



# KING COUNTY

1200 King County Courthouse  
516 Third Avenue  
Seattle, WA 98104

## Signature Report

### Motion 15507

**Proposed No.** 2019-0295.1

**Sponsors** Kohl-Welles

1           A MOTION acknowledging receipt of the human  
2           papillomavirus vaccination plan in compliance with the  
3           2019-2020 Biennial Budget Ordinance, Ordinance 18835,  
4           Section 95, Proviso P2, developing a plan to achieve  
5           United States Department of Health and Human Services's  
6           Healthy People 2020 target of eighty percent human  
7           papillomavirus (HPV) vaccine series completion of county  
8           residents between eleven and seventeen years old.

9           WHEREAS, the 2019-2020 Biennial Budget, Ordinance 18835, Section 95,  
10          Proviso P2, requires the executive to transmit a plan to achieve the United States  
11          Department of Health and Human Services's Healthy People 2020 target of eighty  
12          percent human papillomavirus (HPV) vaccine series completion of county residents  
13          between eleven and seventeen years old, and

14          WHEREAS, the plan includes the following:

- 15           1. Funding options that evaluate both existing and new revenue sources;
- 16           2. Strategies to collaborate and coordinate with various stakeholders including  
17          schools, churches, health care providers, hospitals, community organizations, local  
18          jurisdictions and state agencies;
- 19           3. Identification of potential challenges and plans to mitigate those challenges;

20 and

21 4. A timeline for achieving eighty percent vaccination of county residents that  
22 align with Healthy People 2020 objectives, and

23 WHEREAS, the executive is further required to submit a motion that  
24 acknowledges receipt of the plan by June 30, 2019;

25 NOW, THEREFORE, BE IT MOVED by the Council of King County:

26 The receipt of the Human Papillomavirus Vaccination Plan for King County

- 27 Proviso Response, which is Attachment A to this motion, in compliance with 2019-2020  
28 Biennial Budget, Ordinance 18835, Section 95, Proviso P2, is hereby acknowledged.
- 29

Motion 15507 was introduced on 7/17/2019 and passed by the Metropolitan King County Council on 9/11/2019, by the following vote:

Yes: 9 - Mr. von Reichbauer, Mr. Gossett, Ms. Lambert, Mr. Dunn, Mr. McDermott, Mr. Dembowski, Mr. Upthegrove, Ms. Kohl-Welles and Ms. Balducci



KING COUNTY COUNCIL  
KING COUNTY, WASHINGTON

A handwritten signature in black ink, appearing to read "Rod Dembowski", is written over a horizontal line.

Rod Dembowski, Chair

ATTEST:

A handwritten signature in blue ink, appearing to read "Melani Pedroza", is written over a horizontal line.

Melani Pedroza, Clerk of the Council

**Attachments:** A. 2019 Human Papillomavirus Vaccination Budget Proviso Report

King County Office of Performance Strategy & Budget

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# 2019 Budget Proviso Report

## *Human Papillomavirus Vaccination Proviso Response Report*

As Requested By:  
Ordinance 18835, Section 95, Proviso 2  
Achieving Healthy People 2020 targets for HPV vaccine coverage in King County

June 30, 2019

## Executive Summary

Human papillomavirus (HPV) vaccination is a major cancer prevention breakthrough, but the full public health benefits of these vaccines have yet to be realized in the U.S. The U.S. Department of Health & Human Services' Healthy People 2020 plan establishes the goal of 80 percent HPV vaccine series completion for adolescents ages 13-15 years, however vaccination rates remain inadequate. Data from the Washington State Immunization Information System indicate that just 57 percent of adolescents ages 11-17 years in King County have initiated the HPV vaccine series and 39 percent have received at least two doses.

Budget Ordinance 18835, Section 95, required a report to develop a plan to achieve the national target of 80 percent HPV vaccination coverage for all adolescents ages 11-17 years residing in King County. The Ordinance required that the report include the following elements:

- a. Funding options of both existing and new revenue sources (addressed on page 39);
- b. Strategies to collaborate and coordinate with various stakeholders including schools, churches, health care providers, hospitals, community organizations, local jurisdictions and state agencies (addressed on pages 29-39);
- c. Identification of potential challenges and plans to mitigate those challenges (addressed on pages 13-28); and
- d. A timeline for achieving eighty percent vaccination of county residents between eleven and seventeen years old and identification of key milestones to monitor progress (addressed on page 40).

In order to reconcile the budget proviso directive and the stated Healthy People 2020 objectives, the goal of this report is to put forward a plan **to increase the percentage of adolescents aged 13-15 in King County who have completed the 2-dose HPV vaccine series to 80 percent.**

In winter 2019, the Immunization Program at Public Health – Seattle & King County (PHSKC) conducted an environmental scan to identify local barriers to and facilitators of HPV vaccine uptake in adolescents in King County. The purpose of this environmental scan was to guide development of strategies aimed at increasing HPV vaccination rates in adolescents in King County. Activities undertaken to develop this plan and complete the report included:

- Analysis of HPV vaccination coverage in King County to identify low uptake areas (Appendix C, Figure 2)
- Key informant interviews with local leaders and decision-makers using interview and recruitment tools adapted from the National Cancer Institute
- Focus groups with student HPV vaccine champions at local high schools with school-based health centers, and
- Qualitative analysis of key informant interviews and focus groups to identify major themes.

The key findings are summarized below.

Barriers to and facilitators of HPV vaccination in King County were identified at the system/policy, provider, and patient level. These were consistent with the literature, while being influenced by local factors such as current HPV promotion activities, authoritative recommendations from local agencies, minor consent laws, and state vaccine school entry requirements.

**Summary of barriers and facilitators identified in key informant interview, teen focus groups and VFC provider surveys**

<b>System / Policy Level</b>	<b>Provider / Practice Level</b>	<b>Patient / Parent Level</b>
<i>Barriers</i>	<i>Barriers</i>	<i>Barriers</i>
<ul style="list-style-type: none"> <li>• HPV vaccine not required for school entry</li> <li>• Minor consent laws open to interpretation/confusing.</li> <li>• No requirement for annual adolescent check-up</li> <li>• Cost (administration fee/reimbursement/WCC payment issues)</li> <li>• Washington State Immunization Information System (WA IIS) functionality</li> <li>• No nationwide Immunization Registry</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of standardized practice workflows</li> <li>• Lack of knowledge about HPV and HPV vaccine</li> <li>• Skill in making a quality recommendation</li> <li>• Assumptions about parental vaccine hesitancy</li> <li>• Discomfort discussing the vaccine and sexual transmitted infections</li> <li>• Inconsistent messaging within practice</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of knowledge about the vaccine and HPV disease</li> <li>• Concerns about the vaccine and misinformation</li> <li>• Challenges with access to immunization services</li> <li>• Infrequent preventive care/adolescent visits</li> </ul>
<i>Facilitators</i>	<i>Facilitators</i>	<i>Facilitators</i>
<ul style="list-style-type: none"> <li>• Expand mobile and school-based vaccination programs</li> <li>• Incentivized benchmarks</li> <li>• Update minor consent laws</li> </ul>	<ul style="list-style-type: none"> <li>• Incentivized clinic system improvements (e.g. reminder/recall)</li> <li>• Increased competency, skill and training regarding HPV and HPV vaccine</li> <li>• Skill in providing a strong, quality recommendation</li> <li>• Consistency in communication across clinic team</li> <li>• Routinely recommend HPV vaccine at age 9</li> <li>• Pharmacist and dentist recommendation and referrals</li> </ul>	<ul style="list-style-type: none"> <li>• Cancer prevention messaging from multiple trusted and influential sources</li> <li>• Promote the convenience of accessing HPV vaccine in alternative settings (SBHCs)</li> <li>• messaging &amp; different modes</li> <li>• Peer to peer education (parents &amp; teens)</li> <li>• Patient education re: importance of well-child exams in adolescence</li> <li>• Tailored/culturally appropriate</li> </ul>

Based on these findings, PHSKC identified three goals, twelve strategies, and thirty-seven activities that could contribute towards meeting the Healthy People 2020 target of 80 percent HPV vaccine series completion among adolescents aged 13-15 years in King County. Please

reference Table 5 on pages 42-45. Goals for improving HPV vaccination fall into three broad categories:

- 1) Advocating for policy changes that promote vaccination coverage and access;
- 2) Supporting health care providers to reduce missed clinical opportunities and make a strong recommendation for HPV vaccination; and
- 3) Increasing knowledge and acceptance of HPV vaccination among the public.

These goals are not ranked, recognizing that a combination of strategies across all three levels of influence on HPV vaccine uptake are necessary to achieve 80 percent Healthy People 2020 targets. In addition, coordination of efforts with local and state partners is a key element of all three goals. Public Health evaluated both research- and practice-based evidence in order to prioritize the strategies put forward in this report. Best, promising and emerging practices are described on pages 29-30. The table below identifies the goals, strategies, and practice framework based upon evidence review.

**Goals and Strategies, Practice Framework**

Goal	Strategy	Practice Framework
<b>1. Address system level barriers and advocate for policies that encourage HPV vaccination and maximize access to vaccination services</b>		
	a. Expand mobile and school-based vaccination programs	Best practice
	b. Incentivize benchmarks	Promising practice
	c. Advocate for updated minor consent laws	Promising practice
<b>2. Support healthcare providers to reduce missed clinical opportunities to strongly recommend and administer HPV vaccine</b>		
	a. Provide opportunities for participation in clinical quality improvement initiatives to operationalize evidence-based practice strategies (incentivized)	Best practice
	b. Increase provider knowledge of HPV and increase competency and skills to strongly recommend the vaccine	Best practice
	c. Routinely recommend HPV vaccine starting at age 9	Promising practice
	d. Ensure consistency in communication across the clinic team	Emerging practice
<b>3. Increase knowledge and acceptance of HPV vaccine among parents and adolescents, and promote access to vaccination in alternative settings</b>		
	a. Deliver cancer prevention messaging from multiple trusted and influential sources	Best practice
	b. Promote the convenience of accessing HPV vaccine in alternative settings (e.g. SBHCs)	Promising practice
	c. Support peer-to-peer education, both parent-to-parent and teen-to-teen	Promising practice
	d. Promote annual well child visits in adolescence	Emerging practice
	e. Deliver tailored and culturally appropriate messaging, in a variety of modes	Emerging practice

Looking toward a long term and comprehensive strategy, Public Health drafted a staged implementation of activities over four biennia (eight years) with a mix of both time-limited and

ongoing interventions for achieving the Healthy People 2020 goal of 80 percent HPV vaccination coverage. Activities leverage existing resources and demonstrate a high level of evidence of effectiveness based on research and practice. That said, given the many urgent needs of the Department, it is not recommended that these interventions be funded with County dollars.

- **Near-term strategies:** As described below, these efforts would leverage current funding through Best Starts for Kids and the county budget, which together would support two 1.0 FTE Program Manager positions and an external contract with AAP, to implement three best practice interventions. **\$262,841**
  - Leverage the BSK investment in adolescent immunizations to double the number of clinics participating in the King County Child and Adolescent Health Improvement Partnership (KCHIP) during 2020 (clinic cohort 2). This would serve an additional five clinics or target of 7,500 adolescents at a cost of **\$117,500**.
  - Launch a centralized reminder/recall postcard mailing to approximately 75,000 adolescents who are incomplete for HPV vaccine based on records in WA IIS. **\$50,000**
  - Expand the youth led School-based Health Center HPV Vaccine Promotion project to at least six additional high schools. The current budget of \$335,000 supports 1.0 FTE Program Manager to oversee this work. An additional **\$95,341** would fund 0.5 FTE PHSKC Family Planning Health Education Specialist, an external contract with Neighborcare, campaign incentives, and teen-designed materials.
  
- **The budget for first biennium** would support the implementation of **fifteen activities** in each of the twelve strategies and leverages current resources from the Washington State Department of Health and Best Starts for Kids to enhance several existing activities with minimal additional investment. Activities would include interventions that 1) train providers to present strong and consistent recommendations to all age-eligible patients, 2) offer opportunities for providers to participate in clinical quality improvement initiatives to operationalize best practices, and 3) promote alternative community-based vaccination access points (e.g. SBHCs). **\$1,455,092**
  
- **The budget for second biennium** would fund the implementation of **twenty-five activities** in each of the twelve strategies. Interventions would include the design and launch of a social marketing campaign that establishes HPV vaccination as the norm and promotes the convenience of alternative vaccination sites, hosting community forums, developing materials and resources for schools and other stakeholders, and increasing support to the health care provider community, primarily via KCHIP. **\$2,412,374**



- **The budget for third biennium** would support the implementation of **thirty activities** and builds upon the foundation established in the first four years of HPV vaccine promotion work. New activities would include formative research to develop culturally-competent messages, establishment of a contract with VaxNorthwest to adopt their Immunity Community parent-peer education approach for adolescent vaccines, advocacy work to grant adolescents independent authority to consent for HPV vaccine, and the purchase, operation, and staffing of a mobile vaccination unit. **\$2,975,737**
- **The budget for fourth biennium would support the continuation of twenty-seven activities** implemented in the previous four years, as well as a comprehensive evaluation of program activities. **\$2,862,878**

Detailed budgets can be found in Appendices G and H. The timeline for achieving 80 percent vaccination coverage in King County would be dependent on the level of dedicated resources. However, based on the experiences of other countries, it is estimated that it could require up to a decade to reach this goal. Leveraging work already underway and partnering with diverse partners across the county would increase the success and sustainability of identified strategies.

Activities to prevent cancer by increasing HPV vaccine uptake in King County is, and will remain, an important focus of the PHSKC Immunization Program and its partner organizations. However, in the absence of a significant investment in core public health services, it is PHSKC's position that any new money should be prioritized for strengthening the Department's capacity to effectively monitor, investigate and control the spread of legally reportable diseases as mandated by state law.

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## Proviso Text

As part of the adopted 2019-2020 budget, the Metropolitan King County Council included a proviso regarding human papillomavirus (HPV) vaccination coverage in King County. In 2017, fewer than half of adolescents residing in King County were up to date on the HPV vaccine, and just 61 percent of adolescents ages 13-17 years had received the first dose to start the HPV vaccine series.<sup>1</sup> In addition, adolescents living in suburban and rural regions of the county have been observed to have lower HPV vaccination rates compared with adolescents in urban areas. Recognizing that we are still far short of the US Department of Health and Human Services' Healthy People 2020 goal of 80 percent HPV vaccination coverage among age-eligible adolescents, the King County Council directed Public Health to develop a plan to achieve this national target for all adolescents ages 11-17 years residing in King County. The exact proviso language is below:

Ordinance 18835, Section 95

P2, DIRECTED TO PUBLIC HEALTH, PROVIDED THAT:

Of this appropriation, \$250,000 shall not be expended or encumbered until the Executive transmits a plan to achieve United States Department of Health and Human Services' Healthy People 2020 target of eighty percent human papillomavirus (HPV) vaccine series completion of county residents between eleven and seventeen years old and a motion that should acknowledge receipt of the plan and reference the subject matter, the proviso's ordinance, ordinance section and proviso number in both the title and body of the motion and a motion acknowledging receipt of the plan is passed by the council.

The plan shall include, but not be limited to:

- A. Funding options that should evaluate both existing and new revenue sources;
- B. Strategies to collaborate and coordinate with various stakeholders including schools, churches, health care providers, hospitals, community organizations, local jurisdictions and state agencies;
- C. Identification of potential challenges and plans to mitigate those challenges; and
- D. A timeline for achieving eighty percent vaccination of county residents between eleven and seventeen years old and identification of key milestones to monitor progress.

The Executive should file the plan and a motion required by this proviso by June 30, 2019, in the form of a paper original and an electronic copy with the clerk of the council, who shall retain the original and provide an electronic copy to all councilmembers, the council chief of staff and the lead staff for the health, housing and human services committee, or its successor.

## Framing the Issue: HPV and HPV vaccination in King County

One in four people in the United States—nearly 80 million—are infected with at least one type of Human papillomavirus (HPV), a group of viruses that causes the majority of cases of cervical cancer as well as oropharyngeal, anal, penile, vulvar, and vaginal cancers. HPV infections are the most common sexually transmitted infections in the United States and are typically contracted during adolescence soon after sexual debut. HPV-associated cancers develop years after acquisition of HPV infection and are responsible for about 42,700 new cancer cases each year in the United States (24,391 in women and 18,280 in men).<sup>2</sup> HPV also causes genital warts in men and women.

The HPV vaccine protects against the most common high-risk types of HPV virus that lead to cancers and genital warts. The U.S. Advisory Committee on Immunization Practices (ACIP) recommends routine HPV vaccination of girls and boys at 11 or 12 years of age. Initial recommendations for girls (in 2006) and boys (in 2011) called for a three-dose series. In 2016, ACIP updated its recommendation to state that adolescents who initiate the vaccine series before 15 years of age need only two doses separated by 6-12 months.<sup>3</sup> This recommendation has been endorsed by numerous U.S. medical professional societies and other organizations.

