Geographical Distribution of Blood Donation in Tucson Latino Population

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Abstract

Although blood donation in the United States has been studied extensively to determine motivating factors and interventions to increase donation rates, there is little to no research available for the United States Latino population, which donation rate is less than one percent (France et al., 2007). In search for answers as to why these donation rates are so low for Latinos in the U.S., the study first aimed to survey several samples and obtain data from focus groups to analyze a well-collected and extensive qualitative data set. However, as the research plan developed, it became clear that it was not certain whether non-white Latinos in the US had proper access to blood donation drives or centers. The city of Tucson provided great opportunity for this study as there is a large Latino population without being entirely homogenous in its demographics. Over the course of six months, data was collected from the American Red Cross in order to assess the amount of blood donations occurring per Tucson zip code each month. It was hypothesized that low donation rates would be due to lower accessibility of blood donation drives in zip codes with a higher percent of Latinos. The goal was to thoroughly understand why those geographical barriers may have been in place. As a result, the data showed that blood donation drives were in fact occurring at a lower rate in zip codes with higher Latino density, even though several of those same zip codes had some of the highest populations in Tucson.

Geographical Distribution of Blood Donation in Tucson Latino Population

Trends and motivations in blood donation is a popular and widely researched topic due to the fact that there is almost always a blood shortage in the United States. There has been extensive research on motivating factors for blood donation and these motivating behaviors' relationship with the "Theory of Planned Behavior" (France et al., 2007). The "Theory of Planned Behavior," includes extensions of attitude, subjective norm, and perceived control of one's behaviors.

By analyzing and understanding these extensions of planned behavior, one can better assess the motivation behind one's planned actions. Identifying these motivating factors of previous blood donors, in context of blood donation, then allows for proper interventions to be implemented for non-donors in order to increase blood donation in non-donor populations (France et al., 2007). Not only do motivating factors derived from planned behavior lead to an increase in blood donation in a non-donating population, but self-determination has also been proven to lead to more persisting behaviors, in a blood donating context specifically. Furthermore, intrinsic factors, rather than extrinsic factors have a greater chance in motivating one to carry out a specific action.

However, extrinsic factors may be targeted and internalized as intrinsic factors through proper intervention and advertisement to the potential blood donor (France et al., 2014). Through this research, the initial goal was to identify that very self-determination and its relationship with one's planned behavior and how it can be used practically to design behavior-changing interventions (France et al., 2017). While this research over blood donation and interventions is helpful in understanding the thought process of a blood donor, and possible ways to increase

donation, there remains a gap in the literature pertaining to the United States non-white Latino population.

Although there is comprehensive research available surrounding blood donations and blood donating interventions, most all of this research is completed with mostly racially white participants. Therefore, there is a discontinuity in the previous research and its application to non-white Latinos in the United States. Not only is the lack of research on non-white Latinos in the United States an issue in itself, but it remains a prominent issue in blood donation due to the fact that blood donation rates are less than one percent among non-white Latinos in the United States. This severely low number in donation rate is not only a problem due to a constant blood shortage in the U.S, but proves to be a problem due to the fact that while the forty-five percent of the total U.S. population has an O blood type, the most common blood type, sixty percent of Latinos have an O blood type (Oneblood.org, 2017). Consequently, as the number of Latinos in the U.S. rises, the amount of O type blood needed rises with it.

Additionally, in recent years, the American Red Cross has released statements regarding the importance of matching blood donor and blood acceptor ethnicities to ensure better chance of successful transfusion and uptake of the blood for the acceptor (American Red Cross, 2017). However, several barriers to blood donations in Latinos leading to low donation rates were initially suspected in several forms of research and serve to be reasons that prevent intrinsic motivation for blood donation. These barriers from misinformation included, but were not limited to:

- Weight gain
- Lower sex drive
- HIV infection from donating

- Becoming diabetic, or exacerbating symptoms of diabetes
- Concerns about immigration
- Concerns about equality of distribution in blood donated
- Religious concerns
- Mistrust of the medical profession

(Oneblood.org, 2017).

Interventions regarding these barriers are scarce in consequence to the lack of community donation programs targeted towards minorities. In regards to this lack of targeted programs for minorities, Latinos were most underrepresented at 10/1000 Latinos receiving any form of community outreach for donations, compared to 77/1000 white Americans, and 22/1000 black Americans (Shaz et al., 2015). Therefore, in order to identify and target these present barriers to create successful interventions to increase blood donation in the Latino population in the U.S., it was imperative to understand the true reason for lower donation in order to eventually implement the correct response for intervention. With this knowledge, the study aimed to evaluate the geographic distribution of blood donation opportunities as a function of Latino density by Tucson zip code.

Using the acquired knowledge from previously published research and the importance of determining possible extrinsic causes for these barriers to donation, a comprehensive six-month data collection was performed through the American Red Cross blood drive calendar to assess the amount of blood donation drives occurring per Tucson zip code. Therefore, the study developed to analyze of the possible disparities in the geographic distribution of blood donations and the equity of donation accessibility to assess the barriers to blood donation in one of its most critical and most useful populations for this public health issue.

