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HPV-related cancers and HPV vaccination among Arab Americans: A call to unveil disparities and bridge the research gaps

Short title: HPV-related cancers among Arab Americans

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This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1002/cncr.35830.

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Conflict of Interest Disclosures: Dr. F. Siddiqui received honorarium, travel reimbursement from Varian Medical System, Inc, American College of Radiology, Castle Biosciences, and is a member on Varian Noona Medical Advisory Board. All other coauthors had no conflict to declare.

Funding/Support: None

Keywords: HPV-associated cancers; HPV vaccination; Arab American; MENA population; Disparities

Precise: Arab Americans, a diverse and rapidly growing demographic in the U.S., face unique barriers to HPV vaccination and cancer prevention, but there is a notable lack of research on HPV-associated cancer incidence and vaccination rates in this community. Collaborative efforts among healthcare providers, public health agencies, researchers, and religious community organizations are essential to improve HPV vaccination uptake and reduce cancer disparities within this underserved population by including Middle Eastern and North African as a distinct category in national health surveys, conducting comprehensive epidemiological research, and developing culturally tailored interventions.

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Introduction

Human papillomavirus (HPV) infection involves multiple carcinogenic genotypes that play a fundamental role in the pathogenesis of cervical, head and neck, and anal cancers among others. Extensive evidence indicates that cervical cancer is almost entirely attributable to HPV,[1] making it a significant public health concern due to its high prevalence and mortality rates among women globally. HPV is also associated with approximately 90% of the increasing cases of anal cancer, about 70% of the increasing cases of oropharyngeal cancers, and a smaller percentage of other genital cancers, such as penile, vulvar and vaginal cancers.[2] HPV infection was associated with approximately 37,800 cancer cases diagnosed in the U.S. per year during 2017 to 2021.[3] This widespread impact of HPV underscores the critical need for effective primary and secondary prevention strategies.[4]

Fortunately, an effective intervention exists: the HPV vaccine. Routine HPV immunization has resulted in a substantial decrease in HPV prevalence with a potential in reduction of over 90% of HPV-associated cancers.[5] It is estimated that 35,000 out of the 37,800 HPV-associated cancers could be prevented by the 9-valent HPV vaccine.[3] The Advisory Committee on Immunization Practices recommends routine HPV vaccination for adolescents aged 11 to 12years.[6] Catch-up vaccination is also recommended for both males and females aged 13 to 26 years and shared clinical decision making about the vaccination through age 45 years.[7] Nationally, HPV vaccination rates among adolescents aged 13-17 years are 76.8% for at least one dose and 61.4% for completing the vaccination series as of 2023.[4] Moreover, it was previously reported that ethnic minorities including African American and Latino have lower HPV completion rate compared to White individuals.[8] However, there is a concerning lack of data on HPV vaccination rates among marginalized groups, specifically Arab American

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adolescents and young adults. This makes it challenging to assess the vaccination coverage and identify gaps that need to be addressed. Given the growing Arab American population in the U.S., there is an urgent need for more research to understand and address the disparities in HPV, HPV vaccination, and the associated cancer burden in this community.

Arab American Communities: Diverse and Sizable, Yet Overlooked in HPV-Related Cancers and Vaccination Research

Arab Americans make up various ethnicities of immigrants from the Arabic-speaking countries of the Middle East, North Africa, and Sub-Saharan Africa. Since the 1880s, they have been settling in sizable numbers in the U.S.[9] It is estimate that there are 3.7 million Arab Americans in the U.S. as of 2022.[9] Their Arab heritage reflects a culture that is thousands of years old and includes 22 Arab countries as diverse as Palestine, Yemen, Sudan, and Morocco.[9] The majority of Arab Americans are native-born, and 85% of Arabs in the U.S. are citizens.[9] In the U.S., Arab Americans reside in all 50 states, but up to 95% live in metropolitan areas. Nearly 75% of all Arab Americans live in the following top twelve states by population size: California, Michigan, New York, Texas, Florida, Illinois, New Jersey, Ohio, Minnesota, Virginia, Massachusetts, and Pennsylvania. Michigan, for instance, is home to approximately 392,733 Arab Americans. Notably, Dearborn, MI, has the largest percentage of Arab Americans, with 40% of its residents having Arab ancestry.[9] This demographic distribution highlights the need for developing targeted health interventions to address specific health needs in this community.[9]

Middle Eastern and North African (MENA) has been recognized by the National Institutes of Health as a population experiencing health disparities.[10] MENA populations/Arab Americans have higher rates of hypercholesterolemia, preterm birth in MENA women, lead