HPV vaccines are highly effective. Within 8 years of vaccine introduction, infections from the types of HPV included in the 4-valent (the first iteration of the vaccine, which targeted four strains of the virus) HPV vaccine decreased 71 percent among 14- to 19-year-olds and 61 percent among 20- to 24-year-olds.<sup>4</sup>

Furthermore, vaccine safety reviews have consistently demonstrated an excellent safety profile with over 100 million doses distributed in the U.S. through December 2017.<sup>5,6</sup> In 2013, the Director of the Centers for Disease Control and Prevention (CDC) announced that achieving higher HPV vaccination rates was a top public health priority. In 2019, the World Health Organization is focused on increasing coverage of the HPV vaccine worldwide.<sup>7</sup>

### ABBREVIATIONS

**ACIP:** U.S. Advisory Committee on Immunization Practices

**CDC:** U.S. Centers for Disease Control and Prevention

**DOH:** Washington Department of Health

**F.L.A.S.H.:** Public Health – Seattle & King County’s Family Life and Sexual Health

**HPV:** human papillomavirus

**KCHIP:** King County Child and Adolescent Health Improvement Partnership

**NCI:** U.S. National Cancer Institutes

**NIS:** U.S. National Immunization System

**SBHC:** school-based health center

**VFC:** U.S. Vaccines for Children Program

**WA IIS:** Washington State Immunization Information System

Despite the demonstrated benefits, safety and efficacy of the vaccine, progress in the U.S. toward achievement of the Healthy People 2020 goal of 80 percent HPV vaccination coverage among 13-15 year-old adolescents has stagnated, resulting in ongoing vulnerability to HPV-related morbidity and mortality. 2017 National Immunization Survey (NIS) data indicate that just 48.6 percent of adolescents in the United States were up to date with HPV vaccination; 65.5 percent had begun the series.<sup>8</sup> Coverage rates are marginally better in Washington State. In 2017, 55.2 percent adolescents residing in Washington were up to date on the HPV vaccine,<sup>9</sup> and 71.9 percent of adolescents ages 13-17 years had received the first dose to start the HPV vaccine series.<sup>10</sup>

County-level vaccination coverage data are not available from the NIS, however coverage rates can be estimated based on vaccination records contained in the Washington State Immunization Information System (WA IIS). Estimates from WA IIS indicate that vaccination coverage among King County teens is comparable to national and state levels: 52 percent of females and 48 percent of males aged 13-17 had completed two or more doses of HPV vaccine by the end of 2018. In addition, adolescents living in suburban and rural regions of the county have been observed to have lower HPV vaccination rates compared with adolescents in urban areas. For additional information about HPV vaccination rates and the prevalence of HPV-associated cancers in King County, refer to Appendices A, B and C.

While the King County Council directed Public Health to develop a plan to achieve this national target for all adolescents ages 11-17 years residing in King County, the Healthy People 2020 objectives differ from the budget proviso language. The objective for females was included in the Healthy People 2020 launch in 2010, and the objective for males was added in 2014. Both objectives in Healthy People 2020 are to “increase the percentage of adolescents aged 13 through 15 years who receive 2 or 3 doses of human papillomavirus (HPV) vaccine as recommended. Target: 80 percent.”<sup>11</sup>

**In order to reconcile the budget proviso directive and the stated Healthy People 2020 objectives, the goal of this report is to put forward a plan to increase the percentage of adolescents aged 13-15 in King County who have completed the 2-dose HPV vaccine series to 80 percent.**

Current PHSKC programs that promote and provide HPV vaccine in King County include the Vaccines for Children (VFC) program, Community and School-based Partnerships Program, School-based Health Center HPV Teen Champion Project, King County Child and Adolescent Health Improvement Partnership (KCHIP), Immunization Program staff representation on the Washington HPV Task Force, and the PHSKC Family Planning program and Public Health Centers. See Appendix D for a description of PHSKC HPV vaccine related activities to date.

## Methods/Approach

To respond to the budget proviso and develop strategies to improve HPV vaccination uptake in King County, Public Health sought to identify national and local barriers and facilitators to HPV vaccination. To that end, staff conducted a thorough literature review, developed and administered key informant interviews with stakeholders, conducted focus groups with teen HPV vaccine champions in local high schools, and administered a survey to health care providers affiliated with clinics enrolled in the VFC program. A list of stakeholder groups that were contacted and those that participated can be found in Appendix E. Some of the survey, focus group and interview questions were adapted using tools from previous National Cancer Institute grants. These grants provided funding to conduct environmental scans of HPV vaccine in grantee states and to establish linkages, focusing on HPV vaccine in pediatric settings<sup>12</sup>.

- *Key informant interviews:* Key informant interviews assessed health care providers' and other stakeholders' HPV vaccine practices, with questions focused on barriers to and facilitators of HPV vaccination in adolescents, and strategies to increase vaccine uptake. Interviewees were asked about patient, provider and system-level barriers and facilitators. Twenty-four key informant interviews were conducted. Interviews were between 30 and 60 minutes, and were recorded and transcribed. Key informants were not provided incentives for participation.
- *Student Champion focus group interviews:* Focus groups were conducted at two Seattle high schools that have onsite school-based health centers (SBHCs). Focus group questions centered on barriers to and facilitators of HPV vaccination, and about students' experiences as student HPV vaccine champions. Ballard High School and Cleveland High School student champions participated in the key informant interviews, including four students from each school, and were provided snacks and gift cards for their participation.
- *VFC program Primary Care Provider HPV vaccine survey:* A 16-question online survey was sent via email to 1,614 physicians affiliated with clinics enrolled in the VFC program in King County. The survey assessed health care providers' HPV vaccine practices, with questions focused on barriers to and facilitators of HPV vaccination in adolescents, and strategies to increase vaccine uptake. Health care providers were asked to report on patient, provider and system-level barriers and facilitators. Approximately 140 emails were returned as undeliverable. Two hundred forty-five surveys were completed; a nearly 16 percent response rate. The survey was open for five weeks.
- *2012 survey and focus groups:* In addition to the survey, focus groups and key informant interviews completed in 2019, data from focus groups and surveys with Somali, Eritrean, and Hispanic youth and parents conducted by Public Health in 2012 were reviewed and included

in this analysis. This work was conducted in collaboration with Global 2 Local as part of a grant-funded project which assessed parent and adolescent knowledge, attitudes and barriers related to adolescent vaccinations and promoted vaccination through tailored outreach to Hispanic, Somali, and Eritrean families living in Burien, SeaTac and Tukwila. These cities were chosen because they are among the most diverse in Washington State; 47 percent of the population in these cities is non-white, 31 percent are foreign-born, and 20 percent are living below the federal poverty level. Surveys were administered by Global 2 Local-employed Hispanic, Eritrean, and Somali community health promoters (CHPs) to adolescents 15–18 years of age and parents of adolescents 11–18 years of age residing in SeaTac, Tukwila and Burien. Surveys were professionally translated into Spanish, Tigrinya and Somali, reviewed by the CHPs for accuracy, revised accordingly, and pretested with a small sample of community members. Focus groups were conducted in the native language of each group and facilitated by the CHPs.

## **Barriers & facilitators of HPV vaccine uptake**

Multiple factors affect HPV vaccination uptake. Research has shown that providers and patients tend to divide the barriers and facilitators to HPV vaccination into three major categories: health system/policy level, provider/practice level, and patient level.<sup>13,14</sup> Grouping barriers and facilitators in this way helps develop strategies and multilevel interventions to improve vaccination rates. The list below is not exhaustive, but the barriers and facilitators included in this report were cited multiple times by stakeholders and/or are supported by the literature.

### **Health system and policy level barriers**

The local health system and policies shape the environment in which we live and have significant potential to impact large populations. In the course of gathering information from health care providers and other key stakeholders about barriers and facilitators to HPV vaccination, several respondents identified health system and policy factors that, while important, are not within Public Health's scope or authority to address.

#### **School entry requirement for HPV vaccine**

Sixty-seven percent of VFC provider survey respondents and half of key informant interviewees cited lack of a school entry requirement for HPV vaccine as a barrier to vaccine uptake. The Washington State Board of Health has authority under RCW 28A.21.140 to adopt rules establishing the immunization requirements for school and child care entry. One of the criteria the Board considers when determining which immunizations to include in the rule is the likelihood of the disease spreading in a school setting.<sup>15</sup> One would not expect a student to contract HPV in their normal activities at school; therefore, HPV vaccine does not meet State Board of Health criteria for addition to school entry requirements. It is also likely that mandating HPV vaccination would be difficult to accomplish in Washington State.



### **Lack of clarity and strength of minor consent laws**

Minor treatment statutes give adolescents the ability to consent for testing and treatment of sexually transmitted diseases without the knowledge or involvement of their parents despite the fact that they are still considered minors.<sup>16</sup> However, these statutes do not currently allow adolescents to provide independent authorization for other preventive aspects of their health care such as immunizations and routine medical visits.

State law is generally the controlling authority for whether parental consent is required or minors may consent for their own health care, including vaccination. In Washington State, a health care provider may evaluate a child 13-18 for age, intelligence, maturity, training, experience, economic independence, general conduct as an adult, and freedom from the control of parents when initiating a Mature Minor determination. The determination is made in the best judgement of the treating practitioner, does not require parental involvement, and does not require satisfaction of all the categories. It does require both the consent of the minor and their understanding and appreciation of the consequences of the treatment. This determination includes non-emergency medical services, and immunizations are usually included in this category. However, because of the discretion given to the practitioner in the law, individual medical facilities are advised to consult with their legal counsel for decisions about how they will practice within the law. This results in uncertainty about the legal requirements for consent and inconsistent practices across the state. Furthermore, research suggests that requiring parent/guardian consent limits the success of vaccination programs that target adolescents outside the medical home, especially in school-based vaccination programs.<sup>17</sup> Seven key informants and one VFC provider (in free text response) mentioned minor consent laws as a barrier to HPV vaccination.

### **No requirement for an annual adolescent check-up**

While the American Academy of Pediatrics recommends annual physical exams in adolescence,<sup>18</sup> and most payers will cover the cost of an annual physical exam, there is usually no requirement for physical exam unless a school or team requires a sports physical. Schools in Washington State require students to receive Tdap (tetanus, diphtheria and pertussis) vaccine prior to entering sixth grade, but do not usually require a physical exam for school entry. In a 2018 study that looked at patterns of adolescent primary care visits, authors found that only 35 percent of adolescents had made a preventive care visit in the previous twelve months.<sup>19</sup>

### **Cost**

In 2019 key informant interviews, two stakeholders hypothesized that cost, co-pay, and vaccine administration fees might be a barrier to HPV vaccination. Two stakeholders mentioned that although pharmacies might offer the HPV vaccine, some health plans will not pay for pharmacy-administered vaccines. Vaccination costs, including co-pay, office visit fees, and vaccine

administration fees, were identified in the 2019 surveys and interviews as barriers to HPV vaccination. In a 2014 review of fifty-five articles about barriers to HPV vaccination among U.S. adolescents, five articles cited cost as a barrier to vaccination.<sup>20</sup>

### **WA IIS functionality**

In both interviews and surveys, providers reported challenges using the WA IIS system. Reviewing the patients assigned to their practice and unlinking those that were never or are no longer seen in that practice is a laborious and time consuming effort; many clinics don't have the staffing for these activities. Four providers interviewed and two survey respondents shared reminder/recall limitations in their practices. Though about 95 percent of 2019 VFC provider survey respondents stated they use an electronic medical record, providers reported using reminder/recall for HPV vaccination at low rates (20 percent use mail, 21 percent use phone, and about 5 percent text their patients). Client reminder/recall systems are promoted as a best practice to increase vaccination rates.<sup>21,22,23</sup> Practices with reminder prompts in the electronic medical records have higher rates of HPV vaccination initiation and completion than those without.<sup>24</sup> Less than 50 percent of 2019 survey respondents reported using prompts or reminders in patient records to remind them patients are due for vaccine. If health care providers lack an effective system for reminder/recall, and challenges with the WA IIS discourage providers' use, then they are less likely to effectively send reminder to patients who are due or to recall patients who are overdue for HPV vaccine.

### **A nationwide immunization registry does not exist**

The challenges of getting complete immunization records, especially for children who have moved across state or national lines, was brought up repeatedly in key informant interviews. Multiple respondents recommended the creation of a national immunization registry. Currently, 50 states and 5 cities in the U.S. have their own IIS, and as CDC awardees, must adhere to a set of national guidelines. However, these systems were not designed to communicate with each other, and a large, national system does not exist. Ideally, all of the individual state systems would communicate and immunization records would be available to providers throughout the country, however the 2018-2020 Immunization Information System (IIS) Strategic Plan does not indicate any plans for a nationwide immunization registry and the 10th Amendment allows states to control their own public health issues, including the data in immunization registries.<sup>25</sup>

## **Health system and policy level facilitators**

Health system and policy level strategies have the potential to create significant impacts. Facilitators of HPV vaccine uptake at the system and policy level include:

### **Expand mobile and school-based vaccination programs**

Recognizing that several characteristics of service delivery influence HPV vaccine initiation and completion, the 2013 President's Cancer Panel supports promoting and facilitating HPV vaccination in complementary venues where adolescents receive health care such as school-

based health centers. A systematic review of national and international interventions to increase HPV vaccine uptake over nine years observed two major advantages to school-based vaccination programs: 1) increased access to the HPV vaccine and 2) the ability to reach a large, diverse population, regardless of individual access to health care.<sup>26</sup> An intervention in Colorado comparing schools with vaccination clinics to schools without them demonstrated that students were more likely to receive the HPV vaccine in schools with vaccination clinics, highlighting the importance of increased access and convenience needed to achieve high HPV vaccination coverage levels.<sup>27</sup> Additionally, the majority of those who received the first dose of HPV vaccine completed the series. This implies that with greater participation, school-based vaccination programs have the potential to achieve high HPV vaccine completion rates and provide health care access for underserved populations.

*The fact that we can also say, your school might also provide these vaccinations and here's another place that you could get them if you want to think about it, but don't necessarily want to come back to our clinic.” -2019 key informant*

*“I think the school based clinics are so important for reaching the people who don't have a medical home...I think you need to get more school based clinics into Bellevue, Renton, Kent, more places so that kids can access the care.” -2019 key informant*

*I usually get it [HPV information] here at the teen health center just because they provide so much resources for me to access. And it's all free. And I love how the teen health center, it's like everything's confidential. So, I feel like I can come here for like if I have questions on other shots or like physicals and what I need to do to be healthy. – Student HPV Champion, 2019*

### **Incentivized benchmarks**

In 2016, the National HPV Vaccine Roundtable, a group of national experts, identified and prioritized research gaps that show promise for increasing HPV vaccination.<sup>28</sup> The group identified financial incentives from health insurers and plans, including reimbursement contingent upon meeting HPV vaccination goals, as potential means to increase vaccination rates. Indeed, health systems, payers, and integrated delivery networks (IDNs) play a unique role in their ability to track patients, invest in health information technology, and incorporate population health approaches and preventive strategies that meet the strategic needs of the populations they serve. Health systems and IDNs can and should promote ACIP recommendations, including those for HPV vaccination. The inclusion of accountability measures for HPV vaccination into the strategic and operational plans of health systems, payers, and IDNs can support sustained attention for HPV vaccination. Several stakeholders mentioned holding providers accountable by publishing their HPV vaccination rates, encouraging competition between clinics, and by offering financial incentives for reaching specific targets for HPV vaccination. Financial incentives by health plans for vaccinations have proven successful with medical practices.<sup>29</sup>

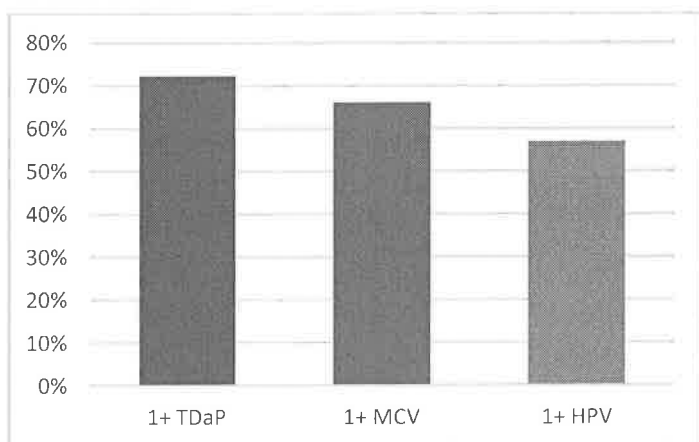
### Update and strengthen minor consent laws

Minor treatment statutes were developed in response to evidence about adolescents' health-seeking and risk-taking behavior, acknowledging that adolescents' independent access to reproductive health care services currently plays a vital role in maintaining personal and public health.<sup>30</sup> Adolescents under 18 years of age present a specific set of challenges, because they represent a group that can be targeted before the initiation of sexual activity but do not have the authority to vaccinate themselves against the HPV virus. Extending the existing minor treatment statutes for adolescent reproductive health care to apply to prevention as well as to testing and treatment of sexually transmitted infections would allow for adolescents' independent access to the HPV vaccine. Given that the majority of cervical and oropharyngeal cancers are HPV related and can occur years after the original infection (often acquired in adolescence or young adulthood) such a policy change would represent an effective public health intervention that could reduce HPV-related morbidity and mortality of women and men of all ages.