Methods

Participants

This study did not require approval for human subjects and did not include any direct interaction with participants. In fact, the entire data set was not based on participant response or behavior, rather the availability of blood donation to the Tucson Latino population as a whole. Data was collected directly from the American Red Cross website and required no human contact.

Study Design and Procedures

To begin, the study was completed over the course of a six-month period. Before data collection, census data for figures of total population, percent Latino, population density, and median household income were recorded per existing zip code in Tucson. Then, beginning in February of 2018, the number of drives per Tucson zip code were recorded from the American Red Cross blood drive calendar per month until August 2018. The data was recorded based on these zip codes in order to eventually examine relationships between geographical distribution of blood drives and the population demographics where most blood drives occurred. Only blood drives that occurred in a zip code with a population were counted in order to keep consistency in what was considered accessible.

Stimuli and Measures

Materials used included the American Red Cross website, excel spreadsheets for data collection and organization, U.S. Census Bureau data for population demographics, the American Community Survey from 2012-2016 from U.S. Census Bureau data profiles, and the ArcGIS Pro software for data analysis. The ArcGIS Pro software works to combine data from various input

sources, while including collected data, in order to visualize it for 3D analysis (Environmental Systems Research Institute).

https://www.redcross.org/give-blood.html

Data Analytic Strategy

The data collected was interpreted through geocoding to match demographic attributes from the American Community Survey from 2012-2016 (US Census Bureau). The geocoding was performed using the ArcGis Pro software in order to perform a Pearson correlation and analyze the zip code demographics and blood drive occurrences data for linear relationships between total blood drives per zip code and percent Latino in that zip code.

Results

The six-month data collected demonstrated relationships between blood drive occurrence and the demographics across the 37 Tucson zip codes. Within those zip codes, eight had rural characteristics with a population density of less than 500 people per square mile. The range of median household income within the 37 zip codes was from $25,742 and $86,982. In addition, there were six zip codes that could be considered to have a homogenous Latino population, with a total percent Latino between 60.6% and 83.2%. Only zip codes with a total population in Tucson were included, as assessing for accessibility of blood drives required that there be residents where the blood drives occurred. A total of 315 blood drives occurred, with a mean occurrence of 8.5, a median of 7.0, and a range of 0-31 blood drives per zip code each month. Often, there was report of zero blood drive occurrence within some of the included zip codes. The location of blood drives correlated strongly to higher population in that zip code ($p < 0.01$).

There was no significance between Latino density and blood drive occurrence ($p = 0.40$). Map visualizations seen in Figures 1, 2, and 3, interestingly, showed the contrary: blood drives were less present in total in zip codes with higher Latino densities, even though some of these zip codes were of the most highly populated zip codes in Tucson. Therefore, although blood drives tend to occur in highly populated zip codes and there is high Latino density in some of these highly populated zip codes, blood drive occurrence was lower in zip codes with higher Latino density. Moreover, accessibility to blood donation drives may be lower for these Latino dense zip codes.

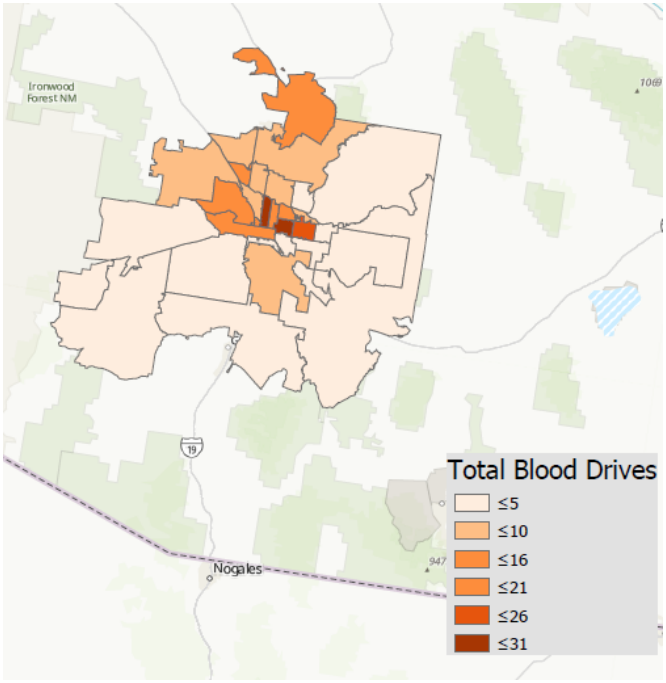

Figure 1. Total blood drives occurring per zip code in the city of Tucson from February 1, 2018 to August 31, 2018.