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exposure in MENA pediatric patients, and low birth weight among MENA children when compared to the US population.[10-12] With regards to health behaviors, MENA populations/Arab Americans are hesitant to use vaccinations and engage in routine cancer screenings.[12] However, limited data is currently available on cancer health disparities in Arab Americans. Despite the substantial Arab American population, there is a notable gap in research regarding HPV infection, HPV-related cancers, and vaccination rates within this group. The gaps are partly due to the lack of MENA as a distinct category in national surveys and census data, which hinders efforts to assess health behaviors and outcomes in this population.[13] For example, the National Immunization Survey – Teen or the National Health Interview Surveys, which are key sources for establishing HPV vaccine coverage, do not include MENA as a specific category.[14]

Among the few existing studies on Arab Americans, some insights into the barriers faced by this community have been identified. One cross-sectional study conducted in New York City from August 2019–April 2021 with 162 Arab American immigrant women who had at least one child aged 9 through 26 years found that 63.5% of mothers reported that their children had not received the HPV vaccine.[15] The two primary reasons given included lack of awareness about the vaccine (67.3%) and insufficient healthcare provider recommendation (59.4%).[15] This is particularly alarming, as lower vaccination rates may contribute to a higher incidence of HPV-associated cancers among Arab Americans, further deepening existing health disparities within this community. Additionally, the study revealed that higher levels of HPV vaccination awareness and uptake were more likely among mothers with higher education levels, longer duration of residence in the U.S., and higher household incomes.[15] A cross-sectional study among women aged 30–65 years old (n=893) in Southeast Michigan conducted between May 1 and October 28, 2019 showed that cervical cancer screening among MENA women were

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markedly low compare to White women, primarily due to factors such as lack of health insurance and shorter time in the U.S.[16] Additionally, an observational cohort study of 430 Arab American women aged 21-65 years old undergoing routine cancer screening between 2003 and 2019 in southeast Michigan reported positive tests for abnormal cervical cytology and high-risk HPV serotypes among study population, with significant barriers to screening including cultural stigma.[17]

Cultural stigma surrounding cervical cancer screening and HPV vaccination among Arab Americans are intertwined with beliefs and attitudes toward virginity and perceptions of sexual activity. In many Arab communities, premarital virginity is emphasized, and virginity is often defined by the presence of an intact hymen. As a result, single Arab women may avoid Pap tests due to concerns that these procedures could be perceived as compromising their virginity or invading bodily privacy.[18] Women who seek reproductive or sexual health services may face ostracization within their communities.[18] Furthermore, many Arab American mothers believed that since children are not sexually active before marriage, HPV vaccination is not necessary or important. Some also reported that other people in the Arab American community saw HPV vaccination as an implicit endorsement of premarital sex.[15,19]

Another example of cultural-level barriers would be related to misinformation circulation between social networks and the high emphasis on family roles through collective decisions on health-related matters affecting younger populations. Social determinates of health, including education, insurance, income, geographic location, and employment, can facilitate or hinder access to healthcare services including vaccination and cancer screening. They can also impact individuals' attitudes towards seeking out information about HPV and understanding the benefits of the vaccine. For instance, individuals residing in rural areas are less likely to receive the HPV

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vaccination or have lower awareness about HPV causing cancers compared to their urban counterparts.[20-23] As these factors can affect initiation or completion of the HPV vaccine, as well as influence the likelihood of increased HPV knowledge and cervical cancer screening, it is important to take into consideration the different social determinants of health and cultural nuances within these communities. Tackling the suboptimal HPV knowledge and vaccination rate among Arab Americans requires a thorough evaluation of the various beliefs and understanding around HPV.

Furthermore, religion is an influential driving force in Arab Americans' health behaviors and beliefs. For instance, fatalistic beliefs, or the belief that illness is God's will or punishment, may be a barrier to cervical cancer screening.[18] A scoping review on religious beliefs and practices toward HPV vaccine acceptance in Islamic countries found concerns over haram ingredients and that some believe vaccines lead to infertility and sexual promiscuity, defy religious norms, and are an abandonment of righteous principles in general.[24]

The lack of research and data on HPV-associated cancers and vaccination rates among Arab Americans pose a major public health issue which further complicates efforts to implement effective solutions. By understanding the specific challenges among Arab Americans, healthcare providers and public health officials can develop targeted interventions to increase vaccination rates and reduce the incidence of HPV-associated cancers.

