of $7,000 and above, or the sum of the component parts of the income questions for income groups below $7,000; and denominator—a multiple of the total income necessary to maintain a family with given characteristics on a nutritionally adequate food plan.[112–116] The dollar value of the diet in the denominator of the PIR is constructed from a food economy plan necessary to maintain minimum recommended daily nutritional requirements.

Poverty thresholds are computed on a national basis only. No attempt has been made to adjust these thresholds for regional, State, or other variations in the cost of living (except for the farm or nonfarm difference). None of the noncash public welfare benefits such as food-stamp bonuses are included in the income of the low-income families receiving these benefits. PIR has been adjusted by year and accounts in some part for inflation.

Tables of weighted average threshold poverty cutoffs for 1976–80 have been published.[117]

Family income group—The respondent was given a card listing categories and was instructed to select the one that represented his or her total combined family income for the past 12 months. Respondents were asked to include income from all sources such as wages, salaries, social security or retirement benefits, help from relatives, rent from property, and the like.

Place of residence—The place of residence of a member of the U.S. civilian noninstitutionalized population is classified as inside a standard metropolitan statistical area (SMSA) or outside of an SMSA.

Standard metropolitan statistical areas—The definitions and titles of SMSA's are established by the U.S. Office of Management and Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas. The definition of an individual SMSA involves two considerations: First, a city or cities of at least 50,000 inhabitants that constitute a central city and identify the county in which they are located as a central county; second, economic and social relationships with contiguous counties (except in New England) that are metropolitan in character so that the periphery of the specific metropolitan area may be determined. SMSA's are not limited by State boundaries. In New England, SMSA's consist of towns and cities rather than of counties.

Urban or rural—Size of place classification was derived from the 1970 Decennial Census of the Population. According to the definition used in the 1970 census, the urban population consisted of all persons living in (a) places of 2,500 inhabitants or more incorporated as cities, boroughs (except Alaska), villages, and towns (except towns in New York, New England States, and Wisconsin), but excluding those persons living in the rural portions of extended cities; (b) unincorporated places of 2,500 inhabitants or more; and (c) other territories included in urbanized areas. The remaining population was classified as rural.

NOTE: A list of references follows the text.

Geographic region—The United States was divided into four broad geographic regions of approximately equal population. The regions, which deviate somewhat from the groups used by the U.S. Bureau of the Census, are as follows:

Region	*States included*
Northeast	Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania
Midwest	Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri
South	Delaware, Maryland, Virginia, West Virginia, Kentucky, Arkansas, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, District of Columbia
West	Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, California, Arizona, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Alaska, Hawaii.

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