NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

# WHO'S CALLING THE SHOTS? : UNDERSTANDING THE ASSOCIATION BETWEEN SOCIOECONOMIC STATUS (SES) AND THE HUMAN-PAPILLOMAVIRUS (HPV) VACCINATION TAKE-UP RATE

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**SCHOOL OF SOCIAL SCIENCES**

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A thesis submitted to the Nanyang Technological University in partial fulfilment of the requirement for the degree of Master of Arts

**2024**

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I certify that all work submitted for this thesis is my original work. I declare that no other person's work has been used without due acknowledgement. Except where it is clearly stated that I have used some of this material elsewhere, this work has not been presented by me for assessment in any other institution or University. I certify that the data collected for this project are authentic and the investigations were conducted in accordance with the ethics policies and integrity standards of Nanyang Technological University and that the research data are presented honestly and without prejudice.

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This thesis **does not** contain any materials from papers published in peer-reviewed journals or from papers accepted at conferences in which I am listed as an author.

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# Abstract

**Background.** Fundamental cause theory is one the most commonly used theories in medical sociology to understand health disparities. It states that health inequalities continue to exist as individuals of higher socio-economic status (SES) levels have better access to resources such as wealth and knowledge, and thus are systematically more likely to make use of new health technologies and adopt health-promoting behaviors.

**Methods.** Using the human papillomavirus (HPV) vaccination in Singapore as a case study, this study aims to elicit the agencies that support this fundamental causality by exploring the similarities and dissimilarities among women of contrasting SES regarding their knowledge and views on the vaccine, as well as the experiences and factors that affect their decision-making process to be vaccinated. Semi-structured interviews were conducted between August 2023 and December 2023 with 19 Singaporean women aged 21-30 of contrasting SES (10 from the low SES group, and nine from the high SES group). Participants were recruited using purposive, non-random sampling, from social media and researcher's personal network. Interviews were recorded, transcribed, and coded; and thematic analysis was undertaken to identify patterns.

**Results.** Findings suggest a complex relationship between SES and one's decision to get vaccinated against HPV. According to fundamental cause theory, the differences in individuals' allocation and access to resources is the most salient factor influencing health disparities. Although this was the case in the results presented where a slightly higher proportion of participants from the high

SES group were fully vaccinated against HPV relative to those from the low SES group, the difference was minimal. Hence, this illustrates that some findings deviated from fundamental cause theory. Despite the fact that all participants knew about the HPV vaccination and viewed it in a positive light, many participants were still not vaccinated. Key reasons include the lack of parental support, their parents' lack of knowledge regarding the vaccine, ability to take the vaccination with a friend or family member, and age.

**Conclusion.** Findings from this paper may aid the development of strategies to improve the adoption rate of the HPV vaccination.

**Key words**

Medical sociology; fundamental cause theory; socio-economic status; health disparities; health inequalities; human papillomavirus vaccination; Singapore; qualitative research

# INTRODUCTION

Human papillomavirus (HPV) is a common sexually transmitted infection, and most sexually active individuals will catch it minimally once (Baseman and Koutsky 2005). While majority of HPV infections are asymptomatic and harmless, in certain instances, it may lead to health problems like genital warts and cervical cancer (Kombe et al. 2021). For example, HPV-related malignancies account for approximately 5% of cancer cases globally (McBride 2024); and around 10% of females infected with HPV of the cervix will develop chronic HPV infection, putting them at high risk of cervical cancer (Centers for Disease Control and Prevention n.d.).

To prevent cervical cancer, an illness for which socioeconomic disparities are well-documented (Bolormaa et al. 2022, Cham et al. 2022, Tadesse 2015), three vaccine types are available namely – Cervarix, Gardasil 4, and Gardasil 9. All three vaccines protect against HPV strains 16 and 18, responsible for 70% of all cervical cancer incidences (de Oliveira, Fregnani and Villa 2019); and Gardasil 4 and 9 protect against another two and seven additional HPV strains respectively (Cheng, Wang and Du 2020). In Singapore, there are currently two vaccine types available – Cervarix and Gardasil 9 (Health Hub n.d.); both vaccines are targeted at females aged nine to 26.

Despite the availability of vaccines, presence of government subsidies, and educational campaigns promoting the benefits of getting vaccinated, the overall

uptake of HPV vaccine in Singapore is still relatively low. There is no official statistic regarding the HPV vaccination take-up rate in Singapore to the best of my knowledge. However, a study carried out using convenience sampling by Temasek Foundation in 2021 indicated that only 19.2% of women in Singapore have completed their HPV vaccine series (Temasek Foundation 2022).

This is worrying as cervical cancer is one of the most prevalent cancers affecting females globally; it is one of the top three cancers in females under 45 years of age in more than 146 countries (Arbyn et al. 2020), and is the tenth most common cancer among females in Singapore (Tay et al. 2015). Hence, this study seeks to understand people's decision-making process on getting the HPV vaccination.

## Theoretical framework

Health disparities by SES have been well documented in social determinants of health scholarship (Kim, Vazquez and Cubbin 2023, McMaughan, Oloruntoba and Smith 2020); and this inverse, vexing relationship is one of the most crucial social issues to solve. Health disparities persist despite the fact that illnesses afflicting individuals as well as the protective and risk factors affecting those illnesses have shifted considerably over different time periods and geographical locations (Link and Phelan 1995).

To understand the workings that result in this relationship, Link and Phelan (1995) coined the theory of fundamental causes. They argued that health disparities

persist due to social conditions, especially relating to one's SES level. Individuals of higher SES have more flexible resources such as financial capital and knowledge, allowing them better access to health resources to navigate current health threats; and they would be able to use their resources to seek preventive and diagnostic health care, embrace healthy habits and behaviors, and thus avoid illness. Hence, such individuals are better able to reduce risks, illnesses, and repercussions of illness (Link and Phelan 1995).

For example, new health knowledge would usually benefit individuals of higher SES more than those of a lower SES group due to the high SES group being more equipped to make use of the new health knowledge (Phelan, Link and Tehranifar 2010). Phelan and Link (2005) scrutinized the association between one's SES level and mortality rates. They found that for diseases that have received significant improvements in prevention and/or treatment, for example lung cancer where new knowledge on the dangers of smoking came to light in the 1950s and 60s, lung cancer mortality started to drop in high SES neighborhoods in the United States. In contrast, lung cancer mortality continued to increase in low SES neighborhoods (Phelan, Link and Tehranifar 2010).

Thus, fundamental cause theory is a useful framework to understand how social resources can be translated to health through numerous mechanisms, which would in turn affect various health outcomes. Essentially, social factors and processes affect one's health in ways that cannot be addressed solely by medical

advances; and it is due to the differences in individuals' allocation and access to these flexible social resources that would affect one's health behaviors and susceptibility to illnesses (Link and Phelan 1995).

Since the development of fundamental cause theory, considerable attention has been given to testing and applying the theory to numerous diseases and populations, which reinforced the link between SES and health behaviors and outcomes (Clouston, Natale and Link 2021, Nicholson Jr 2020). It is important to note that while most research applying fundamental cause theory tend to focus on SES as fundamental cause of health disparities, there are other fundamental causes of health disparities such as stigma (Hatzenbuehler, Phelan and Link 2013) and one's cultural background (Subica and Link 2021) as well. To illustrate, health disparities are often prevalent in numerous minority groups in society such as asylum seekers and indigenous people due to unfair policies including racism and denial of access to flexible resources (Subica and Link 2021).

In the context of women's health, fundamental cause theory has been used as a framework to understand the social factors affecting women's use of contraception (Van Eekert et al. 2024), cancer mortality rates among women (Vanthomme et al. 2017), and also the HPV vaccination uptake, among other things (Gong et al. 2024, Polonijo 2020). However, most research are macrosocial and quantitative in nature, with very few studies examining the mechanisms that underlie this causality qualitatively, on a micro level.

Qualitative research can contribute to the idea of fundamental causes by capturing in detail the heterogeneity, intricacy, and individuality of processes and ways in which this fundamental causality is sustained. Thus, qualitative research can be used to elaborate concretely on how these flexible social resources may and can be translated into numerous health advantages (Lutfey and Freese 2005).

Although fundamental cause theory is useful in understanding how social factors affect health outcomes, there may be certain limitations to its applicability. While individuals with access to more flexible resources can be expected to have better health, there may be certain instances where this does not hold true. For instance, individuals who are chasing beauty may view it as something more important than health; and may prioritize beauty over health, which may have detrimental effects on one's health (Phelan, Link and Tehranifar 2010), such as consuming unregulated diet pills and using tanning beds. This is known as a countervailing mechanism (Lutfey and Freese 2005), which is an aspect that qualitative studies will be able to capture. It is important to note that the presence of countervailing mechanism does not affect the credibility of fundamental cause theory, as the impacts of the countervailing mechanisms are less significant than the impacts of the mechanisms generating this fundamental relationship between flexible resources and health behaviors and outcomes (Lutfey and Freese 2005).

Hence, this study aims to address this gap by using a qualitative approach to understand the agencies that support this fundamental causality with regards to

the uptake of the HPV vaccination. The HPV vaccine is targeted at young women and reduces one's chances of getting cervical cancer, an illness for which socioeconomic disparities (Bolormaa et al. 2022, Cham et al. 2022, Tadesse 2015) and stigmatization are well-documented (McCaffery et al. 2006, Morse et al. 2023, Ziaee et al. 2024). Therefore, using semi-structured interviews, this study will compare the factors influencing the decision-making process regarding the HPV vaccination among individuals (n=19) of contrasting SES in Singapore.

## Background and case study in Singapore

Since 2018, educational talks and campaigns regarding the HPV vaccination have been conducted by healthcare professionals in schools and community centers, to increase awareness on the vaccine (Singapore Cancer Society n.d.). Invitations for HPV vaccination via SMS and/or physical letters have also been sent out to eligible adult females (Open Government Products 2024) or their parents/legal guardians if they are under 18, to educate them on the benefits of vaccination, and to encourage them to get vaccinated (SingHealth 2019).

To ensure that individuals with greater needs are able to afford the HPV vaccine, the Cervarix vaccine is free for Singaporean women aged 18 through 26 from low income households i.e. those who have a valid Community Health Assist Scheme (CHAS) Orange or Blue card (Shafeeq 2022). Additionally, the vaccine is free for all Singaporean girls under 18 (Tang and Wong 2019). For other eligible Singaporean females, the Cervarix vaccine is heavily subsidized by the

government (Health Hub n.d.). They would also be able to tap on their Medisave, a public savings scheme in Singapore that helps individuals to save for their future healthcare needs (Ministry of Health 2023), to pay for their vaccination (Health Hub n.d.). The subsidies available are detailed in the SMS and physical letters sent to eligible adult females or for minors, their parents/legal guardians; and individuals are also encouraged to apply for the appropriate CHAS card, if they have yet to do so.

As Singaporean women from low income households are able to get vaccinated for free, it is unclear if health disparities in HPV vaccine uptake are still as persistent in a country like Singapore. It is also unclear if the fundamental causes regarding one's health behaviors, in this case the decision to be vaccinated against HPV, have shifted from material aspects such as cost due to Singapore's means testing approach for healthcare subsidies where low income individuals get more subsidies compared to high income individuals (Agency for Integrated Care 2024), towards non-material aspects such as cultural traditions and norms.

## Motivation of the research

Hence, using fundamental cause theory as the theoretical framework, the motivations behind this study are to explore and understand the factors that affect one's decision to get vaccinated; and to understand how one's decision to get vaccinated may be influenced by not just economic factors, but cultural and social factors as well.

## Problem Statement

Although the Cervarix vaccine has been approved for women aged nine to 26, and the Gardasil 9 vaccine has been approved for both men and women aged nine to 45 in Singapore (Health Hub n.d.), it is not feasible to analyze the factors affecting the vaccination uptake for all these different demographic groups. Hence, the target demographic group for this study is Singaporean women aged 21 through 30.

This age range has been chosen due to several reasons. First, the target group for HPV vaccination in Singapore is girls and women between nine to 26 years of age (Health Hub n.d.). Second, government subsidies are only given to this group (Ministry of Health n.d.). Third, it is expected that the presence of government subsidies would lead to an increase in uptake as cost would be less of a concern (Yuen et al. 2018), and hence should not be a main barrier to vaccination. There may be more pertinent barriers (and facilitators) to vaccination, which is what this study aims to explore.

## Research Question

The overall research question for this study is: How do women from different SES groups weigh the risks, costs, and benefits of the HPV vaccination? More specifically, to understand the similarities and dissimilarities among women from different SES groups regarding their knowledge and views on the vaccine, as well as the experiences and factors that influence their decision to be vaccinated.

Young women will be defined as Singaporean females aged 21 to 30; and socioeconomic status will be determined by the type of CHAS card one holds, which is determined by one's household income. Hence, SES in this context refers to family/household SES level, rather than that of the individual. Thus, individuals who are unemployed or studying will be categorized based on the SES level of their family members living in the same household. Individuals with a blue or orange CHAS card would be categorized as low SES, and individuals who have a green CHAS card or do not hold a CHAS card would be categorized as high SES. This is because healthcare subsidies are tied to the type of CHAS card one has; and individuals with a blue or orange CHAS card have more subsidies than those with a green or without a CHAS card (Ministry of Health 2024).

In the case of the HPV vaccination, individuals with either a blue or orange CHAS card will be able to get vaccinated for free (Shafeeq 2022), while those with a green or without a CHAS card will receive subsidies (Health Hub n.d.). Permanent residents and foreigners living in Singapore are not eligible to participate as they do not receive the same amount of healthcare subsidies as Singapore citizens.

I chose to define one's SES level based on the amount of healthcare subsidies one receives because cost is a major barrier to HPV vaccination (Lim and Lim 2019, Yuen et al. 2018); and I wanted to explore if health disparities remain just

as persistent even if individuals from lower SES backgrounds are given more subsidies to compensate for their lower access to flexible resources such as money.

## Significance of Research

There are numerous factors that affect our health and well-being. These factors are not just biological, but may be cultural and social as well. For example, in the case of the HPV vaccination, there is a stigma surrounding it due to its association with sexual activities, resulting in some individuals being reluctant or less inclined to get vaccinated (Lim and Lim 2019, Namba, Kaneda and Kotera 2023). Hence, cultural and social norms and beliefs do influence one's health behaviors. However, it is unclear if the stigma surrounding the vaccine or other social and cultural factors affecting one's decision to get vaccination are exclusive to individuals from a particular SES level. Therefore, this study is sociologically interesting as it serves as a chance to critically evaluate the field of public health and relate it to society at large.

It will be significant as cervical cancer is one of the most common cancers in females globally (World Health Organization 2024); and the tenth most common cancer in Singapore (Tay et al. 2018). In Singapore, it is estimated that around 309 women will have a cervical cancer diagnosis, and 172 will not survive their diagnosis each year (The Catalan Institute of Oncology and The International Agency for Research on Cancer 2023), although cervical cancer is mostly

preventable through vaccinations and screenings. Hence, this paper seeks to understand the factors and experiences of individuals of contrasting SES in Singapore that influence their decision to be vaccinated against HPV. This will help develop strategies to improve the adoption rate, and in turn reduce cervical cancer cases in time to come.

# LITERATURE REVIEW

## The effect of SES on one's health

Numerous studies have shown that people from a lower SES background have poorer health and/or earlier mortality (Clouston and Link 2021, Kivimäki et al. 2020, Schüz 2017, Wang and Geng 2019). Some studies focused on the structural factors affecting health. For example, Clouston and Link (2021) opined that individuals from a lower SES background do not have the same flexibility and availability of resources relative to individuals of a higher SES such as strong social connections, wealth, and knowledge. Hence, they would be more likely to be burdened by diseases that can be easily treated or prevented (Clouston and Link 2021). Similarly, McMaughan, Oloruntoba, and Smith (2020) argued that people of a lower SES tend to have poorer access to healthcare; and this lack of access would often result in poorer health outcomes and premature mortality.

Other studies focused on the interaction between structure and agency. While low SES is linked to higher risk of developing many illnesses independent of health behaviors (Kivimäki et al. 2020), numerous studies observed that a significant

percentage of health disparities are due to SES or SES-related differences in health behaviors (Kraft and Kraft 2021, Petrovic et al. 2018, Schüz 2017).

SES differences are observed in many health behaviors such as leading a healthy lifestyle, adhering to medication and health treatments, as well as participating in recommended health screenings and vaccinations (Kraft and Kraft 2021); and Schüz (2017) observed that individuals of a lower SES are less likely to engage in these health behaviors. This could be due to inadequate resources and motivation to lead a healthy lifestyle (Wang and Geng 2019).