Key Priorities for Advancing Research on HPV Related Cancers and Vaccination for Arab Americans

To effectively increase HPV vaccination rates among Arab Americans, it is crucial to conduct more comprehensive research to understand the specific barriers and facilitators within this

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community. By identifying these factors, healthcare providers and public health officials can develop targeted interventions and educational programs that are culturally and linguistically appropriate. These efforts are essential to ensure that Arab American adolescents and young adults receive the full benefits of HPV vaccination, ultimately reducing their risk of developing HPV-associated cancers.

First, MENA should be recognized as a distinct race/ethnicity category in national surveys such as National Immunization Survey-Teens, Health Information National Trends Survey, Behavioral Risk Factor Surveillance System, National Health and Nutrition Examination Survey.[25] The data would allow for disaggregated assessment of HPV vaccination rate, awareness/knowledge of HPV, the vaccine, HPV-associated cancers, and cervical cancer screening among Arab Americans. The U.S. Census Bureau has updated Statistical Policy Directive No. 15 in 2024 to include individuals of MENA descent as a distinct racial/ethnic category.[26] This marks a significant shift in how racial and ethnic data are collected and categorized at the federal level. However, these changes have not yet been fully reflected in national surveys or widely adopted in existing research datasets. Their inclusion in federal standards suggests a broader movement towards a more representative racial classification. Researchers should include MENA as a distinct racial and ethnic category in their studies going forward. Similarly, healthcare organizations should include MENA as a distinct racial and ethnic category in their electronic health records. Additionally, researchers should disaggregate MENA from non-Hispanic whites during data collection and analysis. This distinction ensures that Arab Americans are not misclassified as non-Hispanic white, enabling more accurate comparisons of MENA health outcomes with those of other marginalized groups in the U.S.

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Second, there have been studies that were conducted among Arab Americans and MENA populations globally, and they report low HPV vaccination rates among Arab Americans, low vaccine hesitancy which could be related to lack of knowledge or belief in the vaccine efficacy and safety, lack of insurance coverage, lack of cultural and linguistically- compatible vaccine recommendations and resources, and cultural and social misconceptions.[19,24] This can be used as a foundation for further epidemiological (both quantitative and qualitative) research which should be conducted across the U.S. to expand on 1) the knowledge around HPV, HPV-associated cancers, HPV vaccination, and cervical cancer screening; 2) the vaccination rates, in addition to facilitators and barriers to vaccination; 3) incidence and mortality of HPV-associated cancers among MENA population. The resulting data will provide a foundation for designing evidence-based, culturally tailored interventions that address the unique needs of MENA communities, ultimately improving health equity and reducing the burden of HPV-related diseases. It should be noted that there are challenges that exist in collecting data on HPV vaccination rates for young and middle-aged adults. Unlike HPV vaccination data on teens which is collected by the Centers for Disease Control and Prevention, data on adults are not consistently and regularly collected by national datasets which makes trend analysis difficult. In addition, tracking vaccination rates among adults aged 27-45 is hindered by the shared decision-making model and the lack of public health prioritization for this group by many national health organizations, which see limited public health relevance in vaccinating this age group. Data should be collected consistently and regularly on HPV vaccination rates for adults aged 18-45 years old in national datasets.

Additionally, given the lack of provider recommendation, it is crucial to address this gap by emphasizing the pivotal role of strong healthcare provider endorsements in increasing

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vaccination rates. Some of the barriers contributing to lack of provider recommendation could be due to low level of experience to guide informative discussions related to health-sensitive topics, especially with skeptic patients or patients with specific cultural or religious beliefs, and decreased level of awareness of updated vaccination guidelines.[24] Training workshops should be implemented for healthcare teams, focusing on culturally appropriate communication strategies to effectively encourage patients to receive the HPV vaccine. These workshops can equip providers with the skills to address cultural sensitivities and misconceptions, fostering trust and improving vaccination uptake. Additionally, providing interpreters and providing educational resources in the patient's native language might facilitate easier provider-patient communication. A previous study suggested that it is feasible to implement culturally- , linguistically-, and faith-sensitive interventions for smoking cessation program among Arab Americans.[27] Educational campaigns targeting Arab American parents can play a role in improving HPV knowledge and encouraging higher uptake of the vaccine among their children. Moreover, implementing HPV vaccination outreach or reminder systems can increase vaccine uptake. To implement strategies to improve health outcomes, collaborations between public health agencies, healthcare providers, and community organizations are crucial. Such partnerships can ensure that interventions are well-coordinated, resource-efficient, and more likely to achieve the desired outcomes. In addition, interventions should be customized to the cultural and linguistical needs of Arab American communities. For instance, educational materials in Arabic and English can help narrow the knowledge deficiency and dispel misconceptions about the HPV vaccine. Moreover, community-based approaches involving local leaders and organizations can enhance the reach and impact of these interventions. With trust and influence of community leaders, public health initiatives can gain greater acceptance and participation.

