Vaccine: X 14 (2023) 100335

Contents lists available at ScienceDirect

Vaccine: X

journal homepage: www.elsevier.com/locate/jvacx

Perceived facilitators and barriers to the uptake of the human papillomavirus (HPV) vaccine among adolescents of Arabic-speaking mothers in NSW, Australia: A qualitative study

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ARTICLE INFO

Article history:
Received 18 April 2022
Accepted 16 June 2023
Available online 17 June 2023

Keywords:
Human papillomavirus vaccine
Arabic speaking mothers
Facilitators
Barriers
Culture
Religious beliefs
Culturally and Linguistically Diverse (CALD)

ABSTRACT

Background: Australia has a large immigrant population but there is little data regarding whether human papillomavirus (HPV) vaccination coverage in adolescents varies according to parents' cultural or ethnic background. This work aims to identify facilitators and barriers to HPV vaccination of adolescents as perceived by Arabic-speaking mothers in Western Sydney, South Western Sydney and Wollongong, NSW, Australia.

Methods: A purposive sampling approach was applied to recruit mothers of adolescents from Arabic speaking backgrounds who had at least one child eligible for the HPV school-based vaccination program. Face-to-face semi-structured well as online interviews were conducted in Arabic between April 2021 and July 2021. The interviews were audio-recorded, transcribed, and translated into English and examined using thematic analysis.

Results: Sixteen mothers of adolescents from Arabic backgrounds described facilitators and barriers to HPV vaccination. A) Facilitators of HPV vaccination included: knowledge of HPV disease, trust in the school vaccination program, opportunistic recommendations from healthcare workers, information from friends. B) Barriers to accessing HPV vaccination included communication gaps: breakdown in school-parent information flow, lack of access to the Arabic language version of the information sheet, mother - GP communication barriers, mother–child communication gap; and health system gaps: missed opportunities for vaccination. C) Mothers' suggestions to improve HPV vaccination acceptance: to involve religious and cultural leadership, encourage engagement with GPs, and provide school-based education for parents and students.

Conclusion: Parents could benefit from assistance with HPV vaccination decision making. Interventions via schools, health professionals and religious and cultural organisations could play important roles in HPV vaccination acceptance for Arabic speaking immigrant families and in introducing their adolescent children to this vaccine.

Introduction

Australia has increasingly diverse communities due to immigration over the last five decades, this includes a large number of Arab immigrants coming from a variety of Arabic countries [1]. In the 2021 Census, the Arabic language was reported as the third most common language spoken at home in Australia, after English and Mandarin. It is the second most common language (after English) spoken in South Western Sydney [2]. One study reported that refugees and migrants from some culturally and linguistically diverse (CALD) backgrounds had been inadequately immunised upon arrival to Australia [3]. CALD status can be defined as people born in non-English speaking countries and/or who do not speak English

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https://doi.org/10.1016/j.jvacx.2023.100335
2590-1362/

at home. Several studies have examined the different factors that may influence immigrant parents' decision-making around the human papillomavirus (HPV) vaccine for their children, including perceived facilitators and barriers to vaccination [4–7]. A systematic review published in 2020 revealed a lower uptake of HPV vaccine among immigrants, refugees, and ethnic minorities [7]. Additional studies have reported that Arabic-speaking people living in Western countries as minority groups tend to vaccinate their children less often than the dominant national group [8–10].

HPV is responsible for a substantial burden of disease worldwide, as the causative agent of cancers such as cervical cancer, as well as many other, anogenital and oropharyngeal malignancies and anogenital warts [11,12]. Globally, cervical cancer is the fourth most frequently diagnosed cancer with an estimated 604,000 new cases and 342,000 deaths worldwide in 2020 [12]. In Australia, HPV was detectable in about 93% of cervical cancers diagnosed between 2005 and 2015 [13]. There is no cure for HPV infection, but HPV vaccines are highly effective in preventing HPV related diseases and cancers. Depending on the type of HPV vaccine, vaccination can provide protection against HPV genotypes 6, 11, 16 and 18 and up to 5 additional oncogenic types, responsible for 90% of cervical, anal, genital, head and neck cancers [13,14].