Hence, one's SES would affect the amount and type of agency one has, and in turn one's lifestyle. As Cockerham (2016) noted, lifestyle is inherently constrained by one's social position. While individuals have the agency to choose their preferred lifestyle (and health behaviors), the number of choices individuals have would largely depend on their SES (Cockerham 2016, Cockerham, Abel and Lüschen 1993). In fact, this is further reiterated by Weber (1978) who acknowledged that lifestyles have two main components namely life choices and life chances. Life chances are the likelihoods of fulfilling one's life choices (Weber 1978); and are not based on luck, but rather the opportunities one has because of his or her social status.

Hence, lifestyles, in this case health behaviors, are often related to structural factors, and are influenced by one's life chances (Weber 1978). In contrast,

Giddens (1991) created the term duality of structure. Although one's actions, in this case one's health behaviors, are limited by structural factors such as one's SES, these structures are also influenced by the exercise of agency (Giddens 1991). Thus, as seen in the above-mentioned literatures, SES has a profound influence on one's health behaviors and outcomes. While there are numerous measurements for SES, many sociologists often operationalize SES as income, education, and/or occupation (Fujihara 2020); and these are the three key measures of SES influencing health (Lee et al. 2021, Schlax et al. 2019).

Many studies have explored how these three indicators – income, education, and occupation – specifically influence one's health. Some studies examined all three indicators and their effects on health. For example, Lee et al. (2021) asserted that having a low income, being less educated, and having a non-managerial job are often associated with poorer health outcomes. However, most studies focused on just one indicator.

**Income**

Hahn and Truman (2015) as well as Finkelstein (2022) looked at how one's income would influence one's health behaviors and outcomes. Hahn and Truman (2015) argued that individuals from a higher income background would find it easier to access health-related resources. These resources include healthcare as well as clean and nutritious food (Hahn and Truman 2015). Likewise, Finkelstein (2022) asserted that higher income families are more likely to stay in suburbs

with healthier environments and engage in programs that support self-care. They are also more likely to be able to afford healthcare, be it preventive or diagnostic care (Finkelstein et al. 2022). Hence, having a higher income facilitates better health behaviors and outcomes, both directly such as being able to afford healthcare, and indirectly such as staying in a "healthy" neighborhood.

**Education level**

Other studies explored how an individual's education level may influence health behaviors and outcomes (de Buhr and Tannen 2020, Raghupathi and Raghupathi 2020). Raghupathi and Raghupathi (2020) highlighted that individuals who are more educated experience better health as they have better health literacy. Hence, they are more likely to adopt health promoting behaviors, go for recommended health screenings, and have better health outcomes (Raghupathi and Raghupathi 2020). Similarly, the same can be said for children with more highly educated parents. Parental education level is also closely linked to their children's health behaviors; children with higher educated parents are more likely to consume a balanced diet and engage in sufficient physical activities due to their parents' higher health literacy (de Buhr and Tannen 2020).

**Occupational class**

Some other studies investigated how occupational class has an influence on health behaviors and outcomes (Combs et al. 2023, Qi, Liang and Ye 2020, Ravesteijn, van Kippersluis and van Doorslaer 2013). Ravesteijn, van Kippersluis, and van Doorslaer (2013) opined that people in non-professional

jobs would end up with poorer health relative to those who have a professional job as they are more likely to adopt unhealthy behaviors like sedentary lifestyle and smoking. However, the association between one's occupational class and health outcomes might not be direct; it could also be due to factors that limit or encourage individuals to take up certain kinds of jobs such as wealth and education level (Ravesteijn, van Kippersluis and van Doorslaer 2013).

In contrast, Combs (2023) argued that it is individuals' perceptions of their occupation that would influence health outcomes. Individuals who view their occupation as prestigious generally have better health and wellbeing (Combs et al. 2023). However, Qi, Liang, and Ye (2020) noted that it is working conditions, rather than occupation class or one's perception of their occupation that affects one's health. While individuals of less prestigious occupation classes are more likely to face poorer health outcomes, individuals of more prestigious occupation classes who often engage in overtime or are frequently exposed to hazardous chemicals or dust particles are also likely to face health issues (Qi, Liang and Ye 2020).

**Singapore context**

In the context of Singapore, other than the three main indicators listed above, one other SES indicator affecting health would be that of housing type (Chan, Lee and Low 2018, Lim et al. 2021, Low et al. 2016). Chan, Lee, and Low (2018) acknowledged that Singapore has one of the world's highest home ownership

rates and hence housing would be a good indicator of one's SES level. Individuals who live in public rental apartments generally have lower levels of education, income, social support, and poorer health literacy (Chan, Lee and Low 2018). In addition, they tend to have poorer living conditions such as overcrowding, bad indoor air quality, and sanitation issues, which result in poorer health (Low et al. 2016).

Hence, financial aid and subsidies, including health subsidies in Singapore are often tied to one's housing type and income level; occupation type and education level are rarely used (Ministry of Health 2024). This is because occupation type and education level are often closely linked to one's income (Ravesteijn, van Kippersluis and van Doorslaer 2013), especially in the context of Singapore (Chan, Lee and Low 2018).

## Effects of SES on vaccinations in general

SES has been observed to affect the take-up rates of vaccinations in general (Larsen et al. 2023), though the association may differ between age groups and/or countries (Lee et al. 2015, Sacre et al. 2023). For example, Lee et al. (2015) observed that South Korean young adults aged 18 through 49 from a higher SES background were more likely to be vaccinated against influenza relative to those from a lower SES background. However, the same association was not seen in older adults (Lee et al. 2015). Likewise, an umbrella review conducted by Sacre et al. (2023) indicated that while individuals of higher SES level were more likely

to take vaccinations in general relative to individuals of a lower SES level, this association was only consistently observed in low income nations. For high income nations, this association was less apparently (Sacre et al. 2023).

In contrast, Larsen et al. (2023) analyzed the COVID-19 vaccination rates in numerous developed and developing nations such as Denmark and India. They observed that individuals from high SES groups were significantly more likely to be immunized against COVID-19 relative to those from low SES groups in majority of the nations analyzed.

SES has been observed to affect the uptake of vaccinations in Singapore as well. Goh and Tambyah (2018) and Ang et al. (2018) noted a significant link between SES and the pneumococcal vaccination in Singapore. Individuals who are more educated or from a higher income household were more likely to be immunized (Ang et al. 2018, Goh and Tambyah 2018). Likewise, the same can be said about the COVID-19 vaccination in Singapore (Low et al. 2022, Tan et al. 2021). Low et al. (2022) observed that poorer families were less likely to provide consent for their minor children to receive the COVID-19 vaccination, similar to the findings of Tan et al. (2021) who opined that older adults from a lower SES background would be less likely to go for their COVID-19 vaccinations.

## Effects of SES on HPV vaccination

However, despite the fact that SES has been observed to affect the take-up rates of vaccinations in general, there are very few research papers that looked at the link between SES and HPV vaccination uptake in detail, whether one's SES level would affect one's decision to get vaccinated and the reasons behind that. Most studies explored the barriers and facilitators to HPV vaccination in general, rather than comparing the factors unique or similar to individuals of the various SES groups.

### Country-related factors

Some studies looked at country-related factors pertaining to the HPV vaccination. For example, Gallagher, LaMontagne, and Watson-Jones (2018) observed that the HPV vaccination was seen as costly and unsustainable to many low income nations. Although international aid was available to fund and administer the vaccination, countries were required to co-finance the vaccine from the start. Hence, many would thus choose to use the tight resources available for other types of vaccines such as pneumococcal instead (Gallagher, LaMontagne and Watson-Jones 2018).

### Patient and healthcare worker related factors

Other studies examined patient and healthcare worker related factors. For example, MacDonald et al. (2023) highlighted how many healthcare workers, patients, and caregivers lack in-depth knowledge of the benefits of getting vaccinated against HPV. Many patients and caregivers were also concerned about

the safety and side effects of the vaccine (MacDonald et al. 2023). This, coupled with the vaccine's association with sexual activities, resulted in it being hard to be socially accepted especially among certain groups in society like Indigenous people (MacDonald et al. 2023) or certain religious communities (Hamdi 2018, Hittson et al. 2023).

Hittson et al. (2023) emphasized that Christians were less likely to be vaccinated against HPV due to its association with fornication, which is often frowned upon in Christianity. Similarly, the same can be said for the Islamic community. The vaccine's association with sexual promiscuity makes it a controversial subject in the Islamic community (Hamdi 2018). However, despite the vaccination being perceived as in conflict with the Islamic beliefs, Al Alawi et al. (2023) asserted that many Muslim adults were still willing to be vaccinated and would be supportive of their children being vaccinated as long as the vaccine is recommended by their healthcare provider (Al Alawi et al. 2023). This is reiterated by Perez et al. (2018) who argued that individuals would be more willing to be vaccinated if they have the support and encouragement from their healthcare providers. Hence, healthcare workers play an important role in increasing uptake.

Loke et al. (2017) and Newman et al. (2018) also explored patient-related factors. Loke et al. (2017) observed that facilitators to vaccination include encouragement and support from family and friends, recommendation from healthcare workers,

and vaccination coverage by one's health insurance. Barriers to vaccination include misconceptions and lack of knowledge of the vaccine, preference to take the vaccination at an older age, and cost (Loke et al. 2017). Likewise, Newman et al. (2018) acknowledged that factors affecting the HPV vaccination take-up rate include cost, one's perception of the vaccine, and level of patient-doctor relationship. One's race and SES are also associated with the uptake of vaccination; people of a minority group or from a lower SES group were less likely to get the vaccination (Newman et al. 2018).

The link between SES and the take-up rate of the HPV vaccination was also seen in numerous other studies (Chan et al. 2023, Dilley, Miller and Huh 2020, Spencer, Calo and Brewer 2019, Yoo et al. 2020). However, some studies noted a positive association where individuals of a lower SES were less likely to be vaccinated, while others observed a negative association where individuals of a lower SES were more likely to be vaccinated.

For example, Yoo et al. (2020) argued that girls from less educated, single mother households, of low SES, from non-Black or Hispanic minority groups, were more likely to be inoculated compared to their peers of the majority race who are from more educated and wealthier families. This is because wealthier, more educated suburbs in the United States of America with a lower proportion of ethnic minorities generally have a higher percentage of anti-vaxxers (Chan et al. 2023). In contrast, Dilley, Miller, and Huh (2020) argued that the higher vaccination rate

among marginalized groups in the United States of America was due to the implementation of numerous vaccination programs targeted at them.

However, Spencer, Calo, and Brewer (2019) argued that while ethnic minorities were more likely to be given the first HPV vaccine dose, Caucasians were more likely to finish the full course of immunization. This is because ethnic minorities in the United States of America often have lower continuity of care relative to their White peers (Spencer, Calo and Brewer 2019).

In the Singapore context, Wong et al. (2020) and Lim and Lim (2019) highlighted how cultural norms and beliefs would influence one's decision to take the vaccination. Wong et al. (2020) asserted that the HPV uptake is low in Singapore, or Asian societies in general as many parents feared that vaccinating their children might encourage and promote early sexual intimacy. Additionally, as pre-marital sex is often frowned upon in Asian societies, many Asian adult women who are single feared that getting vaccinated might result in them being labeled as sexually active (Wong et al. 2020).

Likewise, Lim and Lim (2019) argued that the vaccine's association with sexual activities was a barrier to vaccination among young women in Singapore. Other barriers include lack of support from parents, lack of knowledge about the vaccine, lack of perceived risk of being infected with HPV-related illnesses, cost, troublesome to get vaccinated, as well as concerns about safety and side effects

(Lim and Lim 2019). Facilitators to vaccination include presence of encouragement from family members, ability to protect one's health, and presence of (more) subsidies for the vaccination (Lim and Lim 2019), similar to the findings of Basnyat and Lim (2018). They argued that support and encouragement from family members and friends was an important facilitator to vaccination (Basnyat and Lim 2018).

In contrast, Zhuang et al. (2016) and Tay et al. (2015) opined that one of the most crucial factors affecting the HPV vaccination uptake would be that of one's knowledge level. The lack of knowledge with regards to cervical cancer and the HPV vaccination was a main reason behind the low take-up rate in Singapore among female college students in Singapore (Zhuang et al. 2016), congruent with the findings of Tay et al. (2015). They opined that the most common reasons for not taking the vaccine include the lack of information regarding the vaccine and perceived lack of effectiveness (Tay et al. 2015).

## Research rationale

In examining the literatures so far, I observed that most studies acknowledged the importance of SES, how it influences one's health behaviors and outcomes, and how it can be operationalized. Additionally, numerous studies noted an association between SES and uptake of vaccines in general. Despite that, most studies pertaining to the HPV vaccination addressed the factors influencing the uptake in general, rather than examining the SES factors in depth. While some

scholars such as Dilley et al. (2020) and Yoo et al. (2020) looked at how SES would influence and affect the vaccination uptake, none of the studies were in the context of Singapore. Additionally, none of the studies explored the factors unique or different to individuals of contrasting SES.

Singapore has a rather unique healthcare structure that differs significantly from major nations such as Canada and Australia (where healthcare is mostly funded by the state) and the United States of America (where healthcare is mostly funded via private health insurance). For example, Australia was the first nation to administer a fully subsidized nationwide HPV vaccination program for female children and young women in 2007 (Leask et al. 2009), and subsequently expanded to include boys and young men in 2013 (Swift et al. 2022); and the presence of subsidies for HPV vaccination resulted in Australia having one of the highest take-up rates globally (Patel et al. 2018).

In Singapore, healthcare subsidies are means-tested – people from lower income households would be entitled to more subsidies than those from higher income households (Agency for Integrated Care 2024). In the case of HPV vaccination, it is free for eligible individuals from lower income households in Singapore (Shafeeq 2022). However, it is unclear if the presence of subsidies for these individuals in Singapore would result in an increase in HPV vaccination uptake (especially among the low-income individuals), or if the factors affecting one's decision to be vaccinated are more nuanced than this. For example, Lim and Lim

(2019) and Wong et al. (2020) argued that a barrier to vaccination in Singapore would be the vaccine's association with sexual activities; and Basnyat and Lim (2018) highlighted that the presence of encouragement from family members and friends would encourage more eligible Singaporean women to get vaccinated.

Additionally, the lack of vaccination uptake in Singapore might not be limited to individuals from lower income households given the low take-up rate; and individuals of contrasting SES might also differ in terms of the factors that would influence their decision to be vaccinated against HPV. As such, this paper aims to address the literature gap by understanding how does one's SES level affect their views and decision to be vaccinated against HPV in Singapore in greater detail.

# METHODS

## Study design

A qualitative study was conducted using semi-structured interviews, aimed to understand the decision-making process regarding the HPV vaccination among young Singaporean women of different SES. Semi-structured interviews were chosen to get an in-depth understanding of participants' opinions that may not be easily attained through surveys or questionnaires (Rubin and Rubin 2005). Recruitment and interviews were conducted between August 2023 and December 2023; and the coding and data analysis were done in February 2024.

## Sampling and recruitment

Potential participants were recruited using purposive, non-random sampling. Non-random sampling was selected as the study is exploratory in nature; and this sampling method enables data to be collected efficiently and quickly, which could be useful in informing future, more rigorous studies. Purposive sampling was used to ensure a good mix of low and high SES study participants, determined by the type of CHAS card they hold. Participants were recruited from social media and the researcher's personal network. 19 interviews were conducted in total, with nine participants from a low SES background and 10 from a high SES background. Participants were selected based on three criteria:

1) Singapore citizen
2) Female
3) Aged between 21 to 30 years old inclusive

## Study procedure

A structured interview guide was created using existing literature regarding cultural and social factors affecting one's health behaviors and outcomes. Written informed consent was taken by the researcher before commencing the interview. Interviews were carried out in-person in a private and conducive room or over Zoom, depending on the participant's preference. Each interview was audio recorded and lasted around 30 minutes.

The interview commenced with questions regarding the CHAS card participants have, to establish which SES group participants would be classified under. This was followed by questions about participants' self-rated health and health behaviors, especially those relating to preventive health. These questions were asked in a manner to understand participants' perceptions of their overall health and well-being; and whether participants take an active role in their health, and to what extent. Participants were also encouraged to share why they rated their health the way they did, and reflect on their health behaviors. For instance, whether they feel that it is important to stay healthy, and the reasons for doing so; and if so, whether they feel that they are doing enough, and what can they improve on.

