Published in final edited form as:

Transfusion. 2009 October ; 49(10): 2221–2228. doi:10.1111/j.1537-2995.2009.02271.x.

Minority and Foreign-Born Representation among USA Blood Donors: Demographics & Donation Frequency for 2006

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Abstract

Background—Historically, minority populations represented only a small proportion of USA blood donors, but recent trends in immigration and potential blood shortages emphasize the need for recruitment strategies to increase minority donations.

Methods—We analyzed donation data from a network of six USA blood centers for 2006. Race/ethnicity, country of birth and educational attainment data were collected specifically for the study and assessed for their influence on donation behavior. Logistic regression was used to determine independent associations with repeat donors status and annual donation frequency.

Results—We studied 1,288,998 donations from 729,068 donors; most donors had data on race/ethnicity (97.1%) and country of birth (93.1%). The proportion of minority donors differed by blood center, with African-Americans (16%) most common at the Southeastern blood center, and Asians (12%), Hispanics (13%) and foreign-born donors (13%) most common at the Northern California blood center. Minority donors and those born in Mexico or Latin America were younger than Whites. Minority and non-USA-born donors were less likely than Whites and USA-born donors to be repeat donors (odds ratios 0.60 to 0.78), and most were less likely to give ≥ 2 annual donations (odds ratios ranging from 0.82 to 1.11).

Conclusion—Minority and Mexico/Latin America-born donors represent a younger and often first-time donor population compared to White and USA-born donors, but their annual donation frequency was only slightly lower than White and USA-born donors. Increasing the retention and donation frequency of minorities will be important for supplementing the blood supply.

INTRODUCTION

Blood collection and transfusion are important components of health systems in the United States of America (USA) and the world. In the USA, approximately 14 million whole blood products are collected each year from about 8 million volunteer donors.^{1,2} The *Healthy People 2010* data demonstrate that age, race, and education affect blood donation rates, which are defined as the proportion of individuals age 18 years or older who donate blood.³ Overall donation rates were 8% for 18 to 24 year olds, 6% for 25 to 64 year olds and <2% for 65 years or older. Whites donated at a rate of 7%, which was over twice the rate of Asians, Hispanics, and African-Americans. Individuals with at least some college education donated at a rate of 8%, high school graduates at approximately 4%, and those who had not completed high school at only 2%.⁴ Therefore, changing demographics in the USA may impact the blood supply.

Census data demonstrate a change in the racial and ethnic composition of the USA, with substantial increases in some minority groups and minorities approaching one third of the total population.⁵ The Hispanic population increased by 3.4% between July 1, 2005 and July 1, 2006 followed by Asians with a 3.2% increase over the same time period. In comparison, the non-Hispanic White population grew by only 0.3% from 2005 to 2006. The same article emphasized that minorities made up substantially larger percentage of those aged under 40 compared to those 40 and older. As minorities make up an increasing percent of the population, it is important to understand potential effects on the blood supply.

Mirroring the general population, the demographics of blood donors may also be changing. In 1977, Oswalt concluded that the “typical” blood donor was a “White man representing an organized group who tended to be a repeat donor and who gave at a mobile unit in the community where he resided.”⁶ Although only 10% of the donor pool was reported as non-White in 1965, that number had grown to 26% for the period of 1991 to 1995.^{7,8} The Retrovirus Epidemiology Donor Study (REDS) group investigated demographic trends for 901,862 first-time donors at five USA blood centers from 1991 to 1996.⁹ Over the 6-year period, there was a significant increase in the proportion of non-USA-born blood donors and the proportion of Hispanic, African-American, and Asian first-time donors and a concomitant decrease in White donors. This was especially true of Hispanic donors in Southern California and Oklahoma.⁹ On the other hand, over 80% of the blood supply comes from repeat donors and frequent repeat donors are more likely to be older. From 1996 to 2005, the American Red Cross had a significant increase in the percent of donations by repeat donors age 50 years and older (22.1% in 1996 to 34.5% in 2005); these donors also have the highest mean donation frequency compared to the other age groups.¹⁰ These reports leave unanswered some questions about changing demographic trends in blood donors because the REDS data concerned only first-time donors and the American Red Cross report did not report on race, ethnicity, or birthplace.