Australia was the first country globally to implement a fully funded population-based national vaccination program against HPV, delivered primarily through schools [15]. Since 2007 the HPV vaccine has been offered routinely to girls in school year 7 (aged 12–13 years) and, from 2013, to similarly aged boys. A community-based catch-up programme was initially implemented for young women post school age, up to 26 years [15,16].

Many factors have been identified that impact on adolescent HPV vaccination status. Our previous qualitative study (in 2021) found that parental religious beliefs and general practitioners' (GPs') recommendation for the HPV vaccine played an integral role in parents' attitudes towards HPV vaccination uptake for their adolescent [17]. Another study of Arabic mothers in Denmark emphasised additional important factors such as receiving education and information about the HPV vaccine [10]. HPV vaccination completion in adolescents 15 years of age has gradually increased since program introduction and in 2019 had reached 80.5% in girls and 77.6% in boys. However, the COVID-19 pandemic has impacted HPV vaccination course completion in 2020, with the proportion of adolescents aged 11–14 years who received their second dose of HPV vaccine in the same calendar year lower in 2020 than in 2019; the percentage of girls and boys aged 11 to < 15 years who received both doses of HPV vaccine was 11.5 and 11.7 percentage points lower in 2020 than in 2019 [18].

This study aimed to identify the perceived facilitators and barriers among mothers from Arabic-speaking communities in different regions in New South Wales (NSW) in 2021, to school-based HPV vaccination. Further, to identify any participant-advised solutions to improving HPV vaccine awareness and uptake in this community.

Materials and methods

Procedure and participants

The research protocol was approved by the University of Sydney Human Ethics Committee (HREC) on 5 June 2018 (Project no: 2018/038). A non-probability purposive sampling strategy was used to recruit participants, to ensure representation of subgroups who may hold different and important views about the ideas and issues associated with the research question [19,20]. Purposive sampling was used to find participants who met the following criteria: mothers from Arabic-speaking backgrounds living in Western Sydney, South Western Sydney and Wollongong, NSW, Australia, who had at least one child eligible for HPV vaccination as part of the Australian school vaccination program in the two years prior to the interviews. This time frame was chosen to reduce the risk of recall bias. The initial participants were recruited from informal personal contacts and then snowballing was used to locate other participants meeting the sampling criteria. Western Sydney is situated approximately 20 km west of the Sydney Central Business District (CBD). South-Western Sydney is about 25 km south-west of the Sydney CBD. Wollongong is located on the east coast of NSW, approximately 80 km south of Sydney. We chose these geographical locations for their high representation of Arabic migrants. In 2016, the Australian Bureau of Statistics Census revealed that 60% of Arabic migrants live in NSW, and of these, 40% live in South Western Sydney [2].

Participants were contacted by telephone, provided a brief explanation of the project and offered the opportunity to participate. Potential participants were informed that a more comprehensive description of the project and informed consent procedures would be explained further at the interview. The first author (FN), an experienced bilingual qualitative researcher, conducted the interviews in Arabic between April 2021 and July 2021. Where possible, interviews were conducted face-to-face. The introduction of a comprehensive lockdown in NSW, Australia, in late June 2021 as part of the public health response to rising COVID-19 case numbers meant that some interviews were conducted via videoconferencing software (Zoom - https://zoom.us). Interviews were recorded and transcribed into English by the first author (FN). Two bilingual experts reviewed transcripts to assure consistency of translation.

Data analysis

Once all interviews were transcribed, the transcripts were analysed using thematic analysis, an iterative multi-phase process of coding the data in phases to create meaningful patterns. The data were initially coded by the first author (FN) using NVivo software according to the approach described by Braun and Clarke [21]. These codes were refined in consultation with another experienced qualitative researcher (CK). Codes were further reviewed by two additional co-authors (SRS and CD) to ensure coding consistency. Thematic analysis was undertaken to analyse and interpret the results.

Results

We recruited and interviewed 16 Arabic-speaking mothers. Of these, 13 participated in face-to-face interviews, with the remaining three interviews conducted via videoconferencing due to COVID-19 public health restrictions. All 16 women self-identified as Muslim and were between 31 and –50-years of age. Three of 16 mothers had not provided consent for their child to be vaccinated but expressed their willingness to do so soon (see Table 1, presents the demographic information of 16 women from different Arabic speaking countries).

