The Disproportionate Burden of COVID-19 Cases among Arab Americans

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Abstract

Racial and ethnic disparities in COVID-19 cases are pervasive. Some minority, immigrant, and marginalized groups, such as Arab Americans, have been excluded from the research. This population confronts barriers to health care, discrimination, and other factors that may affect understanding, testing, and treatment as it relates to COVID-19. Arab Americans are unique compared to Hispanic, non-Hispanic black, and Asians because Arab Americans do not have a specific ethnic identifier and are classified as non-Hispanic white. Given these issues, this study will estimate COVID-19 cases and examine associations among Arab Americans compared to Hispanic, non-Hispanic black, non-Hispanic white, and Asian adults. Data from the Michigan Disease Surveillance System (March 2020–July 2021), the American Community Survey (2015–2019), and an Arab/Chaldean surname algorithm were used. Chi-square tests were used to determine statistically significant differences between groups. Logistic regression was used to estimate age-adjusted and sex-stratified proportions among Arab Americans compared to non-Hispanic whites before and after adjusting for age and sex. Approximately 17% of Arab Americans tested positive for COVID-19 compared to 11.32% of Hispanics, 9.80% of non-Hispanic blacks, 7.50% of non-Hispanic whites, and 4.24% of Asians. Arab Americans had 2.63 (95% CI: 2.59, 2.66) times greater odds of testing positive for COVID-19 compared to non-Hispanic whites. When Arab Americans were disaggregated from non-Hispanic whites, alarming patterns in COVID-19 cases were observed for Arab Americans. To accurately represent the burden of COVID-19 among Arab Americans, this population needs to have an ethnic identifier that informs appropriate health policy decisions and practice.

Keywords COVID-19 · Arab Americans · Health disparities · American Community Survey

In the United States (US), non-Hispanic blacks, American Indian and Alaska Native, and Hispanics have a disproportionately higher number of COVID-19 cases compared to non-Hispanic whites [1]. There are many economic, social, behavioral, and health implications of the pandemic on minority groups. For the purposes of this study, we will focus on the health implications. Non-Hispanic blacks and Hispanics have higher COVID-19 rates, excess mortality, and higher hospitalization, but they have lower case fatality compared to non-Hispanic whites. Asians appear to have similar rates of hospitalizations, infections, and deaths as non-Hispanic whites. The authors of that paper suggest that these disparities are likely due to comorbid conditions [2]. While COVID-19 rates and comorbid conditions have been investigated for minorities and non-Hispanic whites, within-group differences remain elusive [1].

The unequal impact of COVID-19 on racial and ethnic minorities in comparison to non-Hispanic whites neglects to account for the potential differences in this infection within the non-Hispanic white population. Non-Hispanic whites are heterogeneous and defined by the federal government as persons from Europe, the Middle East, or North Africa (from hereafter, individuals from the Middle East or North Africa are referred to as Arab Americans) [3].

Disaggregating Arab American individuals from the non-Hispanic white population has been a challenge for decades, specifically in health research. Obtaining and analyzing health data is not straightforward for Arab Americans

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because they do not have their own racial or ethnic "check box" as other groups do. To overcome this barrier, many investigators have used place of birth or ancestry information from national data [4–6] or merged surname lists with state [7, 8] or hospital data [9, 10]. Using these innovative methods, investigators have found that Arab Americans are disproportionately affected by diabetes [10, 11], high blood pressure [10, 11], certain cancers [12, 13], and some infectious diseases [14, 15]. The reasons for the higher estimates of comorbid conditions among Arab Americans are complex and multifaceted. Comorbid conditions are a result of the interplay among demographic, cultural (language, traditions, religion), social, economic, environmental, and the healthcare system at the individual, community, and larger institutional levels.

One such infectious disease is COVID-19. Even though it has ravaged communities, especially the most vulnerable, the burden of COVID-19 cases on the Arab American population has not been explored. While many media reports have highlighted the possible disproportionate burden of confirmed COVID-19 cases among the Arab American population [16–20], no epidemiological study has been published to support or refute these media reports. Most of these media reports mentioned the Arab American population in Michigan because Michigan is home to the highest percentage of Arab Americans in the US [21].