Next, participants were asked about their knowledge of cervical cancer as well as the HPV vaccination, to understand participants' health knowledge and literacy, especially those pertaining to HPV and cervical cancer, as lack of knowledge on the HPV vaccination would affect the HPV vaccination uptake. Finally, participants were asked if they have taken the HPV vaccination and the reasons for vaccination or non-vaccination. On this matter, participants were asked to elaborate on their reasons for vaccination or non-vaccination, and provide examples if applicable, so as to paint a more complete picture on the factors that affect one's decision to be vaccination, therefore answering the research question. Study participants were reimbursed with cash for their time, and recruitment stopped when data saturation for each SES group was achieved.

## Data analysis

Interviews were first transcribed using Otter.ai (Otter.ai, Inc, California), and then manually checked and refined to ensure accuracy. Thematic analysis was done using Braun and Clarke's six phases of analysis (Braun and Clarke 2006). The researcher read and familiarized herself with the transcribed interviews, before generating initial codes. These initial codes were generated through the identification of relevant and interesting pieces of data from the transcripts, and were refined as needed. Codes were organized and managed using NVivo R1 (QRS International, Burlington, Massachusetts).

Once all data have been coded, similar codes were then grouped together to form themes, which were subsequently refined to ensure comprehensiveness and accuracy. This was done by reviewing all the extracted data coded to the respective themes, followed by reviewing the individual themes in relation to the data set as a whole, to ensure coherence.

Next, the specifics of individual themes were analyzed and refined, to ensure concise naming and clear definitions of themes. Upon completion of coding and data analysis, several key thematic areas that emerged from the data set relating to the research question were identified, and detailed in the results section.

Thematic analysis was chosen because of its flexibility approach, simplicity, ability to summarize large data and generate unexpected findings (Braun and

Clarke 2006), especially since this is an exploratory study. However, as the identification, development, and analysis of themes using thematic analysis rely heavily on the researcher's judgment, the interpretative nature of thematic analysis may affect the credibility and consistency of the findings generated. To minimize bias, the researcher used an iterative approach to coding. The researcher started coding the first three transcripts, reviewed and refined the codes generated in the three transcripts before coding the rest of the transcripts, allowing her to revise the codes if necessary while working through the remaining transcripts. This would enable her to scrutinize the codes more closely as she gets more familiar with the data and as she progresses through the analysis, thereby reducing bias.

# RESULTS

## Participant characteristics

Participants' demographics are illustrated in Table 1. A total of 19 individuals (10 from the low SES group, and nine from the high SES group) were interviewed, which was sufficient for in-depth, qualitative data analysis and when data saturation was reached. Of the 19, eight were fully vaccinated against HPV (42·1%) and four were partially vaccinated (21·1%); five from the high SES group and three from the low SES group were fully vaccinated, and one from the high SES group and three from the low SES group were partially vaccinated. Most participants rated their health as very good or good (16/19, 84·2%).

There were a good mix of occupations, with the top occupations being business executives/analyst (6/19, 31·6%), engineers (4/19, 21·1%), healthcare workers (3/19, 15·8%), and students (3/19, 15·8%). Most participants were relatively new in their careers, with majority of participants having between 1-3 years of work experience (10/19, 52·6%). As for marital status, all participants were single though some participants were either engaged or in a committed relationship (7/19, 36·8%). As for racial group, most participants were Chinese (15/19, 78·9%); and for highest qualification attained, most participants were university graduates (14/19, 73·7%).

| Table 1: Participant characteristics | |
|---|---|
| **Participant characteristics** | **n= 19[a]** |
| **Vaccination status** | |
| Low SES group: Blue/Orange CHAS[b] card | 9 (47·4) |
| Vaccinated | 3 (15·8) |
| Vaccination in progress[c] | 3 (15·8) |
| Not vaccinated | 3 (15·8) |
| High SES group: Green/No CHAS | 10 (52·6) |
| Vaccinated | 5 (26·3) |
| Vaccination in progress[c] | 1 (5·3) |
| Not vaccinated | 4 (21·1) |
| **Participants' self-rated health** | |
| Excellent | 0 (0·0) |
| Very Good | 4 (21·1) |
| Good | 12 (63·2) |
| Fair | 1 (5·3) |
| Poor | 2 (10·5) |
| **Occupation** | |
| Business executive/analyst | 6 (31·6) |
| Engineer | 4 (21·1) |
| Healthcare worker | 3 (15·8) |
| Student | 3 (15·8) |
| Public servant | 2 (10·5) |
| Others | 1 (5·3) |
| **Number of years of work experience** | |
| Zero work experience | 3 (15·8) |
| Less than 1 year | 5 (26·3) |
| 1-3 years | 10 (52·6) |
| **Marital status** | |
| Single | 19 (100·0) |
| Engaged/In a committed relationship | 7 (36·8) |
| Not attached | 12 (63·2) |
| **Race** | |
| Chinese | 15 (78·9) |
| Malay | 1 (5·3) |
| Indian | 2 (10·5) |
| Others | 1 (5·3) |
| **Highest qualification attained** | |
| Post-secondary (Non-tertiary) | 2 (10·5) |
| Diploma and professional qualification | 3 (15·8) |
| University | 14 (73·7) |

[a] Percentages may not add up to 100% due to rounding

[b] Community Health Assist Scheme

[c] To be considered fully vaccinated, two doses are required for children aged nine through 14, and three doses are required for adults aged 15 and above (Health Hub n.d.)

## HPV vaccine knowledge and views

Most participants, no matter their SES level, generally had very high health literacy. Most, if not all participants knew the importance of exercising and having a healthy diet, the types of food one should eat in moderation, and when to see a doctor be it for their physical or mental health. For example, one participant from the high SES group said:

> "I try to get some physical activities, like I exercise occasionally, and I go on walks. So that's the physical component. For my mental health, I try to be more mindful about what I'm feeling." (Participant 6, high SES group)

This observation of participants from the high SES group having very high health literacy aligns with past studies. For example, Ma et al. (2021) argued that health literacy is generally higher in individuals from higher SES background. This is because individuals from higher SES background tend to have more social support and resources (Ma et al. 2021). Likewise, Svendsen et al. (2020) highlighted that there is a strong SES divide in Denmark where individuals from lower SES background are more likely to have low health literacy. This is despite Denmark being a social democratic nation with universal health coverage (Svendsen et al. 2020).

Interestingly, however, unlike the above-mentioned studies, the high level of health literacy observed in this study is not limited to participants from the high SES group. Participants from the low SES group were equally aware of the benefits of maintaining a healthy lifestyle:

> "I do make it a point to be quite physically active, I go to the gym. And as well, you know, in my dietary habits, you know, I do try to stay away from like, sugary drinks, even though I do treat myself, you know, once in a while, but I think overall, I'm pretty mindful of how I eat." (Participant 14, low SES group)

These accounts reflect the high levels of health literacy among young adults in Singapore; and that an individual's SES level does not have much effect on one's health literacy level. This is congruent to the findings of Mokhtar et al. (2009) who investigated the health seeking behaviors of young adults in Singapore. They found that young adults in Singapore generally have high levels of health consciousness; and would independently search for health information (Mokhtar 2009).

Regarding the HPV vaccine, all participants interviewed were aware of it, either through letters or text messages sent by the government, advertisements on social media platforms, or by word of mouth. Participant 2 from the high SES group

mentioned that she has “heard of [the HPV vaccine], especially in the past year, I think. I heard about it from friends and also, I guess, the government.”

This indicates that the increased outreach by the Singapore government in the past few years led to an increased awareness of the HPV vaccination. For example, the Ministry of Health launched the HPV immunization program in February 2022, in collaboration with Temasek Foundation, to fully subsidize the HPV vaccination for eligible Singaporean women from low-income backgrounds (Shafeeq 2022).

Additionally, in the past few years, invitations for HPV vaccination via SMS and/or physical letters have been sent out to eligible adult females (Open Government Products 2024) or their parents/legal guardians if they are under 18, to educate them on the benefits of vaccination, and to encourage them to get vaccinated (SingHealth 2019).

Given these outreach efforts by the Singapore government, as well as the high levels of health consciousness and health seeking behaviors among young adults in Singapore (Mokhtar 2009), this increased awareness of the HPV vaccination in the past few years has not been limited to solely participants from the high SES group. Participants from the low SES group were also aware of the HPV vaccination. One participant from the low SES group highlighted:

> "Based on my memory, it was actually a letter from the Ministry of Health. And it was basically, they did kind of detail a little bit into the importance of the vaccination, and as well as instructions on how to book for an appointment. So, I thought that was pretty helpful. And I think when I read it, that's when I became more educated about why I should be getting it." (Participant 14, low SES group)

This indicates that the Singapore government's outreach efforts have been successful in educating young Singaporean women on the HPV vaccination. Additionally, most participants from both the high and low SES groups also viewed the vaccine positively; and that it would be useful as a form of protection against cervical cancer:

> "I think is a good thing to be vaccinated. Yeah, it's like a prevention, to be safe." (Participant 9, low SES group)

Participants' positive perception of the HPV vaccination suggests that the Singapore government's messaging in the outreach programs and efforts has been effective in promoting the benefits of vaccination. However, despite the high awareness level and participants viewing it favorably, only 8/19 participants (42.1%) had been vaccinated – five from the high SES group (n=10) and three from the low SES group (n=9). There were numerous experiences and factors

that influenced participants' decision to be vaccinated, which are detailed in the section below.

## Experiences and factors that influence one's decision to be vaccinated

The findings can be categorized broadly into two main themes, which emerged through the analysis: 1) the significance of social forces and 2) access to health services and information.

In the first theme, I explored how a person's social networks, which consist mainly of one's friends and family members, generally have a significant influence on one's health behaviors. I also explored how these participants, coming from the positionality of being Asian, being Singaporean, converse with family members about the HPV vaccination due to its association with sexual intimacy; and if their SES level would shape the types of experiences they have.

In the second theme, I explored how individuals from different SES groups are dissimilar (and similar) in terms of their access to health resources and services, and how these factors affect their decision to be vaccinated against HPV.

### Theme 1: The significance of social forces

Participants mentioned numerous barriers and facilitators they encountered while deciding whether to be vaccinated against HPV. One theme that emerged frequently during the interviews was the influence individuals' social networks, mostly family and friends, have on their health behaviors, in this case, regarding

the HPV vaccine. This is because the family is seen as the most influential agent of socialization especially when the child is young (Lau, Quadrel and Hartman 1990).

As Tuckett (1976) pointed out, children are socialized primarily by their parents and guardians. Parents and guardians are the 'gatekeepers' for their children, where children learn the behaviors, norms, and principles of the family (Tuckett 1976). Thus, health behaviors and practices of children are mainly shaped and influenced by their family. When children become older and less dependent on their family, friends and other individuals such as those in the media are other important socializing agents as well (Lau, Quadrel and Hartman 1990).

One's socioeconomic status and other societal factors play a vital role in one's socialization; children are often socialized to adhere to class-related behaviors and norms as pointed out by Bourdieu (1984). Bourdieu (1984) coined the term habitus, defined as the actions, norms, perceptions, and principles of individuals of a particular social class. Hence, one's experiences and socialization consistent with his or her social status would influence how one perceives the world (Bourdieu 1984). Thus, this theme also aims to explore if there are differences between the low and high SES group participants, in terms of how social forces would affect their decision to get vaccinated against HPV.

**Parents' knowledge of the HPV vaccination**

Many participants from both the low and high SES groups cited that their parents had never heard of the HPV vaccine or were unaware of the benefits of it. One participant from the low SES group mentioned:

> "My parents are not as educated and do not know much about [the vaccine]." (Participant 5, low SES group)

This highlights that parental knowledge on the HPV vaccination is low among participants from the low SES group due to their lower education levels. However, participants from the high SES group echoed a similar sentiment:

> "My mom didn't seem to know too much about [the vaccine] and my brother and father, I don't think they know anything about [the vaccine] too." (Participant 2, high SES group)

Hence, these accounts suggest that SES does not play a major role in parental knowledge levels with regards to the HPV vaccination; parental knowledge is uniformly low across SES groups. As parental knowledge is a prerequisite to underage children HPV vaccination uptake (Polonijo and Carpiano 2013), most participants were not vaccinated when they were minors.

The sole participant that was vaccinated as a minor stated that her parents knew about the vaccine and brought her to get vaccinated as soon as she was eligible, due to her family's history of cancer:

> "I'll say actually partially was for family history, because my parents have cancer history, so I think they are more afraid. So, from the moment I'm eligible for it, they brought me to take [the HPV vaccine]." (Participant 15, low SES group)

For Participant 15, her family has history of cancer; two of her direct relatives died from end-stage cancer when she was a young child. Hence, when her parents found out there was a vaccination that would protect her against cervical cancer, her parents brought her to get vaccinated once she was old enough for the vaccination without hesitation.

Participant 15 remembered that that was the very first time she heard about the HPV vaccination, and that none of her friends knew about it. It was probably because of her parents' negative experiences with cancer in the family that made them more eager to look into and invest in preventive healthcare, especially those pertaining to cancer. This is reinforced by the health belief model (Rosenstock 1974) which states that individuals who perceive themselves to be of a higher risk of developing a specific illness would be more motivated to engage in health behaviors to reduce their risk.

These accounts also suggest that majority of participants from both the low and high SES groups were unaware about the HPV vaccination when they were younger. Many participants from both the high and low SES groups only knew about the vaccine recently, as young adults, after the Singapore government started promoting and educating people regarding the HPV vaccine:

> "It was a very thick letter, encouraging me to take the vaccine because it protects against cervical cancer. I think it was last year or the year before when I received the letter, and that was how I know about [the vaccine]." (Participant 3, low SES group)

This indicates that there was a lack of information on the HPV vaccine until recent years, and thus should not come as a surprise that most participants (and their parents) from both high and low SES groups were not aware of the vaccine in the past.

This is congruent with the findings of Kwek et al. (2023). In the study, study authors compared the level of awareness of the HPV vaccination among Singaporean women aged 21 and above in 2013 and 2019. They found significant improvements in the level of awareness pertaining to cervical cancer and HPV infection in 2019 compared to 2013, and opined that the increased knowledge was due to the implementation of nationwide campaigns on HPV vaccination since 2018 (Kwek et al. 2023).

This is also in line with the notion that individuals' health behaviors are not constant and change over the course of one's lifespan, especially so if planned interventions were implemented during life transitions (Short and Mollborn 2015). In this case, the awareness campaigns on HPV vaccination were carried out when most participants were transitioning from school to the working world, or from that of being a minor to an adult.

As adults have the legal right to make their own medical decisions, lack of parental knowledge should not have a strong influence on one's decision to get vaccinated. However, this was not the case for many of the participants from both the low and high SES groups, despite them acknowledging the benefits of being vaccinated.

**Lack of parental support**

One reason for this would be the lack of parental support. Participants from both the low and high SES groups emphasized family pressures with regards to that decision; they expressed the need for parental support and approval prior to getting vaccinated.

For example, when Participant 10 initially told her parents about her wanting to take the vaccination, she recalled, "My parents kept questioning me about the usefulness of this", especially since she has an older sister, 10 years older than

her, unvaccinated against HPV. Thus, her parents did not see a point in her getting vaccinated, since her older sister "is fine without the vaccination" and "has no major health issues". It took her quite some time to convince her parents that the vaccination would be beneficial for her health before they were supportive of her decision to be vaccinated, and only then did Participant 10 take the vaccination:

> "I think the first thing is, of course, my parents asked me, why must take this vaccine? Isn't it just additional costs? I mean because they haven't heard about [the HPV vaccine]." (Participant 10, high SES group)

This implies that participants generally value their parents' opinions and approval, despite being adults. This is in line with the findings of Li, Singh, and Keerthigha (2021). They observed that Singaporeans generally have high levels of authoritarian filial piety where children, including adult children would abide by their parents' wishes even if it meant that they have to suppress their own wishes and preferences (Li, Singh and Keerthigha 2021). Hence, the presence of parental support is important for many participants, for them to be vaccinated.