We identified themes related to Arabic-speaking mothers' perceived facilitators and barriers for HPV vaccination of their adolescents. Participants discussed facilitators that assisted them in providing consent for the HPV vaccine; they also discussed barriers to acceptance of the HPV vaccine and potential solutions they thought would assist their community more generally in decision-making about HPV vaccination.

Table 1
Demographics of study participants.

Participant number	Age years	Ethnic background	Education level	Year of migration to Australia	Child's sex	HPV vaccine received	Information sheet received from school	City	Interview
KAP1	38	Libyan	University PG/Diploma	2010	2 Girls	Yes	yes	Sydney	Face to face
KAP2	42	Libyan	University	2006	Girl	Yes	Yes	Sydney	Face to face
KAP3	32	Libyan	Year 10	2010	Girl	Yes	Yes	Sydney	Face to face
KAP4	41	Libyan	University PG /Master	2010	Girl	Yes	Yes	Wollongong	Face to face
KAP5	44	Sudanese	University	2006	Girl	Yes	Yes	Sydney	Face to face
KAP6	44	Moroccan	Diploma Childcare	2006	Boy	Yes	Yes	Sydney	Face to face
KAP7	43	Libyan	Year 10	2000	Boy	Yes	Yes	Sydney	Face to face
KAP8	38	Palestinian	University PG/Master	2006	Girl	No	No	Sydney	Face to face
KAP9	46	Palestinian	University	1995	Boy	No	No	Sydney	Face to face
KAP10	42	Kuwaiti	Year 7	2005	Boy	Yes	Yes	Sydney	Face to face
KAP11	41	Libyan	University	2010	Boy	Yes	Yes	Sydney	Face to face
KAP12	41	Libyan	University	2008	Girl	Yes	Yes	Wollongong	Videoconference
KAP13	38	Lebanese	Year 11	1997	Girl	Yes	Yes	Wollongong	Face to face
KAP14	48	Egyptian	Year 11	1994	Girl	Yes	Yes	Wollongong	Face to face
KAP15	50	Syrian	University	2014	2 Boys	Yes	Yes	Wollongong	Videoconference
KAP16	49	Libyan	University	2008	Girl	Yes	Yes	Wollongong	Videoconference

Facilitators of HPV vaccination

Knowledge of HPV disease

Knowledge of HPV disease, particularly that it can cause cancer, was influential in mothers' decisions to consent to HPV vaccination for their adolescents. Some participants shared how their background experience influenced their views about HPV vaccination. This knowledge came from a medical background for one mother, where she had encountered women with late-stage cervical cancers.

> *"KAP1: I have background information about it, as I was studying in the medical field, and I know about this virus, and I know that the vaccination is the only solution for protection from it".*

For another mother, training undertaken as part of her childcare qualification provided an awareness of the various manifestations of HPV disease. Both these mothers described a need for the prevention of HPV disease via HPV vaccination.

Some participants understood that HPV is a disease that can be sexually transmitted. They considered that HPV vaccine might be relevant to their children when they engage in sexual activity through marriage, as sexual relationships outside of marriage are against Islamic beliefs. Some mothers knew that the protection afforded by the HPV vaccine did extend to all sexually transmitted infections, but it was the prevention against cancer that was perceived to be of more importance.

> *"KAP13: If it only protects from sexual transmitted infection and it does not protect from cancer, certainly I would not agree giving it to my daughters. I would have rejected it".*

For some mothers, knowledge about the HPV vaccine was obtained from their children. Three participants from Wollongong described how their daughters told them HPV vaccination can prevent cervical cancer. Their daughters attended the same school and had received an education session on HPV vaccination at the school. They subsequently encouraged their mothers to provide consent for them to be vaccinated.

Trust in the school vaccination program

Offering the HPV vaccination through a school-based program appeared to positively influence mothers' consent to HPV vaccination. Most mothers in our research reported trust in the HPV vaccine as the government recommended it and the information about the vaccine program came through the schools. They believed that the government and schools would make decisions that are safe for children. Therefore, a vaccine included in the school-based vaccination programme was perceived to be reliable:

> *"KAP5: As it is a vaccination coming from the Australian government and through schools, I considered it safe for them".*

Opportunistic recommendation from healthcare workers

One mother described the hospitalisation of her child. During this time, healthcare workers told her about the HPV vaccine and that it could protect her child, which facilitated consent for the vaccine.