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Conclusion

Arab Americans reside across all 50 states, with the largest concentration being in California and Michigan. Despite the large percentage of this population in the U.S., there is a substantial lack of comprehensive data on HPV vaccination and associated cancers among Arab Americans. This poses a significant gap in public health research and a potential major health burden for the community. While limited studies currently exist around HPV and Arab Americans, current literature reported suboptimal HPV vaccination rates and low levels of HPV knowledge. This further highlights the significance of forming a deeper understanding of the perceptions, barriers, and facilitators around HPV within the Arab American community. Capturing ethnic-specific data focusing on MENA is a crucial initial step towards narrowing research and health disparities. Addressing this research gap through well-designed studies and targeted interventions can lead to improved vaccination rates and reduced cancer incidence in this underserved population. The implementation of culturally sensitive and community-focused strategies will be key to the success of these efforts.[28] Finally, multilevel collaborative efforts between providers, healthcare systems, community leaders, and public health organizations can play a major role in facilitating effective educational and health interventions.

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References

1. Bosch FX, Lorincz A, Muñoz N, Meijer CJ, Shah KV. The causal relation between human papillomavirus and cervical cancer. *J Clin Pathol*. Apr 2002;55(4):244-65. doi:10.1136/jcp.55.4.244
2. de Martel C, Plummer M, Vignat J, Franceschi S. Worldwide burden of cancer attributable to HPV by site, country and HPV type. *Int J Cancer*. Aug 15 2017;141(4):664-670. doi:10.1002/ijc.30716
3. Center for Disease Control and Prevention. Cancers Associated with Human Papillomavirus. Accessed 02/25/2025, https://www.cdc.gov/united-states-cancer-statistics/publications/hpv-associated-cancers.html#:~:text=We%20estimated%20that%2037%2C800%20cancers,45%2C%2052%2C%20and%2058.
4. Pingali C, Yankey D, Chen M, et al. National Vaccination Coverage Among Adolescents Aged 13-17 Years - National Immunization Survey-Teen, United States, 2023. *MMWR Morb Mortal Wkly Rep*. Aug 22 2024;73(33):708-714. doi:10.15585/mmwr.mm7333a1
5. Kavanagh K, Pollock KG, Cuschieri K, et al. Changes in the prevalence of human papillomavirus following a national bivalent human papillomavirus vaccination programme in Scotland: a 7-year cross-sectional study. *The Lancet Infectious diseases*. Dec 2017;17(12):1293-1302. doi:10.1016/s1473-3099(17)30468-1
6. Meites E, Szilagyi PG, Chesson HW, Unger ER, Romero JR, Markowitz LE. Human Papillomavirus Vaccination for Adults: Updated Recommendations of the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep*. Aug 16 2019;68(32):698-702. doi:10.15585/mmwr.mm6832a3
7. Petrosky EY, Liu G, Hariri S, Markowitz LE. Human Papillomavirus Vaccination and Age at First Sexual Activity, National Health and Nutrition Examination Survey. *Clinical pediatrics*. Apr 2017;56(4):363-370. doi:10.1177/0009922816660541
8. Spencer JC, Calo WA, Brewer NT. Disparities and reverse disparities in HPV vaccination: A systematic review and meta-analysis. *Preventive medicine*. Jun 2019;123:197-203. doi:10.1016/j.ypmed.2019.03.037
9. Arab American Institute. National Arab American Demographics. Accessed 09/04/2024, https://www.aaiusa.org/demographics
10. National Institutes of Health. Cancer research efforts focused on Middle Eastern and North African (MENA) populations residing in the United States. https://cancercontrol.cancer.gov/brp/events/cancer-research-efforts-focused-on-middle-eastern-and-north-african-populations-residing-united-states?cid=eb_govdel
11. Kindratt TB, Dallo FJ, Brown KK. Maternal and Perinatal Health Disparities Among Middle Eastern and North African Women and Children in the United States. *Matern Child Health J*. Apr 2024;28(4):719-728. doi:10.1007/s10995-023-03863-6
12. Fleischer NJ, Sadek K. Arab, Middle Eastern, and North African Health Disparities Research: A Scoping Review. *J Racial Ethn Health Disparities*. Mar 11 2024;doi:10.1007/s40615-024-01972-8
13. Schachter A, Maghbouleh N, Flores RD. To Uncover Disparities, Collect and Disaggregate Self-Identification Data for Middle Eastern and North African Americans. *American journal of public health*. Nov 2024;114(11):1158-1160. doi:10.2105/ajph.2024.307864
14. Center for Disease Control and Prevention. About the National Immunization Surveys (NIS). Accessed 03/03/2025, https://www.cdc.gov/nis/about/index.html

This article is protected by copyright. All rights reserved.