### Provider and clinic level barriers

The fact that HPV vaccination rates are low compared with other adolescent vaccination rates indicates that missed opportunities exist for simultaneous administration of HPV with other routinely recommended vaccines such as Tdap and meningococcal vaccines.<sup>31</sup> Seventy-two percent of 11-17 year old adolescents residing in King County have received Tdap vaccine and 66 percent have received meningococcal vaccine. In comparison, just fifty seven percent of adolescents have received at least one dose of HPV vaccine (Figure 5).

**Figure 5: Immunization coverage among King County adolescents aged 11 - 17 years old as of 12/31/2018**



### Lack of standardized workflows to maximize vaccine uptake

When adolescents do receive preventive health care visits, opportunities to vaccinate are frequently missed. A chart review of 1,628 adolescents seen at a pediatric practice in Seattle from 2006 to 2011 found the percentage of missed opportunities was 82 percent for MCV

(meningococcal), 85 percent for Tdap, and 82 percent for the first HPV dose (females only).<sup>32</sup> Another large U.S. survey of almost 24,000 adolescents enrolled in Harvard Pilgrim Health Care in 1997-2004 found an average of five missed opportunities to vaccinate occurred for each adolescent who was eligible to receive an immunization and had contact with the healthcare system.<sup>33</sup> In both studies, adolescents who did not seek preventive care were even less likely to receive recommended vaccines. Three key informants identified lack of standardized workflows as a barrier to vaccine uptake, while ten cited better design of office processes as a facilitator of vaccine uptake.

*“Having process in place with my flow staff, some sort of standard work that involves looking at every single person before the visit starts, before they check in, looking at the people on the schedule, seeing what they're due for. And if they're due for HPV, having consent form and a VIS form...having the flow staff say, “Yeah, okay, so he'll be in as soon as he's done with you know to fix your arm and here, this is what you're due for today. You need to sign you need to check off this box and this box and this box. You need to sign this. And as soon as you're done with it, if you want I'll take it back to the injection room... -2019 key informant*

### **Lack of knowledge about HPV and the HPV vaccine**

Eleven key informant interviewees reported lack of HPV knowledge as a significant provider-level barriers to HPV vaccination. While ninety-one percent of 2019 VFC provider survey respondents did not agree that lack of provider knowledge about HPV-related disease and HPV vaccine was a provider-level barrier to HPV vaccine, multiple studies have identified providers' inadequate knowledge of HPV epidemiology and the vaccine as barriers to vaccination.<sup>34,35,36</sup> A 2017 study of providers' knowledge demonstrated wide variations in HPV knowledge, impacted by specialty type and whether they were a VFC provider or not.<sup>37</sup>

### **Lack of skill in providing a quality HPV vaccine recommendation**

Research demonstrates that the single most important factor influencing a parent's decision to have their adolescent vaccinated is the physician's strong recommendation, however physicians are not always communicating with families about disease risk and vaccine benefits, nor routinely recommending adolescent vaccines.<sup>38,39,40,41,42, 43,44</sup> An analysis of 2009 National Immunization Survey-Teen (NIS-Teen) data found that absence of a provider recommendation was a main parent-reported reason for not getting their adolescent immunized.<sup>45</sup> Furthermore, the absence of a provider recommendation has consistently emerged as a top reason for adolescents not receiving vaccines based on both local and national survey data.<sup>46,47,48,49,50,51</sup> Five 2019 key informants reported lack of skill in strongly recommending the vaccine as a provider-level barrier to HPV vaccination. The Immunization Program's 2012 surveys and focus groups demonstrated the importance of a strong provider recommendation. There was nearly universal agreement among mothers that they would vaccinate their adolescents with Tdap, MCV4 and HPV if recommended to do so by their doctors. Furthermore, Eritrean, Hispanic and Somali

parents all agreed that doctors and health care providers are trusted sources of health information.

### **Assumptions about parental vaccine hesitancy**

Thirty percent of VFC providers surveyed agreed that concerns about parent resistance or refusal are a provider- or practice-level barrier to immunizing patients against HPV. One provider interviewed reported that assumptions about parent beliefs impacts their recommendation for the vaccine. Four key informants mentioned provider fatigue recommending HPV vaccine in the face of parent vaccine hesitancy. A 2013 study identified providers' fear of alienating parents by discussing HPV vaccination, especially with parents who had previously declined. Some providers would rather not offer the vaccine for fear of losing the patient.<sup>52</sup> A 2018 systematic literature review of sixty articles concerning U.S. health care providers' knowledge, attitudes and practice of HPV vaccination noted physicians' perceived parental hesitancy for HPV vaccine to be widespread. In reviewing the articles for providers' attitudes and beliefs about recommending HPV vaccine, the authors found forty three articles that identified providers' anticipated or experienced parental concerns to be a provider-level barrier to HPV vaccination.<sup>53</sup>

### **Desire to avoid uncomfortable conversations about the HPV vaccine's association with sexual activity**

Only seven percent of VFC providers surveyed in 2019 agreed that discomfort discussing sexuality and/or sexually transmitted infections was a provider-level barrier to HPV vaccination. However, in key informant interviews, several stakeholders believed that some providers were uncomfortable discussing sexuality or the sexual nature of HPV transmission and studies have demonstrated health care providers' hesitancy to recommend the vaccine, particularly to younger adolescents.<sup>54</sup> The Presidents' Cancer Panel identified "providers' discomfort talking to parents and adolescents about a topic related to sexual behavior" as a key factor contributing to providers' hesitancy in recommending HPV vaccine.<sup>55</sup>

*"I do think that people have a hard time with the conversation. I think nobody wants uncomfortable conversations. And I think that this vaccine was enough of a hot button issue for just enough people that a lot of providers feel as though it's going to be an uncomfortable conversation to have if they offer it and the parent doesn't want to get it because it's going to be a conversation about sex." -2019 key informant*

### **Inconsistent HPV messaging across practice staff**

Four key informants interviewed in 2019 stated that there was inconsistent messaging about the HPV vaccine across office staff in their practices. When asked who was responsible for introducing or recommending HPV vaccine in their practice, ninety percent of King County VFC provider survey respondents chose their clinic's primary care providers, sixty eight percent chose medical assistants, and thirty percent said nurses. This indicates the importance of all clinical staff providing consistent messaging about HPV vaccine.

*“I know that I’ve occasionally I’ve had this all tucked in, I’ve had consent forms signed, I’ve sent people to the injection room and I’ve been crossed up by my injection room staff”. -2019 key informant*

## **Provider and clinic level facilitators**

### **Incentivized clinic system improvements (e.g. reminder/recall systems)**

Immunization reminder/recall systems are cost-effective methods to identify and notify families whose children are due soon for immunizations (reminder) or are already behind (recall). The Community Preventive Services Task Force and the CDC recommend reminder/recall as an evidence-based strategy to increase HPV vaccination uptake.<sup>56,57,58</sup> In a 2016 systematic review of eight studies that looked at client reminder/recall systems, researchers observed strong support for the use of these systems to ensure optimal vaccination rates.<sup>59</sup> A 2012 study comparing patients that received reminder/recall for adolescent immunization to those that did not found significantly higher adolescent vaccination rates among patients that received reminder/recall notifications.<sup>60</sup> Locally, 53 percent of 2019 VFC provider survey respondents agreed that a lack of reminder/recall systems for follow-up doses of HPV vaccine was a practice-level barrier to immunizing patients against HPV. Seventy-six percent of providers surveyed agreed that reminder systems for patients to get doses two and three was important to increase vaccine coverage in adolescents. Eight of the key informants interviewed suggested reminder/recall as a strategy for improving vaccination uptake. Providers identified office processes as key to improving HPV vaccine uptake.

### **Provider education**

A 2015 study demonstrated low baseline knowledge of HPV epidemiology and vaccine among physicians, medical students and other healthcare workers who participated in the study. One-third of participants did not know the recommended age for vaccine administration, and over forty percent did not know the recommended intervals of doses. After educational intervention, knowledge scores improved significantly, across medical specialties, gender, age and race.<sup>61</sup> A 2019 study tested a 20-minute training video intervention for physicians and allied health professionals. There were significant increases in knowledge and self-reported comfort with the skills needed to facilitate vaccination post-intervention.<sup>62</sup> This study demonstrates the positive impact provider education has on knowledge of HPV epidemiology and vaccine. Five key informant interviewees included provider training and education and a facilitator of HPV vaccination.

### **Strong, high quality provider recommendation for the HPV vaccine**

A study reviewing data from the 2014 National Immunization Survey--Teen found that 75 percent of respondents who answered “no/ don’t know” about their intent to vaccinate their adolescents in the next 12 months had never had a healthcare provider recommend the

vaccination.<sup>63</sup> A 2017 study observed that providers who reported that they strongly recommended HPV vaccine frequently had higher rates of completion of the HPV vaccine series than those who reported doing so less frequently.<sup>64</sup> Strong provider recommendation is routinely cited as the most important factor in determining whether a parent/patient chooses to vaccinate for HPV. “Despite availability of safe and effective HPV vaccines, the main reasons reported for not vaccinating teens against HPV underscore that addressing knowledge gaps among parents as well as increasing clinicians’ HPV vaccination recommendations are critical to protecting teens against HPV-associated cancers and genital warts.”<sup>65</sup>

### **Consistent training and messaging across office staff**

The CDC recommends that all office staff receive training on communicating with parents and patients, and that “everyone is on the same page when it comes to proper vaccination practices, recommendations, and how to answer parents’ questions.”<sup>66</sup> The American Cancer Society recommends the same strategy.<sup>67</sup> The President’s Cancer Panel recommends that all office staff be engaged in HPV vaccination efforts. “All office staff who interface with patients should be trained to ensure consistent, positive messaging about the vaccine.”<sup>68</sup> Four of the 2019 key informants suggested standardizing practice and setting clear office policy to improve vaccination uptake. In 2016, the National HPV Vaccine Roundtable, a group of national experts, identified and prioritized research gaps that show promise for increasing HPV vaccination. A key gap noted was how to intervene with an entire medical team, noting a need for more evidence on engaging the entire office.<sup>69</sup>

### **Recommendation of the vaccine starting at age 9**

HPV vaccine is approved for administration beginning at age nine. While the major governmental organizations and professional associations standard guideline is to administer at ages 11-12 (i.e., American Academy of Pediatrics, U.S. Advisory Committee on Immunization Practices), many are seeing a benefit to recommending HPV vaccine earlier. Immunogenicity studies have shown that two doses of HPV vaccine given to 9–14 year-olds at least six months apart are as good as, or better, than three doses given to older adolescents and young adults.<sup>70</sup> The VFC provider survey identified that about 65 percent of medical practices currently introduce the vaccine at ages 11-12. Key informants cited several reasons to start recommending the vaccine earlier: more opportunity to complete the series if started earlier, strong immune response when given younger, and less focus on sexual transmission of HPV when recommended at age 9. Local clinics with high HPV vaccination rates note that they begin recommending the vaccine at age 9.

*“If you start at nine, there'll be all that many more visits where you will have them there.”*

*“3 shots at once for an 11 year old is a lot emotionally for these kids. I often have families that want to immunize but elect to wait another year to alleviate the stress and just do 1 or 2 shots - they will usually choose Meningitis over HPV to do immediately.”*



*“The reason I worry about starting at 11 is that as a kid starts to swing into Junior High...It's not unusual for me to go two, three, four years at a time without seeing those kids again, despite our best efforts to get them in.”*

*You know there's a big emphasis on the 11 year platform because that's when we want to get the Tdap and then the first dose of Meningococcal. The truth of the matter is I think that the later that you start this, the less likely that you are to be able to finish it. “*

-2019 Key Informant Interviews

### **Pharmacists and dentists can make strong recommendations and referrals**

As members of the immunization neighborhood, pharmacies and dentists are uniquely positioned to have a positive impact on HPV vaccine uptake. Americans visit pharmacies regularly and, on average, a pharmacy is available within two miles of every home in the U.S. Similarly, children and adolescents have regular dental visits and 2016 data show that over 84 percent of 2-17 year olds received a dental visit in the previous year.<sup>71</sup> Moreover, dental professionals know the importance of oral cancer screenings and the role HPV vaccination plays in cancer prevention. Both pharmacists play an important role in making effective HPV vaccine recommendations and referrals.

### **Patient level barriers**

A key factor influencing HPV vaccine coverage levels is the extent to which parents accept HPV vaccine for their children. Literature review and local data collection suggest that many parents need more information before vaccinating their children. Frequently cited parent-level barriers included:

#### **Concerns about the vaccine promoting sexual behavior**

At the time of implementation of human papillomavirus (HPV) vaccine immunization programs, concerns were raised by parents, clinicians, and public health professionals about HPV vaccination possibly leading to riskier sexual health choices among young females. Despite persistent attitudes that the HPV vaccine could encourage sexual promiscuity, research has demonstrated that teens are no more sexually promiscuous in states that have passed legislation promoting the HPV vaccine than those living in states that have not.<sup>72,73</sup> Parent concern about the vaccine promoting sexual activity was identified as a barrier to vaccine uptake by two 2019 key informant interviewees and fifty percent of VFC provider survey respondents.

#### **Low perceived risk of HPV infection**

Studies of women and young adults have shown generally poor knowledge about HPV, Pap smear testing, and cervical cancer.<sup>74,75</sup> Current research indicates that understanding has improved, however knowledge of some relevant issues is higher than others. A review by Brewer and Fazekas reported that only 21 percent of respondents knew that HPV is common, 59 percent

knew the purpose of a Pap smear, and 68 percent knew that HPV is a sexually transmitted infection.<sup>76</sup> In addition, awareness of HPV among a racially diverse sample of young adults, aged 18–26 years old, was found to be relatively high, with more than 75 percent of study participants indicating that they had heard of HPV from various sources.<sup>77</sup> However, another recent study examining the acceptability of the HPV vaccination among Latina immigrants and African American women found that 61 percent of Latinas and 78 percent of African Americans had never heard about HPV.<sup>78</sup> Eighty four percent of King County VFC providers surveyed and four key informant interviewees identified low perceived risk of HPV infection as a barrier to vaccine uptake.

### **Concerns about vaccine safety**

Despite demonstrated safety of the HPV vaccine, parents and patients continue to have concerns about its safety.<sup>79</sup> Sixty five percent of study participants in an Alabama study identified concerns about vaccine safety as a barrier to vaccination.<sup>80</sup> Study participants in Hawaii asked for educational materials that included information on safety and side effects,<sup>81</sup> and a 2018 study of provider messaging about HPV vaccination demonstrated that 68 percent of parents wanted information about safety and side effects.<sup>82</sup> This observation was validated by Public Health’s VFC provider survey and key informant interview findings in which 79 percent of survey respondents and over half of key informant interviewees identified parent or patient concerns about safety as a barrier to vaccination.

### **Social influences have also been shown to influence parents’ decision to vaccinate**

Three key informant interviewees mentioned anti-vaccination messages on social media and the internet as an influence on parents’ concerns about the HPV vaccine, and seven survey respondents mentioned social norms to not vaccinate as impacting a parent’s decision. Public Health’s local teen HPV vaccine champion focus group participants thought there were parents who did not believe in vaccines and that their ideas came from the internet. Several recent studies document the impact of social norms on parents’ decision to vaccinate. In Australia, researchers noted that parents that ended up in a vaccine hesitant or resistant community are influenced by their social sphere,<sup>83</sup> while a study utilizing mathematical modeling and pertussis uptake in the United Kingdom found that social norms can either increase or decrease vaccine uptake, depending on the social conditions.<sup>84</sup>

### **Access to care**

Medical homes, which provide comprehensive preventive and primary care services for patients, are a key component for the delivery of immunizations to adolescents. However, forty-four percent of adolescents ages 6–17 years in Washington State lack a medical home and have lower rates of preventive care compared to infants and young children.<sup>85</sup> A recent analysis of data in the WA IIS registry (5/17/2019) found that seven percent (n= 16,250) of adolescents aged 11-17 were not assigned to a health care facility, suggesting they may not have a primary health care

provider. Forty-eight percent of VFC provider survey respondents agreed that lack of a medical home was a barrier to vaccination. In 2019 key informant interviews, four participants cited limited access to clinics in South East King County, and observed that it was inconvenient to get to a clinic for immunizations. Another participant noted that with the expected closure of the Kent Phoenix Academy SBHC, there are no SBHCs in South King County.