> *"KAP12: At the hospital, ... They told me that she has a vaccination to protect her, and I have the right to accept or refuse it".*

Information from friends

A positive recommendation from friends discussing receipt of the HPV vaccine by their adolescents also facilitated HPV vaccination. Mothers with a friend supportive of HPV vaccination were more likely to accept the vaccine.

> *"KAP12: I asked even my friends were Algerians and Moroccan in Victoria and they have been in Australia for long time; they said that they all gave it to their children and advised me to give it to my daughter".*

Barriers to accessing HPV vaccination

Participants identified multiple barriers impacting mothers' vaccination consent such as communication and health system gaps.

Communication gaps

Significant communication gaps and barriers hindered mothers' access to accurate, evidence-based information about HPV vaccination.

Breakdown in school-parent information flow

Some mothers highlighted a perceived gap in the communication between them and the school. This included the report by some that they did not receive the HPV vaccine information sheet and consent form from their adolescents' schools. This resulted in

missed vaccination in at least one case –as they did not receive the government information sheet from the school.

"KAP9: My youngest son is now 15 years old, his school did not send me any letter to inform me of these vaccinations when he was in year 7".

Lack of access to the Arabic language version of the information sheet

All mothers who did receive an information sheet from the schools reported that it was only provided in English. Mothers expressed a strong preference for receiving an Arabic version of the HPV vaccine information sheet. They reported that this would improve their understanding of the HPV vaccine and that they could much more quickly read and understand such a version. In contrast, it was difficult and much more time consuming to read and understand the English version of the information sheet.

"KAP11: of course, in the Arabic language, I can read it (information sheet) in a short time to read and understand the information sheet Arabic version, it may be in two minutes. However, in English version of information sheet the translation from English to Arabic language takes about half an hour".

One mother felt that this might be a deliberate strategy by her adolescent's school to reduce communication workloads.

"KAP2: I think that schools try to reduce communication with parents by any way, even in the topic of academic issue they try to reduce the contact with parents, as it will be less headache (less problems). I believe that they said that "If you explained about this vaccine to parents, it will make them have more information, then encourage them to contact the school, and ask a lot of questions about this vaccine . . .therefore, so they preferred to send consent form and information sheet in English language to parents to sign on it, as parents will be agreed to approval it as it is a childhood vaccine".

The study also found a difference in the information received by mothers in Western Sydney and South Western Sydney compared to Wollongong. Mothers from Western Sydney and South Western Sydney had received an Arabic-language version of information from their children's schools about some topics including nutrition, bullying and child care. However, they did not receive an Arabic – language information sheet about the HPV vaccine. In contrast, mothers from Wollongong reported they had never received an Arabic-language version of any information from their children's schools and did not know this was possible.

"KAP13: I have never seen letters were sent from the school in Arabic version or the schools query parents if they want Arabic version or the school inform that there is Arabic version".

Mother - GP communication barriers

Participants in this study also noted communication gaps between them and their respective GPs. Interviewees stated that information from their GP was important for them to make a decision. However, some participants perceived that GPs did not know much about HPV vaccination and had failed to inform them about the vaccine.

"KAP5: I swear that the GP who I know do not explain in detail about vaccinations, after my children had finished childhood vaccinations, my GP did not mention to me that there is a vaccination (HPV v) for children at year 7".

One participant reported that communication with her GP was difficult, even via an interpreter. She mentioned that she had trouble understanding the interpreter, because the interpreter was using a dialect rather than standard Arabic. This participant considered the interpreter a barrier to her understanding of detailed information from her GP.

"KAP14: The interpreter is incapable to explain all what you need to know. For example, the interpreter told me that my doctor says such and such without any details, so I couldn't respond to the doctor's question. . .. I consider the interpreter as a barrier to me to understand detailed information from my GP".

Mother-child communication gap

Our research found communication challenges for mothers and adolescents during discussions about the HPV vaccine. Some participants found it difficult to communicate about the HPV vaccine due to difficulties with English.

"KAP11: I am not ashamed to talk to my son about this vaccine, but my English level is not good for communicating information correctly to my son".

Health system gaps

Mothers reported several gaps in health systems that functioned as a barrier to receipt of HPV vaccination.

