

Letters

RESEARCH LETTER

Prevalence of Immunosuppression Among US Adults, 2013

The number of immunosuppressed adults in the United States is unknown but thought to be increasing because of both greater life expectancy among immunosuppressed adults due to improvements in medical management, as well as new indications for immunosuppressive treatments.¹⁻⁴ Immunosuppression increases the risks and severity of primary or reactivation infections; its prevalence has implications for food and water safety, tuberculosis control, vaccine programs, infection control strategies, outbreak preparedness, travel medicine, and other facets of public health.¹ We present data on the prevalence of self-reported immunosuppressed adults in the United States.

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Methods | We conducted a cross-sectional analysis of noninstitutionalized civilian adults in the United States aged 18 years or older using the 2013 National Health Interview Survey (NHIS), an annual health survey conducted via household interviews.⁵ The NHIS uses a multistage probability design; sample weights allow inferences on national prevalence to be estimated. The National Center for Health Statistics research ethics review board oversees the NHIS, including the questions used in this study; participants provided verbal informed consent.⁵

In 2013, respondents were asked whether they had ever been told by a “doctor or other health professional” that their immune system was weakened. Those responding yes were asked follow-up questions to assess whether that status was current (ie, at time of response) and to report additional evidence of immunosuppression (Table and Box). Those reporting use of immunosuppressive medications or treatments or occurrence of immunosuppressive medical conditions (ie, hematopoietic cancers or human immunodeficiency virus [HIV] infection) were considered immunosuppressed in our analysis, but those reporting only frequent colds or infections or attributing immunosuppression solely to chronic diseases or to solid cancers (ie, in absence of immunosuppressive treatments) were not (Table). To categorize respondents providing contradictory information (eg, leukemia with no immunosuppressive medical condition), we conducted sensitivity analyses, applying criteria of varying stringency (eTable 1 and eTable 2 in the Supplement). Analyses were performed using SAS version 9.3 (SAS Institute).

Results | The total household response rate was 75.7%, consisting of 41 355 eligible households. Of 34 426 eligible adult respondents within these households, 4.2% (n = 1442) had been

Table. Self-reported Immunosuppressed Status

	No. (%) (n = 951)	Prevalence per 100 US Population, % (95% CI)
Currently immunosuppressed	951 (2.8) ^a	2.7 (2.4-2.9)
Sex		
Male	298 (31.3)	1.8 (1.5-2.1)
Female	653 (68.7)	3.5 (3.1-3.9)
Race/ethnicity ^b		
Hispanic	128 (13.5)	1.6 (1.2-1.9)
Non-Hispanic		
White	641 (67.4)	3.0 (2.7-3.4)
Black	122 (12.8)	2.3 (1.8-2.8)
Asian	29 (3.0)	1.7 (0.8-2.7)
Other	31 (3.3)	3.9 (2.0-5.9)
Age group, y		
18-39	182 (19.1)	1.6 (1.3-1.9)
40-49	136 (14.3)	2.3 (1.8-2.8)
50-59	281 (29.5)	4.4 (3.7-5.1)
60-69	213 (22.4)	3.9 (3.2-4.5)
70-79	101 (10.6)	3.1 (2.4-3.8)
≥80	38 (4.0)	2.5 (1.4-3.5)

^a Based on responses from 34 426 participants to survey questions in the Box. Response of “yes” to question 1 (n = 2148) and question 2 and to either questions 3 or 4 or had hematologic cancer within last 2 years (latter based on question 7 and date calculations from question 8). Those not meeting this definition were categorized as not immunosuppressed. Remaining questions used to assess validity of responses; immune status of respondents providing contradictory answers was categorized using sensitivity analyses (eTable 1 and eTable 2 in the Supplement). There were 103 excluded due to response of “refuse” or “do not know” to any of the questions.

^b Self-identified from provided categories; categories are mutually exclusive.

told at some time by a health professional that their immune system was weakened. Of these, 2.8% (n = 951) reported current immunosuppression and additional evidence of immunosuppression, translating to an estimated US prevalence of 2.7% (95% CI, 2.4%-2.9%). In sensitivity analyses, prevalence ranged from 1.8% (95% CI, 1.6%-2.0%) to 3.1% (95% CI, 2.9%-3.3%). Prevalence was highest among women, whites, and persons aged 50 to 59 years (Table).

Discussion | In this study based on the 2013 NHIS, an estimated 2.7% of US adults self-reported that they were immunosuppressed. This study was not designed to explore the attributable causes of immunosuppression, although prevalence is likely driven by frequency and chronicity (eg, lifelong immunosuppression due to HIV infection, treatment for autoimmune conditions, or solid organ transplantation vs short-term cancer chemotherapy). The higher prevalence of immunosuppression among women may reflect their higher risk for autoimmune conditions.⁶ Age-specific

Box. National Health Interview Survey Questions on Immunosuppression, 2013

1. Have you ever been told by a doctor or other health professional that your immune system is weakened?
2. Based on what a doctor or other health professional told you, do you still have a weakened immune system?
3. During the past 6 months, have you taken prescription medication or had any medical treatments that a doctor or other health professional told you would weaken your immune system?
4. Do you currently have a health condition that a doctor or other health professional told you weakens the immune system, even without related medications or treatments?
5. Has a doctor or other health professional ever told you that your immune system is weakened because you have kidney disease, lung disease, liver disease, diabetes, poor nutrition, or general frailty?
6. Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?
7. What kind of cancer was it?
8. How old were you when your cancer was first diagnosed?
9. Earlier you said you had cancer. Did a doctor or other health professional ever tell you that your immune system is weakened because of this cancer/these cancers?
10. Has a doctor or other health professional ever told you that your immune system is weakened because you seem to get many infections and colds or that you can't seem to get over them?

Additional information appears in eTable 1 and eTable 2 in the Supplement.

immunosuppression increased with age, in parallel with the epidemiology of prevalent conditions that require immunosuppressive treatments, but it is unclear why it peaked at ages 50 to 59 years.

The study has limitations. Self-reports of immunosuppression are prone to misclassification, but the modest range of results in the sensitivity analyses provides reassurance regarding the potential influence of erroneous responses. With a limited number of survey questions, causes or subsets of immunosuppression could not be reliably determined. It is unknown whether data from 2013 reflect the current prevalence of immunosuppression. In addition, the study excluded children and institutionalized adults.

This study addresses an underappreciated phenomenon and serves as a call for additional data from other sources to complement and fill the gaps in the study. Tracking immunosuppression over time is particularly important given the hundreds of clinical trials now under way to assess the use of immunosuppressive treatments for prevention or mitigation of common chronic diseases in highly prevalent risk groups.

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Study concept and design: Harpaz.

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COMMENT & RESPONSE

Evaluating a Value-Driven Outcomes Program

To the Editor In the absence of a randomized clinical trial, evaluating underlying market trends and risk is critical to determining whether an intervention resulted in real improvements in quality or costs. Unfortunately, Dr Lee and colleagues¹ included neither in an observational study of a value-driven outcomes program that found reduced costs and improved quality in 3 clinical projects.

However, the investigators could have initially intervened with randomly chosen physicians or sites (to compare performance of intervention and nonintervention groups in the same diagnosis related groups during the same period); reported concurrent cost and quality measures for diagnosis related groups not subject to interventions in their own institution (to compare results vs market trends); and risk-adjusted findings (to more accurately compare before and after results). Risk adjustment is particularly important in