Likewise, when Participant 4 brought up the vaccination to her parents, they had several misconceptions about it regarding its cost and effectiveness. As the oldest child of four siblings in her family, she was the first person in the family to receive the physical letter in her mailbox from the government to get vaccinated, and that

was the first time her parents had heard of the HPV vaccination. Participant 4 stated that she would get vaccinated after getting her parents on board:

> "Yeah I talked to [my parents] but they think it is a waste of money. They said I can use the money for other things instead, why spend it on something that may not be useful? I told them it is free with my CHAS card. Then they asked me, is it good? So that got me thinking if I should take [the HPV vaccine]. I know it is useful, I mean how often do you have something that prevents cancer, right? But my parents are reluctant so I'm procrastinating or delaying [getting vaccinated]." (Participant 4, low SES group)

Hence, these accounts emphasize that the presence (or lack of) parental support for HPV vaccination has nothing to do with one's SES level, but rather misconceptions of the vaccine, in alignment with a study conducted in Singapore to understand factors affecting the HPV vaccination take-up rate (Lim and Lim 2019). The study found that young adult women in Singapore generally obeyed and respected their parents' opinions with regards to the HPV vaccination. Parents who did not view the vaccination positively was a significant barrier to vaccination for these young women. Likewise, the reverse was also true as seen in the section below.

**Encouragement from family members**

Participants from both the low and high SES groups with parents who viewed the HPV vaccination positively were more inclined to be vaccinated, especially if their parents explicitly voiced out their views. This can be in the form of parents encouraging their adult children to be vaccinated, to finding clinics for them, or paying for their vaccination.

For example, Participant 16 recounted that she probably heard of the vaccine in the past, but did not bother researching on it. It was only after her mother brought it up did she start researching more on it such as what are the benefits of vaccination and where to get vaccinated:

> "I think my mom actually said that my sister and I should go get vaccinated. Then I thought, okay, just get [vaccinated]." (Participant 16, high SES group)

This illustrates that although some participants had some awareness of the HPV vaccination prior to their parents (or mothers) bringing it up, encouragement from their parents serves as a form of motivation for them to pursue further research on it, and subsequently get vaccinated.

Participant 9 and her mother heard about the vaccine through the physical letter sent by the government. She recalled, "The government had this plan for us to

get free vaccine", and that was stated in the letter. Her mother had been encouraging her to go for her vaccination since then, and suggested clinics for her to get vaccinated at:

> "[My mom] keeps talking about it. She's like, oh, it's good to get vaccinated. And you can yeah, like if you fall in the age range that category, then should just go and get [vaccinated]. Here are some clinics I found. Yeah." (Participant 9, low SES group)

This is consistent with the findings of Cooney and Uhlenberg (1992) who argued that parental support does not cease once a child reaches the age of majority. Adult children, especially those in their 20s and living with their parents, often continue to receive the same level of parental support they had when they were younger (Cooney and Uhlenberg 1992). Hence, it should not come as a surprise that parental encouragement plays an important role regarding one's decision to get vaccinated against HPV; and that this holds true for participants from both the high and low SES groups.

**Influence from friends**

Similarly, encouragement from friends would influence one's decision to get vaccinated. Participants were persuaded by their friends' behaviors and attitudes. In the case of Participant 19, she was more inclined to be vaccinated after

knowing that her friend had taken the vaccine; and felt better of her decision to get the vaccine:

> "Because my friend, she took it, and then she told me that I should go and take as well." (Participant 19, high SES group)

This highlights that participant's knowledge of a friend being vaccinated would provide reassurance and validation for her decision to be vaccinated; and alleviate any concerns she might have pertaining to the vaccine. For many of these participants, friends not only influenced them to take the vaccine, but also provided comfort to them, reassuring them that they made the right choice to get vaccinated.

For example, Participant 13 was more willing to be vaccinated after receiving encouragement from friends. She was also partly influenced by a fear of missing out on getting something beneficial for her health:

> "Like, if everyone around me was vaccinated, and they're like, oh, my gosh [redacted name of participant] go do it, I will probably be more likely [to be vaccinated]. I feel like in my close circles, the girls, we don't even talk about [the HPV vaccination in the past]. We rarely talk about it. Now, we're talking about it more." (Participant 13, low SES group)

These responses have highlighted the peer pressure associated with one's decision to be vaccination, and that there is no notable difference in the role this peer pressure plays across SES groups. This is in line with the findings of Chirayil, Thompson, and Burney (2014) who argued that views of one's social network might be associated with one's preventive health behaviors.

For example, Asian women often expressed the need for peer approval before deciding whether to be vaccinated against HPV (Chirayil, Thompson and Burney 2014). This could also be explained by the phenomenon of social proof (Mehrad et al. 2023), which highlights that individuals often conform to behaviors of people around them. Hence, in this context, participants would be more willing to be vaccinated if their friends are already vaccinated.

**Ability to take the HPV vaccine with a friend or family member**

Many participants also cited the ability to be vaccinated together with their friends or family members as a facilitator to vaccination:

> "I'm taking my vaccine with my friends. So, I think there's like an added motivation to do it together." (Participant 9, low SES group)

This indicates that getting vaccinated with a friend or family member would increase one's motivation to get vaccinated. Taking the vaccination with someone close could make the vaccination process feel less daunting:

> "I managed to book a slot and then my cousins, were also [getting vaccinated]. So, we just did together." (Participant 1, high SES group)

These responses highlight that participants, be it from the high or low SES group, were more inclined to be vaccinated against HPV if they had a companion alongside them, to go through the entire vaccination process with them such as researching on the type of HPV vaccination to take, finding a clinic, booking an appointment, and going for the vaccination appointment together.

**Discussion with parents on the vaccination**

While numerous participants from both the low and high SES groups mentioned that they were not willing to discuss the HPV vaccination with their parents, both groups differed in their reasons. For participants in the high SES group, it was due to the vaccine's association with sexual activities. In the case of Participant 6 and 12, their parents were not approving of their adult child's decision to be vaccinated due to the misconception that the vaccine is linked to promiscuity. Participant 6 grew up in a staunch Christian family, and acts of fornication are forbidden in her household due to her religious upbringing.:

> "My mom saw the letter [from the government] that came in [regarding the HPV vaccination], and then she was like, why did they ask you to go for this? Because she thought that I have been sexually active or

> something like that. And that's why the government sent the letter to my house. And I feel that there's a certain amount of like, embarrassment, like a lot of misinformation out there about the topic." (Participant 6, high SES group)

This indicates a high level of parental misconception and misinformation on the HPV vaccination; and that parental perceptions of the HPV vaccination might affect one's decision to be vaccinated. Likewise, Participant 12 grew up in a traditional Asian household where it has been ingrained in her from a young age that she is only allowed to engage in sexual activities after marriage:

> "I think [my mom] asked a couple of questions, like why must you take [the HPV vaccine]? Isn't this vaccine only for certain demographics? Like people who engage in sexual activities, you know that kind of thing?" (Participant 12, high SES group)

This significant level of misconception indicates the need for better education on the HPV vaccination in Singapore, especially for older adults. Similarly, for Participant 17 who also grew up in a traditional Asian household, she was not comfortable talking to her parents about getting vaccinated, and did not want her parents to think that she was engaging in sexual intimacy:

> "I think my family is pretty conservative. This is not something I mean, you know, given the HPV vaccine, and nature of it. It's not something that we talk about." (Participant 17, high SES group)

The abstracts above indicate that the HPV vaccination was seen as something 'taboo'. To avoid conflict with their parents and/or to prevent giving their parents the impression that they were sexually active (or planning to be) prior to marriage, many participants in the high SES group avoided getting vaccinated despite being old enough to make their own medical decisions. This is because engaging in any form of sexual intimacy prior to marriage is often perceived as a deviant behavior; and the deeply rooted cultural sensitivities surrounding sex prevent parents and society from having open discussions regarding it in the Singapore context.

Additionally, many Asian women, especially those who are single and living with their parents, tend to abide by household rules. Hence, to avoid upsetting and offending their parents, many of these women would seek approval and consent from their parents prior to vaccination. Without parental approval, many of them would be less inclined to get vaccinated.

This is consistent with Bauman (1999) who highlighted that individual choices, in this case the choice to be vaccinated against HPV, would be constrained by one's available resources e.g. financial ability to afford vaccination as well as societal norms and rules (Bauman 1999). Hence, due to the vaccine being closely

linked to sexual activities and the societal norm that pre-marital sex is taboo, many participants in the high SES group did not feel comfortable getting vaccinated, congruent with the findings of Tay et al. (2008) and Lim et al. (2019), who argued that a barrier to HPV vaccination was due to the stigma attached to it.

For participants from the low SES group, it was mainly because they felt that their parents did not know much about the vaccine and hence decided not to discuss this with their parents, rather than the stigma associated with it. For Participant 5, her father is a factory worker, and her mother is a homemaker. Both her parents have secondary-level qualifications from Malaysia. She felt that there was no need for her to discuss with her parents about the vaccine as they would not be able to advise her accordingly due to their lack of knowledge:

> "My parents are not as educated and do not know much about [the vaccine] … [Whether I am vaccinated or not] it does not influence them." (Participant 5, low SES group)

This abstract suggests that participants from the low SES group were less concerned of how their parents would react should they choose to take the HPV vaccination compared to participants from the high SES group; and the fear of stigma associated with the vaccine was less prevalent among participants from the low SES group.

**Protection**

While many participants from both the low and high SES groups agreed that they were inclined or chose to get vaccinated to get some protection against HPV-related illnesses, some participants from the high SES group mentioned that it was also because they were in a committed, monogamous relationship or were engaged. Hence, they needed to be protected against HPV, which is mostly spread via sexual contact, to protect themselves:

> "Because at that time [of vaccination], I also got a boyfriend. So, I decided to, you know, probably have to protect myself better." (Participant 10, high SES group)

The above-mentioned abstract indicates how relationship status would affect one's decision to get vaccinated; individuals who are in a relationship would have a higher risk of HPV infection, and thus should be vaccinated. This goes against existing literature which suggested that women in committed relationships were more likely to perceive themselves having a low risk of getting HPV and thus less likely to be vaccinated (Lefkowitz et al. 2014, Thompson et al. 2019, Weiss, Rosenthal and Zimet 2011).

However, while participants from the low SES group brought up protection of one's health as a reason to be vaccinated, none of them explicitly mentioned that

it was due to them being in a relationship, despite some of them being in a committed relationship:

> "I learned about it through a few friends who also took it. And since it's a prevention, I thought, why not just take it." (Participant 5, low SES group)

This suggests that many participants from the low SES group viewed the HPV vaccination as a form of protection against cervical cancer in general, and it would be beneficial to be vaccinated whether one is single or in a relationship.

## Theme 2: Access to health services and information

Another theme that emerged during the conversation with participants was healthcare access related factors such as availability of information on the vaccine, cost, and recommendation or encouragement from healthcare professionals. This is because the use of health services largely depends on individuals' need for healthcare, whether individuals know that they require healthcare, whether individuals are willing to use healthcare, and whether healthcare is accessible (National Academies of Sciences Engineering and Medicine 2018).

### Lack of convenience

Many participants from both the low and high SES groups acknowledged that they found it troublesome to get vaccinated. For Participant 6, although she would like to be vaccinated, she found the process of deciding which type of HPV

vaccine to take troublesome; and was weighing between the pros and cons of the two types of HPV vaccines available in Singapore:

> "I feel like it's very troublesome, because as far as I know, there are different tiers of the vaccines. So, the basic tier, which covers two strains, is [heavily subsidized] by the government, and you just need to go for the appointment. But there are other ones like Gardasil 9, which covers the maximum number of strains, it is significantly more expensive, and you have to pay for it based on your own, like, pay for it yourself. So, I think, the logistical problem of like looking into it, and having to make a decision on what which vaccine I'm going to get is something that hinders me from actually going forward." (Participant 6, high SES group)

This illustrates that the presence of multiple vaccine options would complicate participant's decision-making process. This is especially so since there is a significant difference in coverage and cost between the two available HPV vaccines in Singapore, making the process of deciding between which vaccine one should take difficult for some participants. For Participant 2, while she would like to be vaccinated, she found the process of looking for a clinic troublesome:

> "I think it's troublesome to kind of book the vaccination. I did try to look at two different clinics previously, at one point, to see if I can go for the

vaccination. But at that point when I was contacting the clinics, they didn't seem to know too much about it." (Participant 2, high SES group)

This implies the lack of adequate support and information provided at medical clinics, suggesting clinic staff's lack of knowledge on the HPV vaccination. Likewise, Participant 8 found the process of finding time to book an appointment tedious:

"Sometimes I think about [getting vaccinated], but then I don't really have the time to go and book an appointment." (Participant 8, low SES group)

The absence of immediate action from the participant despite knowing about the vaccination, and thinking of getting vaccinated suggest that getting vaccinated might not be a priority for the participant. This coupled with the participant's perception of booking an appointment as troublesome has resulted in the participant still not vaccinated till this date.

These abstracts illustrate how vaccination convenience significantly affects uptake for both the high and low SES groups. The perceived trouble in getting information on the type of vaccines available, the pros and cons of the different vaccines, searching for clinics and finding time to get vaccinated discourage participants from taking the vaccination. This is in line with existing literature which highlighted that if vaccination services are not offered at a time and place

convenient for individuals, individuals would be less inclined to get vaccinated (Galagali, Kinikar and Kumar 2022, Myburgh et al. 2023).

**Lack of detailed information on HPV vaccination**

Many participants from both the low and high SES groups also agreed that while information on the HPV vaccination were available online, it was unclear how to go about getting vaccinated, how many doses are required, cost of vaccination, as well as the pros and cons of the different types of HPV vaccines available. Participant 13 felt that there was inadequate information online on the pros and cons of the two different vaccine types available in Singapore. She felt that she was unable to make an informed decision on which vaccine type to take with the limited information available, and hence decided to delay vaccination for now:

> "I wanted to seek information about [the HPV vaccine], like which vaccine to take and stuff, I feel like, it wasn't very accessible to me. Personally, I feel like I had to go and search about [the HPV vaccine], but things were also not very clear online. So, I was just very confused." (Participant 13, low SES group)

This highlights that the participant faced difficulties accessing detailed and clear information on the HPV vaccination in Singapore online, and found the information available confusing. Similarly, Participant 18 found limited information on the HPV vaccination online. However, she adopted a more

proactive approach and decided to source for the information she needed by asking healthcare professionals as well as her friends for help:

> "The information was actually really hard to find online. You could only find the very basic information about like the different types [of HPV vaccine]. But they don't tell you like, where it's a good place to get it or like how much it is. So, we had to actually call around to different clinics to find out their rates. And we also had to like, even ask our friends who have gotten it done before, where they got it, what was the process like and how much it was." (Participant 18, high SES group)

This suggests that the lack of adequate and detailed information regarding the HPV vaccination online; and that participants often had to depend on word of mouth to understand more about the process and cost of vaccination.

These abstracts illustrate the confusion among participants from both the high and low SES groups pertaining to the vaccination process. Hence, there is a need for more detailed and accessible information regarding the HPV vaccination in Singapore online, to educate people on the vaccination, and the benefits of getting vaccinated.

**Healthcare workers' lack of knowledge**

Additionally, some participants from both the low and high SES groups mentioned that even healthcare workers themselves were not well-versed in HPV vaccination matters, making them less inclined to get vaccinated. For Participant 5, she was initially hesitant to get vaccinated as even her sister, a nurse in a public healthcare institution, did not see the benefits of doing so:

> "At first, I am willing to go for [the HPV vaccination], but there's no push. Even after I talked to my sister, who is a healthcare worker, she doesn't see the need. And so, I just left it hanging until one day she came to me and asked if we want to get it together." (Participant 5, low SES group)

This highlights that the participant's decision to get vaccinated was influenced by her sister's perception of the HPV vaccination, presumably due to the fact that her sister is a healthcare worker and she trusts her sister's professional judgment.

For Participant 2, while she would like to get vaccinated and took the initiative to inquire with some clinics about the HPV vaccination, the clinics that she contacted were unable to address her queries:

> "I did try to look at two different clinics previously, at one point, to see if I can go for the vaccination. But at that point when I was contacting the clinics, they didn't seem to know too much about it. So, I was quite

hesitant to go to a clinic that doesn't know much about the vaccine." (Participant 2, high SES group)

This shows that the lack of healthcare workers' knowledge of the HPV vaccination resulted in participant's lack of confidence and hesitancy in getting vaccinated. Hence, these two abstracts suggest that healthcare workers play an important role in influencing individuals from both the high and low SES groups to get the HPV vaccination; the clinics' lack of knowledge on the HPV vaccination was a barrier to vaccination for some participants. This is reiterated by Kaur, Coppeta, and Olesen (2023). They argued that when healthcare workers show a lack of knowledge regarding a particular vaccine, it might result in a reduction in vaccination rate (Kaur, Coppeta and Olesen 2023).