Missed opportunities

One participant reported that she did not receive a vaccination information sheet from her son's school. She also reported that after relocation to another area and attendance at a new Medical Centre, the medical records, including vaccination records, were not transferred. Her new GP had no information about due HPV vaccine doses due to the lack of records. This sequence of events meant that her son did not receive the HPV vaccine in year 7 and remains unvaccinated against HPV.

One participant described that her family arrived in Australia when her adolescent was in the middle of Year 7. She reported that no one informed her about HPV vaccination or recommended this vaccine to her. At the interview (approximately one year later), her daughter was still unvaccinated against HPV.

"KAP8: No, my daughter didn't get vaccinations in year 7, as we came to Australia last year, we came when my daughter was in year 7".

Another mother detailed how her adolescent in a special needs school was not offered HPV vaccination.

"KAP13: she[daughter] studies in special need school, the school has not sent information sheet in English or Arabic version, she didn't receive HPV vaccine, but for my [other] daughters in private school, they were vaccinated".

Mothers' suggestions to improve HPV vaccination uptake

Religious and cultural leadership

Mothers identified some ways in which HPV vaccination could be encouraged in their communities.

Religious leadership

There was a high willingness to consent to the HPV vaccine if it was recommended and endorsed by religious leaders. Participants noted that their preferred source of information was from religious leaders; if respected people in the community were supportive of the HPV vaccine, they were more willing to vaccinate. There was joint agreement amongst participants that Imams and community leaders need to play a more significant role in distributing informa-

tion about the HPV vaccine and all vaccines. Some mentioned that a fatwa (i.e., religious ruling) regarding HPV vaccination from the National Australia Fatwa Council would provide a powerful endorsement of the vaccine and would highly encourage parents to consent to the vaccine. Related to this was a discussion of the need for clarity around the Halal status of the ingredients in the HPV vaccine. Mothers felt that religious leaders should discuss the permissibility status of the vaccine and that ideally, Halal certification should be present on the vaccine information sheet.

> *"KAP8: This vaccine should have Halal certified in the information sheet or have Fatwa that this vaccine is not Prohibited from the National Australian Fatwa Council, we need to have information about Halal status from them*".

Community organisation

There was also common agreement amongst participants that community organisations need to play a greater role in distributing information about the HPV vaccine and all vaccines at youth centres and community centres. Mothers mentioned the important role community organisations could play in providing HPV related education to the Arabic-speaking community.

> *"KAP2: The Islamic Arabic community has a main role to provide information about this vaccine. We have youth centres and community centres everywhere; we have specialists in this community in all fields, they can educate women and explain about this vaccination*".

Engagement with GPs

Participants stated that receipt of information from their GPs would be important in facilitating HPV decision-making. They stated that their GPs should educate parents about the HPV vaccine and provide reminders when their children were due for this vaccine.

> *"KAP11: GP should inform parents about this vaccine; it is supposed that GPs inform parents that there is a vaccination for those who are at a certain age (year 7) and explain it to us*".

One mother expressed that ongoing communication between the school and GPs would also assist those who may not be able to read Arabic or English.

> *"KAP16: There are a large group of refugees here in Wollongong. . . do not know how to read or write. . .therefore, the school should send to the family doctor that these families have sons or daughters who will be vaccinated in year 7, then family doctor should explain this vaccination to parents because they cannot read the information sheet*".

School-based education for parents and students

Participants also emphasised the importance of adequate information for them and their adolescents about HPV vaccination from their school. Several mothers expressed a preference for receiving vaccine information via a face-to-face parent meeting organised by the school.

> *"KAP3: I hope there is parents meeting in face to face to explain about this vaccine, it will be better than the information paper*".

Educating this community about HPV infection was suggested by most participants to help them understand the preventive benefits of the HPV vaccine. There was some consensus that school registration was a good time to deliver information about the HPV vaccine. It was considered a good opportunity because parents needed to attend the school to enrol their adolescent in person.

Discussion

This study provides insights into Arabic-speaking mothers' perspectives on the facilitators, barriers, and potential solutions regarding HPV vaccination of adolescents. We have previously reported that mothers from Arabic-speaking communities in Western Sydney, Australia had insufficient knowledge about the HPV vaccination [17]. A recent study (2020) investigated the level of knowledge and awareness about HPV and vaccination among Arabic women living in four Arabic countries [22]. It suggested there was relatively poor understanding and knowledge of some participants about HPV and HPV vaccine.

