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Sociodemographic and Behavioral Characteristics Associated with Blood Donation in the United States: A Population-Based Study

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Abstract

Background: Contemporary population-based data on characteristics associated with blood donation in the U.S. are limited.

Study Design and Methods: A cross-sectional analysis was performed among 28,739 persons aged 18 years who participated in the 2016 National Health Interview Survey (NHIS), a household survey of the noninstitutionalized U.S. civilian population. Analyses were weighted and accounted for the complex survey design. Adjusted prevalence ratios (aPR) were estimated by multivariable log-binomial regression.

Results: The percentage of individuals reporting a past-year history of blood donation was 5.7% (95%CI=5.3%–6.1%), and was highest in the youngest age group (18–24 years:8.4%). A past-year history of blood donation was more common in males compared to females (6.3% vs. 5.1%;aPR=1.12;[95%CI=0.99–1.27]) and those born in the U.S. compared to individuals born outside the U.S. (6.4% vs. 2.4%;aPR=1.92;[95%CI=1.49–2.47]). The percentage of individuals with a past-year history of blood donation was significantly lower in Blacks (3.9%;aPR=0.60; [95%CI=0.47–0.75]) and Hispanics (3.0%;aPR=0.63;[95%CI=0.48–0.83]) in comparison to Whites (6.9%). Being a college graduate, being employed, being physically active, and never being a cigarette smoker were factors positively associated with blood donation. The percentage of individuals with a past-year history of blood donation varied by geographic census region, with

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prevalence being higher in the Midwest (7.3%) and South (6.0%) compared to the Northeast (4.7%) and West (4.4%).

Conclusion: Continued differences in the blood donor population with reference to the U.S. population underscore the need to understand barriers or deterrents to blood donation. Evidence-based donor recruitment and related policies remain imperative to ensure there is a sustainable blood supply.

Keywords

Blood donors; blood transfusion; epidemiology; sexual and gender minorities

INTRODUCTION

Blood transfusion is a lifesaving procedure that is integral to the management of many surgical and medical pathologies. In the United States (U.S.), blood transfusion rates have steadily declined over 30% in the past decade.^{1–5} Several factors have contributed to this decline, including the availability of revised clinical guidelines,^{6–8} implementation of patient blood management programs,^{9–13} an expanded repertoire of bone marrow-sparing and hemostatic agents,^{14–16} and an increase in the practice of minimally invasive surgeries.^{17–19} Despite these advancements, blood transfusion remains common in U.S. hospitals.^{5,20}

Blood collection for transfusion in the U.S. is primarily conducted by nonprofit blood collection agencies. Blood centers located across the U.S. coordinate with local hospitals to ensure there is a safe and adequate blood supply readily available for patient needs. The decline in blood utilization has contributed to decreases in revenue for blood centers, changes in blood center operations, mergers between blood centers, and ultimately, less resources for investment in blood donor recruitment and retention.²¹ Nationally, blood collections have also decreased over time.^{2,3} In 2015, ~12.6 million red blood cell (RBC) units were collected, of which ~12.0 million units were available for transfusion and ~11.3 million units were transfused.³ The small difference between the number available and the number transfused of RBC units has raised concerns regarding the adequacy and resiliency of the national blood supply to address routine and emergent demands for blood.⁴

Maintenance of a sustainable blood supply is critically dependent on a stable blood donor pool. In the U.S., blood donation for transfusion is voluntary. However, individuals who donate plasma for further manufacturing can receive monetary payment. According to the National Blood Collection and Utilization Survey (NBCUS)—a web-based survey of all civilian blood centers—the number of allogeneic, nondirected blood donors decreased from approximately 9.2 million in 2011 to 6.8 million in 2015.²² The decline in the number of blood donors is likely a result of the systemic changes occurring regarding blood collections, decreased demand for blood, and a decrease in wasted blood products. Additionally, there are changes in the blood donor pool. For instance, older age cohorts may be aging out of the blood donor pool. Using data from eight U.S. blood collectors, Yazer et al. highlighted the changing age and racial/ethnic distribution of blood donors between 2006 and 2015.²³ While these data from blood centers are important, temporal trends in donor demographics can be difficult to interpret without directly accounting for the changing demographic composition

of the underlying population. Furthermore, determining independent factors associated with being a blood donor requires a reference group of nondonors.

In the U.S., national population-based household sample surveys have previously been used to identify characteristics associated with a history of blood donation since 1985 (e.g., donor vs nondonor), but these data are largely outdated.²⁴ Understanding contemporary factors associated with blood donation could prove vital in the timely design of targeted donor recruitment, replacement, and management strategies (e.g., national social media recruitment campaigns). In addition, national data can help monitor the collective influence of existing blood donor recruitment and replacement strategies and donor policies. This study aimed to examine sociodemographic and behavioral correlates of a self-reported past-year history of blood donation in a national sample of the U.S. household population.

METHODS

Study Population

The National Health Interview Survey (NHIS) is an on-going, cross-sectional household survey conducted annually by the National Center for Health Statistics (NCHS), U.S. Centers for Disease Control and Prevention.²⁵ The NHIS uses a multistage area probability sampling design in order to generate estimates representative of the noninstitutionalized U.S. civilian population at both the national- and census-region level. The sample includes persons living in households and non-institutional group quarters (e.g., college dormitories) throughout each of the 50 states and the District of Columbia. Face-to-face interviews are conducted in the respondents' residence by trained interviewers employed by the U.S. Census Bureau. After a family interview, one adult (≥ 18 years) is randomly selected from each family to answer additional questions. The present analysis used data from the 2016 NHIS sample adult component, which had an unconditional response rate of 54.3%.²⁵ The primary analytic sample for this study was further restricted to participants with complete data on all variables included in the analysis.

Ethics Statement

The NCHS Ethics Review Board approved the NHIS protocol and all participants provided informed consent. This analysis of de-identified and publicly available data was deemed exempt from review by the Johns Hopkins School of Medicine Institutional Review Board.