The goal of the current study was to determine the demographic characteristics and donation behavior of contemporary donors to better understand the effect of changing USA demographics on blood availability. Understanding the changes in blood donor demographics is important to guide recruitment strategies that focus on minority blood donors and to provide benchmarks to measure the success of these programs.

METHODS

Population and study design

This was a cross-sectional study of minority blood donors at six USA blood centers participating in the Retrovirus Epidemiology Donor Study II (REDS-II; see appendix for

names and locations). The blood centers are distributed across the USA and collect over one million donations per year, or at least 8 percent of total national collections. Any donor making at least one allogeneic whole blood or apheresis donation during 2006 was eligible for inclusion; those making only autologous or directed donations were excluded. Donors had to meet blood donor selection criteria at the six centers to be included in the dataset; we separately counted presentations that resulted in deferral (temporary and permanent combined) but those were not included in the main analysis. Each donor was represented only once in the analytical data set even if they made multiple donations, but the number of annual donations was counted for each donor. Minority donors were defined as donors of other than non-Hispanic White race/ethnicity.

Data on age at donation, sex, race/ethnicity, educational attainment, country of birth and first-time or repeat donor status were collected by blood center staff and entered into operational computer systems before being transferred to the central REDS-II donation database. At some blood centers, some of these variables represented data that were newly collected for REDS-II using specific research data systems. Race/ethnicity was self-reported by the donors and categorized separately as race and Hispanic/non-Hispanic ethnicity according to the USA Census categories: non-Hispanic White, non-Hispanic African-American, Hispanic of any race, Asian and “other” race/ethnicity. Country of birth was similarly collected by self-report and categorized into Mexico, other Latin America, other foreign country, and USA. Donors with missing race/ethnicity or country of birth data were excluded from analyses concerning those variables, respectively, in the bivariate analyses (Tables 1 and 2); donors with missing data on any included variable were excluded from the logistic regression analysis. First-time and repeat donor status was ascertained using donor self report as well as retrospective examination of the database for previous donations and/or infectious disease test results relating to the same person. For subsequent donations, we considered only successful whole blood or apheresis donations during the 2006 calendar year; deferrals for medical condition or infectious disease risk and incomplete donations were not counted as subsequent donations.

Statistical analysis

Overall and blood center-specific frequencies were calculated for race/ethnicity and country of birth. Cross tabulations of these two variables with age, sex and educational attainment, by blood center were also created. Deferral rates were expressed as the number of deferred donors divided by number of accepted donors plus number of deferred donors, by temporary versus permanent deferral and race/ethnicity. The distribution of first-time/repeat donor status and the frequency of donation during 2006 were calculated according to race ethnicity and country of birth, by blood center. In order to account for confounding between variables, logistic regression models were created separately for the dependent variables donor status (repeat versus first-time) and donation frequency during 2006 (≥ 2 vs. 1 donation).

Race/ethnicity and country of birth were included in each model while other demographic variables were retained in the model only if they contributed significantly at $p < 0.10$.

To estimate the degree of under- or over-representation of each race/ethnicity group in the donor pool compared to the general population of the collection catchment area, we calculated a “representation ratio” for each race/ethnicity, and blood center. This ratio was defined as the proportion of donors of a specific race/ethnicity (Donors_i) relative to the total donor population of that blood center (All Donors), divided by the proportion of that same race/ethnicity in the local census population (Census_i) relative to the total local census population (Total Census) (Eq.1). For the purpose of this calculation, each blood center provided its local catchment area defined as the counties where the majority of their donors

resided. Census data on race/ethnicity for those same counties was obtained from the USA Census estimates for 2006.

$$\text{Ratio}_i = \frac{(\text{Donors}_i / \text{All Donors})}{(\text{Census}_i / \text{Total Census})}$$