**Strong doctor-patient relationship**

Likewise, the reverse was also true. If healthcare workers are well-versed in HPV vaccination matters, have good rapport with their patients, and encourage their patients to get vaccinated, individuals would be more inclined to be vaccinated.

In the medical sociology field, the doctor-patient relationship is a complex and heterogenous concept in which patients willingly visit a doctor and hence subscribe to the social contract where they are likely to comply with the doctor's advice (Shrivastava, Shrivastava and Ramasamy 2014).

Parsons (1951) argued that when an individual is down with an illness and takes on the sick role in exchange for exemption from one's duties, this sick individual has a moral obligation to seek appropriate treatment to exit the sick role as early as possible. This is because the exemption from one's duties is only tolerated if the sick individual is agreeable to undergo the necessary medical treatments recommended by the doctor (Parsons 1951).

Hence, the doctor has authority over the sick individual not solely because of the doctor's expertise in the medical field, but also because of the unspoken agreement between the sick individual and society; sick individuals are expected to seek treatment and exit the sick role once well (Parsons 1951).

Although the doctor has the bulk of social power, his or her superior medical knowledge will not be used to its fullest potential should the patient not feel comfortable talking to him or her or if there is a lack of trust. Thus, a strong doctor-patient relationship would affect one's health behaviors and outcomes, in this case one's decision to take the HPV vaccine.

This was brought up by participants from both the low and high SES groups. For Participant 17, she has a regular family doctor and would consult him if she has any medical needs or queries. She would also go for regular screenings and ensure that her vaccinations are up to date:

> "Actually, all along, even in my younger days, like in my university days, I do go for vaccinations [at my regular doctor's office], try to keep things up to date […] [The doctor] told me about [the HPV vaccination], and that got me thinking because he really explained to me like, why should I take it, what are the benefits?" (Participant 17, high SES group)

This indicates that the participant trusts her doctor, and that the information provided by her doctor on the HPV vaccination was detailed enough for her to start thinking about getting vaccinated. Likewise, Participant 14 has a regular family doctor too and would go for annual health screenings:

> "For sure. Yeah, I try to aim to go [for health screenings] at least once a year with the same doctor. Yeah, I think it's just important just to check your vitals like and this is, just not be complacent and see if everything is fine, and everything's functioning." (Participant 14, low SES group)

This highlights that the participant is comfortable with her doctor, and would visit her doctor minimally once a year for health screening. Hence, a sound doctor-patient relationship would be a facilitator to vaccination for participants from both the high and low SES groups. When individuals have good rapport with their doctors, they would be more likely to take their doctor's health recommendations seriously.

**Age**

Another factor common among participants of both low and high SES groups would be their age. Participants who were closer to 26 years of age were more inclined to be vaccinated. This is because government subsidies for the HPV vaccination for individuals who do not qualify for the free vaccination would cease when a woman turns 27 (Ministry of Health 2020, Shafeeq 2022, Tang and Wong 2019):

> "And also like the government has sent mails, not emails, hardcopy mails to remind us to take our vaccine so. They did say that the limit is 26 years old and I'm reaching 26 so I need to start thinking [about getting vaccinated]." (Participant 2, high SES group)

This illustrates the participant's sense of urgency to get vaccinated as she would be turning 26 years old soon. Likewise, for individuals who qualify for the free vaccination as they hold either a Blue or Orange CHAS card, they will no longer be eligible for it once they turn 27:

> "Yeah, I think it's also because of my age, because I do understand that the, I guess the recommended age to do is before 26. So, I haven't done [the HPV vaccination]. So, I decided to, you know, actually take the active step this year." (Participant 14, low SES group)

Similarly, this indicates the participant's desire to get vaccinated as she would be able to get vaccinated for free as long as she takes the first dose before turning 27. These abstracts indicate that the age limit the government has placed on the HPV vaccination subsidies has resulted in many unvaccinated participants from both the high and low SES group who are turning 26 or who are already 26 feeling the pressing need to get vaccinated soon.

**Cost**

One other factor that would influence one's decision to be vaccinated was cost. Due to Singapore's means testing approach for healthcare subsidies, participants from the low SES group were able to get the Cervarix vaccination for free (Shafeeq 2022). Hence, numerous participants from the low SES group took the vaccination:

> "After hearing that it is free, then it's like why not [get vaccinated], you know." (Participant 9, low SES group)

This indicates that the provision of free vaccination would encourage more individuals to be vaccinated. In contrast, participants from the high SES group were not eligible for the free vaccination. Although there are government subsidies available for these participants, and Medisave can be used to cover the remaining out of pocket cost, many participants from the high SES group still found the vaccination expensive.

For example, Participant 19 found the HPV vaccination costly, and the cost was hindering her from getting vaccinated. There are two HPV vaccines available in Singapore – Gardasil 9 and Cervarix. Gardasil 9 protects against nine HPV strains, whereas Cervarix only protects against two (Cheng, Wang and Du 2020, de Oliveira, Fregnani and Villa 2019):

> "It's because it's a little expensive. And so, I didn't [get vaccinated]." (Participant 19, high SES group)

This above-mentioned abstract illustrate that the subsidies provided are inadequate. Additionally, some participants from the high SES group were still studying, and hence did not have the financial ability to pay for the vaccination:

> "So, I mean, I guess as a student is like, I mean, [the HPV vaccination] can be expensive, even though it is subsidized by the government." (Participant 12, high SES group)

This reinforces the fact that many adult children in Singapore who are still studying are still financially dependent on their parents. These participants from the high SES group would only be able to get vaccinated if their parents knew about the vaccine, understand the benefits of vaccination, and were willing to pay

for their vaccination. This is not an issue faced by participants from the low SES, as the vaccination is free for them.

As established in the earlier sections, parental knowledge on the HPV vaccination is low across SES groups; and parental misconceptions on the vaccination are high. Hence, while it is a good policy to fully subsidize the HPV vaccination only for eligible individuals of low SES to mitigate the financial barrier, individuals of high SES who are still studying and/or unemployed face the same financial barrier to vaccination, especially if their parents are not supportive of them getting vaccinated. These individuals from the high SES group thus fall through the cracks as their families are not poor enough for them to qualify for the free vaccination, but they cannot afford to pay for the vaccination themselves due to the lack of income.

For Participant 7, she was more concerned about the lack of subsidies available for Gardasil 9 because she was more inclined to take that vaccine as it would protect her against more HPV strains than Cervarix, which is subsidized by the government:

> "Ok maybe if there are like greater subsidies for like, maybe the [HPV vaccine] that protects against like nine subtypes" (Participant 7, high SES group)

This shows that the subsidies being limited to solely the Cervarix vaccine is a barrier to vaccination among some individuals from the high SES group.

# DISCUSSION

## Principal findings

The findings of this study illustrate a complex relationship between SES and one's decision to get vaccinated against HPV; there are numerous barriers to vaccination among not just participants from the low SES group, but participants from the high SES group as well. While parental understanding of the HPV vaccination was universally low regardless of SES level, all participants from both the low or high SES group knew about the HPV vaccination and viewed it in a positive light.

This is unsurprising, as the government has sent out numerous physical letters and text messages on the benefits of vaccination as well as the subsidies available to eligible Singaporean women, to encourage them to get vaccinated; and this implies the effectiveness of public health messaging in Singapore, particular among young adults. However, despite that, only 42·1% (8/19) of participants – 50% (5/10) of participants in the high SES group and 33·3% (3/9) of participants in the low SES group – were fully vaccinated, implying that the differences in vaccination rates across SES groups are quite minimal. The reasons behind this are documented in the subsequent paragraphs below.

According to fundamental cause theory, the differences in individuals' allocation and access to resources is the most salient factor influencing health disparities; individuals of a higher SES would have access to more flexible resources relative to those of a lower SES (Link and Phelan 1995). Hence, it would be expected to see participants from the high SES group consistently making good use of the resources they have on preventive healthcare, in this case getting the HPV vaccination to protect themselves against cervical cancer. Likewise, it would be expected to observe participants from the low SES group being upset or annoyed by their lack of access to these resources.

Although this was the case in the results presented where a slightly higher proportion of participants from the high SES group had completed their HPV vaccination course compared to those from the low SES group, the difference was minimal. Additionally, there were many instances in the interview data where participants from the high SES group were unable to translate their superior resources to healthy habits and behaviors, more specifically getting the HPV vaccination despite perceiving it as something good and useful. This inability to translate one's resources to positive health behaviors and outcomes is known as countervailing mechanisms (Lutfey and Freese 2005). For example, in the context of this study, filial-minded participants whose parents are not supportive of them being vaccinated may choose to prioritize and respect their parents' wishes and not get vaccinated, even if they feel that the vaccination would benefit them; and this includes participants from the high SES group.

To illustrate, one factor affecting one's decision to be vaccinated similar among both low and high SES groups was the lack of parental knowledge and support. Participants, regardless of SES level, were less inclined to be vaccinated against HPV if their parents did not know much about the vaccine, had misconceptions about the vaccine and/or did not support their decision to be vaccinated, even if participants themselves perceived the vaccine to be useful. This cultural inclination to get parental approval and consent prior to vaccination despite being adults and of legal age to make their own medical decisions seemed to be a norm among many of the interview participants across SES groups. Many interview participants indicated parents as an important consideration regarding their decision to be vaccinated, with some participants indicating that they would not go behind their parents' back to get vaccinated, and would delay getting vaccinated.

This behavior surrounds the value of filial piety, defined as the Confucian notion that children, including adult children, should obey and respect their parents such as abiding by their rules and listening to them, as well as caring for and supporting their parents (Lam et al. 2021, Li, Singh and Keerthigha 2021). This is reinforced and ingrained in the Singapore society, where children are often taught and reminded to respect their elders formally in their regular Character and Citizenship Education (CCE) lessons (Loh 2023), or informally during their daily interactions with their family members and teachers. Additionally, policies in Singapore often center around the importance of family and the idea that family

should be individuals' first line of support; only if individuals have exhausted help from their family members will they be able to turn to their community or state for support. For example, many welfare and assistance programs such as the Public Rental Scheme and Comcare Long-term Assistance Program will only be granted to applicants who lack family support (Zhan and Huang 2023).

Hence, although none of the participants explicitly mentioned the need to abide by their parents' wishes as a factor influencing their decision to be vaccinated against HPV, many highlighted the need for and importance of parental support in their decision to be vaccinated as they found it hard to take the vaccination without their parents' approval. Likewise, participants, regardless of SES level, who received encouragement and support from their family members, be it emotionally and/or financially were more willing to be vaccinated. In that sense, many participants internalized the value of "filial piety' by seeking permission or confirmation from their parents prior to getting vaccinated. This could be a reason behind why there is no notable differences in vaccination rates across SES groups.

Hence, as parents are seen as an important deciding factor on whether one should be vaccinated against HPV, it should not come as a surprise that another factor affecting one's decision to be vaccination was that of stigmatization. Numerous participants from the high SES group brought up the vaccine's link to sexual activities as a barrier to vaccination. These participants argued that they were reluctant to get vaccinated as their parents had the misconception that getting

vaccinated would promote and encourage their adult children to be sexually active prior to marriage. As these participants did not want their parents to have the wrong impression that they were planning or have been engaging in pre-marital sex, they decided not to get vaccinated at the moment.

Interestingly, this factor was only brought up by participants from the high SES group; none of the participants from the low SES group mentioned and/or acknowledged stigmatization in the interviewers, despite parental knowledge on the HPV vaccination being uniformly low across SES groups.

This could be explained by cultural capital theory. This theory argues that cultural capital such as knowledge, preferences, and skills would shape one social standing and social interactions (Bourdieu 1997, Bourdieu 2018). Participants, especially those from the high SES group might have a stronger inclination to protect one's family reputation and status. Thus, due to the vaccine's association with sexual activity, some of these participants might choose not be vaccinated as being vaccinated might suggest that they are engaging in sexual promiscuity, and/or other risky behaviors, which are considered taboo in their social environment, and would reflect badly on their status. For some of these participants in the high SES group who were concerned of the stigma attached to the vaccination, it has been established in the interviews that cost is not a main barrier to vaccination for them as they are willing to tap on their own savings if

needed. In that sense, cultural stigmas do override the "SES advantage" that some of these individuals have.

Additionally, this could be due to social barriers given that individuals of low SES have fewer resources and would often prioritize their limited resources to meet their immediate needs, or on things that they would be able to see the direct benefits of (Akinyemiju et al. 2016, Sheehy-Skeffington 2020). Hence, it should not come as a surprise that parents of participants from the low SES group were generally more concerned about the monetary aspect, whether getting vaccinated would be a waste of money, rather than the stigma associated with the vaccination.

While cost was a factor that influenced participants' decision to be vaccinated, it affected participants from the high and low SES groups differently. Some participants from the high SES group highlighted that the subsidies available for the HPV vaccination was insufficient, and thus, were less inclined to be vaccinated. Although participants were able to use their Medisave to pay for the remaining cost of the vaccine after government subsidies, some participants were either still studying or started working not too long ago and hence might not have sufficient funds in their Medisave account for their vaccination.

There are two vaccine types available in Singapore – Cervarix and Gardasil. Medisave can only be used for the Cervarix vaccine, which protects against two HPV strains (de Oliveira, Fregnani and Villa 2019), and not Gardasil 9, which

protects against nine strains (Cheng, Wang and Du 2020). Likewise, government subsidies are only available for the Cervarix vaccine. Hence, some participants from the high SES group were frustrated by the lack of subsidies and the inability to use one's Medisave for Gardasil 9, which was significantly more expensive than Cervarix. They preferred to take Gardasil 9 due to the additional protection it offered relative to the Cervarix vaccine, but were still contemplating whether to get vaccinated due to its cost.

This was not discussed by participants from the low SES group as the HPV vaccination is fully subsidized for them, due to their lower household income (Shafeeq 2022). While they were only able to get the Cervarix vaccine for free, and would receive no subsidies and would be unable to use Medisave for their vaccination if they choose to take Gardasil 9, none of the participants from the low SES group indicated that as a barrier to vaccination. In fact, it was due to the Cervarix vaccine being free that encouraged some of the participants from the low SES group to get vaccinated.

This is despite the fact that some of these participants from the low SES group knew about the Gardasil 9 vaccine, and the better coverage it would provide compared to Cervarix. In that sense, participants from the low SES group seemed to feel restricted by their social conditions and articulated a rather passive agency, which was the decision to take the Cervarix vaccine. The decision to take the Cervarix vaccine did not stem from their lack of knowledge of the different

vaccines available, but rather them trying to make the best decision based on the "limited" resources they have.

This indicates that Singapore's means testing approach to vaccination subsidies is rather successful in terms of reducing the financial barriers to vaccination among low-income individuals, who may otherwise not be able to afford vaccination. It is a targeted approach to mitigate health disparities by ensuring that cost will not be a barrier to vaccination, at least among the low-income individuals.

However, numerous participants from the high SES group highlighted that the current subsidies available for vaccination are insufficient, indicating the need for a more universal policy to ensure that all eligible Singaporean women, regardless of household income, would be able to get vaccinated and benefit from the vaccination. While Singaporean girls under 18 are able to get vaccinated against HPV for free since 2019 regardless of household income, this has not been extended to adults (Khalik 2019, Ministry of Health 2022).

Another factor unique to participants from the high SES group was that of relationship status. Participants from the high SES group mentioned that they would be more inclined to take the HPV vaccination if they were in a committed relationship. This is because HPV-related illnesses are often transmitted via sexual intercourse (Baseman and Koutsky 2005, Panatto et al. 2012) and these

participants indicated that they wanted to have some protection against HPV prior to engaging in sexual intimacy with their respective partners. This was not brought up by participants of the low SES group, despite some of them being in a committed, long-term relationship. However, many participants from the low SES group did mention the ability to get protection against HPV-related illnesses as a facilitator to vaccination, similar to the participants from the high SES group.

Other experiences and factors affecting one's decision to get vaccinated against HPV as derived from the interviews include influence and encouragement from friends to take the vaccine, ability to take the HPV vaccine together with either a family member or friend, strong doctor-patient relationship, age, convenience, availability of detailed information on the HPV vaccination, as well as healthcare workers' knowledge of the vaccine.

## Comparison with previous studies

To the best of our knowledge, this is the first study in Singapore that looked at the similarities and dissimilarities among women from different SES groups regarding their knowledge and views on the vaccine, as well as the experiences and factors that influence their decision to be vaccinated.