### **Low preventive care utilization**

Low preventive care utilization among adolescents is a recognized barrier to HPV vaccine uptake.<sup>86,87</sup> Evidence supports that vaccines are provided primarily during preventive care visits, however several studies have demonstrated low preventive-care utilization among adolescents compared to younger children, with notable differences in visit patterns according to age, gender and insurance status.<sup>88,89,90,91</sup> An evaluation of data from the Healthcare Effectiveness Data and Information Set (HEDIS) revealed that only one-third of adolescents had at least one preventive visit in the previous year.<sup>92</sup> Adolescents with lower socioeconomic levels or who are uninsured are even less likely to use preventive care services. National Health Interview Survey data from 2014 found that Hispanic adolescents aged 10-17 (27.8 percent) are more likely than non-Hispanic white (19.7 percent) and non-Hispanic Black (18.0 percent) adolescents to not receive a well-child checkup in the past 12 months. Adolescents with family income of 138 percent FPL or less (24.4 percent) were more likely to not receive a well-child checkup compared with those having family income greater than 138 percent FPL (19.8 percent). Adolescents who were uninsured were more likely to have not received a well-child checkup (54.2 percent), compared with those having private (18.8 percent) or public (19.4 percent) health coverage.<sup>93</sup>

In our 2012 survey and focus groups, Somali families reported being unaware of the American Academy of Pediatrics recommendation for an annual adolescent visit,<sup>94</sup> indicating that limited use of primary care services may be an impediment to immunization uptake among Somali adolescents. In stakeholder interviews, a disconnect was identified between patient and provider knowledge of insurance reimbursement for annual well-child checks and actual payer reimbursement. For example, a payer might reimburse for one well-child exam each year, from a child's first birthday until the next birthday, however clinics might interpret the policy as one exam each calendar year. Meanwhile, parents may be misinformed about whether a well-child exam will be covered by insurance, and forego scheduling.

## **Patient level facilitators**

### **Cancer prevention messaging**

Numerous national agencies and professional organizations, including CDC, National Institutes of Health, and the National Cancer Institute stress the importance and success of providing messages focused on the HPV vaccine's ability to prevent cancer.<sup>95,96,97,98</sup> One study noted that communications with parents were more effective if they included information about cancer prevention.<sup>99,100</sup> Five stakeholders participating in 2019 key informant interviews identified cancer prevention message as a facilitator of HPV vaccine uptake and five stakeholders

identified it as a strategy to increase uptake. Cancer prevention is one of the key messages the President's Cancer Panel recommends to health care providers to promote HPV vaccine uptake.<sup>101</sup> Additionally, several key informants mentioned dentists as a source of HPV vaccine anti-cancer messaging.

*“By trying to work as a team and then also having dental talk about oral cancers and that the HPV vaccine is one of the best way to prevent oral cancer, that's another – another – you know they don't actually give the vaccines but they can certainly help to educate and promote them.” – 2019 key informant.*

### **Ability to get HPV vaccine in alternative settings (School-based Health Centers)**

The President's Cancer Panel recognized that novel strategies to improve the delivery of vaccination services to 11 to 18 year olds should be implemented with the goal of increasing vaccine coverage.<sup>21</sup> For example, vaccines should be available and easily accessible at a variety of venues where adolescents receive healthcare, including school-based health centers (SBHCs). Studies have demonstrated that SBHCs are successful in improving access to health services for adolescents, such as counseling and treatment for mental health problems and substance abuse, management of chronic illnesses, the provision of reproductive health services, and immunizations.

Moreover, surveys of both parents and adolescents suggest that SBHCs are an acceptable setting for receiving vaccines. In a 2017 study of adolescents and parents, participants held favorable opinions about SBHCs as a venue for HPV vaccination. Adolescents cited the convenient location, hours and ease of scheduling as reasons for acceptance. Furthermore, using an SBHC to receive HPV vaccination was associated with taking responsibility for themselves.<sup>102</sup> 2019 key informants also reported convenience of SBHCs for parents and adolescents.

*“If I know a kid that I've given dose one to goes to one [SBHC], I can tell them that you know, “This is at your school, you can probably go and get dose two here and you don't need to come back and see me” which seems to make everybody happy.*

*“You also have to start putting yourself first and you have to start doing -- fending for yourself and a lot of ways. So this is a good way to kind of step outside of your comfort zone with your parents telling you how to do things and you have to start worrying about yourself and how you're going to start taking care of yourself.”*

-2019 Key informants

### **Parent peer-to-peer interactions**

Parent peer-to-peer interactions have demonstrated impact on parent attitudes towards vaccines. A public-private partnership of health organizations in Washington State developed and implemented a 3-year intervention involving parent peer advocates, called the “Immunity

Community.” Parents who had positive attitudes about vaccinations engaged with vaccine-hesitant parents in their communities. Evaluation of the intervention found that parents who interacted with a peer advocate had improved attitudes towards vaccines, with increased concern over parents not vaccinating their children, and self-reports of decreased vaccine hesitancy.<sup>103</sup> Four of the 2019 stakeholders interviewed mentioned the Immunity Community specifically as a parent-level facilitator of HPV vaccine uptake, and two key informants offered parent peer-to-peer interactions as a promising strategy to improve vaccine uptake.

**Student peer-to-peer interactions (particularly with high school students)** In Public Health’s 2019 key informant interviews, eight stakeholders suggested expanding the student HPV vaccine champion program as a means to increase HPV vaccine uptake. Five interviewees mentioned the current student teen champions as a facilitator of HPV vaccination and current student champions in two high schools were confident about their ability to educate and engage their fellow students as a means to increase HPV vaccination. Teen champions cited their interactive activities and being approachable as peers as important reasons for their success. Research suggests that peer education increases HPV vaccine knowledge and awareness. A 2018 study comparing students who received a 30-minute peer-to-peer educational session about HPV to those that did not found that the intervention group showed significant increases in willingness to accept facts about HPV, and 96 percent of intervention participants stated they had gained HPV knowledge.<sup>104</sup>

*I would say from experience, I think this [student HPV champion program] is definitely up there on the best way to raise awareness. I mean this and health class, I think are very much up there because I don't know -- I don't really, I wouldn't really trust online sources all the time or what my mom tells me because it could be biased. Hearing it from an unbiased source, I think it's a lot more effective.*

*“We're able to say get it here, for free, now, this second.”*

—Student HPV Champions, 2019

### **Tailored HPV education materials for patients**

Research indicates that providing adequate, clear and accessible information to parents can reduce concerns and misperceptions about vaccines.<sup>105</sup> In the 2019 key informant interviews, twenty-two interviewees identified patient education as an important strategy for increasing vaccine uptake. Forty-five percent of VFC provider survey respondents stated that educational materials for patients and families was an important facilitator of HPV vaccine uptake. The Immunization Program’s 2012 parent survey findings indicated that sixty-five percent of Hispanics and sixty-six percent of Eritrean or Ethiopian respondents preferred to learn about health topics by reading written materials. All three ethnic groups who participated in the 2012 survey and focus groups (Hispanic, Somali, Eritrean) expressed a desire to access vaccine information in their respective language(s) and in a variety of formats, including community

classes and small group settings. Moreover, research suggests that HPV vaccine-related awareness and knowledge are significantly associated with race/ethnicity, educational attainment, income, occupation, birthplace, parents' birthplace, English usage, health insurance coverage, type of health insurance, and child having a primary care provider, and that educational interventions in collaboration with diverse communities are needed.<sup>106</sup> In a 2018 review of health care provider's knowledge, attitudes and practices regarding HPV vaccination, authors recommended "educational materials should be available in multiple languages and should be accessible to patients and families who have low health literacy."<sup>107</sup>

Table 3 displays the main barriers to and facilitators of HPV vaccination that were heard from the 2019 stakeholders that might be acted upon by Public Health and its partners. All of these were cited in scientific literature except for discordance between agencies recommending HPV vaccine at 9-10 years of age versus 11-12 years of age.

**Table 3: Local barriers to and facilitators of HPV vaccine uptake in adolescents in King County**

Level	Barriers	Facilitators
System / policy	<ul style="list-style-type: none"> <li>• HPV vaccine not required for school entry</li> <li>• Minor consent laws open to interpretation/confusing</li> <li>• No requirement for annual adolescent check-up</li> <li>• Cost (administration fee/reimbursement/WCC payment issues)</li> <li>• WA IIS functionality</li> <li>• No nationwide Immunization Registry</li> </ul>	<ul style="list-style-type: none"> <li>• Expand mobile and school-based vaccination programs</li> <li>• Incentivized benchmarks</li> <li>• Update minor consent laws</li> </ul>
Provider / clinic	<ul style="list-style-type: none"> <li>• Lack of standardized practice workflows</li> <li>• Lack of knowledge about HPV and HPV vaccine</li> <li>• Skill in making a quality recommendation</li> <li>• Assumptions about parental vaccine hesitancy</li> <li>• Discomfort discussing the vaccine and sexual transmitted infections</li> <li>• Inconsistent messaging within practice</li> </ul>	<ul style="list-style-type: none"> <li>• Incentivized clinic system improvements (e.g. reminder/recall)</li> <li>• Increased competency, skill and training regarding HPV and HPV vaccine</li> <li>• Skill in providing a strong, quality recommendation</li> <li>• Consistency in communication across clinic team</li> <li>• Routinely recommend HPV vaccine at age 9</li> <li>• Pharmacist and dentist recommendation and referrals</li> </ul>
Patient / parent	<ul style="list-style-type: none"> <li>• Lack of HPV knowledge and awareness among the public</li> <li>• Concerns about the vaccine and misinformation</li> <li>• Challenges with access to immunization services</li> <li>• Infrequent preventive care/adolescent visits</li> </ul>	<ul style="list-style-type: none"> <li>• Cancer prevention messaging from multiple trusted and influential sources</li> <li>• Promote the convenience of accessing HPV vaccine in non-traditional settings (SBHCs)</li> <li>• Peer to peer education (parents &amp; teens)</li> <li>• Patient education re: importance of well-child exams in adolescence</li> <li>• Tailored/culturally appropriate messaging &amp; different modes</li> </ul>

## Strategies to increase HPV vaccine uptake

In order to respond to the proviso and identify strategies to increase HPV vaccination rates in King County, Public Health synthesized input from local stakeholders and conducted a comprehensive literature review of national and international interventions to increase HPV vaccine uptake, comparing the relative efficacy of these interventions.

For example, the immunization programs in Chicago and Philadelphia received 2013-2014 CDC funds to implement five specific interventions, in combination, aimed at increasing adolescent vaccination rates. Both cities saw great gains in HPV vaccine uptake as a result of the interventions. While the results of these multi-pronged interventions significantly improved vaccination rates, the relative success of each intervention was not individually evaluated.<sup>108,109</sup> While the combination of interventions described below are anticipated to be the most impactful, the relative contribution of each individual intervention is unknown.

Presented below are three goals, twelve strategies, and thirty-seven activities to achieve the Healthy People 2020 target of 80 percent HPV vaccination completion among adolescents aged 13-15 in King County. The goals are broad statements of desired program outcomes. The strategies are general approaches to achieve the goals. The activities are specific actions that would implement the strategies.

### Goals:

1. Address system-level barriers and advocate for policies that encourage HPV vaccination and maximize access to vaccination services
2. Support healthcare providers to reduce missed clinical opportunities to strongly recommend and administer HPV vaccine
3. Increase knowledge and acceptance of HPV vaccine among parents and adolescents, and promote access to vaccination in alternative settings

As recommended by the President's Cancer Panel,<sup>110</sup> these goals comprise a multi-level set of interventions, which in combination are likely to have the greatest impact on HPV vaccination uptake. For this reason, the goals are not presented in ranked order, however, the strategies (Table 4) and activities (narrative beginning on page 34 and in Table 5 on page 42) are presented in ranked order.

Public Health evaluated both research-based and practice-based evidence in order to prioritize the strategies put forward in this report. Best practices are defined as interventions proven, through rigorous evaluation, to be effective in improving population health when implemented in real-life settings. Promising practices are defined as interventions still in their infancy but show some signs of potential effectiveness in the long run. Emerging practices are interventions that



are new, innovative and which hold promise based on some level of evidence of effectiveness or change that is not research-based and/or sufficient to be deemed a 'promising' or 'best' practice. Staff also sought to take into account cost-effectiveness, expected program sustainability, and contextual factors (for example, political environment) that might influence the ability of the strategies to achieve the desired outcome. Low population impact strategies were excluded from consideration.

Table 4 describes the strategies for increasing HPV vaccine uptake along with a summary statement of the evidence to support the classification of a best practice or promising practice. Table 5 lists individual activities, lead agency and potential partners. The strategies and their associated activities are also described in the narrative below from most to least impactful.

**Table 4: Strategies to increase HPV vaccination uptake in adolescents in King County**

Goal	Strategy	Practice Framework	Evidence	Sustainability, Cost-effectiveness & Contextual Factors
<b>1. Address system level barriers and advocate for policies that encourage HPV vaccination and maximize access to vaccination services</b>				
	a. Expand mobile and school-based vaccination programs	Best practice	School-based vaccination programs have been shown to successfully increase access to HPV vaccine and reach a large, diverse population	<ul style="list-style-type: none"> <li>• Resource intensive</li> <li>• Not sustainable in the absence of continuous investment</li> <li>• ESJ considerations</li> <li>• Likely not cost-effective unless other services/vaccines are provided; cost potentially mitigated by billing insurance</li> </ul>
	b. Incentivize benchmarks	Promising practice	Difficult to distinguish the effect of pay-for-performance (PFP) with the effect of other improvement initiatives. Performance incentives <u>alone</u> do not appear to be effective at improving incentivized aspects of pediatric healthcare, including immunizations.	<ul style="list-style-type: none"> <li>• Many organizational, technical, legal, and ethical challenges to designing and implementing PFP programs</li> <li>• Resource intensive; potential to leverage resources with KCHIP</li> <li>• Consistent with current HEDIS measures and clinical guidelines</li> <li>• Sustainable; performance levels sustained even after incentive is removed</li> </ul>
	c. Advocate for updated minor consent laws	Promising practice	Interventions to increase adolescent vaccination should consider strategies that increase the ability of unaccompanied minors, particularly older minors, to receive vaccines within the context of legal, ethical, and professional guidelines. Regions where minors have access to vaccines without a parent present have higher HPV vaccination rates (e.g. Rhode Island and the City of Philadelphia).	<ul style="list-style-type: none"> <li>• Sustainable once passed</li> <li>• ESJ considerations</li> <li>• Success dependent on political environment &amp; legislative priorities</li> </ul>

Goal	Strategy	Practice Framework	Evidence	Sustainability, Cost-effectiveness & Contextual Factors
<b>2. Support healthcare providers to reduce missed clinical opportunities to strongly recommend and administer HPV vaccine</b>				
	a. Provide opportunities for participation in clinical quality improvement initiatives to operationalize evidence-based practice strategies	Best practice	Provider-focused interventions including repeated contacts, education, individualized feedback, and strong quality improvement incentives (e.g. Maintenance of Certification) have the potential to produce sustained improvements in HPV vaccination rates.	<ul style="list-style-type: none"> <li>• Resource intensive, however leverages existing resources with BSK investment &amp; KCHIP</li> <li>• Sustainable assuming clinics institutionalize evidence-based practices</li> </ul>
	b. Increase provider knowledge of HPV and increase competency and skills to strongly recommend the vaccine	Best practice	Health care provider communication with patients and families about HPV vaccination has a strong positive impact on HPV vaccine acceptability and uptake.	<ul style="list-style-type: none"> <li>• Low resource</li> <li>• Leverages existing resources with WithinReach webinars, KCHIP activities, and PHSKC AFIX/IQIP clinic visits</li> </ul>
	c. Routinely recommend HPV vaccine starting at age 9	Promising practice	Starting the HPV vaccine series earlier allows more time and opportunities to finish the two dose series, however this strategy has not been thoroughly evaluated.	<ul style="list-style-type: none"> <li>• Leverages existing resources with KCHIP and PHSKC AFIX/IQIP clinic visits</li> <li>• Low resource</li> <li>• Sustainable assuming practice is institutionalized</li> </ul>
	d. Ensure consistency in communication across the clinic team	Emerging practice	Not well studied; insufficient evidence to recommend	<ul style="list-style-type: none"> <li>• Leverages existing resources with KCHIP and PHSKC AFIX/IQIP clinic visits</li> <li>• Unknown/theorized impact on HPV vaccine uptake</li> </ul>
<b>3. Increase knowledge and acceptance of HPV vaccine among parents and adolescents, and promote access to vaccination in alternative settings</b>				
	a. Deliver cancer prevention messaging from multiple trusted and influential sources	Best practice	Informational interventions using both individualized and community-wide education campaigns improves vaccination uptake during the active intervention period. Perceived benefit of	<ul style="list-style-type: none"> <li>• Potentially resource intensive depending on scale</li> <li>• Not sustainable in the absence of continuous investment</li> </ul>