Equation 1

RESULTS

Overall, there were 1,288,998 donations from 729,068 donors at the six REDS-II blood centers during 2006. There were 217,248 donors at the largest center and 54,008 donors at the smallest center. A total of 20,925 (2.9%) donors had missing race/ethnicity data; of those remaining there were 41,314 (5.8%) African-American, 24,985 (3.5%) Hispanic, 16,017 (2.3%) Asian, and 12,208 (1.7%) “other” race donors, in addition to 613,619 (86.7%) non-Hispanic White donors. There was substantial blood center variation in the distribution of race/ethnicity with the Northern California center having the highest percentage of Hispanic (12.9%) and Asian (12.0%) donors, and the Southeastern center having the highest proportion of African-American (15.9%) donors (Table 1). The other four centers each had more than 92% White non-Hispanic race/ethnicity among their donors. During 2006, the percentage of presentations that resulted in deferral was higher among minority donors: 23.6% for African-Americans, 22.5% for Hispanics and 25.2% for Asians compared to 17.1% for White donors.

There were a total of 50,059 (6.9%) donors with missing country of birth; of those remaining 2,142 (0.3%) donors were born in Mexico, 4,817 (0.7%) donors were born in other Latin American countries, 23,339 (3.4%) donors were born in other foreign countries, and 648,711 (95.5%) donors were born in the USA. Again, the distribution of birthplace differed between blood centers (Table 2): the Northern California center had almost 3% of donors born in Mexico or other Latin American countries and over 10% born in other foreign countries; two other centers had about 3% of donors born in non-Latin American foreign countries; and the remaining three centers each had less than 2% foreign-born donors each.

The degree of underrepresentation or overrepresentation of each race/ethnicity group estimated by our calculated representation ratio is presented in Figure 1. Although there was some variation by blood center, Asians, African-Americans and Hispanics all had a representation ratio of approximately 0.5 or less indicating that their proportion in the donor pool was less than half of their proportion in the general population of donor age. Interestingly, there was less underrepresentation for those in the “other” race/ethnicity group, although the ratio varied more by blood center probably due to small numbers of these other race donors. White donors were overrepresented relative to their proportion in the population. Differences in the ratio by center should be interpreted with some caution because of uncertainty in defining a blood center’s catchment area with precision and therefore potential mismatch in the comparison between donor and census populations.

Minority donors were substantially younger than White donors (Table 1). Whereas only 43.8% of White donors were aged less than 40 years, 66% of African-American donors, 71% of Hispanic donors and 72% of Asian donors were under age 40. Whereas White donors were almost equally male and female, African-American and Hispanic donors were more likely to be female and Asian donors were more likely to be male. Without adjusting for age, educational attainment was lower among African-American and Hispanic donors,

with 40% to 45% of each group reporting a high school diploma or less. The educational attainment of Asian donors was almost identical to that of White donors.

Donors born in Mexico and Latin America were substantially younger than donors born in the USA (Table 2). Whereas 47% of USA-born donors were less than 40 years old, 76% of Mexico-born and 62% of other Latin America-born donors were less than 40 years old. Those born in other foreign countries had an age distribution similar to that of USA-born donors. Donors born in Mexico and other Latin American countries had a similar male:female ratio to USA-born donors, while those born in other foreign countries were slightly more likely to be male. Educational attainment differed by country of birth, with the following rank order of those reporting a high school diploma or less: Mexico-born (64%), other Latin America-born (38%), USA-born (30%) and other foreign country-born (23%).

Race/ethnicity was associated with both first-time/repeat donor status and donation frequency among repeat donors (Figure 2-A). Approximately 40% of non-White donors were first-time donors in 2006, compared to only 23% of White donors. Mean donation frequencies during 2006 were lower among minority donors than among Whites: Asian 1.89, African-American 1.70, Hispanic 1.86, other race ethnicity 1.85 and White 2.08. Country of birth was also associated with first-time/repeat donor status and donation frequency among repeat donors (Figure 2-B). First-time donor status was reported by 50% of Mexico-born donors, 39% of other Latin America-born donors and 32% of other foreign-born donors, compared to only 25% of USA-born donors. Mean donation frequency during 2006 was 1.73 among Mexico-born and 1.88 among Latin America-born donors, compared to 2.08 among other foreign-born and 2.06 among USA-born donors.