Previous knowledge of HPV disease was a powerful facilitator of HPV vaccination acceptance. This study found that some mothers' professional background experiences in healthcare and teaching provided higher health literacy and supported their acceptance of HPV vaccination for their adolescents. In general, awareness in this population about the protection HPV vaccine provides against cancers was limited. The study found that some participants had daughters who were able to inform them that the HPV vaccine could protect against cervical cancer. It has been noted in previous studies that a higher level of maternal education was related to greater knowledge of cervical cancer and HPV infection [23,24].

Our study identified a gap in healthcare provider recommendation for the HPV vaccine. This study found that a recommendation from GPs could play a key role in facilitating adolescent vaccination through the school program. This is supported by many studies showings that a recommendation from GPs and/or other healthcare providers is the most critical driver to increase vaccination uptake [25–29].

We identified significant barriers impeding mothers' access to accurate information about the HPV vaccine, including communication gaps between schools and mothers. Most mothers, who were less proficient in English, had difficulty understanding the English language version of the HPV vaccine information sheet and consent form. Findings from another two studies in USA (2013) and Canada (2018) align with our findings and identified that immigrant women who were less proficient in English were less likely to receive the HPV vaccine for their adolescents and themselves [30,31].

Missed vaccination opportunities in the school-based program or during consultations in healthcare settings are a major concern. Our study highlights barriers to accessing HPV vaccine and other vaccinations among migrant children post-arrival in Australia. Parents need better information about the HPV vaccine to promote HPV vaccine uptake. School nurses, GPs and Imams, can play an important role in evidence-based decision- making about HPV vaccination and introducing children to this important health-promotion intervention [32,33].

Cultural and religious beliefs can also influence HPV vaccine decision-making in mothers from Arabic backgrounds. Specifically, cultural restrictions around discussing sexuality have been documented in some Arabic communities [34,35]. However, mothers in this study who knew about the sexually transmitted nature of HPV and also that the HPV vaccine protects against cervical cancer were accepting of the HPV vaccine to protect their children after marriage. Other studies have also supported this and that immigrant women believe that it is important to think about their daughter's future health as part of decision-making around HPV vaccination [36,37].

Table 2
Potential solutions to address barriers related to HPV vaccination of adolescents in Arabic-speaking communities.

Ensure the provision of the Arabic version of an information sheet about HPV vaccine sent from schools to parents from Arabic-speaking background
Strengthen provision of resources to schools to provide education sessions for students and parents about HPV vaccine
Work on establishing partnerships between GPs and the school-based vaccination program
Greater GP involvement in educating parents about HPV vaccine, including the provision of reminders and catch-up information
Issue a fatwa from the National Australia Fatwa Council to provide clarity around the Halal status of the HPV vaccine
Include Halal certification on the HPV vaccine information sheet
Community support appears particularly important to Arabic speaking mothers, thus utilise peer liaisons between health organisations and the community to assist in HPV vaccine acceptance

Most participants in this study were also interested in knowing about the HPV vaccine from their religious leaders. Other research indicates that a religious leaders' recommendation can influence people's choices around vaccination. One study found it could be useful for religious leaders to be involved in reviewing vaccine concerns to determine if there is any religious basis for these concerns [38]. In keeping with the nature of their religious beliefs, Muslim parents may have different attitudes and knowledge about the HPV vaccine and require culturally sensitive medical information in their preferred language [39,40]. A Halal certificate for the HPV vaccine would reassure mothers in this study. Multiple studies have found that the Halal status of the vaccine is a key factor in vaccine acceptance for the Muslim community [41–43].

Our study found that a critical driver shaping mothers' acceptance of HPV vaccination for their adolescents was interaction with the school. This finding is supported by other studies in Australia in the general population [44,45]. In 2021, a study in Australia found that an education intervention with adolescents about the HPV vaccine via a school-based program provided an opportunity to promote knowledge about the benefits of the HPV vaccine to protect them from cancers. Adolescents were then able to discuss the preventive vaccine with their parents [46].