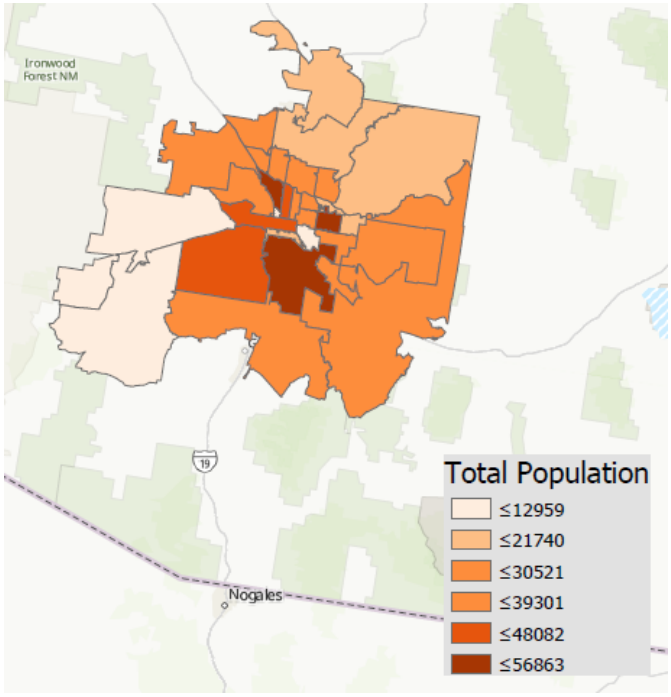

Figure 2. Total population per zip code in the city of Tucson.

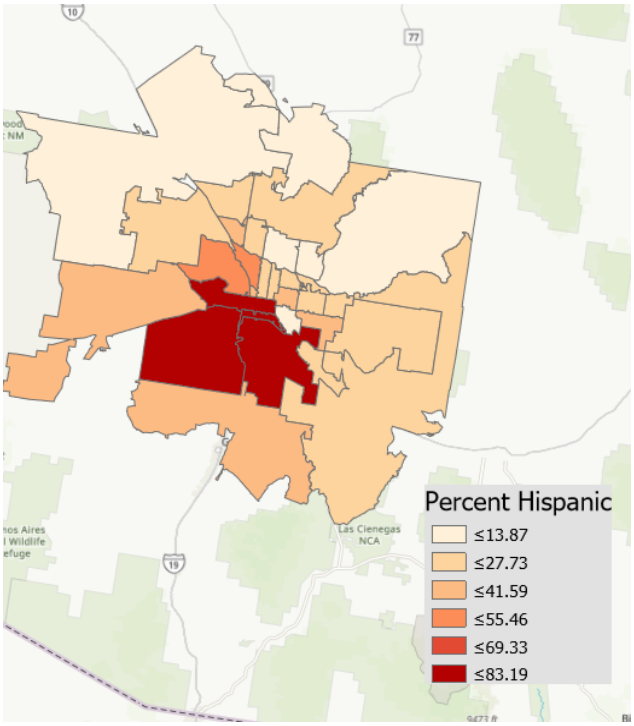

Figure 3. Percent Latino/Hispanic per zip code in the city of Tucson.

Discussion

The goal of this study was to analyze ongoing disparities in the geographic distribution of blood donations and the equity of donation accessibility in order to assess the barriers to blood donation for the Tucson Latino population. It was important to first assess for accessibility of these blood drive occurrences before seeking possible cultural and social barriers to donation. Through consistent data collection from the American Red Cross and analyzation of the geographic blood drive trends, visualization of these blood drives within the city of Tucson was achieved.

Although preliminary, these data point out a major oversight in the geographical blood donation drive distribution process implemented by the American Red Cross. These data are not considered statistically significant, however map visualizations point to a trend that cannot be ignored. Although the study first set out to identify more intrinsic barriers to blood donation that prevent non-white U.S. Latinos from donating blood, it became clear that extrinsic factors may contribute more than previously believed. It may still be true that there are certain myths and misinformation associated with blood donation for the Latino population, however this study proposes that accessibility is an immediate priority.

There were potential flaws that may have occurred during data collection that could have contributed to the significance of the relationships observed. To expand, there were limitations to the methods for this study, as the American Red Cross wipes the calendar every three weeks and does not make any archives available, meaning that data cannot be checked for consistency. In addition, upon requesting cooperation from the American Red Cross to better understand these data, their administration refused. Even upon explaining the severe implication of a study such as

this, the organization ultimately decided to decline partnership to thoroughly examine the results, conduct more research together, and define potential interventions.

Without the desire and ability to confront this lack of accessibility, further interventions would not be appropriate or useful. Given the lack of cooperation and partnership from the largest blood donation center in the country, it is the duty of the researchers involved to ensure that this data be further studied and understood. Low blood donation rates are a public health issue that effect all human beings, and this study offers a possible solution to increase these rates by simply increasing the accessibility to a population that has the potential to more often donate blood that is universal and useful. More than that, this study has pointed to a much graver institutional issues, as a powerful organization cowers to the prospect of admitting fault and possible discrimination in order to fix this injustice and differential treatment.

The data show that Latino dense zip codes are less likely to have access to blood donation opportunities, leading to a disparity in the donation rates between Latinos and other populations. It is clear that Tucson blood drives target highly populated zip codes, but tend to avoid southern Tucson zip codes where a high number of Latinos reside, despite having high total populations. There must be more research to ensure that the ambiguity of the accessibility of blood donation drives in Latino dense zip codes is in fact what the map visualization of the data show. With this clarification, there must also be action towards eliminating this injustice if in fact true, and to inform intervention efforts based on the data from this and subsequent research.

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