The results of multivariate modeling of first-time/repeat donor status and annual donation frequency are presented in Table 3. Repeat donors were much less likely to be less than 40 years old; they were also less likely to be female and of high school diploma or lower educational attainment. After adjustment for other demographic factors, minority donors were also significantly less likely than White donors to be repeat donors. Similarly, donors born in Mexico, other Latin American countries or other foreign countries were all less likely than USA-born donors to be repeat donors. An annual donation frequency of two or more blood units in 2006 was much less likely to be found in donors younger than age 40 and less likely in female donors. Donors with a high school diploma or less were very slightly more likely to have a higher donation frequency. Whereas African-American donors had an odds ratio of about 0.8 of being a higher frequency donor, those of Asian, Hispanic or other race/ethnicity had odds ratios of approximately 0.9. Finally, there were only weak associations between country of birth and donation frequency, with those born in Mexico slightly less likely and those born in Latin America or other foreign countries slightly more likely to give two or more donations, all compared to USA-born donors.

DISCUSSION

This study provides data on the current distribution of minority blood donors at six USA blood centers. It shows considerable variation in the percent of minority donors, comprising less than 10 percent of donors at some centers, but a substantially higher proportion at others. This probably represents regional differences in minority populations and possibly differences in recruitment strategies. Still, minorities are substantially underrepresented in the donor pool compared to non-Hispanic Whites. Many of them are young and first-time donors. However, our preliminary data on donation frequency shows smaller differences with White donors after controlling for other demographic differences, suggesting that minorities might be converted to regular repeat donors. Given that minority donors are

younger and less educated, retaining them as repeat donors will require concerted recruitment efforts.

At four of the six blood centers represented in this study, minority donors represent a very small percentage of their total donor pool. Thus, Oswalt's stereotype of the "White male" blood donor has been expanded to "White male and female" donor in these regions. While still underrepresented, the other two centers have achieved a more substantial proportion of minority donors, most likely reflecting the demographics of the underlying populations in their catchment areas. This hypothesis is supported by our analysis of representation ratios; the two centers with higher proportions of minority donors do not have a substantially higher representation of minority donors relative to their local populations. Our data are descriptive and cannot discriminate reasons for minority under-representation. Possible hypotheses include: unintentional or intentional failure of blood banks to recruit minorities or hold mobile drives in minority venues; perceived or real discrimination from the minority viewpoint; cultural barriers to volunteer blood donation; poor communication of recruitment messages or donor eligibility criteria; or a combination of these.

These data are comparable to those of the study that examined bone marrow donors and cord blood donors, and found minorities to be substantially underrepresented compared to the census population covered by their local blood center.¹¹ Although recruitment for these types of donation may differ from recruitment for community blood donation, the authors did conclude that better strategies for minority recruitment are needed. Our data on higher deferral rates among minorities suggest that these groups have somewhat higher levels of risk behaviors or medical conditions that make them ineligible for blood donation, but not enough to explain all of the underrepresentation. Biological differences in hemoglobin levels among minority groups may also lead to higher rates of deferral. Donor eligibility criteria, history questionnaires and educational materials may need to be tailored to minority populations.¹² Surveys of the general population or models using existing data on health and behavior exclusions are necessary to estimate the relative proportion of donors to non-donors, and eligibility for donation, in different race ethnicity groups¹³.

Our intention in performing this study was to provide baseline data on minority representation among blood donors, essentially a snapshot of the current situation. We anticipate that minority recruitment efforts under way at individual blood centers and under the sponsorship of blood bank organizations such as the American Red Cross and America's Blood Centers will be effective in increasing the proportion of minority donors. Such recruitment efforts will depend upon a better understanding of motivation to blood donation among different demographic groups of the population¹⁴. However large databases such as that used in this study will be necessary to accurately measure the change in donor demographics, and blood centers need to collect data on race/ethnicity and country of birth in a more systematic fashion.