The majority of factors mentioned by participants such as the lack of convenience and lack of information regarding the HPV vaccination, as well as the presence of encouragement from friends and the ability to take the HPV vaccine together

with a close friend or family member were similar to findings from other studies (Chan, Lee and So 2024, Talabi et al. 2023, Zheng, Wu and Zheng 2021). Some of the findings that were more prominent in this study relative to previous studies included the lack of parental influence, support, and approval, as well as the need to be vaccinated before the age of 27.

One other prominent factor that was brought up by participants was the stigma attached to the vaccine due to its association with sexual activities. While this barrier was unsurprising given that it was mentioned in many of the past studies, be it in the Asian or Western context (Cernasev et al. 2024, McKenzie et al. 2023, Namba, Kaneda and Kotera 2023, Polonijo, Mahapatra and Brown 2022, Siu, Fung and Leung 2019), what was interesting was the fact that this was only highlighted by participants from the high SES group in our study. Additionally, while cost was a barrier to vaccination that was emphasized in numerous other studies (Ferrer et al. 2014, Zhao et al. 2023, Zheng, Wu and Zheng 2021), in our study, cost was interestingly observed as a barrier only for participants from the high SES group, rather than that of the low SES group.

## Strengths and limitations

One strength of this qualitative study was that it helped to fill the research gap by examining how one's SES level would facilitate and/or limit one's ability and decision to be vaccinated against HPV. Hence, this study presented new insights as to how differences in access to economic and social resources might influence

one's health behaviors, and these are what Link and Phelan (1995) would consider as fundamental causes. Existing literature on fundamental cause theory are often quantitative in nature such as deriving findings from large scale survey data (Clouston et al. 2020, Harawa et al. 2022, Salway et al. 2022, Swisher et al. 2022, Vanthomme et al. 2017). As such, another strength of this study was that fundamental cause theory was applied in a qualitative study to gain more insights with regards to participants' thought processes and the factors that would influence their decision to be vaccinated, and whether participants of different SES would be influenced by different factors.

One other strength was that participants' SES level was determined by the CHAS card they hold, rather than their household income. This is because participants might not be comfortable sharing their household income due to it being a sensitive topic; and one's household income would affect the type of CHAS card one would be able to attain, making it a good indicator for SES in the Singapore context.

There are some limitations to the study. First, potential participants were recruited using purposive, non-random sampling, through personal networks and social media platforms, which may result in selection bias. Hence, the views of participants may not be representative of all Singaporean young women.

Additionally, recruited participants were mostly Singaporean Chinese. Hence, the findings from this study may fall short in terms of grasping the nuances that may be specific to a given race. This is because individuals of different races may have different lived experiences such as traditions and values (Zhang 2019), which could affect the factors affecting their decision to be vaccinated against HPV.

However, this was an exploratory study to increase our knowledge regarding the agencies, attitudes, and thought processes that are key to fundamental cause theory (Link and Phelan 1995) that might not be possible using quantitative methods. As such, the sampling frame was kept broad on purpose. Lastly, significant differences across SES groups cannot be established, given the small sample size (n=19). However, the sample size was large enough for data saturation to occur.

## Implications for future research and practice

Firstly, consider doing mixed-method research. This can be done by using qualitative methods such as focus group discussions or semi-structured interviews to complement quantitative research. In this case, this will be useful to grasp macrosocial issues that cannot be entirely clarified and analyzed using fundamental cause theory. The fundamental causes regarding health behaviors may have shifted away from material aspects such as education background, income level, occupation status, to that of non-material aspects such as cultural norms, traditions, beliefs, support from family members and friends, as well as

health knowledge. Hence, using interviews or focus group discussions to complement quantitative research may aid in the understanding of whether there are other mechanisms influencing one health behaviors and outcomes beyond that of material factors.

Secondly, it is useful to consider other meta-mechanisms beyond the differences in access to flexible resources, and look beyond fundamental cause theory to understand the disparities in vaccination uptake between the high and low SES groups. While access to flexible resources is an important factor affecting one's decision to be vaccinated, with the high SES group having greater access to flexible resources compared to the low SES group, the findings indicate less variation across SES groups than expected pertaining to vaccination uptake.

This is because the meta-mechanisms affecting one's decision to be vaccinated may not be derived solely from micro-level agencies like those investigated in this paper (Lutfey and Freese 2005). Future research can examine in depth the ways in which agencies of institutions such as the government can serve to minimize or worsen the health disparities faced by individuals from different SES groups.

Thirdly, it is evident from the findings that there are cultural associations of the HPV vaccination with normative contestations of sexual activities. Hence, future

research can investigate these associations in greater detail, so as to get a better sensing of how do these associations affect individuals from different SES groups.

Fourthly, the intersectionality of race and class can be explored, to see if race and class taken together would affect one's decision to get vaccinated against HPV. Hence, future studies can consider recruiting a good mix of Singaporean Chinese, Malay, and Indian participants to increase the representativeness of the sample, and to see how individuals of different races and SES levels differ in their inclination to take the HPV vaccination, and the reasons behind that. Future research can also consider adopting a more diverse recruitment strategy for example, partnering with healthcare institutions or community organizations, to enhance findings' representativeness.

# CONCLUSION

Using fundamental cause theory as the theoretical framework, this study investigated the constraining and enabling impacts of SES on one's decision and inclination to take the HPV vaccination in the context of Singapore. The findings indicate that barriers to vaccination exist for both the high SES and low SES groups. Hence, more can be done to increase public's knowledge of the vaccine so as to encourage more young women in Singapore to get vaccinated against HPV.

# REFERENCES


Agency for Integrated Care. 2024, "Means Testing", Singapore. Retrieved Jul 18, 2024 (https://www.aic.sg/care-services/means-testing/).

Akinyemiju, Tomi, Kemi Ogunsina, Swati Sakhuja, Valentine Ogbhodo and Dejana Braithwaite. 2016. "Life-Course Socioeconomic Status and Breast and Cervical Cancer Screening: Analysis of the Who'S Study on Global Ageing and Adult Health (Sage)." *BMJ Open* 6(11):e012753. doi: 10.1136/bmjopen-2016-012753.

Al Alawi, Salma, Omar Al Zaabi, Margaret E. Heffernan, Judie Arulappan, Noora Al Hasani, Munira Al Baluchi, Alia Al Mamari and Amani Al Saadi. 2023. "Knowledge, Attitudes and Acceptance toward Human Papillomavirus (Hpv) Vaccination: Perspectives of Muslim Women and Men." *Vaccine* 41(13):2224-33. doi: https://doi.org/10.1016/j.vaccine.2023.02.063.

Ang, L. W., J. Cutter, L. James and K. T. Goh. 2018. "Epidemiological Characteristics Associated with Uptake of Pneumococcal Vaccine among Older Adults Living in the Community in Singapore: Results from the National Health Surveillance Survey 2013." *Scand J Public Health* 46(2):175-81. doi: 10.1177/1403494817720105.

Arbyn, M., E. Weiderpass, L. Bruni, S. de Sanjosé, M. Saraiya, J. Ferlay and F. Bray. 2020. "Estimates of Incidence and Mortality of Cervical Cancer in 2018: A Worldwide Analysis." *Lancet Glob Health* 8(2):e191-e203. doi: 10.1016/s2214-109x(19)30482-6.

Baseman, J. G. and L. A. Koutsky. 2005. "The Epidemiology of Human Papillomavirus Infections." *J Clin Virol* 32 Suppl 1:S16-24. doi: 10.1016/j.jcv.2004.12.008.

Basnyat, Iccha and Cheryl Lim. 2018. "Perspectives of Young Chinese Singaporean Women on Seeking and Processing Information to Decide About Vaccinating against Human Papillomavirus." *Women & Health* 58(7):806-21. doi: 10.1080/03630242.2017.1342741.

Bauman, Zygmunt. 1999. *In Search of Politics*. Stanford, Calif: Stanford University Press.

Bolormaa, E., S. A. Choe, M. Son, M. Ki and D. Paek. 2022. "Income-Based Disparities in the Risk of Distant-Stage Cervical Cancer and 5-Year Mortality after the Introduction of a National Cancer Screening Program in Korea." *Epidemiol Health* 44:e2022066. doi: 10.4178/epih.e2022066.

Bourdieu, Pierre. 1984. *Distinction*. Cambridge, MA: Harvard University Press.

Bourdieu, Pierre. 1997. "The Forms of Capital in Ah Halsey (Ed.), Education: Culture, Economy and Society." Oxford: Oxford University Press.

Bourdieu, Pierre. 2018. "Cultural Reproduction and Social Reproduction." Pp. 71-112 in *Knowledge, Education, and Cultural Change: Papers in the Sociology of Education*, Vol. 3.

Braun, Virginia and Victoria Clarke. 2006. "Using Thematic Analysis in Psychology." *Qualitative research in psychology* 3(2):77-101. doi: 10.1191/1478088706qp063oa.

Centers for Disease Control and Prevention. n.d., "Basic Information About Hpv and Cancer". Retrieved Jan 11, 2025 (https://www.cdc.gov/cancer/hpv/basic-information.html#:~:text=About%2010%25%20of%20women%20with,cause%20cell%20changes%20called%20precancers.).

Cernasev, Alina, Kenneth C. Hohmeier, Oluwafemifola Oyedeji, Kristina W. Kintziger and Tracy M. Hagemann. 2024. "Views of the Pharmacists' Role in Hpv Vaccinations: A Qualitative Study in Tennessee." *Pharmacy* 12(2).

Cham, Stephanie, Alicia Li, J. Alejandro Rauh-Hain, Ana I. Tergas, Dawn L. Hershman, Jason D. Wright and Alexander Melamed. 2022. "Association between Neighborhood Socioeconomic Inequality and Cervical Cancer Incidence Rates in New York City." *JAMA Oncology* 8(1):159-61. doi: 10.1001/jamaoncol.2021.5779.

Chan, Catherine Qiu Hua, Kheng Hock Lee and Lian Leng Low. 2018. "A Systematic Review of Health Status, Health Seeking Behaviour and Healthcare Utilisation of Low Socioeconomic Status Populations in Urban Singapore." *International Journal for Equity in Health* 17(1):39. doi: 10.1186/s12939-018-0751-y.

Chan, D. N. S., C. Li, B. M. H. Law, K. C. Choi, P. P. K. Lee and W. K. W. So. 2023. "Factors Affecting Hpv Vaccine Uptake among Ethnic Minority Adolescent Girls: A Systematic Review and Meta-Analysis." *Asia Pac J Oncol Nurs* 10(9):100279. doi: 10.1016/j.apjon.2023.100279.

Chan, Dorothy Ngo Sheung, Pinky Pui Kay Lee and Winnie Kwok Wei So. 2024. "Exploring the Barriers and Facilitators Influencing Human Papillomavirus Vaccination Decisions among South Asian and Chinese Mothers: A Qualitative Study." *Journal of Racial and Ethnic Health Disparities* 11(3):1465-77. doi: 10.1007/s40615-023-01623-4.

Cheng, L., Y. Wang and J. Du. 2020. "Human Papillomavirus Vaccines: An Updated Review." *Vaccines (Basel)* 8(3). doi: 10.3390/vaccines8030391.

Chirayil, Evangeline I., Claire L. Thompson and Sue Burney. 2014. "Predicting Human Papilloma Virus Vaccination and Pap Smear Screening Intentions among Young Singaporean Women Using the Theory of Planned Behavior." *SAGE Open* 4(4):2158244014554961. doi: 10.1177/2158244014554961.

Clouston, S. A. P. and B. G. Link. 2021. "A Retrospective on Fundamental Cause Theory: State of the Literature, and Goals for the Future." *Annu Rev Sociol* 47(1):131-56. doi: 10.1146/annurev-soc-090320-094912.

Clouston, Sean A. P., Julia Acker, Marcie S. Rubin, David H. Chae and Bruce G. Link. 2020. "Fundamental Social Causes of Inequalities in Colorectal Cancer Mortality: A Study of Behavioral and Medical Mechanisms." *Heliyon* 6(3):e03484. doi: https://doi.org/10.1016/j.heliyon.2020.e03484.

Clouston, Sean A. P., Ginny Natale and Bruce G. Link. 2021. "Socioeconomic Inequalities in the Spread of Coronavirus-19 in the United States: A

Examination of the Emergence of Social Inequalities." *Social Science & Medicine* 268:113554. doi: 10.1016/j.socscimed.2020.113554.
Cockerham, William C. 2016. *The New Blackwell Companion to Medical Sociology*: John Wiley & Sons.
Cockerham, William C., Thomas Abel and Günther Lüschen. 1993. "Max Weber, Formal Rationality, and Health Lifestyles." *The Sociological Quarterly* 34(3):413-28.
Combs, Aidan, Robert E. Freeland, Katelin M. Alfaro Hudak and Elizabeth A. Mumford. 2023. "The Effect of Occupational Status on Health: Putting the Social in Socioeconomic Status." *Heliyon* 9(11):e21766. doi: https://doi.org/10.1016/j.heliyon.2023.e21766.
Cooney, Teresa M. and Peter Uhlenberg. 1992. "Support from Parents over the Life Course: The Adult Child's Perspective." *Social Forces* 71(1):63-84. doi: 10.2307/2579966.
de Buhr, Elke and Antje Tannen. 2020. "Parental Health Literacy and Health Knowledge, Behaviours and Outcomes in Children: A Cross-Sectional Survey." *BMC Public Health* 20(1):1096. doi: 10.1186/s12889-020-08881-5.
de Oliveira, C. M., Jhtg Fregnani and L. L. Villa. 2019. "Hpv Vaccine: Updates and Highlights." *Acta Cytol* 63(2):159-68. doi: 10.1159/000497617.
Dilley, S., K. M. Miller and W. K. Huh. 2020. "Human Papillomavirus Vaccination: Ongoing Challenges and Future Directions." *Gynecol Oncol* 156(2):498-502. doi: 10.1016/j.ygyno.2019.10.018.
Ferrer, Harriet Batista, Caroline Trotter, Matthew Hickman and Suzanne Audrey. 2014. "Barriers and Facilitators to Hpv Vaccination of Young Women in High-Income Countries: A Qualitative Systematic Review and Evidence Synthesis." *BMC Public Health* 14(1):700. doi: 10.1186/1471-2458-14-700.
Finkelstein, Daniel M., Jessica F. Harding, Diane Paulsell, Brittany English, Gina R. Hijjawi and Jennifer Ng'andu. 2022. "Economic Well-Being and Health: The Role of Income Support Programs in Promoting Health and Advancing Health Equity." *Health Affairs* 41(12):1700-06. doi: 10.1377/hlthaff.2022.00846.
Fujihara, Sho. 2020. "Socio-Economic Standing and Social Status in Contemporary Japan: Scale Constructions and Their Applications." *European Sociological Review* 36(4):548-61. doi: 10.1093/esr/jcaa010.
Galagali, P. M., A. A. Kinikar and V. S. Kumar. 2022. "Vaccine Hesitancy: Obstacles and Challenges." *Curr Pediatr Rep* 10(4):241-48. doi: 10.1007/s40124-022-00278-9.
Gallagher, K. E., D. S. LaMontagne and D. Watson-Jones. 2018. "Status of Hpv Vaccine Introduction and Barriers to Country Uptake." *Vaccine* 36(32 Pt A):4761-67. doi: 10.1016/j.vaccine.2018.02.003.
Giddens, Anthony. 1991. *Modernity and Self-Identity*. Stanford, CA: Stanford University Press.