Study Outcome

The outcome of interest was the percentage of participants who self-reported a history of blood donation in the past 12 months. The outcome was determined from the following survey item: "Now, I am going to ask about giving blood donations to a blood bank such as the American Red Cross. During the past 12 months, have you donated blood?" Response options were coded as: "yes", "no", "don't know", "refused", and "not ascertained".²⁶ Persons who had responses coded as "don't know", "refused", and "not ascertained" were considered to have missing data in this analysis. Persons who responded "yes" were considered recent or past-year blood donors. Of note, the survey did not collect information on participants' lifetime history of blood donation, the number of blood donations the

participant made in the past 12 months, or the type of blood donation that was made (e.g., WB, apheresis platelets or source plasma donation).

Variables of Interest

After performing a literature review, we identified sociodemographic and behavioral variables in the NHIS database that could potentially be associated with making a blood donation. All variables were ascertained by self-report. Sociodemographic variables included: age group, sex, race/ethnicity, birthplace, geographic census region, educational attainment, employment status in the past 12 months, estimated annual family household income, marital status, and sexual orientation. Behavioral variables included cigarette smoking status, alcohol consumption, and leisure-time aerobic physical activity levels. The survey did not collect information about marijuana use, opioid use, or other illicit drug use. Cigarette users were classified as never smokers (smoked <100 cigarettes in their lifetime), former smokers (smoked ≥100 cigarettes in their lifetime but do not currently smoke), and current smokers (smoked ≥100 cigarettes in their lifetime and smoke some days or every day). Current alcohol drinkers were classified as participants who had ≥12 drinks in their lifetime and ≥1 drink in the past 12 months. Leisure-time aerobic physical activity levels were measured from a series of questions examining usual frequency and duration of light-to-moderate intensity and vigorous-intensity leisure-time physical activity; the variable was categorized as being inactive (0 minutes/week), insufficiently active (>0 and <150 minutes/week), sufficiently active (≥150 and <300 minutes/week), and highly active (≥300 minutes/week) based on the 2008 Physical Guidelines for Americans.

Statistical Analysis

The analysis was conducted using *svy* commands in Stata/MP, version 15.2 (StataCorp LP, College Station, Texas). NCHS-provided survey weights were used to adjust for unequal selection probabilities, unit non-response, and under-coverage of the noninstitutionalized U.S. civilian population. All estimates were calculated using these survey weights unless stated otherwise. Taylor series linearization was used to estimate standard errors (SE) reflective of the complex survey design; logit-transformed 95% confidence intervals (CI) were also calculated.

Characteristics of participants in the analytic sample and those excluded from the analytic sample were examined using descriptive statistics. The overall estimated percentage of individuals who reported donating blood in the preceding 12 months was multiplied by the corresponding 2010 U.S. Census-based population total to approximate the number of recent blood donors in the U.S. adult population. The percentage of individuals who reported donating blood in the preceding 12 months was also estimated by each sociodemographic and behavioral characteristic. Prevalence ratios (PR) of reporting a history of blood donation in the preceding 12 months were estimated using univariable log-binomial regression models. Adjusted prevalence ratios (aPR) were estimated from a multivariable log-binomial regression model that included sociodemographic and behavioral variables associated with recent blood donation in univariable analyses ($P<0.2$). Two-sided P values were determined by design-adjusted Wald F-tests and a P value less than 0.05 was considered statistically significant.

RESULTS

In 2016, 33,028 individuals participated in the adult sample component of the NHIS. Participants were excluded from the analytic sample if they did not know their recent blood donation history (n=19), the participant refused to respond about their recent blood donation history (n=49), or if data on their recent blood donation history were not ascertained (n=903). An additional 3,318 participants were excluded because of missing data on relevant covariates. The primary analytic sample consisted of 28,739 participants with complete data. Older participants were more likely to be excluded from the analytic sample (Supplemental Table 1). Table 1 presents characteristics of the analytic sample. Of the 28,739 participants in the analytic sample, 1,677 participants reported a history of donating blood in the 12 months prior to the interview.

The (weighted) percentage of individuals reporting a history of blood donation in the past 12 months was 5.7% (95% CI: 5.3%–6.1%), extrapolating to approximately 13.3 million (95% CI: 12.5–14.3) recent blood donors. Table 2 presents the percentage of individuals reporting a history of blood donation in the past 12 months by sociodemographic and behavioral characteristics. The percentage of individuals reporting a history of blood donation in the past 12 months varied significantly by geographic census region with prevalence being highest in the Midwest region (7.3%) as compared to the South (6.0%), Northeast (4.7%), and West (4.4%) ($p<0.05$ for all comparisons; Table 2). The percentage of individuals reporting a history of blood donation in the past 12 months was significantly higher among males (6.3%) than among females (5.1%; $p=0.001$). The percentage of individuals reporting a history of blood donation in the past 12 months also varied by race/ethnicity with prevalence being significantly higher among non-Hispanic whites (6.9%) in comparison to non-Hispanic blacks (3.9%), non-Hispanic Asians (3.3%), and Hispanics (3.0%) ($p<0.001$ for all comparisons; Table 2). The percentage of individuals reporting a history of blood donation in the past 12 months varied significantly by age group; prevalence was highest in the 18–24 year old age group (8.4%) and lowest in the age group ≥ 70 years (1.9%; $p<0.001$). Similar age-specific patterns in the percentage of individuals reporting a history of blood donation in the past 12 months were observed when further stratifying the data by sex and race/ethnicity (Figure 1). In univariable analyses, all sociodemographic and behavioral characteristics examined were significantly associated with a self-reported history of blood donation in the past 12 months ($p<0.05$); with the exception of sexual orientation (Table 2).