15. Ayash C, Raad N, Finik J, et al. Arab American Mothers' HPV Vaccination Knowledge and Beliefs. *Journal of community health*. Aug 2022;47(4):716-725. doi:10.1007/s10900-022-01103-6
16. Harper DM, Tariq M, Alhawli A, Syed N, Patel MR, Resnicow K. Comparative predictors for cervical cancer screening in Southeast Michigan for Middle Eastern-North African (MENA), White and African American/black women. *Preventive medicine*. Jun 2022;159:107054. doi:10.1016/j.ypmed.2022.107054
17. Shallal A, Abada E, Fehmi Z, et al. Human Papillomavirus Infection and Cervical Dysplasia in a Subset of Arab American Women. *Womens Health Rep (New Rochelle)*. 2021;2(1):273-278. doi:10.1089/whr.2020.0129
18. Abboud S, De Penning E, Brawner BM, Menon U, Glanz K, Sommers MS. Cervical Cancer Screening Among Arab Women in the United States: An Integrative Review. *Oncology nursing forum*. Jan 1 2017;44(1):E20-e33. doi:10.1188/17.Onf.E20-e33
19. Ayash C, Raad N, Finik J, et al. Perspectives on Human Papilloma Virus Vaccination Barriers, Knowledge and Beliefs, and Practices: Providers Serving Arab-American Populations. *Journal of community health*. Feb 2024;49(1):127-138. doi:10.1007/s10900-023-01248-y
20. Adjei Boakye E, Fedorovich Y, White M, et al. Rural-Urban Disparities in HPV Vaccination Coverage Among Adolescents in the Central Part of the State of Illinois, USA. *Journal of community health*. Feb 2023;48(1):24-29. doi:10.1007/s10900-022-01136-x
21. Adjei Boakye E, Babatunde OA, Wang M, et al. Geographic Variation in Human Papillomavirus Vaccination Initiation and Completion Among Young Adults in the U.S. *American journal of preventive medicine*. Mar 2021;60(3):387-396. doi:10.1016/j.amepre.2020.09.005
22. Lee M, Gerend MA, Adjei Boakye E. Rural-Urban Differences in Human Papillomavirus Vaccination Among Young Adults in 8 U.S. States. *American journal of preventive medicine*. Feb 2021;60(2):298-299. doi:10.1016/j.amepre.2020.07.023
23. Adjei Boakye E, Tobo BB, Rojek RP, Mohammed KA, Geneus CJ, Osazuwa-Peters N. Approaching a decade since HPV vaccine licensure: Racial and gender disparities in knowledge and awareness of HPV and HPV vaccine. *Human vaccines & immunotherapeutics*. Nov 2 2017;13(11):2713-2722. doi:10.1080/21645515.2017.1363133
24. Kisa S, Kisa A. Religious beliefs and practices toward HPV vaccine acceptance in Islamic countries: A scoping review. *PloS one*. 2024;19(8):e0309597. doi:10.1371/journal.pone.0309597
25. The National Iranian American Council. MENA Category in the U.S. Census – Memo. https://www.niacouncil.org/news_publications/mena-category-in-the-u-s-census-memo/#:~:text=However%2C%20as%20of%20March%2018,Iranian%20included%20as%20a%20subcategory
26. Office of Management and Budget. Revisions to OMB's Statistical Policy Directive No. 15: Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity. Accessed 03/02/2025, https://www.federalregister.gov/documents/2024/03/29/2024-06469/revisions-to-ombs-statistical-policy-directive-no-15-standards-for-maintaining-collecting-and
27. Haddad L, Corcoran J. Culturally tailored smoking cessation for arab american male smokers in community settings: a pilot study. *Tob Use Insights*. 2013;6:17-23. doi:10.4137/tui.S11837

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28. Alsous MM, Ali AA, Al-Azzam SI, et al. Knowledge and awareness about human papillomavirus infection and its vaccination among women in Arab communities. *Sci Rep*. Jan 12 2021;11(1):786. doi:10.1038/s41598-020-80834-9

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