Given the concerns described above, the aims of this study were two-fold: (1) estimate and compare the adjusted and stratified proportion of confirmed COVID-19 cases among Arab Americans compared to Hispanic, non-Hispanic black, non-Hispanic white, and Asian adults and (2) examine associations between race/ethnicity and COVID-19 case status before and after adjusting for age and sex. We hypothesize that COVID-19 cases will be higher among Arab Americans compared to Hispanic, non-Hispanic black, non-Hispanic white, and Asian adults.

Methods

Data Sources

The following two data sources were used to identity Arab American adults: (1) Michigan Department of Health and Human Services Michigan (MDHHS) Disease Surveillance System (MDSS) and (2) 2015–2019 American Community Survey (ACS) PUMS.

Michigan Disease Surveillance System

MDSS data were used to create the numerators in this study. Data were pulled from March 1, 2020, to July 30, 2021. This dataset was merged with an Arab and Chaldean (Iraqi

Catholic) surname database and put through an algorithm to identify probable Arab ancestry [22]. For this study, we will use the term "Arab American" to stay consistent with most of the studies that have been published on this community, because most of this population in Michigan identifies as "Arab American" or "Chaldean American" and because the surname algorithm was developed in Michigan and has shown high reliability and validity in this community. Arab/ Chaldean ethnicity was established by either the indicator of probable Arab ancestry based on name or self-reported Arab ethnicity. Self-reported Arab ethnicity was surveyed by the MDSS. A self-reported response of no Arab ethnicity trumped indication of probable Arab ancestry by algorithm. Unknown Arab or Hispanic ethnicity was viewed as having no Arab or Hispanic ethnicity, respectively. "Other" and "Refused" responses across ethnicity variables were coded as missing. Utilizing the Arab/Hispanic ethnicity and race variables, an overall race/ethnicity variable was created to represent the following racial/ethnic groupings: non-Hispanic Arab American, non-Hispanic non-Arab Asian, non-Hispanic non-Arab Black, non-Hispanic non-Arab White, non-Arab Hispanic, and all others. For simplicity, these groups will be referred to as Arab American, Asian, non-Hispanic black, non-Hispanic white, and Hispanics. Instances of non-Hispanic non-Arab mixed race or dual ethnicity (Arab and Hispanic ethnicity) established its own category or was placed within "all others." Unknown and "American" (viewed as a refused response) race responses were made missing. *In this study, Arab Americans are treated as an ethnic group, and all race responses within this group are identified as non-Hispanic white. There were no issues of non-responses to the race question overall and specifically among Arab Americans*. The MDSS data were used to obtain confirmed and probable cases of COVID-19 within racial/ethnic and age groups and by sex. Only confirmed cases were used for the numerators because of the small proportion of probable cases (10%). Sex (male, female, unknown) and age (18 and older) were also collected from MDSS data. Unknown responses for sex were excluded in sex-specific stratified results.

American Community Survey (ACS)

American Community Survey (ACS) data were used for the population size denominators in this study. The most recent (2015–2019) 5-year Public Use Microdata Samples (PUMS) data were downloaded from the US Census Bureau website [23]. Consistent with the MDSS, the ACS collects data on sex (male or female), age, and race/ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic Asian, Hispanic, and others). Based on previous studies, participants who indicated at least one Arab ancestry or were born in the

United Arab Emirates, Comoros, or Djibouti were classified as having an Arab race/ethnicity [24].

Statistical Analysis

The frequency of confirmed cases from MDSS data and population sizes from ACS data were combined into 2×2 contingency tables to calculate proportions for each race/ethnicity group collectively and stratified by age and sex. Chi-square tests (with an alpha set at $p < 0.05$) were used to determine statistically significant differences between groups. Logistic regression was used to estimate age-adjusted and sex-stratified proportions using estimated marginal (least-squares) means and the odds of testing positive among Arab Americans in comparison to non-Hispanic whites as the majority population before and after adjusting for age and sex. Confidence intervals were estimated from 2×2 tables with the confirmed cases in the MDSS data and the ACS population estimates for each race and ethnicity by age and sex. Then, we created an expanded dataset with the cross-tabulations followed by running the predicted marginals using the least-squares means procedure. Statistical analysis was conducted using STATA, version 17 (College Station, TX) [25], and Statistical Analysis Software, version

9.4 (Cary, NC) [26]. Institutional Review Board approval was obtained for this study by MDHHS (# 202,010–02-XA).