In multivariable analysis, age, race/ethnicity, and geographic census region remained significantly associated with a self-reported history of blood donation in the past 12 months ($p<0.05$; Table 2). Although the association between sex and a self-reported history of blood donation in the past 12 months was not statistically significant in the multivariable model, males remained more likely than females to report a history of donating blood in the past 12 months (aPR, 1.12 [95% CI: 0.99–1.27]; $p=0.077$). Persons born in the U.S. (vs. foreign-born; aPR, 1.92 [95% CI: 1.49–2.47]), persons who graduated from college (vs. had less than a high school education; aPR, 1.42 [95% CI: 1.02–1.98]), and persons who were employed in the past year (vs. unemployed; aPR, 1.65 [95% CI: 1.35–2.02]) were significantly more likely to report a history of blood donation in the past 12 months. Health-related behaviors were also significantly associated with blood donation. Highly active

persons (vs. inactive; aPR, 1.85 [95% CI: 1.51–2.25]) and alcohol drinkers (vs. non-drinkers; aPR, 1.17 [95% CI: 1.02–1.34]) were significantly more likely to report a history of donating blood in the past 12 months. Current smokers were significantly less likely to report a history of donating blood in the past 12 months than never smokers (aPR, 0.73 [95% CI: 0.61–0.88]). Neither family income nor marital status were factors independently associated with a self-reported history of blood donation in the past 12 months.

Less than 5% of the study population identified as a sexual minority (Table 1). Of the males, 96.7% (SE: 0.2) identified as straight (heterosexual), 2.3% (SE: 0.2) identified as gay or bisexual, and 2.1% (SE: 0.1) identified with another sexual identity or did not know their sexual orientation. The percentage of males who reported a history of blood donation in the prior 12 months was 6.3% (95% CI: 5.7%–6.9%) among those who identified as straight and 5.4% (95% CI: 2.4%–11.4%) among those who identified as gay or bisexual. Of the females, 95.9% (SE: 0.2) identified as straight, 2.9% (SE: 0.2) identified as gay or bisexual, and 1.2% (SE: 0.1) identified with another sexual identity or did not know their sexual orientation. The percentage of females who reported a history of blood donation in the prior 12 months was 5.1% (95% CI: 4.6%–5.6%) among those who identified as straight and 6.6% (95% CI: 4.4%–9.8%) among those who identified as lesbian, gay, or bisexual.

DISCUSSION

Given the decentralized nature of the U.S. blood collection system, there are limited nationally-representative data characterizing factors associated with blood donation in the United States. In this population-based study, 5.7% of the adult U.S. household population in 2016 reported donating blood in the preceding 12 months. The percentage of individuals reporting a blood donation in the past 12 months was higher among younger individuals (18–24 years), non-Hispanic whites, U.S.-born persons, individuals living in the Midwest or South, and those who reported healthier behaviors. Although data on same-sex behavior was not available in the present study, a similar proportion of males who identified as gay/bisexual reported donating blood in the past year as males who identified as straight.

Despite concerted efforts toward recruitment of minority blood donors, the distribution of the blood donor base by race/ethnicity appears largely unchanged with continued underrepresentation of Black, Asian and Hispanic donors. Using data from select blood collection centers, a 2006 study concluded that minority and non-U.S.-born donors were less likely than white and U.S.-born donors to be repeat donors, and most were less likely to donate more than once per year.²⁷ Analysis of blood donation trends over the subsequent 10 years was largely unchanged with white donors still constituting the majority of the donor pool, despite a decrease in donations from white donors over time.²⁸ Here, we use national data to show racial/ethnic minorities are less likely than non-Hispanic whites to be recent blood donors (vs. nondonors) while accounting for the underlying racial/ethnic distribution of the U.S. population. Broader racial/ethnic representation in the donor pool is necessary from an operational standpoint to ensure sustainability of a diverse blood supply, as broad racial/ethnic representation has important consequences regarding antigen-negative blood utilization and availability.^{29,30}

In this study, young adults were more likely than older populations to report donating blood in the previous 12 months. Over a decade ago, Zou et al. reported aging in the blood donor population and the authors recommended a shift to recruitment of younger donors as a measure to ensure sustainability of the blood supply.³¹ Sapiano et al. reported the blood donor pool had increasing numbers of the youngest (age <18 years) and oldest aged donors (aged 65 years).²² Similar temporal trends in the changing age distribution of the donor population have been reported in Europe.³² A higher percentage of younger donors (e.g. aged 18–24 years) in this study could indeed reflect targeted recruitment, as is known to occur through mobile blood drives at high schools and colleges.³³ Recruitment of young blood donors is viewed favorably where early introduction to donation practice has the potential for long-term repeated donation over the lifetime of the donor, however, there are concerns regarding younger female donors (age 16 and 17) due to higher adverse events and potential consequences of iron deficiency. Disproportionate recruitment of high school donors aged 16 and 17 years is controversial given their higher propensity toward adverse events and iron deficiency.^{34–38} Although the sample population in this study was restricted to persons aged 18 years at the time of the survey, some of the 18-year-olds in this study who reported donating blood in the prior 12 months may have been 17 years of age at the time of blood donation.

The geographic distribution of recent blood donors in this study varied significantly. Such occurs by operational design as evidenced by the disproportionate number of collection facilities that are located in the Midwest and South regions (as compared to the West and Northeast regions).²¹ This is partly an economic phenomenon: the costs of collection in the Midwest and South are lower than those in the West and Northeast.²¹ The placement of blood collection centers is important to consider, as geographic access to blood donation sites has previously been linked to donor behaviors due to convenience.³⁹ The geographical variation in blood donor prevalence could also be due to cultural differences, as has been seen with other volunteer and social capital behaviors.⁴⁰

Individuals who reported a history of recent blood donation were more affluent than nondonors, as evidenced by a higher likelihood of being a college graduate, being employed, and being from a family with a higher income. However, it should be noted that being from a family with a higher income was not an independent predictor of a self-reported history of blood donation in this study. These data also suggest the act of donating blood largely selects for a healthier population: donors tended to report higher physical aerobic activity levels and were less likely to report smoking cigarettes. This is consistent with more favorable health-related outcomes, such as lower cancer incidence and related mortality among U.S. blood donors in comparison to nondonors.⁴¹ Recent alcohol use was positively associated with blood donation, but this variable was highly inclusive and likely included light social drinkers. The strength of this association was also sharply attenuated in multivariable analysis, suggesting the association could be explained by confounding. While a generally healthier blood donor base is favorable to donor recruitment, it can result in selection bias when blood donors are used as convenient study populations for epidemiological surveillance. In short, this study provides contemporary evidence that U.S. blood donors are not representative of the general U.S. population in terms of socioeconomic and health-related behavioral characteristics.⁴²