Our study found that one adolescent attending a special education school had not received information about the HPV vaccine and remained unvaccinated against HPV. Similarly, two other studies in Australia found low vaccination coverage in special schools [47,48]. This suggests the need for additional research into the HPV vaccination needs of CALD adolescents with disability and their families. Additional support is likely to be required, especially in the setting of the intersection of disability and CALD status.

Limitations and strengths

We identified two main strengths of this study. First, a bilingual researcher conducted the interviews in Arabic, and two bilingual experts checked the translated transcripts for accuracy and consistency. The researcher, who is from the Arabic-speaking community, effectively built rapport with mothers from this community. Second, using qualitative interviews rather than surveys ensured the inclusion of participants with low literacy.

A limitation of this study was being unable to interview some participants in person due to the strict lockdown during COVID-19 outbreaks. Participants appeared to be less inhibited in face-to-face interviews, potentially because they were away from other family members. Some participants also found it difficult to use the technology associated with virtual interviews. Despite this, valuable data was gained from the three virtual interviews. Another limitation is that we interviewed the mothers only. The study was conducted this way because in Arabic Muslim culture it is less acceptable for a female interviewer to speak to a non-relative male informant about culturally sensitive issues.

Recommendations

This research also sought to identify participant-advised solutions to improving HPV vaccine awareness and uptake in the Arabic community. This approach has been informed by co-design principles, which a recent systematic review found could provide an effective mechanism for engagement to improve health outcomes in communities [49]. Further research has identified how co-design principles can be used to design programs in CALD communities [50]. Parents interviewed in this study provided some potential solutions to overcome barriers to HPV uptake in the Arabic-speaking community. These solutions have been amalgamated with recommendations from our other key findings and are presented below in Table 2.

Conclusions

This study investigated the facilitators and barriers to HPV vaccination of adolescents among Arabic-speaking mothers in Sydney and Wollongong. We have highlighted some significant gaps and barriers in HPV vaccine knowledge. Current findings also support the need to improve the health literacy of this community by providing culturally and linguistically appropriate resources in Arabic. Vaccination providers working with people from Arabic-speaking backgrounds need to be aware of the important role those religious leaders play in their communities. Future work could focus on implementing recommendations from this research and incorporating co-design principles to create effective HPV vaccine uptake interventions.

Institutional Review Board Statement

The study was approved by the University of Sydney Human Research Ethics Committee (HREC) on 5 June 2018 (Project no: 2018/038). Study participants were provided with a PIS and Consent Form in Arabic language. Informed consent was obtained at the time of the interview. The researcher read the PIS with the participants to ensure they understood what consenting to the study involved. Participants signed the Consent Form at the beginning of the interview. Separate parental consent was sought to allow the researcher to link adolescent vaccination status with parent interview data through the National HPV Register, which ceased operating on 31 December 2018, with all HPV vaccinations now being recorded on the Australian Immunisation Register.

Informed Consent Statement

Informed consent was obtained from all participants involved in the study.

Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to ethical restrictions.

CRediT authorship contribution statement

Faeza Netfa: Conceptualization, Methodology, Software, Validation, Writing – review & editing, Formal analysis, Data curation, Investigation, Resources, Writing – original draft, Visualization, Supervision. **Catherine King:** Conceptualization, Methodology, Software, Validation, Writing – review & editing, Formal analysis, Data curation, Investigation, Resources, Writing – original draft, Visualization, Supervision. **Cristyn Davies:** Software, Validation, Writing – review & editing, Formal analysis, Data curation, Investigation, Supervision. **Harunor Rashid:** Conceptualization, Methodology, Validation, Writing – review & editing, Supervision. **Mohamed Tashani:** Validation, Writing – review & editing, Supervision. **Robert Booy:** Validation, Writing – review & editing, Supervision. **S. Rachel Skinner:** Conceptualization, Methodology, Software, Validation, Writing – review & editing, Formal analysis, Data curation, Investigation, Resources, Visualization, Supervision, Project administration.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: S.R.S. has received honoraria from Seqiris and Merck for educational presentations on HPV vaccine. The other authors declare that there is no conflict of interest.

Acknowledgments

The authors wish to thank all mothers who participated in the study. We gratefully acknowledge and wish to thank Dr Ali Asheibi and Dr Hunida Elfallah for proofreading, providing helpful comments, and reviewing the translation from Arabic to English.

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