Goal	Strategy	Practice Framework	Evidence	Sustainability, Cost-effectiveness & Contextual Factors
			vaccination is associated with both intent and behavior.	<ul style="list-style-type: none"> <li>• Consistent with national (CDC) initiative</li> </ul>
	b. Promote the convenience of accessing HPV vaccine in alternative settings (e.g. SBHCs)	Promising practice	Parents and adolescents are comfortable with HPV vaccination in alternative settings and offering HPV vaccine in alternative settings may increase vaccine uptake, especially among hard-to-reach adolescents.	<ul style="list-style-type: none"> <li>• Limited reach if solely reliant on SBHCs as alternative settings</li> <li>• Low resource</li> <li>• Leverages existing SBHC HPV project/teen champions and social media campaign</li> <li>• Sustainable given continued funding</li> </ul>
	c. Support peer-to-peer education, both parent-to-parent and teen-to-teen	Promising practice	Peer and medical expert sources play a critical role in promoting HPV vaccination, however increased intent to vaccinate does not always translate into behavior.	<ul style="list-style-type: none"> <li>• Resource intensive</li> <li>• Not sustainable in the absence of continuous investment</li> <li>• Limited reach depending on number of peer champions</li> </ul>
	d. Promote annual well child visits in adolescence	Emerging practice	The AAP and Bright Futures recommend annual well-care visits during adolescence (ages 12-21) however there is insufficient evidence to support the promotion of well child exams in adolescents as an effective intervention to promote HPV vaccine uptake.	<ul style="list-style-type: none"> <li>• Potential to leverage resources with KCHIP</li> <li>• Low resource</li> <li>• Unknown impact on HPV vaccine uptake</li> </ul>
	e. Deliver tailored and culturally appropriate messaging, in a variety of modes	Emerging practice	Not strong evidence to recommend any specific educational intervention. Additional studies are required to determine the effectiveness of culturally-competent interventions reaching diverse populations.	<ul style="list-style-type: none"> <li>• Resource intensive</li> <li>• Unknown impact</li> <li>• Potentially limited reach</li> <li>• ESJ considerations</li> </ul>

The immunization system includes a diverse group of partners from across all sectors – government, industry, health systems, associations, academia, and non-profit – many of whom are currently supporting HPV vaccination efforts. Strengthening the effectiveness of local efforts to improve HPV vaccine coverage would require effective partnerships, funding, and consistent messaging. Collaboration with public, private, and volunteer organizations and individuals dedicated to reducing the incidence of and mortality from HPV cancers in the U.S. is a core component of each strategy.

### **Goal #1: Address system level barriers and advocate for policies that encourage HPV vaccination and maximize access to vaccination services**

Additional barriers to achieving optimal HPV vaccination coverage levels stem from system- and policy-level factors, including consent laws, incentives, health care utilization patterns among teens, and poor insurance coverage or reimbursement for some populations.

#### **Strategy 1a: Increase access in alternative settings**

##### *Activities:*

- i. Working with payers, DOH and the Washington State Pharmacy Association, advocate for expanded access to HPV vaccine at pharmacies. Consider a pilot-test to enroll up to 5 safety-net pharmacies in King County as VFC providers.
- ii. Continue to investigate alternate immunization site options with KCHIP members. Stakeholders identified urgent care, emergency departments, sites like the MultiCare vaccine clinic at South Hill Mall, and offering vaccine at community events as additional ways to increase uptake of HPV vaccine.
- iii. Staff a mobile immunization team that has a regular rotation in schools that don't have SBHCs. Investigate offering vaccines at other locations that serve youth in South King County, such as community centers and after school programs. Total impact score: 6.
- iv. Encourage medical providers to expand hours to accommodate office visits outside of normal business hours.
- v. Through the PHSKC School-based Partnerships Program, expand SBHCs to middle and high schools in South King County.

#### **Strategy 1b: Incentivize benchmarks**

##### *Activities:*

- i. Partner with health plans to develop provider incentives for on-time HPV vaccination via Health Plan Partnership of Washington, DOH and KCHIP.
- ii. Partner with commercial health plans to implement a pay-for-performance (P4P) program aimed at rewarding up-to-date immunization delivery to 11-12 year olds according to the ACIP recommended schedule. The performance measure would be consistent with the National Committee for Quality Assurance (NCQA) Health Plan Employer Data and

Information Set (HEDIS) benchmark of one dose of meningococcal (MCV) vaccine and one tetanus, diphtheria and acellular pertussis (Tdap) vaccine by the 13th birthday, with the addition of 2 doses HPV vaccine.

- iii. Advocate for tracking of HPV at the clinic level and health plan level to Washington Health Alliance Community Checkup in the Common Measure Set, including health plans and medical groups.

#### **Strategy 1c: Advocate for minor consent laws that allow adolescents to consent for vaccines**

- i. Work with advocacy groups and legislators to introduce bills to grant adolescents independent authority to consent to vaccination.
- iv. Work with professional medical societies, advocacy groups and legislators to extend the state's existing minor treatment statutes for adolescent reproductive health care to apply to prevention as well as to testing and treatment of sexually transmitted infections.

#### **Goal #2: Support healthcare providers in reducing missed clinical opportunities to recommend and administer HPV vaccine**

The fact that HPV vaccination rates lag behind other routinely recommended adolescent vaccines suggests that missed clinical opportunities occur and are, according to a recent report from CDC, the most important reason why the US has not achieved high rates of HPV vaccine uptake.<sup>111</sup>

While multiple studies have shown that a strong recommendation by a trusted health care provider is the most significant factor in parents' decisions to vaccinate their children with HPV vaccine, many health care providers report barriers to offering HPV vaccine – such as their own discomfort with addressing questions about sexually transmitted infections, limited understanding of the benefits of the vaccine (especially for males), and a personal preference for vaccinating teens who are older.<sup>112</sup>

Recognizing that primary care providers deliver most vaccinations in practice-based settings, the newly established King County Child Health Improvement Partnership (KCHIP) is well situated to play a key role in convening stakeholders to improve the frequency and strength of clinical recommendations, decrease missed opportunities for HPV vaccine administration, and increase local HPV vaccination rates. Moreover, KCHIP is responsible for providing clinical guidance for private practices and large health systems to engage physicians, physician assistants, and nurse practitioners and targeting evidence-based interventions and strategies that engage the entire health care team.

#### **Strategy 2a: Provide opportunities for participation in clinical quality improvement initiatives to operationalize evidence-based practice strategies**

*Activities:*

Leverage the BSK investment in adolescent immunizations to fund KCHIP for four biennia. KCHIP could manage three QI cohorts of clinics per year, recruiting a minimum of five clinics or targeting at least 7,500 adolescents per cohort. Specifically, KCHIP would:

- i. Support healthcare organizations in developing standing orders that authorize nurses to assess a patient's immunization status and administer vaccinations without the need for examination or direct order from an attending provider.
- ii. Support practices in developing clinic protocols to review vaccines at every visit.
- iii. Support clinics in sending reminders to patients who are due or and recall message to patients who are overdue for vaccinations via text, e-mail, phone or mail.
- iv. Encourage and provide technical assistance to clinics to utilize electronic medical record (EMR) decision support or paper chart reminders/prompts. This outreach activity would include designating specific clinic staff to check WA IIS to determine needed vaccines before each patient's appointment.

**Strategy 2b: Increase provider knowledge of HPV and increase competency and skills to strongly recommend HPV vaccine**

*Activities:*

- i. Through a partnership with WithinReach, the HPV Taskforce and KCHIP, educate health care providers through multiple channels, including in-person trainings and on-demand webinars (offering CE credit). Content would include information about the burden of HPV disease, HPV infection risks and benefits of HPV vaccination for both males and females, the critical role of a strong provider recommendation, and guidance about how best to make that recommendation. Promote American Academy of Pediatrics "HPV Vaccine: Same way same day" app and other opportunities for practicing new skills.

**Strategy 2c: Routinely recommend HPV vaccine to parents starting at age 9**

*Activities:*

- i. Standardize PHSKC Public Health Center policies for introducing HPV vaccine at age 9.
- ii. Through KCHIP, endorse, promote and share best practices around recommending vaccination beginning at age 9.
- iii. Use the VFC program as a vehicle for disseminating best practices around recommending vaccination beginning at age 9, including the Washington Vaccine Advisory Committee's position paper on this topic.
- iv. Develop posters with vaccine schedules for healthcare provider offices that show HPV recommended at age 9.

**Strategy 2d: Ensure consistency in communication across clinic team**

*Activities:*

- i. Engage medical assistants and nurses in the activities of the KCHIP QI Learning Collaborative.

- ii. Ensure that training and education developed for health care providers in activity 2a includes information that is applicable and relevant to the entire clinic staff.
- iii. Partner with KCHIP and WithinReach to develop webinars and resources specifically targeted to medical assistants, nurses, and other members of a clinic care team.

### **Goal #3: Increase knowledge and acceptance of HPV vaccines among parents and adolescents and promote access to vaccination in alternative settings**

Parents are critical to the successful provision of HPV vaccine. While parents want to protect their children from the harmful effects of HPV infection and are generally accepting of the vaccine, research also suggests that many parents need more information before vaccinating their children. Concerns about the vaccine promoting sexual behavior, low perceived risk of HPV infection, social influences, and irregular preventive care have been identified as some of the key barriers among parents. Public Health is uniquely positioned to engage with local stakeholders in the development of targeted family communication efforts with the goal of increasing knowledge of the benefits and importance of HPV vaccine.

#### **Strategy 3a: Deliver cancer prevention messaging from multiple trusted and influential sources**

##### *Activities:*

- i. Leverage resources and expertise with stakeholders to develop a comprehensive, coordinated social marketing campaign targeting parents through websites, PSAs, blogs, social media, and print. The campaign would include messaging consistent with CDC's "HPV is cancer prevention" branding. Stakeholders may include the Washington State Department of Health (DOH), Immunization Action Coalition of Washington (IACW), Kaiser Permanente, University of Washington, Seattle Children's, Washington Chapter of the American Academy of Pediatrics (AAP), Washington Chapter of the American Academy of Family Physicians (AAFP) and the American Cancer Society (ACS).
- ii. Work with colleagues in the Public Health Family Planning Program to incorporate HPV content into the high school F.L.A.S.H. comprehensive sexuality education curriculum. The curriculum is currently undergoing a five-year evaluation, but enhanced HPV content could be added when the evaluation is complete.
- iii. Work with the Washington HPV Taskforce, DOH and WithinReach to develop HPV education for dental providers and pharmacists. As described previously, pharmacists play an important role in making effective HPV vaccine recommendations and referrals. Similarly, dentists and hygienists are in a unique position to provide HPV education. They see patients twice a year and they are beginning to routinely screen for oral cancers.<sup>113</sup> Oral health professionals can use the oral cancer screening as an opportunity to recommend HPV vaccine to parents.



### **Strategy 3b: Promote the convenience of accessing HPV vaccine in alternative settings**

#### *Activities:*

- i. Partner with School-based Health Center sponsor organizations to facilitate SBHC patient registration throughout the school year (with a special emphasis at the beginning of the school year). Continue to work with SBHC sponsor organizations and school districts to create an online SBHC patient registration form.
- ii. Work with the King County Child Health Improvement Partnership (KCHIP) and WithinReach to develop a social media campaign promoting the value of SBHCs as complimentary vaccination sites targeted to local parents of children and adolescents.
- iii. Depending on funding to support the establishment of a mobile vaccination unit, develop a population-based campaign (social media, web presence, WithinReach Family Health Hotline) promoting the availability of low-barrier vaccination modeled after the PHSKC Healthcare for the Homeless program's Mobile Medical Van.

### **Strategy 3c: Support peer-to-peer education (both parent-to-parent and teen-to-teen)**

#### *Activities:*

- i. Sustain and expand the Student HPV Vaccine Champion program in at least six additional high schools in Auburn, Kent and Federal Way in partnership with PHSKC Family Planning Health Educators, and fund Neighborcare Health Educators to mentor Student HPV Vaccine Champions at four high schools.
- ii. Partner with VaxNorthwest to adopt their Immunity Community approach for adolescent vaccines, recruiting at least one parent advocate in middle schools in areas with the lowest HPV vaccine coverage rates (n=50) to educate parent peers about the benefits of HPV vaccine and to address misinformation (emphasize cancer prevention, vaccine benefits, efficacy and safety).

### **Strategy 3d: Promote annual well child exams in adolescence (National Performance Measure 10)**

#### *Activities:*

- i. Launch a centralized reminder system (e.g. postcard mailing) using information contained in WA IIS.
- ii. Use mobile devices, email, and social networking sites to promote prevention education and services. Social media vehicles offer low-cost avenues to develop and distribute health care messages tailored to adolescents.
- iii. Partner with state agencies, health plans (via Health Plan Partnership) and KCHIP to develop messages and materials (e.g. infographics) to distribute to practices and patients/parents regarding the importance of well child exams in adolescence and describing reimbursement policies.
- iv. Develop customizable posters for provider offices promoting annual well child exams for adolescents.

### **Strategy 3c: Deliver tailored & culturally appropriate messaging, in a variety of modes**

#### *Activities:*

- i. In an effort to engage with immigrant populations, partner with community health boards, faith-based organizations, and cultural centers to host a series of community forums facilitated by trusted health care professionals. These forums would offer parents an opportunity to learn about HPV vaccine and ask questions. Community forums have proven to be a desirable and effective means of communicating with some local immigrant populations on various health topics, including vaccine hesitancy.
- ii. For sub-populations, conduct formative research to develop culturally-competent messages and to identify accessible, acceptable, and impactful modes of communication – including translated materials and local radio ads where appropriate. Collaboration with multi-sector partners such as schools and faith-based and community-based organizations would expand the reach of the campaign.
- iii. Partner with the Office of Superintendent of Public Instruction (OSPI), school districts, and WA DOH to develop sample vaccine letters for HPV and MCV that are evidence-based and translated into multiple languages. These can be included in school enrollment packets and posted on school websites.

## **Current and Potential Funding Options**

The Public Health Immunization Program currently is funded with the following funding sources:

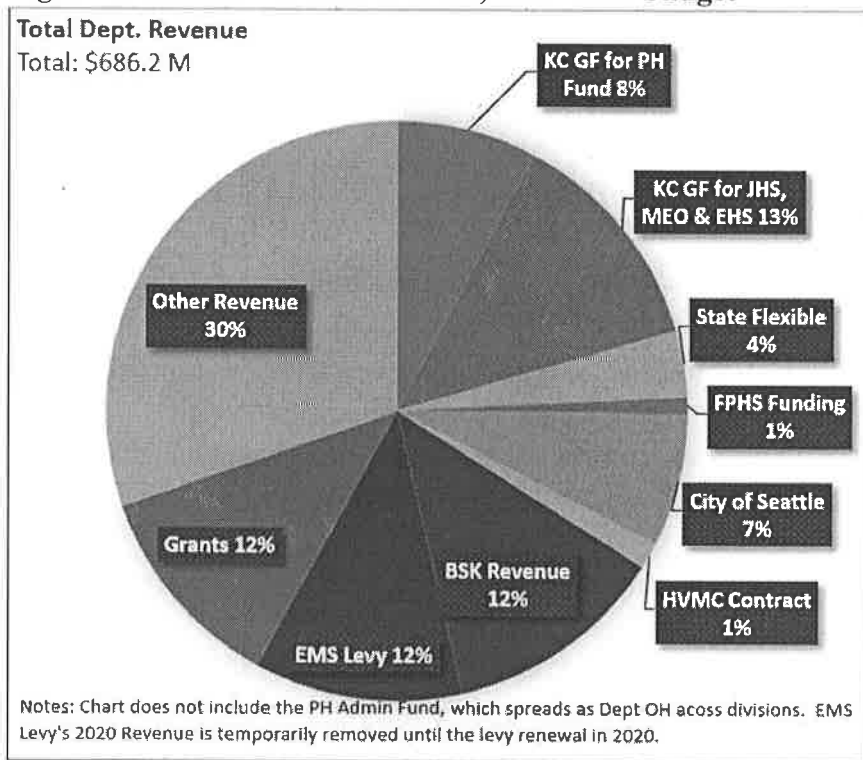
- Best Start for Kids provides about \$400,000 annually to fund one FTE Program Manager II and \$200,000 for external contract to support adolescent immunization work
- The PHSKC Immunization Program also received a \$65,000 Group Health Foundation grant which has supported the SBHC Teen HPV Vaccine Champion Project since 2015 and ends in August 2019.
- \$120,000 DOH grant focused on increasing childhood vaccination rates by working with schools and school districts (July 2018 – June 2019)
- One-time Council appropriation through King County General Fund of \$120,000 to purchase HPV vaccines for uninsured clients receiving family planning
- One-time Council appropriation through King County General Fund of \$335,000 to support 1.0 FTE to expand the “HPV Vaccine Peer Champion” program to increase knowledge and acceptance of HPV vaccine among parents/guardians and youth in the County.