The primary strength of this study is its population-based design, capturing a reference group of individuals who reported they did not donate blood in the previous 12 months. The NHIS also collects sociodemographic and behavioral data that are often excluded from other donor studies. However, it is important to consider that this study is subject to limitations inherent to national household surveys. This study had a moderate final response rate; thus, the study findings may have been influenced by nonresponse bias despite adjustment for unit nonresponse. In addition, the sampling frame for the NHIS excludes individuals in long-term care facilities and correctional facilities.²⁵ NHIS participants have been shown to be healthier than the general population.⁴³

Notably, this study was based on self-reported data and the study outcome has not been validated in the United States. Given that the NHIS includes the administration of a lengthy questionnaire regarding health-related behaviors, acquiescence bias may have potentially impacted the measurement of the outcome. It is also possible that the study outcome was influenced by social desirability bias. This has previously been reported when examining the prevalence of *ever* making a blood donation in the Swiss Health Survey.⁴⁴ In addition, there is potential for recall bias; however, this is unlikely given that recall of a previous blood donation improves substantially with time since blood donation and the NHIS questionnaire specified a short 12-month window.⁴⁵ In an Australian record-linked survey, there was optimal concordance between the self-reported and recorded date of most recent blood donation for those who had a recorded blood donation within one year of the survey.⁴⁵

The prevalence of blood donation observed in this study (5.7%) is similar to annual estimates of blood donation among individuals aged 18 years in other developed countries that have blood donor registries (e.g., Denmark [5.4%]).⁴⁶ The best available data source for the enumeration of blood donors in the U.S., however, is the NBCUS.^{3,22} In the 2015 NBCUS, it was estimated that there were 6.9 million individuals who successfully donated a blood product (i.e., 6.8 million allogeneic, nondirected donors, 23,000 autologous donors, and 26,000 directed donors).²² NBCUS estimates exclude donors for whom the donated product was ultimately rejected (due to deferral policies), as well as those who donated blood at military blood centers. It is unlikely that these exclusions fully explain the difference in the number of estimated blood donors between the 2015 NBCUS and the present study, especially given that the present study did not include the youngest blood donors (i.e., 16–17-year-olds). The aforementioned selection and response biases may have partly led to the overestimation of U.S. blood donors in the present study. It is also plausible that individuals who made a source plasma donation at a commercial plasma collection center may have identified as a blood donor, given that the survey item did not specify the type of blood product donated. These plasma donors would not have been captured in the NBCUS. Data from the Plasma Protein Therapeutics Association suggest source plasma collections have been on the rise since 2005 with 38.3 million plasma collections made in 2016.⁴⁷ Over six hundred plasma collection centers are currently distributed throughout the U.S. It is unclear if contemporary factors associated with voluntary blood donation are similar or different to factors associated with paid plasma donation. Future surveys should consider collecting more granular data to differentiate the type of blood donation that was made in addition to collecting more specific data on donor histories (i.e., first-time vs. repeat donors).

While it is reassuring that the relative associations observed in this study are largely consistent with the literature, this study has additional limitations. As an observational study, the findings may be subject to residual and unmeasured confounding. It is important to recognize that this study represents a population-based perspective and did not account for those ineligible to donate. Given that donor rates of eligibility vary by demographic factors (e.g., race/ethnicity),⁴⁸ the observed disparities in blood donation should be interpreted with caution. Finally, data on same-sex sexual behavior was unavailable and there was limited power to make statistical inferences regarding the prevalence of blood donation by sexual orientation (identity).

In conclusion, this study offers population-based data on sociodemographic and health behavioral-related factors associated with blood donation in the U.S. These data should be considered as a complement to data from blood collection centers. The study findings reiterate the need to understand barriers to blood donation among racial/ethnic minority groups. Designing and successfully implementing effective donor recruitment and related policies remains imperative to contend with the challenges of maintaining a sustainable blood supply.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Roubinian NH, Escobar GJ, Liu V, Gardner MN, Carson JL, Kleinman SH, et al. Decreased red blood cell use and mortality in hospitalized patients. *JAMA Intern Med.* 2014 Aug;174(8):1405–7. [PubMed: 24978650]
2. Chung KW, Basavaraju SV, Mu Y, van Santen KL, Haass KA, Henry R, et al. Declining blood collection and utilization in the United States. *Transfusion* [Internet]. 2016/05/14. 2016;56(9):2184–92. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27174734> [PubMed: 27174734]
3. Ellingson KD, Sapiano MRP, Haass KA, Savinkina AA, Baker ML, Chung KW, et al. Continued decline in blood collection and transfusion in the United States-2015. *Transfusion* [Internet]. 2017/06/08. 2017;57 Suppl 2:1588–98. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28591469> [PubMed: 28591469]
4. Klein HG, Hrouda JC, Epstein JS. Crisis in the Sustainability of the U.S. Blood System. *N Engl J Med.* 2017 Oct;377(15):1485–8. [PubMed: 29020590]
5. Goel R, Chappidi MR, Patel EU, Ness PM, Cushing MM, Frank SM, et al. Trends in red blood cell, plasma, and platelet transfusions in the United States, 1993–2014 [Internet]. 2018/02/28. Vol. 319, *JAMA - Journal of the American Medical Association.* 2018 p. 825–7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/29486023> [PubMed: 29486023]