Results

The age-adjusted proportions of confirmed COVID-19 cases are shown in Table 1. Approximately 17% of Arab Americans tested positive for COVID-19 compared to 11.32% of Hispanics, 9.80% of non-Hispanic blacks, 7.50% of non-Hispanic whites, and 4.24% of Asians. In age-adjusted and sex-specific analyses (Table 2), Arab American males had higher (17.11%) estimates compared to females (16.28%), which also was the pattern among non-Hispanic blacks (males, 10.38%; females, 9.20%) and Asians (males, 4.39%; females, 4.08%). However, non-Hispanic white and Hispanic males had lower estimates compared to females [(non-Hispanic whites: males, 7.28%; females, 7.64%); (Hispanics: males, 11.14%; females, 11.41%)].

When stratified by age, Table 3 illustrates that in general and for all races and ethnicities, except for Hispanics, the percentages of COVID-19 cases decrease with age for both sexes. For example, among Arab American males, the estimates are 18.7% (18–39 years of age), 16.6% (40–59 years

Table 1 Age-adjusted confirmed COVID-19 cases by race/ethnicity in Michigan, March 1, 2020–July 30, 2021 ($n = 7,617,576$ ages 18 and older)

	Total weighted sample 2015–2019 ACS population	Age-adjusted confirmed COVID-19 cases (%)	95% CI	p value
Race/ethnicity				< 0.0001
Arab American[*]	172,316	16.78	(16.61–16.96)	
Hispanic	325,494	11.32	(11.22–11.43)	
Non-Hispanic black	1,012,656	9.80	(9.74–9.86)	
Non-Hispanic white	5,863,238	7.50	(7.48–7.52)	
Asian	243,872	4.24	(4.16–4.32)	

[**]*The total weighted sample sizes will not add up to this number exactly because of the unknowns and other/mixed races*

Table 2 Age-adjusted and sex-specific confirmed COVID-19 cases by race/ethnicity in Michigan, March 1, 2020 − July 30, 2021 ($n = 7,617,576$, ages 18 and older)

	Males			Females		
	Total weighted sample 2015–2019 ACS population	Age-adjusted confirmed COVID-19 cases % (95% CI)	p value	Total weighted sample 2015–2019 ACS population	Age-adjusted confirmed COVID-19 cases % (95% CI)	p value
Race/ethnicity			< 0.0001			< 0.0001
Arab American	86,907	17.11 (16.86–17.36)		85,409	16.28 (16.04–16.52)	
Hispanic	164,748	11.14 (10.99, 11.29)		2,992,708	11.41 (11.26–11.56)	
Non-Hispanic black	466,849	10.38 (10.29–10.47)		545,807	9.20 (9.13, 9.28)	
Non-Hispanic white	2,870,530	7.28 (7.25–7.31)		124,687	7.64 (7.61–7.67)	
Asian	119,185	4.39 (4.27, 4.50)		160,746	4.08 (3.98–4.19)	

Table 3 Confirmed COVID-19 cases by race/ethnicity in Michigan stratified by age, March 1, 2020–July 30, 2021 (*n*=7,617,576, ages 18 and older)

	18–39 years*		40–59 years*		60–79 years*		80+ years*	
	Total weighted sample 2015–2019 ACS population	Confirmed*N* (Row %)	Total weighted sample 2015–2019 ACS population	Confirmed*N* (Row %)	Total weighted sample 2015–2019 ACS population	Confirmed*N* (Row %)	Total weighted sample 2015–2019 ACS population	Confirmed*N* (Row %)
Race/ethnicity								
Arab American	84,601	16,049 (19.0)	56,714	9619 (17.0)	26,490	4051 (15.3)	4511	620 (13.7)
Hispanic	178,021	22,150 (12.4)	102,638	12,967 (12.6)	39,360	3811 (9.7)	5475	546 (10.0)
Non-Hispanic black	427,676	47,961 (11.2)	335,914	33,403 (9.9)	211,663	17,705 (8.4)	37,403	3251 (8.7)
Non-Hispanic white	1,932,803	176,590 (9.1)	1,974,733	143,325 (7.3)	1,611,665	94,939 (5.9)	344,037	24,774 (7.2)
Asian	121,686	5899 (4.8)	80,223	3536 (4.4)	36,899	1320 (3.6)	5064	232 (4.6)
Males								
Race/ethnicity								
Arab American	42,791	8001 (18.7)	29,044	4834 (16.6)	13,243	2148 (16.2)	1829	289 (15.8)
Hispanic	91,237	10,622 (11.6)	52,844	6366 (12.1)	18,763	1924 (10.3)	1904	203 (10.7)
Non-Hispanic black	207,815	22,756 (11.0)	155,317	16,854 (10.9)	91,243	8579 (9.4)	12,474	1183 (9.5)
Non-Hispanic white	988,597	82,044 (8.3)	978,553	69,337 (7.1)	770,799	47,255 (6.1)	132,581	9963 (7.5)
Asian	61,950	3001 (4.9)	38,507	1661 (4.3)	16,403	655 (4.0)	2325	101 (4.3)
Females								
Race/ethnicity								
Arab American	41,810	7981 (19.1)	27,670	4747 (17.2)	13,247	1878 (14.2)	2682	331 (12.3)
Hispanic	86,784	11,454 (13.2)	49,794	6536 (13.1)	20,597	1871 (9.1)	3571	342 (9.6)
Non-Hispanic black	219,861	24,957 (11.4)	180,597	16,336 (9.1)	120,420	9069 (7.5)	24,929	2065 (8.3)
Non-Hispanic white	944,206	94,000 (10.0)	996,180	73,571 (7.4)	840,866	47,478 (5.7)	211,456	14,787 (7.0)
Asian	59,736	2871 (4.8)	41,716	1867 (4.5)	20,496	665 (3.2)	2739	131 (4.8)