HPV is an important and preventable public health problem, but the resources available to increase awareness of the consequences of HPV and promote the vaccine are limited. Aside from

current funding sources, there are no other funding opportunities available to support additional HPV vaccine promotion initiatives in King County. For the past few years, federal funding for public health and prevention programs (including immunizations) has been flat, and state and local funding for such programs has decreased. The CDC has not allocated additional funding specifically for HPV vaccine promotion efforts and federal Section 317 funds awarded to DOH do not support HPV vaccination work. Those funds go towards the purchase of vaccines for uninsured and underinsured adults and support critical state health department infrastructure functions such as disease surveillance and outbreak detection.

Furthermore, a very small proportion of Public Health’s budget is flexible funding and the majority is categorical funding allocated for specific programs and activities. Figure 6 outlines the revenue sources for Public Health & Seattle – King County, totaling approximately \$686 million. These budget challenges have resulted in delayed responses to state-mandated disease investigation work.

**Figure 6: PHSKC revenue sources, 2019-2020 budget**



## Implementation Timeline

Achieving the Healthy People 2020 guidelines would require significant investment. While resource-intensive interventions may be necessary to increase vaccination rates among populations with very low vaccination rates or communities where disparities in coverage persist, these interventions are likely to cost less if implemented as part of a stepped approach

over four biennia (eight years). Activities that leverage existing resources, have demonstrated a high level of evidence of effectiveness based on research and practice, and are the most likely to result in sustainable change over time are included in the first biennium.

A concerted effort would be necessary to optimize uptake of the HPV vaccine among adolescents in King County. Overall, this report identifies the use of multipronged interventions that target the provider and the patient, as well as policy and system-level strategies to reach the greatest number of adolescents and achieve the highest vaccination rates. Yet as previously noted, there is no clear roadmap for how best to significantly increase vaccination rates nor to estimate with a high degree of certainty how long it could take to achieve the Healthy People 2020 target.

Public health interventions often take several years to be broadly adopted and sustained. Looking to other countries that have realized high HPV vaccination rates, it typically took a decade to reach 80 percent vaccination coverage. The U.K. introduced HPV vaccine into their national routine programme in 2009, where the vaccine is provided for free through secondary schools and clinics. In 2017-18 academic year, nearly 84 percent of Year 9 (aged 13-14 years) females completed the two-dose HPV vaccination series,<sup>114</sup> Australia was one of the first countries to establish a nationally financed HPV vaccination program for girls and young women in 2007. The HPV immunization rate for 15-year-old females rose from 72 percent in 2012 to 79 percent in 2016, and from 62 percent in 2014 to 73 percent in 2016 for 15-year-old males.<sup>115</sup>

Looking toward a long term and comprehensive strategy, a staged implementation of activities over four biennia (eight years) with a mix of both time-limited and ongoing interventions would likely be the most effective approach to achieving the Healthy People 2020 goals. Table 5 below lists individual activities, lead agency, potential partners, and the biennium(s) in which the activity would be implemented.

**Table 5: Strategies and activities: level of effort, lead agency, potential partners, and inclusion in biennium budget 1, 2, 3 and 4 (8 years)**

Goal	Strategy	Activity	Lead agency	Potential partners	Biennium 1	Biennium 2	Biennium 3	Biennium 4
<b>1. Advocate for HPV vaccination and maximize access to vaccination services by addressing system level barriers</b>								
a. Expand mobile and school-based vaccination programs								
		i. Advocate for expanded access to HPV vaccine at pharmacies and enroll pharmacies in VFC program	PHSKC	Payers, WA DOH, WA Pharmacy Association			X	X
		ii. Investigate alternate immunization site options	PHSKC	KCHIP, HPV Taskforce, community health boards		X	X	X
		iii. Staff a mobile immunization team that has a regular rotation in schools without SBHCs	PHSKC	School districts, community health boards, other PHSKC programs serving children and adolescents			X	X
		iv. Encourage medical providers to expand hours	KCHIP	KCHIP, DOH, HPV Taskforce	X	X	X	X
b. Incentivize benchmarks								
		i. Develop provider incentives for on-time HPV vaccination	KCHIP	Health Plan Partnership of Washington, DOH, KCHIP		X	X	X
		ii. Partner with health plans to implement a pay-for-performance plan	KCHIP	Commercial health plans, KCHIP, DOH			X	X
		ii. Advocate for tracking HPV at the clinic level and health plan level using Community Checkup	KCHIP	Washington Health Alliance, KCHIP, DOH	X	X	X	X
c. Advocate for minor consent laws that allow adolescents to consent for vaccines								
		i. Introduce bills to grant adolescents independent authority to consent for HPV vaccine	To be determined	Advocacy groups, legislators		X		
		ii. Extend state's current minor treatment statutes to apply to prevention	To be determined	Professional medical societies, advocacy groups, legislators		X		
<b>2. Support healthcare providers to reduce missed clinical opportunities to recommend and administer HPV vaccine</b>								
a. Provide opportunities for participation in clinical quality improvement initiatives to operationalize evidence-based practice strategies								
		i. Support development of nurse standing orders to assess a	KCHIP	KCHIP, DOH	X	X	X	X

Goal	Strategy	Activity	Lead agency	Potential partners	Biennium 1	Biennium 2	Biennium 3	Biennium 4
		patient's immunization status and administer vaccinations						
		ii. Support practices in developing clinic protocols to review vaccines at every visit	KCHIP	KCHIP, DOH	X	X	X	X
		iii. Support clinics in sending reminders via text, email, phone, or mail	KCHIP	KCHIP, DOH	X	X	X	X
		iv. Technical assistance to clinics to utilize electronic medical record (EMR) decision support / paper chart reminders/prompts	KCHIP	KCHIP, DOH	X	X	X	X
b. Increase provider knowledge of HPV and increase competency and skills to strongly recommend the vaccine								
		i. Educate health care providers through multiple channels, including in-person trainings	KCHIP and PHSKC	WithinReach, HPV Taskforce, KCHIP, DOH, ACS	X	X	X	X
c. Routinely recommend HPV vaccine starting at age 9								
		i. Standardize PHSKC Public Health Center policies for introducing HPV vaccine at age 9	PHSKC	PHSKC Community Health Services Division	X			
		ii. Endorse and promote best practices around recommending vaccination beginning at age 9	KCHIP	KCHIP, WA AAFP, DOH	X	X	X	X
		iii. Disseminate best practices around recommending vaccination beginning at age 9 through VFC and AFIX site visits	PHSKC	PHSKC VFC Program, other local health jurisdictions	X	X	X	X
		iv. Develop posters with vaccine schedules for healthcare provider offices	PHSKC or KCHIP	KCHIP, DOH		X		
d. Ensure consistency in communication across the clinic team								
		i. Engage medical assistants and nurses in the activities of the QI Learning Collaborative	KCHIP	KCHIP		X	X	X
		ii. Ensure that training and education developed for health	KCHIP	KCHIP, DOH, WithinReach, HPV Taskforce	X	X	X	X

Goal	Strategy	Activity	Lead agency	Potential partners	Biennium 1	Biennium 2	Biennium 3	Biennium 4
		care providers in activity 2b includes information for their entire staff						
		iii. Develop webinars and resources targeting MAs, nurses, other clinic care team	KCHIP	KCHIP, WithinReach, HPV Taskforce			X	
<b>3. Increase knowledge and acceptance of HPV vaccine among parents and adolescents, and improve access to vaccination.</b>								
a. Deliver cancer prevention messaging from multiple trusted & influential sources								
		i. Comprehensive, coordinated social marketing campaign targeting parents through websites, PSAs, blogs, social media, and print	KCHIP or IACW	IACW, Kaiser Permanente, University of Washington, Seattle Children's, KCHIP, WA Chapter AAFP, ACS, other LHJs, community health boards		X	X	X
		ii. Add HPV to PHSKC F.L.A.S.H. curriculum	PHSKC	PHSKC's Community Health Services Division	X			
		iii. HPV education for dental providers and pharmacists	HPV Taskforce	HPV Taskforce, WA Academy of General Dentistry, WA Pharmacy Association			X	X
b. Promote the convenience of accessing HPV vaccine in alternative settings such as School-based Health Centers								
		i. Facilitate student registration at SBHCs	PHSKC	SBHC sponsor organizations	X	X	X	X
		ii. Social media to promote SBHCs as complementary vaccination sites	PHSKC or KCHIP	KCHIP, WithinReach, ACS, SBHC sponsor organizations		X	X	X
		iii. Campaign promoting mobile vaccination unit	PHSKC	PHSKC, school districts, community-based organizations			X	X
c. Support peer-to-peer education, both parent-to-parent and teen-to-teen								
		i. Sustain and expand Student HPV Vaccine Champion program in 6+ high	PHSKC	SBHC sponsor organizations, PHSKC Family Planning Program, schools	X	X	X	X
		ii. Recruit 1+ parent advocate in 50 middle schools to educate peers	VaxNorthwest	PHSKC, VaxNorthwest, VaxWA parent advocacy group			X	X
d. Deliver tailored, culturally appropriate messaging								
		i. Host community forums	PHSKC or WithinReach	Faith-based organizations, community-based organizations, cultural centers			X	X

Goal	Strategy	Activity	Lead agency	Potential partners	Biennium 1	Biennium 2	Biennium 3	Biennium 4
		ii. Conduct formative research, develop culturally competent messages, identify modes of communication	UW	Schools, faith-based organizations, community-based organizations			X	X
		iii. Partner to develop sample vaccine materials for schools, translated	PHSKC			X		
e. Promote annual well child exams in adolescence								
		i. Launch a centralized reminder system	PHSKC	DOH, KCHIP	X	X	X	X
		ii. Use mobile devices, email, and social networking sites to promote prevention education and services	PHSKC	KCHIP, VFC enrolled clinics, WA AAFP, Seattle Children's, community-based organizations, community health boards		X	X	X
		iii. Develop materials re: importance of well child exams in adolescence and reimbursement	PHSKC	Health Plan Partnership, KCHIP		X		
		iv. Develop customizable posters for provider offices promoting annual well child exams for adolescents	PHSKC	KCHIP, VFC enrolled clinics		X	X	



## Conclusion

HPV vaccination is safe and effective. Just a decade since introduction, HPV vaccines have already been shown to reduce the prevalence of precancerous lesions in individuals who have been immunized. Yet HPV vaccination coverage in King County lags behind coverage rates for other routinely recommended vaccinations for adolescents.

An environmental scan of King County aided in the identification of barriers to and facilitators of HPV vaccine uptake in the county, as well as evidence-based best practices identified through research. In summary, systems change must focus on developing supportive policies; streamlining structures, practices, and procedures; enhancing the use of office systems to support vaccination; and increasing access to vaccination. Comprehensive educational campaigns that take into account cultural and other demographic factors are needed.

In response to Proviso 18835, Section 95, Proviso 2, Public Health identified a staged implementation of activities over four biennia (eight years) with a mix of both time-limited and ongoing interventions. Activities included in the first biennium could leverage existing resources, demonstrate a high level of evidence of effectiveness based on research and practice, and are the most likely to result in sustainable change.

- **Near-term strategies:** would leverage current funding through Best Starts for Kids and the county budget, which together would support two 1.0 FTE Program Manager positions and an external contract with AAP, to implement three best practice interventions. **\$262,841**
- **The budget for first biennium** would support the implementation of **fifteen activities** in each of the twelve strategies and leverage current resources from the Washington State Department of Health and Best Starts for Kids to enhance several existing activities with minimal additional investment. Activities include interventions that 1) train providers to present strong and consistent recommendations to all age-eligible patients, 2) offer opportunities for providers to participate in clinical quality improvement initiatives to operationalize best practices, and 3) promote alternative community-based vaccination access points (e.g. SBHCs). **\$1,455,092**
- **The budget for second biennium** would fund the implementation of **twenty-five activities** in each of the twelve strategies. Interventions include the design and launch of a social marketing campaign that establishes HPV vaccination as the norm and promotes the convenience of alternative vaccination sites, hosting community forums, developing materials and resources for schools and other stakeholders, and increasing support to the health care provider community, primarily via KCHIP. **\$2,412,374**

- **The budget for third biennium** would support the implementation of **thirty activities** and build upon the foundation established in the first four years of HPV vaccine promotion work. New activities would include formative research to develop culturally-competent messages, establishment of a contract with VaxNorthwest to adopt their Immunity Community parent-peer education approach for adolescent vaccines, advocacy work to grant adolescents independent authority to consent for HPV vaccine, and the purchase, operation, and staffing of a mobile vaccination unit. **\$2,975,737**
- **The budget for fourth biennium would support the continuation of twenty-seven activities** implemented in the previous four years, as well as a comprehensive evaluation of program activities. **\$2,862,878**

This plan was developed in response to Ordinance 18835, Section 95, Proviso 2. It acknowledges county characteristics, legislative priorities, and equity considerations. Leveraging work already underway and partnering with diverse partners across the county would increase success and sustainability of identified strategies. Near-term investments in King County's youth are cost-effective and can help ensure they thrive as they move into adulthood. However, given the challenging funding environment for public health, it is not recommended to pursue this comprehensive plan at this time.

## Appendix

### Appendix A: HPV-associated cancers in King County

Current data are available at the county level for oropharyngeal, cervical and anal cancers. Age-adjusted incidence of oral and pharyngeal cancers in men and women in King County is 12.7 per 100,000, with an average 277 new cases per year. This number is increasing<sup>116,117</sup>. The most current age-adjusted incidence rate of cervical cancer for King County is 5.9 per 100,000, with an average 64 new cases per year<sup>118</sup>. The most current age-adjusted incidence of anal cancers for King County is 4.6 per 100,000, with an average 100 new cases per year. From 2013 to 2015, there were an estimated 7 deaths per year from anal cancer, 17 from cervical cancer, and 52 from oral pharyngeal cancers in King County<sup>119</sup>.

#### Ethnic and racial disparities in cervical cancer in King County

In King County, Native Hawaiian/Pacific Islander women have the highest rates of cervical cancer, followed by Hispanic, American Indian / Alaska Native, Asian, white, and Black women, as displayed in table 1, below.<sup>120</sup> Local mortality data by race are not available, however, nationally, Black women are more likely to die of cervical cancer than any other racial/ethnic group, followed by Hispanic women.<sup>121,122,123</sup> Disparities in cancer prevalence and mortality may demonstrate inequities in access to care in the United States.

**Table 1. Cervical cancer incidence (females), King County (average: 2010-2014)**

Race / Ethnicity	Incidence
American Indian / Alaska Native	9.1
Asian	7.3
Black	4.7
Hispanic	10.3
Multiple	*
Native Hawaiian / Pacific Islander	<b>40.7</b>
White	5.9

\* Data suppressed to protect confidentiality

Race/ethnicity data are not available for other HPV-attributable cancers at the county level.

## **Appendix B: HPV vaccination to prevent HPV infection and disease**

In the U.S., almost all childhood and adolescent vaccines are provided in a patient's medical home. The CDC's Vaccines for Children (VFC) program provides free vaccines to eligible children through a network of 61 grantees and approximately 45,000 enrolled clinics nationally. In Washington State, vaccines are provided at no cost for all children under the age of 19 through a universal vaccine program in which childhood vaccines are purchased by the state with a combination of funds from the national VFC program and assessments from health plans and other payers<sup>124</sup>. The Washington Department of Health (DOH) administers the VFC program and is responsible for delivering vaccine to 1,060 clinics across the state, nearly a third of which are in King County. Approximately 75 percent of clinics enrolled in the VFC program in King County are family medicine or pediatric practices, where the majority of childhood and adolescent vaccines are administered.

## Appendix C: HPV vaccination rates and trends in King County

The WA IIS is a lifetime registry that tracks immunization records for people of all ages in Washington State and supports health care providers in identifying the immunization needs of their patients. The WA IIS contains over 80 million individual vaccination records for over 8 million unique individuals. More than 2,100 different organizations use the IIS, including: hospitals, health care providers, pharmacists, childcare centers, schools, WIC (women, infant, and children) clinics, STD/HIV (sexually transmitted diseases/human immunodeficiency virus) clinics, tribal and Indian Health Service clinics, family planning clinics and health plans<sup>125</sup>. Many pharmacies in King County are submitting billing data to the IIS, including major pharmacy chains Bartell's, CVS, Rite Aid, Safeway, Walmart, and Walgreens<sup>126</sup>. Eighty percent of participating pharmacies are submitting billing data to the WA IIS<sup>127</sup>. Health care providers in Washington are not mandated to report to the WA IIS, however ninety-seven percent of children ages 4 months-5 years have two or more immunizations recorded in the IIS. Eighty-eight percent of adolescents ages 11-17 years have two or more immunizations recorded and 70 percent of adults ages 19 years and older have one or more immunizations in the IIS<sup>128</sup>. A 2013 study found that the required fields in the WA IIS have nearly complete data, while optional data fields were often left blank. For example, 68 percent of the provider identifier fields reviewed were blank, and nearly all of the time, vaccine manufacturer and route of administration were missing<sup>129</sup>. Race/Ethnicity is about 64 percent complete in the IIS; therefore, it's not currently possible to identify specific sub-groups of adolescents by race/ethnicity that may have lower vaccine uptake.