6. Carson JL, Stanworth SJ, Roubinian N, Fergusson DA, Triulzi D, Doree C, et al. Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion. *Cochrane database Syst Rev*. 2016 Oct;10:CD002042. [PubMed: 27731885]
7. Carson JL, Guyatt G, Heddle NM, Grossman BJ, Cohn CS, Fung MK, et al. Clinical Practice Guidelines From the AABB: Red Blood Cell Transfusion Thresholds and Storage. *JAMA*. 2016 Nov;316(19):2025–35. [PubMed: 27732721]
8. Carson JL, Stanworth SJ, Alexander JH, Roubinian N, Fergusson DA, Triulzi DJ, et al. Clinical trials evaluating red blood cell transfusion thresholds: An updated systematic review and with additional focus on patients with cardiovascular disease. *Am Heart J*. 2018 Jun;200:96–101. [PubMed: 29898855]
9. Thakkar RN, Lee KHK, Ness PM, Wintermeyer TL, Johnson DJ, Liu E, et al. Relative impact of a patient blood management program on utilization of all three major blood components. *Transfusion*. 2016 Sep;56(9):2212–20. [PubMed: 27383581]
10. Leahy MF, Hofmann A, Towler S, Trentino KM, Burrows SA, Swain SG, et al. Improved outcomes and reduced costs associated with a health-system-wide patient blood management program: a retrospective observational study in four major adult tertiary-care hospitals. *Transfusion*. 2017 Jun;57(6):1347–58. [PubMed: 28150313]
11. Frank SM, Thakkar RN, Podlasek SJ, Ken Lee KH, Wintermeyer TL, Yang WW, et al. Implementing a Health System-wide Patient Blood Management Program with a Clinical Community Approach. *Anesthesiology*. 2017 Nov;127(5):754–64. [PubMed: 28885446]
12. Gupta PB, DeMario VM, Amin RM, Gehrie EA, Goel R, Lee KHK, et al. Patient Blood Management Program Improves Blood Use and Clinical Outcomes in Orthopedic Surgery. *Anesthesiology*. 2018 Dec;129(6):1082–91. [PubMed: 30124488]
13. Goel R, Cushing MM, Tobian AAR. Pediatric Patient Blood Management Programs: Not Just Transfusing Little Adults. *Transfus Med Rev*. 2016 Oct;30(4):235–41. [PubMed: 27559005]
14. Wright JD, Ananth CV, Lewin SN, Burke WM, Siddiq Z, Neugut AI, et al. Patterns of use of hemostatic agents in patients undergoing major surgery. *J Surg Res*. 2014 Jan;186(1):458–66. [PubMed: 23993203]
15. Montroy J, Hutton B, Moodley P, Fergusson NA, Cheng W, Tinmouth A, et al. The efficacy and safety of topical tranexamic acid: A systematic review and meta-analysis. *Transfus Med Rev*. 2018 Feb;
16. Sanders S, Tien H, Callum J, Nascimento B, Peng H, Funk C, et al. Fibrinogen Concentrate in the Special Operations Forces Environment. *Mil Med*. 2018 Jan;183(1–2):e45–50. [PubMed: 29401352]
17. Davis CH, Shirkey BA, Moore LW, Gaglani T, Du XL, Bailey HR, et al. Trends in laparoscopic colorectal surgery over time from 2005–2014 using the NSQIP database. *J Surg Res*. 2018 Mar;223:16–21. [PubMed: 29433869]
18. Davis CH, Gaglani T, Moore LW, Du XL, Hwang H, Yamal J-M, et al. Trends and outcomes in laparoscopic versus open surgery for rectal cancer from 2005 to 2016 using the ACS-NSQIP database, a retrospective cohort study. *Int J Surg*. 2019 Mar;63:71–6. [PubMed: 30771485]
19. Xia L, Talwar R, Taylor BL, Shin MH, Berger IB, Sperling CD, et al. National trends and disparities of minimally invasive surgery for localized renal cancer, 2010 to 2015. *Urol Oncol*. 2019 Mar;37(3):182.e17–182.e27.
20. Goel R, Patel EU, White JL, Chappidi MR, Ness PM, Cushing MM, et al. Factors associated with red blood cell, platelet, and plasma transfusions among inpatient hospitalizations: a nationally representative study in the United States. *Transfusion*. 2019 Feb;59(2):500–7. [PubMed: 30548491]
21. Mulcahy AW, Kapinos KA, Briscoombe B, Uscher-Pines L, Chaturvedi R, Case SR, et al. Toward a sustainable blood supply in the United States. *Rand Corp St Monica, CA*. 2016;
22. Sapiiano MRP, Savinkina AA, Ellingson KD, Haass KA, Baker ML, Henry RA, et al. Supplemental findings from the National Blood Collection and Utilization Surveys, 2013 and 2015. *Transfusion* [Internet]. 2017/06/08. 2017;57 Suppl 2:1599–624. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28591471> [PubMed: 28591471]