Goh, Lee Gan and Paul Anantharajah Tambyah. 2018. "Pneumococcal Vaccination in Adults." *The Singapore Family Physician* 44(2):14-22.
Gong, Xiaoqian, Jing Xu, Yuzhen He, Guofang Zou and Jing Liu. 2024. "Socioeconomic Inequalities in Human Papillomavirus Knowledge and Vaccine Uptake: Evidence from a Cross-Sectional Study in China." *Frontiers in Public Health* 12. doi: 10.3389/fpubh.2024.1399192.
Hahn, R. A. and B. I. Truman. 2015. "Education Improves Public Health and Promotes Health Equity." *Int J Health Serv* 45(4):657-78. doi: 10.1177/0020731415585986.
Hamdi, Sabrine. 2018. "The Impact of Teachings on Sexuality in Islam on Hpv Vaccine Acceptability in the Middle East and North Africa Region." *Journal of Epidemiology and Global Health* 7:S17-S22. doi: https://doi.org/10.1016/j.jegh.2018.02.003.
Harawa, N. T., K. M. Schrode, J. Daniels, M. Javanbakht, A. Hotton, S. Makgoeng, A. Ragsdale, J. Schneider, K. Fujimoto, R. Bolan and P. Gorbach. 2022. "Factors Predicting Incarceration History and Incidence Among black and Latino Men Who Have Sex with Men (Msm) residing in a Major Urban Center." *PLoS One* 17(3):e0265034. doi: 10.1371/journal.pone.0265034.
Hatzenbuehler, M. L., J. C. Phelan and B. G. Link. 2013. "Stigma as a Fundamental Cause of Population Health Inequalities." *Am J Public Health* 103(5):813-21. doi: 10.2105/ajph.2012.301069.
Health Hub. n.d., "Preventing Hpv Infection: Hpv Vaccination", Singapore. Retrieved Jan 14, 2024 (https://www.healthhub.sg/a-z/diseases-and-conditions/faqs-on-hpv-and-hpv-immunisation).
Hittson, Hannah, Leah McAleer, Lydia Saucedo, Lindsay Mahler, Gabriel Andino, Andie Zorba, Sarah Walden, Brett E. Pickett, Brian D. Poole and Erika L. Abel. 2023. "Association between Religious Beliefs and Hpv Vaccination Attitudes among College Students." *Vaccines* 11(10).
Kaur, Mandeep, Luca Coppeta and Ole F. Olesen. 2023. "Vaccine Hesitancy among Healthcare Workers in Europe: A Systematic Review." *Vaccines* 11(11).
Khalik, Salma. 2019, "Parliament: Free Opt-in Cervical Cancer Vaccine for Sec 1 Girls from This Year", Singapore: The Straits Times. Retrieved Sep 27, 2021 (https://www.straitstimes.com/politics/parliament-free-opt-in-cervical-cancer-vaccine-for-sec-1-girls-from-this-year).
Kim, Yeonwoo, Christian Vazquez and Catherine Cubbin. 2023. "Socioeconomic Disparities in Health Outcomes in the United States in the Late 2010s: Results from Four National Population-Based Studies." *Archives of Public Health* 81(1):15. doi: 10.1186/s13690-023-01026-1.
Kivimäki, Mika, G. David Batty, Jaana Pentti, Martin J. Shipley, Pyry N. Sipilä, Solja T. Nyberg, Sakari B. Suominen, Tuula Oksanen, Sari Stenholm, Marianna Virtanen, Michael G. Marmot, Archana Singh-Manoux, Eric J. Brunner, Joni V. Lindbohm, Jane E. Ferrie and Jussi Vahtera. 2020. "Association between Socioeconomic Status and the Development of

Mental and Physical Health Conditions in Adulthood: A Multi-Cohort Study." *The Lancet. Public health* 5(3):e140-e49. doi: 10.1016/S2468-2667(19)30248-8.

Kombe, Kombe Arnaud John, Bofeng Li, Ayesha Zahid, Hylemariam Mihiretie Mengist, Guy-Armel Bounda, Ying Zhou and Tengchuan Jin. 2021. "Epidemiology and Burden of Human Papillomavirus and Related Diseases, Molecular Pathogenesis, and Vaccine Evaluation." *Frontiers in Public Health* 8. doi: 10.3389/fpubh.2020.552028.

Kraft, Pål and Brage Kraft. 2021. "Explaining Socioeconomic Disparities in Health Behaviours: A Review of Biopsychological Pathways Involving Stress and Inflammation." *Neuroscience & Biobehavioral Reviews* 127:689-708. doi: https://doi.org/10.1016/j.neubiorev.2021.05.019.

Kwek, Michelle E-Jyn, Joella Xiaohong Ang, Manisha Mathur and Lily Chye Lee Kho. 2023. "Comparison of Awareness, Attitudes and Knowledge on Human Papilloma Virus Vaccination in Singapore: 2019 Versus 2013." *Singapore medical journal*:10.4103/singaporemedj.SMJ-2020-437. doi: 10.4103/singaporemedj.SMJ-2020-437.

Lam, June Sing Hong, Paul S. Links, Rahel Eynan, Wes Shera, A. Ka Tat Tsang, Samuel Law, Wai Lun Alan Fung, Xiaoqian Zhang, Pozi Liu and Juveria Zaheer. 2021. "“I Thought That I Had to Be Alive to Repay My Parents”: Filial Piety as a Risk and Protective Factor for Suicidal Behavior in a Qualitative Study of Chinese Women." *Transcultural Psychiatry* 59(1):13-27. doi: 10.1177/13634615211059708.

Larsen, Sophie L., Ikgyu Shin, Jefrin Joseph, Haylee West, Rafael Anorga, Gonzalo E. Mena, Ayesha S. Mahmud and Pamela P. Martinez. 2023. "Quantifying the Impact of Sars-Cov-2 Temporal Vaccination Trends and Disparities on Disease Control." *Science Advances* 9(31):eadh9920. doi: 10.1126/sciadv.adh9920.

Lau, Richard R., Marilyn Jacobs Quadrel and Karen A. Hartman. 1990. "Development and Change of Young Adults' Preventive Health Beliefs and Behavior: Influence from Parents and Peers." *Journal of Health and Social Behavior* 31(3):240-59. doi: 10.2307/2136890.

Leask, Julie, Cath Jackson, Lyndal Trevena, Kirsten McCaffery and Julia Brotherton. 2009. "Implementation of the Australian Hpv Vaccination Program for Adult Women: Qualitative Key Informant Interviews." *Vaccine* 27(40):5505-12. doi: 10.1016/j.vaccine.2009.06.102.

Lee, J. Y., K. Han, Y. G. Park and S. H. Park. 2021. "Effects of Education, Income, and Occupation on Prevalence and Symptoms of Knee Osteoarthritis." *Sci Rep* 11(1):13983. doi: 10.1038/s41598-021-93394-3.

Lee, K. C., K. Han, J. Y. Kim, G. E. Nam, B. D. Han, K. E. Shin, A. Lee and B. J. Ko. 2015. "Socioeconomic Status and Other Related Factors of Seasonal Influenza Vaccination in the South Korean Adult Population Based on a Nationwide Cross-Sectional Study." *PLoS One* 10(2):e0117305. doi: 10.1371/journal.pone.0117305.

Lefkowitz, E. S., K. M. Kelly, S. A. Vasilenko and J. L. Maggs. 2014. "Correlates of Human Papillomavirus Vaccination among Female University Students." *Women Health* 54(6):487-501. doi: 10.1080/03630242.2014.903552.

Li, W. W., S. Singh and C. Keerthigha. 2021. "A Cross-Cultural Study of Filial Piety and Palliative Care Knowledge: Moderating Effect of Culture and Universality of Filial Piety." *Front Psychol* 12:787724. doi: 10.3389/fpsyg.2021.787724.

Lim, A. S. E. and R. B. T. Lim. 2019. "Facilitators and Barriers of Human Papillomavirus Vaccine Uptake in Young Females 18-26 Years Old in Singapore: A Qualitative Study." *Vaccine* 37(41):6030-38. doi: 10.1016/j.vaccine.2019.08.053.

Lim, Daniel Yan Zheng, Ting Hway Wong, Mengling Feng, Marcus Eng Hock Ong and Andrew Fu Wah Ho. 2021. "Leveraging Open Data to Reconstruct the Singapore Housing Index and Other Building-Level Markers of Socioeconomic Status for Health Services Research." *International Journal for Equity in Health* 20(1):218. doi: 10.1186/s12939-021-01554-8.

Link, B. G. and J. Phelan. 1995. "Social Conditions as Fundamental Causes of Disease." *J Health Soc Behav* Spec No:80-94.

Loh, Wee Cheng. 2023, "Character and Citizenship Education in Singapore", Singapore: National Institute of Education. Retrieved Jul 7, 2024 (https://singteach.nie.edu.sg/2023/10/11/character-and-citizenship-education-in-singapore/).

Loke, A. Y., M. L. Kwan, Y. T. Wong and A. K. Y. Wong. 2017. "The Uptake of Human Papillomavirus Vaccination and Its Associated Factors among Adolescents: A Systematic Review." *J Prim Care Community Health* 8(4):349-62. doi: 10.1177/2150131917742299.

Low, Jia Ming, Chloe Wen Ting Soo, TA Phuong, Youjia Zhong and Le Ye Lee. 2022. "Predicting Vaccine Hesitancy among Parents Towards Covid-19 Vaccination for Their Children in Singapore." *Frontiers in Pediatrics* 10. doi: 10.3389/fped.2022.994675.

Low, L. L., W. Wah, M. J. Ng, S. Y. Tan, N. Liu and K. H. Lee. 2016. "Housing as a Social Determinant of Health in Singapore and Its Association with Readmission Risk and Increased Utilization of Hospital Services." *Front Public Health* 4:109. doi: 10.3389/fpubh.2016.00109.

Lutfey, Karen and Jeremy Freese. 2005. "Toward Some Fundamentals of Fundamental Causality: Socioeconomic Status and Health in the Routine Clinic Visit for Diabetes." *American Journal of Sociology* 110(5):1326-72. doi: 10.1086/428914.

Ma, T., H. Meng, Z. Ye, C. Jia, M. Sun and D. Liu. 2021. "Health Literacy Mediates the Association between Socioeconomic Status and Productive Aging among Elderly Chinese Adults in a Newly Urbanized Community." *Front Public Health* 9:647230. doi: 10.3389/fpubh.2021.647230.

MacDonald, S. E., L. Kenzie, A. Letendre, L. Bill, M. Shea-Budgell, R. Henderson, C. Barnabe, J. R. Guichon, A. Colquhoun, H. Ganshorn, N. Bedingfield, P. D. Vandenboogaard, R. A. Bednarczyk, S. Glaze and G. Nelson. 2023. "Barriers and Supports for Uptake of Human Papillomavirus Vaccination in Indigenous People Globally: A Systematic Review." *PLOS Glob Public Health* 3(1):e0001406. doi: 10.1371/journal.pgph.0001406.

McBride, Alison A. 2024. "Human Malignancies Associated with Persistent Hpv Infection." *The Oncologist* 29(6):457-64. doi: 10.1093/oncolo/oyae071.

McCaffery, K., J. Waller, J. Nazroo and J. Wardle. 2006. "Social and Psychological Impact of Hpv Testing in Cervical Screening: A Qualitative Study." *Sexually Transmitted Infections* 82(2):169. doi: 10.1136/sti.2005.016436.

McKenzie, A. H., R. Shegog, L. S. Savas, C. M. Healy, L. A. Shay, S. Preston, S. Coan, T. Teague, E. Frost, S. W. Spinner and S. W. Vernon. 2023. "Parents' Stigmatizing Beliefs About the Hpv Vaccine and Their Association with Information Seeking Behavior and Vaccination Communication Behaviors." *Hum Vaccin Immunother* 19(1):2214054. doi: 10.1080/21645515.2023.2214054.

McMaughan, Darcy Jones, Oluyomi Oloruntoba and Matthew Lee Smith. 2020. "Socioeconomic Status and Access to Healthcare: Interrelated Drivers for Healthy Aging." *Frontiers in Public Health* 8(231). doi: 10.3389/fpubh.2020.00231.

Mehrad, Aida, Jeslie Da Veiga, Jaya Kasparian, Minely Cardoso and Isabel Hernandez. 2023. "Understanding and Exploring Social Psychology in the Context of Human Behavior." 8:1-18. doi: 10.23954/osj.v8i2.3303.

Ministry of Health. 2020, "Medisave Can Be Used for Clinically and Cost-Effective Hpv Vaccines", Singapore: Ministry of Health. Retrieved Sep 27, 2021 (https://www.moh.gov.sg/news-highlights/details/medisave-can-be-used-for-clinically-and-cost-effective-hpv-vaccines).

Ministry of Health. 2022, "Offering Deferment of Human Papillomavirus Vaccination to Female Students Beyond Secondary 2", Singapore: Ministry of Health. Retrieved Feb 15, 2025 (https://www.moh.gov.sg/newsroom/national-school-based-human-papillomavirus-(hpv)-programme).

Ministry of Health. 2023, "Medisave", Singapore: Ministry of Health. Retrieved Jan 14, 2023 (https://www.moh.gov.sg/healthcare-schemes-subsidies/medisave).

Ministry of Health. 2024, "Community Health Assist Scheme", Singapore: Ministry of Health. Retrieved Jan 31, 2024 (https://www.moh.gov.sg/healthcare-schemes-subsidies/community-health-assist-scheme).

Ministry of Health. n.d., "Stay One Step Ahead with Vaccinations", Singapore: Ministry of Health (MOH). Retrieved Sep 27, 2021 (https://www.healthhub.sg/programmes/163/vaccinate/).

Mokhtar, Intan Azura. 2009. "Medical and Health Information Seeking among Singapore Youths: An Exploratory Study." *Singapore Journal of Library & Information Management*.

Morse, Rachel M., Joanna Brown, Julia C. Gage, Bryn A. Prieto, Magdalena Jurczuk, Andrea Matos, Javier Vásquez Vásquez, Reyles Ríos Reátegui, Graciela Meza-Sanchez, Luis Antonio Díaz Córdova, Patti E. Gravitt, J. Kathleen Tracy, Valerie A. Paz-Soldan, Iris Carhuaza, Lita E. Carrillo Jara, María del Carmen Caruhapoma, Meda Del Carpio-Morgan, Henrry Daza Grandez, Magaly Figueredo Escudero, Esther Y. Garcia Satalay, Sarah D. Gilman, Karina Gonzales Díaz, José Jerónimo, Alcedo Jorges, Anna Kohler-Smith, Margaret Kosek, Gabriela Ladrón de Guevarra, Daniel Lenin de Cuadro, Renso Lopez Liñán, Andrea Matos Orbegozo, Jaime Marín, Graciela Meza, Helen E. Noble, Victor A. Palacios, E. Jennifer Ríos López, Patricia Rivas, Karina Román, Anne F. Rositch, Carlos Santos-Ortiz, Hermann F. Silva Delgado, Sandra Soto, Nolberto Tangoa, Giannina Vásquez del Aguila, Karen Zevallos and Group the Proyecto Precancer Study. 2023. "“Easy Women Get It”: Pre-Existing Stigma Associated with Hpv and Cervical Cancer in a Low-Resource Setting Prior to Implementation of an Hpv Screen-and-Treat Program." *BMC Public Health* 23(1):2396. doi: 10.1186/s12889-023-17324-w.

Myburgh, N., M. Mulaudzi, G. Tshabalala, N. Beta, K. Gutu, S. Vermaak, C. Lau, C. Hill, L. Stanberry, W. James, S. Madhi, T. Makadzange and J. J. Dietrich. 2023. "A Qualitative Study Exploring Motivators and Barriers to Covid-19 Vaccine Uptake among Adults in South Africa and Zimbabwe." *Vaccines (Basel)* 11(4). doi: 10.3390/vaccines11040729.

Namba, M., Y. Kaneda and Y. Kotera. 2023. "Breaking Down the Stigma: Reviving the Hpv Vaccination Trust in Japan." *QJM: An International Journal of Medicine* 116(11):895-96. doi: 10.1093/qjmed/hcad146.

National Academies of Sciences Engineering and Medicine. 2018. in *Health-Care Utilization as a Proxy in Disability Determination*. Washington (DC): National Academies Press (US).

Newman, P. A., C. H. Logie, A. Lacombe-Duncan, P. Baiden, S. Tepjan, C. Rubincam, N. Doukas and F. Asey. 2018. "Parents' Uptake of Human Papillomavirus Vaccines for Their Children: A Systematic Review and Meta-Analysis of Observational Studies." *BMJ Open* 8(4):e019206. doi: 10.1136/bmjopen-2017-019206.

Nicholson Jr, Harvey L. 2020. "Socioeconomic Status, Fundamental Cause Theory, and Prescription Opioid Use Behaviors: A Theoretical Examination." *Sociological Spectrum* 40(1):1-32. doi: 10.1080/02732173.2019.1707138.