*$p < 0.0001$, chi-square test

of age), 16.2% (60–79 years of age), and 15.8% (80 years of age or older). Among Arab American females, these estimates are 19.1% (18–39 years of age), 17.2% (40–59 years of age), 14.2% (60–79 years of age), and 12.3% (80 years of age or older). Among Hispanics, COVID-19 percentages are similar for the 18 to 39 and 40 to 59 year olds and then for the 60 to 79 and 80 or older individuals.

Table 4 displays results from logistic regression analyses. Arab Americans are 2.63 (95% CI: 2.59, 2.66) times more likely to have tested positive for COVID-19 compared to non-Hispanic whites. A similar pattern, although with lower odds ratios, was observed for Hispanics (OR = 1.69; 95% CI = 1.68, 1.71) and non-Hispanic blacks (OR = 1.38; 95% CI = 1.37, 1.39), but not for Asians (OR = 0.58; 95%

Table 4 Crude and sex- and age-adjusted logistic regression models for confirmed COVID-19 cases, March 1, 2020–July 30, 2021 (*n*=7,617,576, ages 18 and older)

	Model 1: Crude *OR (95% CI)*	Model 2: Adjusted for age and sex *OR (95% CI)*
Race/ethnicity		
Non-Hispanic white	1.00	1.00
Arab American	2.63 (2.59, 2.66)	2.48 (2.45, 2.51)
Hispanic	1.69 (1.68, 1.71)	1.57 (1.55, 1.59)
Non-Hispanic black	1.38 (1.37, 1.39)	1.33 (1.32, 1.34)
Asian	0.58 (0.57, 0.59)	0.54 (0.53, 0.55)

CI = 0.57, 0.59). When adjusted for age and sex, the odds ratios were slightly attenuated and remained statistically significant.

Discussion

The goal of this study was to estimate the age- and sex-adjusted proportion of confirmed COVID-19 cases among Arab Americans compared to non-Hispanic whites, non-Hispanic blacks, Asians, and Hispanics in Michigan. The results were staggering, with Arab Americans displaying proportions that were approximately two times higher (16.78%) compared to non-Hispanic whites (7.50%) and blacks (9.80%) and four times higher when compared to Asians (4.24%). The findings remained robust and statistically significant in logistic regression analyses.

To date, none of the COVID-19 peer-reviewed research has included Arab Americans. The current study is the first of its kind; therefore, we are unable to compare our findings to published research. The only publicly available information on COVID-19 among Arab Americans shows that in Michigan, 2.83% of all Arab Americans had COVID-19. This estimate included all age ranges and was not limited to those 18 years of age and older. Our study included only those 18 years of age or older. Also, the data from the state of Michigan are not comparable to other racial and ethnic groups because they do not include a population-based denominator. Our study used population estimates from the American Community Survey (ACS) for the denominator so that we can compare the findings with other racial and ethnic groups. Notably, our findings confirm the media reports recently published about the astounding rates of COVID-19 among Arab Americans [16–20].

There are multiple reasons, some of which were alluded to in the media reports mentioned above, that may help explain why COVID-19 cases are higher among Arab Americans compared to other racial and ethnic groups.