23. Yazer MH, Vassallo R, Delaney M, Germain M, Karafin MS, Sayers M, et al. Trends in age and red blood cell donation habits among several racial/ethnic minority groups in the United States. *Transfusion* [Internet]. 2017/04/04. 2017;57(7):1644–55. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28370164> [PubMed: 28370164]
24. Gillum F, Eder AF, McLaurin-Jones TL. Hispanic ethnicity, race and blood donation in the United States. *Transfus Med*. 2008;18(6):366–70. [PubMed: 19140820]
25. National Center for Health Statistics. Survey Description, National Health Interview Survey, 2016. Hyattsville, Maryland; 2017.
26. National Center for Health Statistics. National Health Interview Survey, 2016. Public-use data file and documentation 2017.
27. Murphy EL, Shaz B, Hillyer CD, Carey P, Custer BS, Hirschler N, et al. Minority and foreign-born representation among US blood donors: demographics and donation frequency for 2006. *Transfusion*. 2009;49(10):2221–8. [PubMed: 19555415]
28. Yazer MH, Delaney M, Germain M, Karafin MS, Sayers M, Vassallo R, et al. Trends in US minority red blood cell unit donations. *Transfusion* [Internet]. 2017/02/17. 2017;57(5):1226–34. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28205236> [PubMed: 28205236]
29. Shaz BH, Zimring JC, Demmons DG, Hillyer CD. Blood donation and blood transfusion: special considerations for African Americans. *Transfus Med Rev*. 2008 Jul;22(3):202–14. [PubMed: 18572096]
30. Shaz BH, Hillyer CD. Minority donation in the United States: challenges and needs. *Curr Opin Hematol*. 2010 Nov;17(6):544–9. [PubMed: 20717026]
31. Zou S, Musavi F, Notari EP th, Fang CT, Group AR. Changing age distribution of the blood donor population in the United States. *Transfusion* [Internet]. 2007/11/17. 2008;48(2):251–7. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/18005327> [PubMed: 18005327]
32. Wittock N, Hustinx L, Bracke P, Buffel V. Who donates? Cross-country and periodical variation in blood donor demographics in Europe between 1994 and 2014. *Transfusion* [Internet]. 2017/08/26. 2017;57(11):2619–28. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28840944> [PubMed: 28840944]
33. Eder AF, Klein HG, Conry-Cantilena C. Inform Parents, Protect High School Blood Donors. *JAMA Pediatr* [Internet]. 2017/03/14. 2017;171(5):409–10. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28288255> [PubMed: 28288255]
34. Eder AF, Hillyer CD, Dy BA, Notari EP th, Benjamin RJ. Adverse reactions to allogeneic whole blood donation by 16- and 17-year-olds. *JAMA* [Internet]. 2008/05/22. 2008;299(19):2279–86. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/18492969> [PubMed: 18492969]
35. Bloch EM, Mast AE, Josephson CD, Klein HG, Eder AF. Teenage Blood Donors: Are We Asking Too Little and Taking Too Much? *Pediatrics* [Internet]. 2017/03/05. 2017;139(4). Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28258073>
36. Spencer BR, Bialkowski W, Creel DV., Cable RG, Kiss JE, et al. Elevated risk for iron depletion in high-school age blood donors. *Transfusion*. 2019;
37. Patel EU, White JL, Bloch EM, Grabowski MK, Gehrie EA, Lokhandwala PM, et al. Association of blood donation with iron deficiency among adolescent and adult females in the United States: a nationally representative study. *Transfusion*. 2019 Feb;
38. Notari IV EP, Zou S, Fang CT, Eder AF, Benjamin RJ, Dodd RY. Age-related donor return patterns among first-time blood donors in the United States. *Transfusion*. 2009;49(10):2229–36. [PubMed: 19903284]
39. James AB, Josephson CD, Shaz BH, Schreiber GB, Hillyer CD, Roback JD. The value of area-based analyses of donation patterns for recruitment strategies. *Transfusion*. 2014;54(12):3051–60. [PubMed: 24912544]
40. Zoorob MJ, Salemi JL. Bowling alone, dying together: The role of social capital in mitigating the drug overdose epidemic in the United States. *Drug Alcohol Depend*. 2017 Apr;173:1–9. [PubMed: 28182980]
41. Vahidnia F, Hirschler NV, Agapova M, Chinn A, Busch MP, Custer B. Cancer Incidence and Mortality in a Cohort of US Blood Donors: A 20-Year Study. *J Cancer Epidemiol* [Internet].

- 2014/02/04. 2013;2013:814842 Available from: <https://www.ncbi.nlm.nih.gov/pubmed/24489545> [PubMed: 24489545]
42. Golding J, Northstone K, Miller LL, Davey Smith G, Pembrey M. Differences between blood donors and a population sample: implications for case-control studies. *Int J Epidemiol*. 2013 Aug; 42(4):1145–56. [PubMed: 23825379]
43. Keyes KM, Rutherford C, Popham F, Martins SS, Gray L. How Healthy Are Survey Respondents Compared with the General Population?: Using Survey-linked Death Records to Compare Mortality Outcomes. *Epidemiology*. 2018 Mar;29(2):299–307. [PubMed: 29389712]
44. Volken T, Banziger A, Buser A, Castelli D, Fontana S, Frey BM, et al. Too Many Blood Donors - Response Bias in the Swiss Health Survey 2012. *Transfus Med Hemother* [Internet]. 2016/12/21. 2016;43(6):400–6. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/27994526> [PubMed: 27994526]
45. Karki S, Davison TE, Thijsen A, Gemelli CN, Irving DO, Wright ST. Completeness and accuracy of self-reported history of blood donation: results from a cohort of older adults in Australia. *Transfusion*. 2018;
46. Burgdorf KS, Simonsen J, Sundby A, Rostgaard K, Pedersen OB, Sorensen E, et al. Socio-demographic characteristics of Danish blood donors. *PLoS One* [Internet]. 2017/02/10. 2017;12(2):e0169112 Available from: <https://www.ncbi.nlm.nih.gov/pubmed/28182624> [PubMed: 28182624]
47. Association PPT. United States Total Collections 2009–2018 [Internet]. Available from: https://www.pptaglobal.org/images/Data/Plasma_Collection/2009-2018_US_TC.pdf
48. James AB, Hillyer CD, Shaz BH. Demographic differences in estimated blood donor eligibility prevalence in the United States. *Transfusion* [Internet]. 2011/11/03. 2012;52(5):1050–61. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/22044443> [PubMed: 22044443]

Figure 1. Age-specific self-reported prevalence of blood donation in the past 12 months stratified by (A) sex and (B) race/ethnicity.

Data were weighted and error bars reflect design-adjusted, logit-transformed 95% confidence intervals. The “Other” group in panel B consists of persons in the non-Hispanic Asian, Hispanics, and non-Hispanic other/multiracial groups as sample sizes among each of these groups were too small to analyze separately.

Table 1.