Open Government Products. 2024, "I Received a Msg from Moh and Provided Me Subsidies for Hpv Vaccine, after Getting Injection, the Clinic Said I

Am Not Entitled It and This Is Not Entitled for Pr. Eventually I Paid All from My Medisave, Why?". Retrieved Jan 18, 2025.
Panatto, D., D. Amicizia, C. Trucchi, F. Casabona, P. L. Lai, P. Bonanni, S. Boccalini, A. Bechini, E. Tiscione, C. M. Zotti, R. C. Coppola, G. Masia, A. Meloni, P. Castiglia, A. Piana and R. Gasparini. 2012. "Sexual Behaviour and Risk Factors for the Acquisition of Human Papillomavirus Infections in Young People in Italy: Suggestions for Future Vaccination Policies." *BMC Public Health* 12:623. doi: 10.1186/1471-2458-12-623.
Parsons, Talcott. 1951. "Illness and the Role of the Physician: A Sociological Perspective." *American journal of orthopsychiatry* 21(3):452-60. doi: 10.1111/j.1939-0025.1951.tb00003.x.
Patel, C., J. M. Brotherton, A. Pillsbury, S. Jayasinghe, B. Donovan, K. Macartney and H. Marshall. 2018. "The Impact of 10 Years of Human Papillomavirus (Hpv) Vaccination in Australia: What Additional Disease Burden Will a Nonavalent Vaccine Prevent?". *Euro Surveill* 23(41). doi: 10.2807/1560-7917.Es.2018.23.41.1700737.
Petrovic, Dusan, Carlos de Mestral, Murielle Bochud, Mel Bartley, Mika Kivimäki, Paolo Vineis, Johan Mackenbach and Silvia Stringhini. 2018. "The Contribution of Health Behaviors to Socioeconomic Inequalities in Health: A Systematic Review." *Preventive Medicine* 113:15-31. doi: https://doi.org/10.1016/j.ypmed.2018.05.003.
Phelan, J. C., B. G. Link and P. Tehranifar. 2010. "Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications." *J Health Soc Behav* 51 Suppl:S28-40. doi: 10.1177/0022146510383498.
Polonijo, A. N. 2020. "The Impact of School-Entry Mandates on Social Inequalities in Human Papillomavirus Vaccination." *SSM Popul Health* 12:100647. doi: 10.1016/j.ssmph.2020.100647.
Polonijo, Andrea N. and Richard M. Carpiano. 2013. "Social Inequalities in Adolescent Human Papillomavirus (Hpv) Vaccination: A Test of Fundamental Cause Theory." *Social Science & Medicine* 82:115-25. doi: https://doi.org/10.1016/j.socscimed.2012.12.020.
Polonijo, Andrea N., Durga Mahapatra and Brandon Brown. 2022. "“I Thought It Was Just for Teenagers”: Knowledge, Attitudes, and Beliefs About Hpv Vaccination among Women Aged 27 to 45." *Women's Health Issues* 32(3):301-08. doi: https://doi.org/10.1016/j.whi.2022.01.007.
Qi, Yaqiang, Tongxin Liang and Hua Ye. 2020. "Occupational Status, Working Conditions, and Health: Evidence from the 2012 China Labor Force Dynamics Survey." *The Journal of Chinese Sociology* 7(1):14. doi: 10.1186/s40711-020-00128-5.
Raghupathi, Viju and Wullianallur Raghupathi. 2020. "The Influence of Education on Health: An Empirical Assessment of Oecd Countries for the Period 1995–2015." *Archives of Public Health* 78(1):20. doi: 10.1186/s13690-020-00402-5.

Ravesteijn, B., H. van Kippersluis and E. van Doorslaer. 2013. "The Contribution of Occupation to Health Inequality." *Res Econ Inequal* 21:311-32. doi: 10.1108/s1049-2585(2013)0000021014.
Rosenstock, Irwin M. 1974. "The Health Belief Model and Preventive Health Behavior." *Health Education Monographs* 2(4):354-86.
Rubin, Herbert and Irene Rubin. 2005. "Qualitative Interviewing (2nd Ed.): The Art of Hearing Data." Thousand Oaks
Thousand Oaks, California: SAGE Publications, Inc.
Sacre, A., C. Bambra, J. M. Wildman, K. Thomson, N. Bennett, S. Sowden and A. Todd. 2023. "Socioeconomic Inequalities in Vaccine Uptake: A Global Umbrella Review." *PLoS One* 18(12):e0294688. doi: 10.1371/journal.pone.0294688.
Salway, Travis, Ashleigh J. Rich, Olivier Ferlatte, Dionne Gesink, Lori E. Ross, Richard Bränström, Aida Sadr, Syma Khan, Troy Grennan, Mostafa Shokoohi, David J. Brennan and Mark Gilbert. 2022. "Preventable Mortality among Sexual Minority Canadians." *SSM - Population Health* 20:101276. doi: https://doi.org/10.1016/j.ssmph.2022.101276.
Schlax, J., C. Jünger, M. E. Beutel, T. Münzel, N. Pfeiffer, P. Wild, M. Blettner, J. G. Kerahrodi, J. Wiltink and M. Michal. 2019. "Income and Education Predict Elevated Depressive Symptoms in the General Population: Results from the Gutenberg Health Study." *BMC Public Health* 19(1):430. doi: 10.1186/s12889-019-6730-4.
Schüz, Benjamin. 2017. "Socio-Economic Status and Theories of Health Behaviour: Time to Upgrade a Control Variable." *British journal of health psychology* 22(1):1-7. doi: 10.1111/bjhp.12205.
Shafeeq, Syarafana. 2022, "Free Hpv Jab for Women with Blue or Orange Chas Cards in Fight against Cervical Cancer", Singapore: The Straits Times. Retrieved Jan 14, 2024 (https://www.straitstimes.com/singapore/free-hpv-jab-for-women-with-blue-or-orange-chas-cards-in-fight-against-cervical-cancer).
Sheehy-Skeffington, Jennifer. 2020. "The Effects of Low Socioeconomic Status on Decision-Making Processes." *Current Opinion in Psychology* 33:183-88. doi: https://doi.org/10.1016/j.copsyc.2019.07.043.
Short, Susan E. and Stefanie Mollborn. 2015. "Social Determinants and Health Behaviors: Conceptual Frames and Empirical Advances." *Current Opinion in Psychology* 5:78-84. doi: https://doi.org/10.1016/j.copsyc.2015.05.002.
Shrivastava, S. R., P. S. Shrivastava and J. Ramasamy. 2014. "Exploring the Dimensions of Doctor-Patient Relationship in Clinical Practice in Hospital Settings." *Int J Health Policy Manag* 2(4):159-60. doi: 10.15171/ijhpm.2014.40.
Singapore Cancer Society. n.d., "Immunise to Maximise", Singapore: Singapore Cancer Society. Retrieved June 16, 2024 (https://www.singaporecancersociety.org.sg/get-screened/cervical-cancer/hpv-vaccination.html#hpv-education-talk).

SingHealth. 2019, "Should My Child Get the Hpv Vaccination". Retrieved Jan 18, 2025 (https://www.singhealth.com.sg/news/patient-care/should-my-child-get-the-hpv-vaccination).

Siu, Judy Yuen-Man, Timothy K. F. Fung and Leo Ho-man Leung. 2019. "Social and Cultural Construction Processes Involved in Hpv Vaccine Hesitancy among Chinese Women: A Qualitative Study." *International Journal for Equity in Health* 18(1):147. doi: 10.1186/s12939-019-1052-9.

Spencer, J. C., W. A. Calo and N. T. Brewer. 2019. "Disparities and Reverse Disparities in Hpv Vaccination: A Systematic Review and Meta-Analysis." *Prev Med* 123:197-203. doi: 10.1016/j.ypmed.2019.03.037.

Subica, Andrew and Bruce Link. 2021. "Cultural Trauma as a Fundamental Cause of Health Disparities." *Social Science & Medicine* 292:114574. doi: 10.1016/j.socscimed.2021.114574.

Svendsen, Majbritt Tang, Carsten Kronborg Bak, Kristine Sørensen, Jürgen Pelikan, Signe Juul Riddersholm, Regitze Kuhr Skals, Rikke Nørmark Mortensen, Helle Terkildsen Maindal, Henrik Bøggild, Gitte Nielsen and Christian Torp-Pedersen. 2020. "Associations of Health Literacy with Socioeconomic Position, Health Risk Behavior, and Health Status: A Large National Population-Based Survey among Danish Adults." *BMC Public Health* 20(1):565. doi: 10.1186/s12889-020-08498-8.

Swift, C., A. Dey, H. Rashid, K. Clark, R. Manocha, J. Brotherton and F. Beard. 2022. "Stakeholder Perspectives of Australia's National Hpv Vaccination Program." *Vaccines (Basel)* 10(11). doi: 10.3390/vaccines10111976.

Swisher, Raymond, Ginny Garcia-Alexander, Lynne Cossman and Drew Schaefer. 2022. "Explaining Racial/Ethnic and Socioeconomic Differences in Covid Protective Behavior." *SSM - Population Health* 19:101147. doi: https://doi.org/10.1016/j.ssmph.2022.101147.

Tadesse, Sara Kebede. 2015. "Socio-Economic and Cultural Vulnerabilities to Cervical Cancer and Challenges Faced by Patients Attending Care at Tikur Anbessa Hospital: A Cross Sectional and Qualitative Study." *BMC Women's Health* 15(1):75. doi: 10.1186/s12905-015-0231-0.

Talabi, Odunayo, Hannah Gilbert, Mary C. Smith Fawzi, Rose Anorlu and Thomas Randall. 2023. "Examining Barriers and Facilitators of Hpv Vaccination in Nigeria, in the Context of an Innovative Delivery Model: A Mixed-Methods Study." *BMJ Public Health* 1(1):e000003. doi: 10.1136/bmjph-2023-000003.

Tan, Micah, Paulin Tay Straughan, Wensi Lim and Grace Cheong. 2021. "Special Report on Covid-19 Vaccination Trends among Older Adults in Singapore." Vol. Singapore: Singapore Management University.

Tang, Louisa and Pei Ting Wong. 2019, "Free Hpv Vaccinations to Be Made Available to 13-Year-Old Girls: Moh", Singapore: TODAY. Retrieved Jan 14, 2024 (https://www.todayonline.com/singapore/free-hpv-vaccinations-be-made-available-13-year-old-girls-moh).

Tay, S. K., K. C. Tesalona, N. M. Rashid, E. Y. Tai and S. M. Najib. 2015. "Vaccine Misconceptions and Low Hpv Vaccination Take-up Rates in Singapore." *Asian Pac J Cancer Prev* 16(12):5119-24. doi: 10.7314/apjcp.2015.16.12.5119.

Tay, S. K., B. W. Lee, W. Y. Sohn, I. H. Lee, G. Mathur, M. Sanicas and G. Van Kriekinge. 2018. "Cost-Effectiveness of Two-Dose Human Papillomavirus Vaccination in Singapore." *Singapore Med J* 59(7):370-82. doi: 10.11622/smedj.2017085.

Temasek Foundation. 2022, "Temasek Foundation and Singapore Cancer Society Launch the Temasek Foundation Human Papillomavirus (Hpv) Immunisation Programme to Protect More Women from Preventable Cervical Cancer", Singapore. Retrieved Oct 1, 2022 (https://www.temasekfoundation.org.sg/news/media-releases/temasek-foundation-and-singapore-cancer-society-launch-the-temasek-foundation-human-papillomavirus).

The Catalan Institute of Oncology and The International Agency for Research on Cancer. 2023, "Singapore

Human Papillomavirus and Related Cancers, Fact Sheet 2023", Spain: HPV Information Centre. Retrieved Feb 2, 2024 (https://hpvcentre.net/statistics/reports/SGP_FS.pdf).

Thompson, E. L., C. A. Vamos, R. Piepenbrink, M. Kadono, C. Vázquez-Otero, S. Matthes and E. M. Daley. 2019. "Human Papillomavirus Risk Perceptions and Relationship Status: A Barrier to Hpv Vaccination?". *J Behav Med* 42(5):991-97. doi: 10.1007/s10865-019-00025-4.

Tuckett, David. 1976. *An Introduction to Medical Sociology*. London: Tavistock Publications.

Van Eekert, Nina, Naomi Biegel, Leen De Kort, Veronique Verhoeven, Thies Gehrmann, Caroline Masquillier, Sarah Ahannach and Sarah Lebeer. 2024. "Relationship between Classic Indicators of Health Behaviour and Contraceptive Choices in Women in Flanders." *BMC Women's Health* 24(1):275. doi: 10.1186/s12905-024-03079-y.

Vanthomme, Katrien, Hadewijch Vandenheede, Paulien Hagedoorn and Sylvie Gadeyne. 2017. "Evolution of Educational Inequalities in Site-Specific Cancer Mortality among Belgian Men between the 1990s and 2000s Using a “Fundamental Cause” Perspective." *BMC Cancer* 17(1):470. doi: 10.1186/s12885-017-3461-8.

Wang, J. and L. Geng. 2019. "Effects of Socioeconomic Status on Physical and Psychological Health: Lifestyle as a Mediator." *Int J Environ Res Public Health* 16(2). doi: 10.3390/ijerph16020281.

Weber, M. 1978. *Economy and Society*. Berkeley, CA: University of California Press.

Weiss, T. W., S. L. Rosenthal and G. D. Zimet. 2011. "Attitudes toward Hpv Vaccination among Women Aged 27 to 45." *ISRN Obstet Gynecol* 2011:670318. doi: 10.5402/2011/670318.

Wong, Li Ping, Pooi-Fong Wong, Megat Mohamad Amirul Amzar Megat Hashim, Liyuan Han, Yulan Lin, Zhijian Hu, Qinjian Zhao and Gregory D. Zimet. 2020. "Multidimensional Social and Cultural Norms Influencing Hpv Vaccine Hesitancy in Asia." *Human Vaccines & Immunotherapeutics* 16(7):1611-22. doi: 10.1080/21645515.2020.1756670.

World Health Organization. 2024, "Cervical Cancer": World Health Organization. Retrieved Feb 2, 2024 (https://www.who.int/health-topics/cervical-cancer#tab=tab_1).

Yoo, W., A. Koskan, M. Scotch, H. Pottinger, W. K. Huh and D. Helitzer. 2020. "Patterns and Disparities in Human Papillomavirus (Hpv) Vaccine Uptake for Young Female Adolescents among U.S. States: Nis-Teen (2008-2016)." *Cancer Epidemiol Biomarkers Prev* 29(7):1458-67. doi: 10.1158/1055-9965.Epi-19-1103.

Yuen, W. W. Y., A. Lee, P. K. S. Chan, L. Tran and E. Sayko. 2018. "Uptake of Human Papillomavirus (Hpv) Vaccination in Hong Kong: Facilitators and Barriers among Adolescent Girls and Their Parents." *PLoS One* 13(3):e0194159. doi: 10.1371/journal.pone.0194159.

Zhan, Shaohua and Lingli Huang. 2023. "State Familism in Action: Aging Policy and Intergenerational Support in Singapore." *China Population and Development Studies* 7(2):111-29. doi: 10.1007/s42379-023-00132-5.

Zhang, Junhao. 2019. "Educational Diversity and Ethnic Cultural Heritage in the Process of Globalization." *International Journal of Anthropology and Ethnology* 3(1):7. doi: 10.1186/s41257-019-0022-x.

Zhao, Xue-Lian, Shang-Ying Hu, Jia-Wei Hu, Hong-Hao Wang, Tian-Meng Wen, Yu-Shu Feng, You-Lin Qiao, Fang-Hui Zhao and Yong Zhang. 2023. "Tackling Barriers to Scale up Human Papillomavirus Vaccination in China: Progress and the Way Forward." *Infectious Diseases of Poverty* 12(1):86. doi: 10.1186/s40249-023-01136-6.

Zheng, L., J. Wu and M. Zheng. 2021. "Barriers to and Facilitators of Human Papillomavirus Vaccination among People Aged 9 to 26 Years: A Systematic Review." *Sex Transm Dis* 48(12):e255-e62. doi: 10.1097/olq.0000000000001407.

Zhuang, Qing Yuan, Ru Xin Wong, Wei Ming Darren Chen and Xiao Xuan Guo. 2016. "Knowledge, Attitudes and Practices Regarding Human Papillomavirus Vaccination among Young Women Attending a Tertiary Institution in Singapore." *Singapore medical journal* 57(6):329-33. doi: 10.11622/smedj.2016108.

Ziaee, Arash, Masood Ziaee, Arghavan Asghari, Samira Elhamirad and Ghodsiyeh Azarkar. 2024. "Unpacking Hpv Stigma: Assessing Healthcare Workers' Knowledge and Stigma Towards Hpv While Exploring the Connection between the Two." *Journal of Medical Education and Curricular Development* 11:23821205241260596. doi: 10.1177/23821205241260596.