We found that minority donors were substantially younger than White donors, similar to USA Census data indicating the youthfulness of these groups. There were only minor differences in gender distribution, with overrepresentation of African-American and Hispanic females and underrepresentation of Asian females. Whether these differences are due to social mores or body habitus within the minority groups, or simply due to differences in donor recruitment, remains to be determined. The educational attainment of African-American and Hispanic donors was lower than for non-Hispanic Whites and Asians. Nevertheless, more than 50% of African-American and Hispanic donors had achieved greater than a high school diploma, compared to 42% and 30%, respectively, in the regional African-American and Hispanic census populations¹⁵. Thus higher educational status is over-represented in donors of all race/ethnicity groups, suggesting a substantial opportunity

for the recruitment of minorities with higher education levels. Understanding how to recruit lower education donors is also important.

Our data on the first time versus repeat donor status indicated that approximately 40% or more of minority and Mexico/Latin America-born donors were first-time donors compared to only 23% first-time status among non-Hispanic White and USA-born donors. In part, this was because younger age is associated with first-time status, and the minority and Mexico/Latin America-born donors were younger than their White and USA-born counterparts. However the first-time donor association persisted in the multivariate model, indicating an independent tendency towards first-time donor status among minority and Mexico/Latin America-born donors. This is encouraging in that it may indicate recent recruitment efforts aimed at these populations are yielding new donors. This is consistent with the findings of Oswalt and Gordon, who found no differences in positive and negative motivations towards blood donation among minority college students compared to their White counterparts.¹⁶ They suggested that underrepresentation of minorities among blood donors was more likely due to socioeconomic causes and blood bank recruitment approaches.

Our data on annual donation frequency is encouraging, because it suggests that after adjusting for first-time donation status and age, minority and foreign-born donors have annual donation rates that are not too much lower than their non-Hispanic White and USA-born counterparts. Similar data on minority return rates have been reported by earlier studies of donor return behavior^{17,18}. These data support the hypothesis that conversion from first-time to repeat donor status will succeed among minority and foreign-born donors. A 1995 study found that only 1% of 281 five-gallon blood donors were of African-American race/ethnicity compared to 8% of 500 randomly selected donors at the same blood center¹⁹. Their selection of only those with the highest donation frequencies may have omitted African-American donors with moderate donation frequencies, and findings may have changed in the 11 years since the earlier study. Other authors have emphasized the need to recruit more African-American donors, particularly to provide a broader distribution of red cell phenotypes to prevent alloimmunization in frequently transfused patients with sickle-cell disease or other hemoglobinopathies²⁰. Increasing the annual donation rate of each donor is essential if the blood supply is to be maintained, since repeat donors have lower infectious disease marker rates and contribute substantially more in terms of total donations than do first-time donors, many of whom donate only once¹⁸.

This study has several strengths. REDS-II instituted the collection of data on race/ethnicity and country of birth in a systematic fashion from all donors at the time of donation. Such data are not collected by many blood centers. We included a large number of donors and donations from six blood centers distributed across the USA. We could also track the number of donations made by each donor, allowing calculation of annual donation rates. Weaknesses are that the six participating blood centers may or may not be representative of all USA blood centers. For example, we do not include large metropolitan areas with high numbers of Hispanic donors such as Southern Florida or Southern California. On the other hand, we do include centers from the Northeast, Southeast, Mid-Atlantic, Midwest and West coast. The relatively short one-year period of data collection limited our ability to calculate annual donation rates, particularly for infrequent donors. Finally, our calculation of a representation ratio was limited by the difficulty in defining a blood center's catchment area, since boundaries between catchment areas of different centers are poorly defined and many donations may occur close to a donor's workplace rather than their residence. Others have noted the same limitation¹¹; future work may allow refinement of this approach.

In conclusion, this study provides important data on the proportion and characteristics of minority blood donors in the USA in 2006. It should provide a baseline against which efforts

to increase minority blood donation may be measured. It also serves to highlight the need for additional studies on the characteristics and donation behavior of minority blood donors in order to implement appropriate recruitment interventions. In particular, surveys of non-donors would be useful in determining the risk factor and medical eligibility of minority and foreign-born donors. Given the aging of the predominately White pool of frequent repeat donors, it will be crucial to increase the participation and retention of minority donors if the blood supply is to be maintained.