Characteristics of the study population. *

Characteristic	Overall		History of Blood Donation in the Past 12 Mo.			
	No.	% (SE)	No		Yes	
	No.	% (SE)	No.	% (SE)	No.	% (SE)
Total	28,739	-	27,062	-	1,677	-
Age group, years						
18–24	2,708	12.2 (0.3)	2,432	11.8 (0.3)	276	17.9 (1.4)
25–29	2,276	9.1 (0.3)	2,120	9.1 (0.3)	156	9.8 (1.1)
30–39	4,628	18.0 (0.3)	4,316	17.9 (0.3)	312	19.5 (1.3)
40–49	4,204	16.7 (0.3)	3,960	16.7 (0.3)	244	16.5 (1.1)
50–59	4,980	17.5 (0.3)	4,649	17.4 (0.3)	331	19.0 (1.2)
60–69	5,144	14.8 (0.3)	4,880	14.8 (0.3)	264	13.4 (1.0)
70	4,799	11.8 (0.2)	4,705	12.3 (0.3)	94	3.9 (0.5)
Sex						
Female	15,638	51.5 (0.4)	14,798	51.8 (0.4)	840	46.5 (1.6)
Male	13,101	48.5 (0.4)	12,264	48.2 (0.4)	837	53.5 (1.6)
Race/ethnicity						
Non-Hispanic white	20,361	65.4 (0.9)	19,009	64.5 (0.9)	1,352	79.3 (1.5)
Non-Hispanic Black	3,111	11.9 (0.5)	2,988	12.1 (0.5)	123	8.1 (0.9)
Non-Hispanic Asian	1,465	6.0 (0.3)	1,400	6.1 (0.3)	65	3.5 (0.6)
Hispanic	3,361	15.8 (0.7)	3,240	16.2 (0.7)	121	8.4 (1.1)
Other/multiracial	441	1.0 (0.1)	425	1.0 (0.1)	16	0.7 (0.2)
Birthplace						
Foreign-born	4,028	18.4 (0.6)	3,909	19.0 (0.6)	119	7.8 (0.9)
U.S.-born	24,711	81.6 (0.6)	23,153	81.0 (0.6)	1,558	92.2 (0.9)
Census region						
Northeast	4,802	18.0 (0.8)	4,546	18.1 (0.8)	256	14.9 (1.2)
Midwest	6,471	22.5 (0.6)	6,016	22.1 (0.7)	455	28.9 (1.7)
South	9,918	35.5 (1.1)	9,363	35.4 (1.1)	555	37.5 (1.9)
West	7,548	24.1 (0.9)	7,137	24.4 (1.0)	411	18.8 (1.4)
Educational attainment						
Less than H.S.	3,393	11.9 (0.3)	3,313	12.3 (0.4)	80	5.4 (0.8)
H.S. graduate or GED	7,063	24.5 (0.4)	6,788	25.0 (0.5)	275	17.6 (1.3)
Some college	5,848	19.8 (0.4)	5,439	19.6 (0.4)	409	22.8 (1.3)
College graduate	12,435	43.8 (0.6)	11,522	43.2 (0.6)	913	54.1 (1.7)
Employment status in past 12 months						
Unemployed	10,170	31.0 (0.4)	9,894	32.0 (0.4)	276	15.1 (1.2)
Employed	18,569	69.0 (0.4)	17,168	68.0 (0.4)	1,401	84.9 (1.2)
Annual family income, \$						
<50,000	14,372	41.7 (0.6)	13,717	42.3 (0.6)	655	31.9 (1.5)
50,000–99,999	8,077	30.1 (0.4)	7,563	30.0 (0.4)	514	32.6 (1.6)

Characteristic	Overall		History of Blood Donation in the Past 12 Mo.			
			No		Yes	
	No.	% (SE)	No.	% (SE)	No.	% (SE)
100,000	6,290	28.2 (0.6)	5,782	27.7 (0.6)	508	35.5 (1.6)
Marital status						
Never married	6,638	22.4 (0.4)	6,147	22.1 (0.4)	491	26.4 (1.5)
Married/living with partner	14,522	61.0 (0.5)	13,644	61.0 (0.5)	878	61.5 (1.6)
Separated/divorced/widowed	7,579	16.6 (0.3)	7,271	16.9 (0.3)	308	12.1 (0.9)
Sexual orientation						
Straight	27,642	96.3 (0.2)	26,024	96.3 (0.2)	1,618	96.2 (0.7)
Gay/lesbian/bisexual	781	2.6 (0.1)	738	2.6 (0.1)	43	2.8 (0.6)
Other identity †	316	1.1 (0.1)	300	1.1 (0.1)	16	1.0 (0.4)
Cigarette smoking status						
Never	16,883	62.1 (0.5)	15,787	61.7 (0.5)	1,096	67.9 (1.5)
Former	7,101	22.2 (0.4)	6,742	22.3 (0.4)	359	19.9 (1.2)
Current	4,755	15.7 (0.4)	4,533	15.9 (0.4)	222	12.2 (1.0)
Alcohol drinking status						
Non-drinker	13,192	45.0 (0.5)	12,631	45.8 (0.5)	561	32.8 (1.5)
Drinker	15,547	55.0 (0.5)	14,431	54.2 (0.5)	1,116	67.2 (1.5)
Leisure time aerobic activity level						
0 minutes/week	7,892	26.6 (0.6)	7,666	27.3 (0.6)	226	13.9 (1.2)
>0 and <150 minutes/week	5,957	20.8 (0.4)	5,664	21.0 (0.4)	293	16.8 (1.2)
150 and 300 minutes/week	4,771	16.9 (0.3)	4,472	16.8 (0.4)	299	17.9 (1.2)
>300 minutes/week	10,119	35.8 (0.5)	9,260	34.9 (0.5)	859	51.4 (1.7)

* Data are unweighted sample sizes (No.) of the analytic sample and corresponding weighted column percentages and design-corrected standard errors (SE).

† Includes persons who reported “something else” and “I don’t know”.

Table 2.

Factors associated with a self-reported history of blood donation in the past 12 months (n=28,739).