Despite widespread availability of HPV vaccine through most healthcare providers and some pharmacies (data on pharmacies offering HPV vaccine are limited), HPV coverage rates in King County are below the Healthy People 2020 targets. The CDC recommends that adolescents aged 11-12 receive two doses of HPV vaccine. However, as of December 31, 2018, only 46 percent of 11-12 year olds and 62 percent of 13-17 year-olds in King County had received at least one dose of HPV vaccine (see Table 2, below). Since the vaccine was first routinely recommended for males in 2011, the vaccine initiation rate among boys in King County has been steadily increasing from 38 percent in 2013 to 60 percent in 2018. However, the vaccine initiation rate among females in King County has plateaued, remaining at roughly 63 percent for the past five years and the most recent data suggest a similar plateau among males (see Figure 1 below to see the four-year trend for females and males). HPV vaccine series completion rates are even lower, with just 39 percent of 11-17 years olds in King County receiving at least 2 doses of HPV vaccine. Looking at HPV vaccine series completion rates for 11-17 year olds is complex because the recommended vaccine schedule changed in late 2016 for adolescents who started the series before age 15. In Table 2 below, some of the teens need 3 doses to be complete and some are already considered complete with 2 doses. Thirty three percent of adolescents that were aged 11-12 in 2017 (n=24,485), had completed the two dose series and are considered fully immunized since they received two doses prior to age fifteen. Fifty percent of adolescents aged 13-17, had completed two doses, and an additional twenty-six percent had completed three doses of HPV

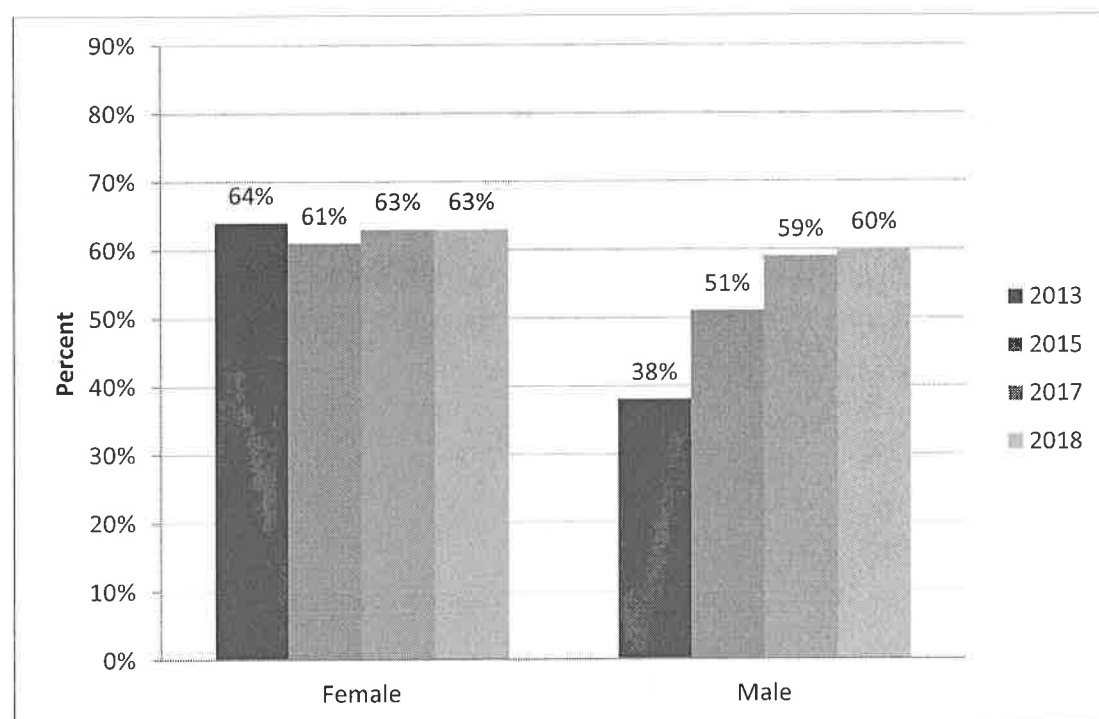
vaccine. Future analyses will identify completion rates based on the recommendations for adolescents aged 9-14 and those aged 15-17.

**Table 2. HPV immunization coverage among King County adolescents aged 11-17 years as of 12/31/2018**

11-17 yo	Total pop	1+ HPV		2+ HPV		3+ HPV	
		N	%	N	%	N	%
All	206568	117778	57.0	81449	39.4	37763	18.3
Females	100979	58906	58.3	41632	41.2	20295	20.1
Males	105589	58872	55.8	39817	37.7	17468	16.5

Data source: Washington State Immunization Information System; all vaccines administered as of 12/31/2018

**Figure 1. Percentage of King County adolescents age 13-17 receiving ≥ 1 dose HPV vaccine, 2013-2018**

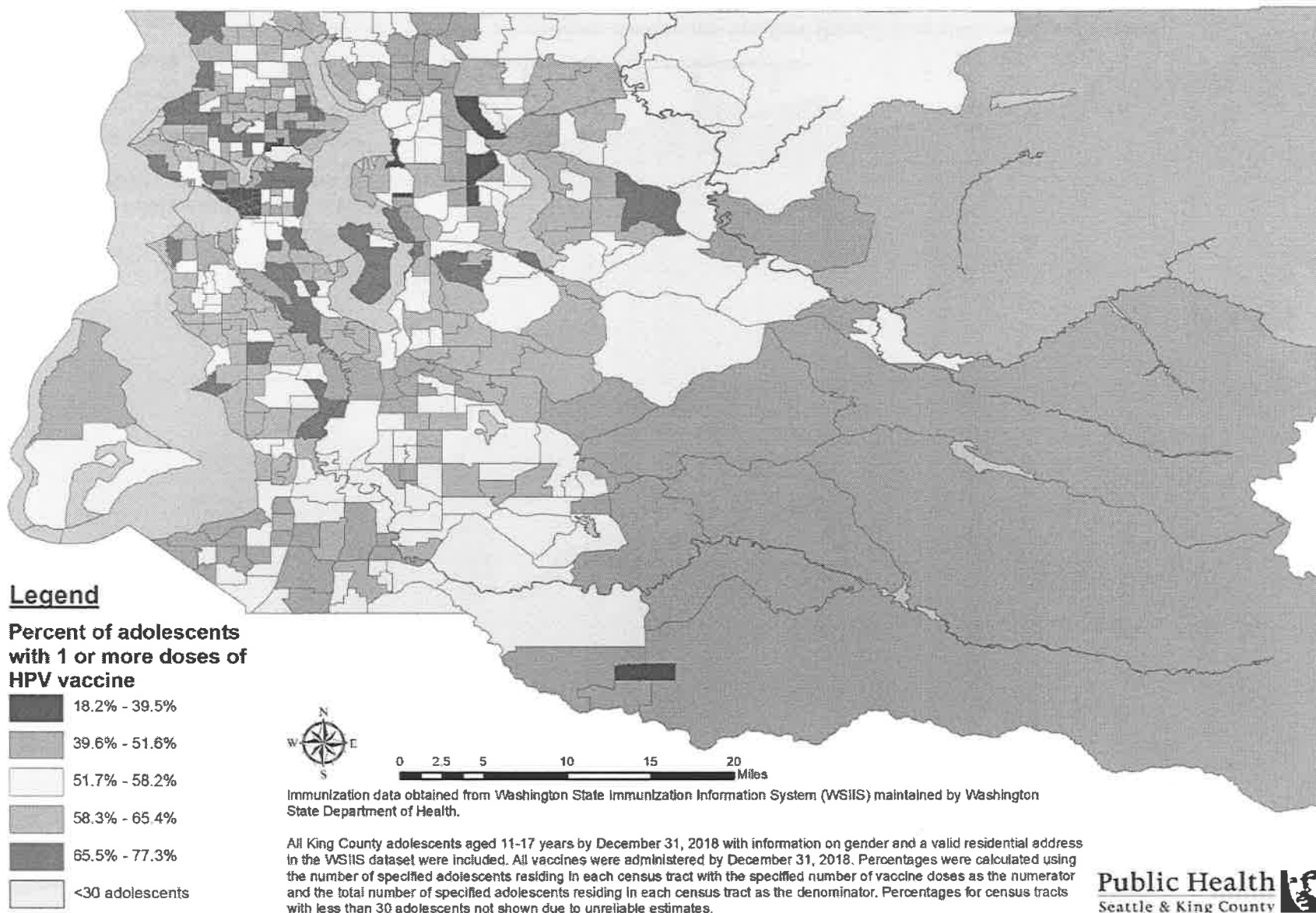


Data source: Washington State Immunization Information System

Because the WA IIS does not reliably capture demographic information such as race and ethnicity, it is challenging to assess local disparities in HPV vaccine uptake. However, geospatial analysis reveals geographic clustering of under immunization in specific regions of the county. The following map (Figure 2) displays the percentage of adolescents aged 11-17 with at least one dose of HPV in 2018. While immunization rates vary geographically, we see especially low rates on Vashon Island and in Eastern and Southeastern King County. Figure3 below shows the same

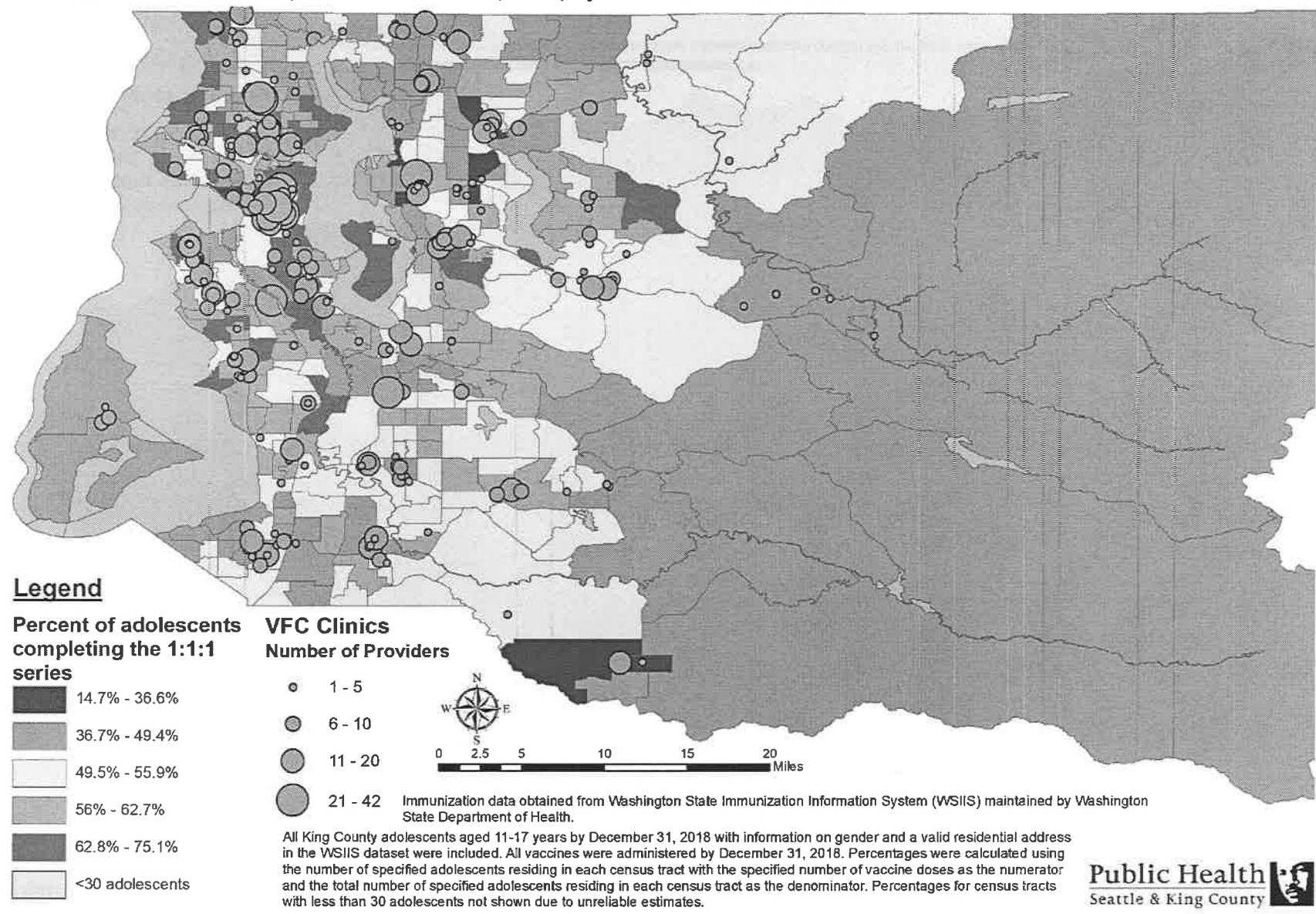
map with an overlay of VFC providers. The population density is lower in Eastern King County (see Figure 4, below), which may explain the dearth of VFC providers.

**Figure 2: Percent of adolescents aged 11-17 with 1 or more doses of HPV vaccine as of December 31, 2018, by census tract and residence**

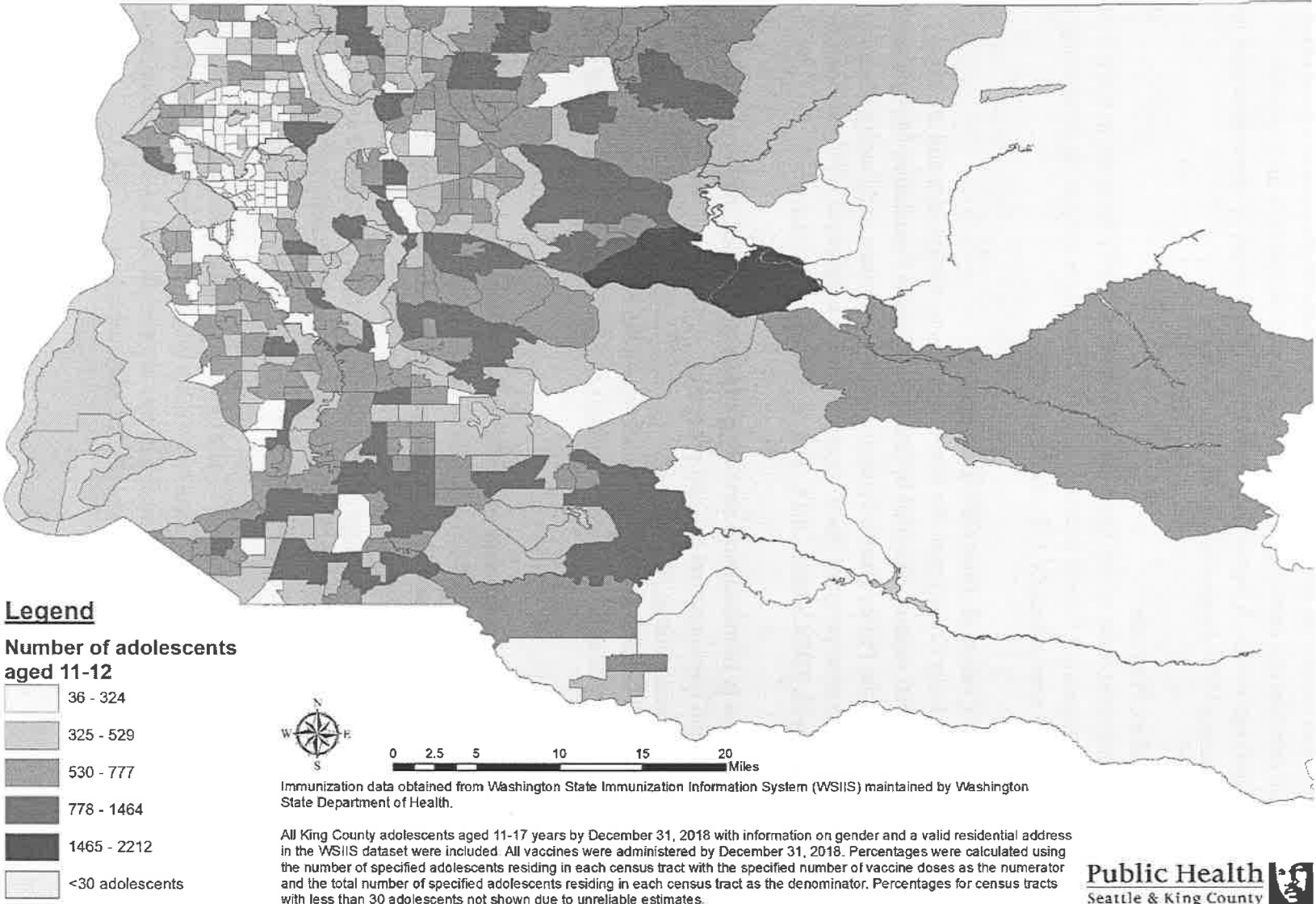




**Figure 3: VFC provider overlay: Percent of adolescents aged 11-17 who completed the 1:1:1 series ( $\geq 1$  dose TDaP,  $\geq$  doses MCV,  $\geq$  dose HPV vaccine) as of December 31, 2018, by census tract and residence**



**Figure 4: Number of adolescents aged 11-17 with records in the Washington State Immunization Information System as of December 31, 2018, by census tract of residence**



## **Appendix D: PHSKC Immunization Program HPV Vaccine Activities**

The Public Health Immunization Program oversees and implements ongoing state and grant-funded activities with a focus on underserved populations, and offers clinical consultation to local health care providers to ensure quality from the patient perspective and optimal immunization coverage levels. A significant component of this work is ensuring access to HPV vaccine and increasing HPV vaccine uptake in King County.