Acknowledgments

This work was supported by NHLBI contracts N01-HB-47168, -47169, -47170, -47171, -47172, -47174, -47175 and -57181 and by career award K24-HL-75036 to Dr. Murphy.

The authors thank the staff at all six participating blood centers. Without their help, this study would not have been possible.

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Appendix

The Retrovirus Epidemiology Donor Study - II (REDS-II Study Group) is the responsibility of the following persons:

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Figure 1.

Representation ratio, by race ethnicity and blood Center. The representation ratio equals the proportion of each race/ethnicity among all donors at each center divided by the proportion of each race/ethnicity among the general population in counties comprising the blood center catchment area, USA Census 2006 data.

A)

B)

Figure 2. Proportion of first-time donors and number of donations per year among repeat donors during 2006, by **A)** race/ethnicity and **B)** country of birth (the Latin America category excludes Mexico).

TABLE 1

Number (percent) of 2006 REDS-II blood donors, by demographic characteristics, geographic area and race/ethnicity. Column percentages are given for the age, gender and education, row percentages for blood center. Donors with missing data on race/ethnicity (20,925; 2.9% of all donors) were excluded from the Table.

Variable	Asian N=16,017	African-American N=41,314	Hispanic N=24,985	Other N=12,208	White N=613,619	All Donors N=708,143
Age						
<20	3,992 (25)	11,676 (28)	8,132 (33)	3,888 (32)	96,865 (16)	124,553 (18)
20-29	3,984 (25)	7,591 (18)	5,409 (22)	2,895 (24)	87,076 (14)	106,955 (15)
30-39	3,496 (22)	7,809 (19)	4,147 (17)	1,837 (15)	84,940 (14)	102,229 (14)
40-49	2,528 (16)	7,274 (18)	3,898 (16)	1,704 (14)	137,423 (22)	152,827 (22)
50-59	1,501 (9)	5,044 (12)	2,262 (9)	1,308 (11)	129,770 (21)	139,885 (20)
60+	516 (3)	1,920 (5)	1,137 (5)	576 (5)	77,542 (13)	81,691 (12)
Gender						
Male	8,636 (54)	17,495 (42)	11,650 (47)	5,936 (49)	303,050 (49)	361,344 (51)
Female	7,377 (46)	23,817 (58)	13,332 (53)	6,272 (51)	310,546 (51)	346,767 (49)
Education						
<=High School diploma	4,308 (28)	14,404 (40)	10,552 (46)	4,574 (41)	162,860 (29)	196,698 (30)
College or higher	10,856 (72)	21,631 (60)	12,465 (54)	6,654 (59)	404,594 (71)	456,200 (70)
Blood collection center						
Connecticut & Massachusetts	2,883 (1)	2,417 (1)	5,625 (3)	3,923 (2)	202,400 (93)	217,248
Georgia	3,212 (2)	29,208 (16)	6,488 (4)	3,420 (2)	141,434 (77)	183,762
Pennsylvania	610 (1)	2,557 (3)	841 (1)	765 (1)	87,340 (95)	92,113
Ohio	437 (1)	2,254 (4)	541 (1)	478 (1)	50,298 (93)	54,008
Wisconsin	606 (1)	2,498 (3)	2,591 (3)	1,159 (1)	85,319 (93)	92,173
California	8,269 (12)	2,380 (3)	8,899 (13)	2,463 (4)	46,828 (68)	68,839

TABLE 2

Number (percent) of 2006 REDS-II blood donors, by demographic characteristics, geographic area and country of birth. Latin America refers to Central and South American countries other than Mexico. Column percentages are given for the age, gender and education, row percentages for blood center. Donors with missing data on country of birth (50,059; 6.9% of all donors) were excluded from the Table.