The first is that Arab Americans suffer from diabetes, cancer, obesity, and asthma, which are some of the risk factors for contracting symptomatic COVID-19 [27]. These medical conditions not only place Arab Americans at a higher risk of contracting COVID-19, but also to develop more serious outcomes compared to individuals who are healthy.

The second is that Arab Americans are less likely to engage in preventive behaviors compared to other groups. Several national studies have shown that influenza vaccine uptake, cancer screenings, and other efforts are lower among Arab Americans compared to other groups [4, 5, 28]. Coupled with the findings of the current study and that vaccine hesitancy is a concern in the Arab American community [29], there is a need for targeted prevention intervention programs about the risks of COVID-19 among Arab Americans.

The third is living conditions. Many Arab Americans have strong familial ties and live in multigenerational homes. For example, the average household size for Yemeni families is 4.3 compared to the national average of 2.6 [30, 31]. These living situations could increase the transmission of the virus, especially if social distancing, masking, and hand sanitizing are not practiced. Furthermore, Michigan, home to the largest population of Arab Americans, has had several severe outbreaks of coronavirus since the pandemic started [32].

A fourth factor that might be contributing to the higher estimates of infection among Arab Americans is lack of education. One study (unpublished) in Michigan interviewed Arab American participants about the COVID-19 risks and severity. Roughly half (52%) acknowledge the changes that someone in their environment would get infected, and only 37.9% said they would have to go to the hospital if they got infected. Furthermore, respondents reported that the following were very effective in preventing the transmission of the coronavirus: wearing a face mask (71.3%), praying (34.9%), and seeing a healthcare provider if feeling healthy but worried that he/she was exposed to the virus (43.2%). Again, it is imperative that targeted educational interventions are developed and implemented to help reduce the transmission of the virus.

The fifth reason is that of healthcare barriers to getting tested and being treated if infected. Many studies have shown that Arab Americans confront serious barriers to accessing and using the healthcare system [33]. COVID-19 is no exception. Arab Americans might have language barriers, transportation issues, lack of social support, and stigma that may prevent them from getting tested and receiving treatment if they test positive. There have been efforts from community organizations to mitigate these barriers. Such programs need to be resourced so that they can continue to provide a safety net for Arab Americans seeing testing and treatment.

The sixth factor that may be influencing these high estimates is discrimination of Arab Americans. Discrimination has contributed to health disparities among Arab Americans [34, 35], and discrimination will continue to influence disparities in COVID-19. More consistent and constant efforts need to be made to ensure that Arab Americans are treated fairly and respectfully in health care.

Strengths and Limitations

This study had several strengths and limitations. The strengths were the large sample size, the use of state data, and the use of ACS data. While the ACS is the only source of US population estimates available, there is concern about the validity and reliability of the use of ACS for subpopulations. To address this, we used a 5-year ACS estimate to be more confident our findings are valid and reliable. The ACS

states, "[l]arge geographic areas also benefit from the larger sample used for 5-year estimates, resulting in more precise estimates of population and housing characteristics, especially for subpopulations within those areas" [23]. Five-year estimates are most appropriate when precision is important and when analyzing very small populations [23]. There have been concerns that the ACS may represent an undercount of the Arab population. Even if the undercount was as high as 10%, that would still indicate a high burden of COVID-19 for this population (15.8% with an adjusted population estimate). In addition, these data were pulled prior to the Delta variant surfaced, so rates are probably higher now. We examined a limited time frame from March 2020 to July 2021, which was prior to the Delta and Omicron variants being discovered. We speculate that estimates might be higher now for Arab Americans compared to what we illustrated in the current paper. Additionally, vaccines were only available in the last 6 months of our time frame. Now that vaccines are available, future studies might find differences in estimates compared to the findings from our current study.

Future Studies

Given that this is the first study to examine COVID-19 positive cases among Arab Americans, future studies should include Arab Americans in the discourse on COVID-19 health disparities. These studies should include sociodemographic, nativity status, medical health conditions, access to health care, and other important variables that have been shown to be associated with COVID-19. In addition, when an ethnic identifier for Arab Americans is available on national, state, and hospital surveys, we can then focus on informing policy and practice. However, until then, this community will continue being invisible. The current study is seminal because it provides baseline data on which other studies can be built.

Declarations

Ethics Approval and Consent to Participate This article does not contain any studies with human participants or animals performed by any of the authors. Informed consent was not required for this study.

Conflict of Interest The authors declare no competing interests.

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