History of Blood Donation in the Past 12 Mo.					
Characteristic	% (95% CI) *	Univariable Analysis		Multivariable Analysis	
		PR (95% CI) †	P‡	aPR (95% CI) ‡	P‡
Age group, years					
18–24	8.4 (7.2–9.7)	Ref.	-	Ref.	-
25–29	6.1 (4.9–7.6)	0.73 (0.56–0.95)	0.021	0.67 (0.51–0.88)	0.004
30–39	6.2 (5.4–7.1)	0.74 (0.60–0.91)	0.004	0.76 (0.60–0.97)	0.025
40–49	5.6 (4.8–6.5)	0.67 (0.55–0.83)	<0.001	0.70 (0.55–0.89)	0.003
50–59	6.2 (5.4–7.1)	0.74 (0.60–0.90)	0.003	0.79 (0.63–1.00)	0.048
60–69	5.2 (4.5–6.0)	0.62 (0.50–0.76)	<0.001	0.74 (0.57–0.97)	0.027
70	1.9 (1.4–2.5)	0.23 (0.17–0.31)	<0.001	0.37 (0.25–0.52)	<0.001
Sex					
Female	5.1 (4.7–5.6)	Ref.	-	Ref.	-
Male	6.3 (5.7–6.9)	1.22 (1.08–1.38)	0.001	1.12 (0.99–1.27)	0.077
Race/ethnicity					
Non-Hispanic white	6.9 (6.4–7.4)	Ref.	-	Ref.	-
Non-Hispanic black	3.9 (3.1–4.8)	0.56 (0.45–0.70)	<0.001	0.60 (0.47–0.75)	<0.001
Non-Hispanic Asian	3.3 (2.4–4.6)	0.48 (0.34–0.67)	<0.001	0.79 (0.55–1.14)	0.210
Hispanic	3.0 (2.3–3.9)	0.44 (0.34–0.57)	<0.001	0.63 (0.48–0.83)	0.001
Other/multiracial	4.0 (2.1–7.6)	0.58 (0.30–1.12)	0.103	0.75 (0.39–1.45)	0.395
Birthplace					
Foreign-born	2.4 (1.9–3.0)	Ref.	-	Ref.	-
U.S.-born	6.4 (6.0–6.9)	2.67 (2.12–3.36)	<0.001	1.92 (1.49–2.47)	<0.001
Census region					
Northeast	4.7 (3.9–5.7)	0.64 (0.52–0.81)	<0.001	0.70 (0.56–0.87)	0.001
Midwest	7.3 (6.5–8.3)	Ref.	-	Ref.	-
South	6.0 (5.4–6.7)	0.82 (0.70–0.97)	0.017	0.98 (0.84–1.15)	0.824
West	4.4 (3.8–5.2)	0.61 (0.50–0.74)	<0.001	0.67 (0.55–0.82)	<0.001
Educational attainment					
Less than H.S.	2.6 (1.9–3.5)	Ref.	-	Ref.	-
H.S. graduate or GED	4.1 (3.5–4.8)	1.58 (1.13–2.21)	0.008	1.04 (0.74–1.47)	0.804
Some college	6.6 (5.8–7.4)	2.53 (1.83–3.51)	<0.001	1.34 (0.95–1.90)	0.096
College graduate	7.0 (6.4–7.7)	2.72 (1.99–3.70)	<0.001	1.42 (1.02–1.98)	0.039
Employment status in past 12 months					
Unemployed	2.8 (2.4–3.3)	Ref.	-	Ref.	-
Employed	7.0 (6.5–7.5)	2.52 (2.13–2.99)	<0.001	1.65 (1.35–2.02)	<0.001
Annual family income, \$					
<50,000	4.3 (3.9–4.8)	Ref.	-	Ref.	-
50,000–99,999	6.2 (5.5–6.9)	1.42 (1.21–1.65)	<0.001	1.06 (0.90–1.26)	0.478
100,000	7.2 (6.4–8.0)	1.65 (1.43–1.91)	<0.001	1.01 (0.84–1.21)	0.932

History of Blood Donation in the Past 12 Mo.					
Characteristic	% (95% CI) *	Univariable Analysis		Multivariable Analysis	
		PR (95% CI) †	P§	aPR (95% CI) ‡	P§
Marital status					
Never married	6.7 (5.9–7.6)	Ref.	-	Ref.	-
Married/living with partner	5.7 (5.2–6.3)	0.85 (0.74–0.99)	0.035	0.99 (0.83–1.18)	0.871
Separated/divorced/widowed	4.2 (3.6–4.8)	0.62 (0.51–0.75)	<0.001	0.98 (0.79–1.22)	0.887
Sexual orientation					
Straight	5.7 (5.3–6.1)	Ref.	-	-	-
Gay/lesbian/bisexual	6.1 (4.1–8.9)	1.07 (0.73–1.57)	0.734	-	-
Other identity ^{//}	5.4 (2.7–10.6)	0.95 (0.48–1.89)	0.894	-	-
Cigarette smoking status					
Never	6.2 (5.7–6.8)	Ref.	-	Ref.	-
Former	5.1 (4.5–5.8)	0.82 (0.71–0.95)	0.010	0.88 (0.75–1.02)	0.093
Current	4.4 (3.7–5.2)	0.71 (0.59–0.85)	<0.001	0.73 (0.61–0.88)	0.001
Alcohol drinking status					
Non-drinker	4.1 (3.7–4.6)	Ref.	-	Ref.	-
Drinker	7.0 (6.4–7.5)	1.68 (1.47–1.92)	<0.001	1.17 (1.02–1.34)	0.023
Leisure time aerobic activity level					
0 minutes/week	3.0 (2.5–3.5)	Ref.	-	Ref.	-
>0 and <150 minutes/week	4.6 (4.0–5.4)	1.55 (1.24–1.93)	<0.001	1.20 (0.96–1.51)	0.113
150 and 300 minutes/week	6.0 (5.2–7.0)	2.02 (1.62–2.53)	<0.001	1.42 (1.13–1.78)	0.003
>300 minutes/week	8.2 (7.5–8.9)	2.74 (2.27–3.32)	<0.001	1.85 (1.51–2.25)	<0.001

* Data are weighted row percentages and corresponding logit-transformed 95% confidence intervals (CI).

† Prevalence ratios (PR) and corresponding 95% CIs were estimated by weighted log-binomial regression models.

§ P values were determined from design-adjusted Wald F-tests.

‡ Adjusted prevalence ratios (aPR) and corresponding 95% CIs were estimated from a weighted multivariable log-binomial regression model that included all covariates shown with the exception of sexual orientation.

// Includes persons who reported “something else” and “I don’t know”.