Variable	Mexico N=2,142	Latin America N=4,817	Other Foreign N=23,339	USA N=648,711	All Donors N=679,009
Age					
<20	742 (35)	991 (21)	2,763 (12)	114,318 (18)	118,814
20-29	413 (19)	1,010 (21)	3,737 (16)	97,123 (15)	102,283
30-39	470 (22)	1,002 (21)	4,849 (21)	91,627 (14)	97,948
40-49	320 (15)	970 (20)	5,284 (23)	140,431 (22)	147,005
50-59	127 (6)	555 (12)	3,970 (17)	130,062 (20)	134,714
60+	70 (3)	289 (6)	2,736 (12)	75,147 (12)	78,242
Gender					
Male	1,026 (48)	2,353 (49)	12,227 (52)	316,708 (49)	332,314
Female	1,116 (52)	2,464 (51)	11,111 (48)	331,974 (51)	346,665
Education					
<=High School diploma	1,301 (63)	1,721 (38)	5,056 (23)	188,372 (30)	196,450
College or higher	750 (37)	2,832 (62)	17,148 (77)	434,614 (70)	455,344
Center					
Connecticut & Massachusetts	87 (0)	1,764 (1)	6,920 (3)	200,401 (96)	209,172
Georgia	800 (0)	1,578 (1)	5,912 (4)	158,623 (95)	166,913
Pennsylvania	22 (0)	133 (0)	1,349 (2)	88,493 (98)	89,997
Ohio	24 (0)	104 (0)	782 (1)	52,020 (98)	52,930
Wisconsin	265 (0)	157 (0)	1,269 (1)	88,833 (98)	90,524
California	944 (1)	1,081 (2)	7,107 (10)	60,341 (87)	69,473

TABLE 3

Multivariate logistic regression analyses of factors associated with repeat donor status and two or more annual donations among USA blood donors in 2006.

A) Model predicting repeat donor status		
Variable	Odds Ratio	(95% Confidence Interval)
White	1.00	---
Asian	0.69	(0.66–0.72)
African-American	0.60	(0.58–0.61)
Hispanic	0.73	(0.71–0.76)
Other race/ethnicity	0.67	(0.64–0.70)
Born in USA	1.00	---
Mexico-born	0.78	(0.70–0.86)
Latin America-born	0.77	(0.72–0.83)
Other Foreign-born	0.77	(0.74–0.79)
Age $\geq$ 40	1.00	---
Age $<$ 40	0.31	(0.31–0.32)
Male	1.00	---
Female	0.86	(0.85–0.87)
> High School diploma	1.00	---
$\leq$ High School diploma	0.39	(0.39–0.40)
Center		
Connecticut& Massachusetts	1.00	---
Georgia	0.96	(0.94–0.98)
Pennsylvania	1.05	(1.03–1.07)
Ohio	1.16	(1.13–1.19)
Wisconsin	0.71	(0.70–0.73)
California	0.81	(0.79–0.83)
B) Model predicting two or more annual donations during 2006.		
Variable	Odds Ratio	(95% Confidence Interval)
White	1.00	---
Asian	0.92	(0.88–0.97)
African-American	0.82	(0.79–0.84)
Hispanic	0.91	(0.87–0.95)
Other race/ethnicity	0.90	(0.86–0.95)
Born in USA	1.00	---
Mexico-born	0.94	(0.82–1.07)
Latin America-born	1.11	(1.02–1.20)
Other non-USA-born	1.02	(0.99–1.06)
Age $\geq$ 40	1.00	---
Age $<$ 40	0.61	(0.60–0.62)
Male	1.00	---
Female	0.80	(0.79–0.81)

A) Model predicting repeat donor status		
Variable	Odds Ratio	(95% Confidence Interval)
> High School diploma	1.00	---
< = High School diploma	1.06	(1.04–1.07)
Center		
Connecticut & Massachusetts	1.00	---
Georgia	0.89	(0.87–0.90)
Pennsylvania	0.90	(0.88–0.92)
Ohio	1.01	(0.99–1.03)
Wisconsin	1.41	(1.38–1.44)
California	1.20	(1.18–1.23)