### ***Vaccines for Children Program***

PHSKC administers some tasks of the Vaccines for Children (VFC) Program in King County, primarily focused on assuring federal accountability requirements are met by conducting quality assurance site visits at approximately 170 clinics annually.

### ***School Based Health Centers & Teen HPV Champions***

SBHCs in Seattle and King County provide health services to adolescents and are highly accessible. With financial support provided by the Group Health Foundation Momentum Fund and in partnership with the Public Health School-based Partnerships and Family Planning programs, the Immunization program has overseen a project to increase HPV vaccination coverage in schools with SBHCs since 2015. The project objectives are to:

1. Simplify access to immunization services through streamlined, electronic SBHC registration and immunization consent processes
2. Increase awareness among students and their families regarding the importance and benefits of HPV vaccine and the risks associated with HPV infection
3. Increase referrals from primary care providers to SBHCs to improve vaccine series completion rates

HPV Vaccine Promotion campaigns are currently active in fifteen high schools and six middle schools in King County. The student-led campaigns exist only at the high school level, where adult mentors support campaign activities. A majority of the current mentors are PHSKC employees, with the exception of an AmeriCorps member and two Neighborcare Health Educators. Mentors advise student groups as they develop campaigns tailored to their school's specific needs, population, and resources. Grant funding supports incentives, event and meeting supplies, marketing, and other campaign materials.

The middle school campaigns involve SBHC staff and school administration, and are targeted towards both students and parents, who tend to be more involved in their children's healthcare decisions at this age. Educational and outreach events are coordinated by the AmeriCorps member and SBHC staff, school nurses, and school administration.

Currently, the Group Health Foundation grant funds FTE for three PHSKC employees to engage in this work at varying levels of involvement, as well as the AmeriCorps member who acts as the full-time Project Coordinator. Other mentors for the HPV project include Neighborcare Health Educators who are not currently receiving any FTE contribution from the grant. A list of the school-based health centers in King County can be found in Appendix F.

### ***Adolescent Immunization QI Learning Collaborative & Improvement Partnership***

With dedicated funding through the Best Starts for Kids initiative, in 2019, Public Health partnered with the Washington Chapter of the American Academy of Pediatrics and Seattle Children's Hospital to establish a King County child and adolescent health improvement partnership (KCHIP). Based on the national model developed by the National Improvement Partnership Network, KCHIP will convene stakeholders to address systemic barriers to increasing adolescent immunization coverage rates in King County. In addition, KCHIP will support a clinic-level quality improvement (QI) learning collaborative with the goal of improving adolescent immunization rates through structured, 9-month QI cycles. Clinics enrolled in the learning collaborative will be provided training, coaching and opportunities for peer-to-peer collaboration through a forum that fosters shared learning and innovation, and supports systemic changes that will result in lasting, measurable improvements to adolescent immunization rates in King County. The first cohort of King County healthcare providers to participate in the QI learning collaborative will convene in September 2019 with two additional cohorts planned in 2019-20.

This program leverages \$400k from BSK to support one FTE (PHSKC Program Manager) and an external contract with the Washington Chapter of the American Academy of Pediatrics.

### ***Representation on HPV Task Force***

The PHSKC Immunization Program participates in the Washington State HPV Task Force. The Task Force is a forum for a diverse group of local partners and stakeholders (e.g. IACW, DOH, American Cancer Society, University of Washington, local health jurisdictions, and Kaiser Permanente) to share information, coordinate efforts, and advocate for cancer prevention through HPV vaccine. The Task Force is currently convened by the American Cancer Society and members meet quarterly to increase synergy and cooperation for ongoing assessment, planning, implementation and evaluation of HPV immunization efforts. PHSKC was involved in launching the Oral HPV Committee of the HPV Task Force which has created multiple resources for oral health care professionals to discuss HPV vaccine with their patients, including an HPV toolkit and Dental HPV "You are the Key" webinar.

### ***PHSKC Public Health Centers and Family Planning Program***

Sexual and reproductive health services are provided at three primary care clinics (Downtown, Eastgate, and Navos), four Family Planning clinics (Auburn, Federal Way, Kent and Eastgate), all SBHCs (four of which are operated by Public Health and the rest by community partners),

and all of our Health Care for the Homeless Network clinics and their partners. These sexual health services include HPV vaccines, primarily for people under the age of 19. HPV vaccine is purchased and supplied by the VFC program.

Between January 2017 and September of 2018, 1554 individuals at the Public Health Family Planning and Primary Care clinics initiated the HPV vaccination series; the clinics do not track the number of clients eligible for HPV vaccine. Access gaps remain for uninsured adults, ages 19-26, due to cost (vaccine and vaccine administration fees). Should more HPV vaccine be made available, more public health clients would receive the HPV vaccination, particularly those who are uninsured aged 19-26. Currently, almost half of PHSKC Family Planning clients are uninsured. The Family Planning Program has six community-based health educators who work in schools and community-based agencies serving youth and young adults. Educators provide direct health education on how to prevent HPV and link youth to care for HPV vaccines and cervical cancer screening services. Family Planning educators will participate in the expansion of the SBHC HPV Teen Champion Project to mentor youth and oversee campaigns in at least six high schools in south King County during the 2019-20 school year.

***Screening of the documentary “Someone You Love” in partnerships with Group Health and Seattle Children’s***

In 2015, the Immunization Program partnered with the Group Health Foundation and Seattle Children’s Hospital to host a screening of the documentary “Someone You Love: the HPV Epidemic” followed by a panel discussion with advocates, physicians and researchers. This award-winning documentary highlights the lives of five women affected by HPV infection. Their stories portray the misconceptions, stigma, shame, heartbreak, pain, and triumph that they experienced while battling cervical cancer.

***SAHM grant focused on adolescent immunization promotion in specific ethnic minority groups***

In 2011, the Immunization Program was awarded a grant from the Society of Adolescent Health and Medicine (SAHM) to identify attitudes regarding adolescent vaccines among Hispanic, Somali, and Eritrean communities in King County, and to create culturally sensitive interventions to address vaccine-related misperceptions that were identified.

In-person surveys of Hispanic, Somali, and Eritrean adolescents (n= 49) and parents of adolescents (n=157), and three focus groups with mothers of 11–18 year olds were conducted to assess knowledge, attitudes and barriers related to adolescent vaccinations. Findings were used to develop 1) culture-specific written brochures for community members that addressed misperceptions about adolescent immunizations and related diseases and, 2) a presentation highlighting specific messages for health care providers in the target communities. Health care providers were surveyed after delivery of the presentation.

Overall, 56 percent of parents surveyed had heard of Tdap, 33 percent had heard of MCV4, and 38 percent had heard of HPV vaccines. Hispanic parents were more likely than Eritrean or Somali parents to be aware of adolescent vaccines. Adolescents were less aware of the vaccines compared with parents. Lack of knowledge of adolescent vaccination recommendations was the main reason given by parents that their adolescents had not been vaccinated. The majority of parents in the focus groups reported that they would vaccinate their teens if their doctor recommended it. Focus groups also indicated a variety of misperceptions and beliefs about adolescent vaccines and corresponding vaccine-preventable diseases (VPDs), and parents expressed a desire for translated immunization materials.

### ***Group Health Foundation HPV Grant: Outreach to Health Care Providers***

As part of a 2-year HPV promotion grant funded by the Group Health Foundation, the PHSKC Immunization Program conducted outreach to local health care providers promoting HPV vaccine series completion in King County SBHCs. Additional resources will facilitate expansion and sustainability of this outreach effort.

Between July, 2015 and June, 2017, Public Health Seattle & King County immunization program staff members visited 32 primary care practices to promote SBHCs as an alternative site for adolescent immunizations. We delivered 5- to 10-minute presentations at staff and provider meetings in two parts. In Part 1 (July, 2015 through October, 2016), we visited 26 clinics. In Part 2 (March, 2017 through June, 2017), we visited 6 additional clinics and followed up with 16 of those we visited in Part I. Results suggest that health care providers and support staff are largely receptive to the idea of referring adolescents to SBHCs to initiate or complete the HPV vaccine series. However, competing clinical priorities and frequent employee turnover may make it difficult for this strategy to remain on staff members' radars. Regular communication from Public Health about SBHCs, therefore, is key.

### ***Social media campaign in partnership with American Cancer Society***

With support from the American Cancer Society (\$10k), PHSKC launched social media campaigns directed at parents of adolescents that attend schools with SBHCs. Campaigns promoted HPV vaccination and encouraged parents to take advantage of SBHCs for vaccination. Video and static ads were run on YouTube and Facebook over a period of five months. Other elements to the project included designing a webpage for clinicians about SBHC and HPV referral, a webpage for parents, encouraging HPV vaccination at SBHCs, and designing and mailing postcards to approximately 250 primary care practices in Seattle, Burien, Tukwila, Vashon and Bellevue to remind them about SBHCs and including a link to the new HPV webpage. The grant ran July 2018 – June 2019, with the bulk of the work completed July 2018 – February 2019.

### ***HPV Vaccination: Framing the Conversation for East African Families***

An educational video, HPV Vaccination: Framing the Conversation for East African Families, was developed locally (largely by staff from the Immunization Program at PHSKC, in partnership with the University of Washington and Fred Hutchinson Cancer Research Center) for providers and their medical practices. It was released in 2018. Providers reported this video to be very helpful in speaking with their East African patients about the HPV vaccine and understanding their concerns. The Immunization Program also helped develop presentations for East African families (Ethiopian, Eritrean, and Somali) in 2017, and those were delivered by members of the community in 2017 and 2018. The project was funded by the CDC.

## Appendix E: Stakeholder Outreach and Participation

Agency / Organization	Participated?
Academy of General Dentistry	Yes
Aetna Life Insurance Company (Board member WA Vaccine Association)	No
American Cancer Society	Yes
American Congress of Obstetricians/Gynecologists	No
Ballard High School and School-based Health Center	Yes
Cleveland High School and School-based Health Center	Yes
Coordinated Care Health	Yes
Enumclaw School District	Yes
Fred Hutchinson Cancer Research Center	Yes
HealthPoint	Yes
HMC Pediatrics (UW)	Yes
Immunization Action Coalition (WithinReach)	Yes
International Community Health Services	Yes
Kaiser Permanente Capitol Hill	Yes
King County Medical Society	Yes
Korean Women's Association	No
Merck	Yes
Moda Health	No
Neighborcare Health	Yes
Oral HPV Taskforce	Yes
PHSKC STD Clinic	No
Polyclinic Madison	Yes
Public Health - Seattle & King County Family Planning	Yes
Renton School District	Yes
SeaMar	Yes
Seattle Children's	No
Seattle Public Schools	Yes
Seattle University Student Health Clinic	No
Somali Health Board	Yes
Swedish	No
Tukwila schools (Foster)	No
Virginia Mason	Yes
Washington Dept of Health OICP	Yes
Washington State Medical Association	No
Washington State Pharmacy Association	Yes
Regence BlueShield, Washington (Board member WA Vaccine Association)	No
Woodinville Pediatrics	Yes



## Appendix F: School-based Health Centers in King County

Sponsoring organization and schools	School District	HPV vaccine champion student-led campaigns	HPV vaccine promotion campaigns
<b>HealthPoint Community Health Centers</b>			
Evergreen High School	Highline	X	
Renton High School	Renton	X	
Tyee Campus	Highline	X	
<b>International Community Health Services</b>			
Highland Middle School	Bellevue		X
Seattle World School	Seattle		
<b>Kaiser Permanente (formerly Group Health Cooperative)</b>			
Aki Kurose Middle School	Seattle		
Franklin High School	Seattle	X	
Interagency Academy	Seattle		
Nathan Hale High School	Seattle	X	
Washington Middle School	Seattle		X
<b>Neighborcare Health</b>			
Bailey Gatzert Elementary	Seattle		
Chief Sealth High School	Seattle	X	
Dearborn Park Elementary	Seattle		
Denny International Middle School	Seattle		X
Hamilton International Middle School *	Seattle		
Highland Park Elementary	Seattle		
Madison Middle School	Seattle		X
Mercer Middle School	Seattle		X
Roosevelt High School	Seattle	X	
Roxhill Elementary	Seattle		
Van Asselt Elementary	Seattle		
Vashon High School (also serving Chatauqua Elementary and McMurray Middle School)	Vashon	X	
West Seattle Elementary	Seattle		
West Seattle High School	Seattle	X	
<b>Odessa Brown Children's Clinic (Seattle Children's Hospital)</b>			
Beacon Hill International School	Seattle		
Garfield High School	Seattle	X	
Madrona Elementary	Seattle		
<b>Public Health — Seattle &amp; King County</b>			
Cleveland High School	Seattle	X	
Ingraham High School	Seattle	X	
Kent-Phoenix Academy	Kent		
Rainier Beach High School	Seattle	X	
<b>Swedish Medical Center</b>			
Ballard High School	Seattle	X	
Beaver Lake Middle School *	Issaquah		
Gibson Ek Innovative High School *	Issaquah		
Issaquah High School *	Issaquah		
Issaquah Middle School *	Issaquah		

Issaquah Valley Elementary *	Issaquah		
Liberty High School *	Issaquah		
Maple Hills Elementary *	Issaquah		
Maywood Middle School *	Issaquah		
Pacific Cascade Middle School *	Issaquah		
Pine Lake Middle School *	Issaquah		
Skyline High School *	Issaquah		
Sunset Elementary School *	Issaquah		
The Center School	Seattle	X	
Woodinville High School *	Northshore		

\*SBHC offers mental health services only

## Appendix G: Budget for near-term investments

Near-term Investments	Annual Cost	Notes
<b>Personnel</b>		
Education Specialist (1 @.50FTE)	\$ 33,995	
<b>Salaries</b>	<b>\$ 33,995</b>	
Medical	\$ 9,144	Annual medical, prorated per FTE
Social Security	\$ 2,601	7.65% of salary
Retirement	\$ 4,372	12.86% of salary
Paid Family Leave	\$ 51	.0015% of salary
<b>Fringe Benefits</b>	<b>\$ 16,167</b>	
<b>Total Personnel</b>	<b>\$ 50,162</b>	
<b>Travel</b>		
<b>Total Travel</b>	<b>\$ -</b>	
<b>Other</b>		
IIS reminder/recall with postcards	\$ 50,000	Centralized reminder for 75K adolescents and design, print and mail postcards
SBHC campaign incentives	\$ 7,350	\$350 per school, 21 schools
SBHC HPV campaign materials	\$ 8,000	Includes posters, snacks, and give aways
Space/cubicles, prorated for FTE	\$ 2,695	Assume \$5389/yr, per cube for the 12th floor
Contract administration (1 set up, 1 amend per yr per contract)	\$ 3,916	Contract set up and amendment, each action is \$979
<b>Total Other</b>	<b>\$ 71,961</b>	
<b>Contracts</b>		
Supplemental contract with AAP	\$ 117,500	BSK funds one contract, this would allow AAP to double the number of cohorts
Two Neighborcare Health Educators (@.05FTE)	\$ 8,532	10 month school year
<b>Total Contracts</b>	<b>\$ 126,032</b>	
<b>Subtotal Direct Costs</b>	<b>\$ 248,155</b>	
<b>Indirect Costs @ 43.2% of Sal</b>	<b>\$ 14,686</b>	No change in indirect rate over time
<b>Total All Costs</b>	<b>\$ 262,841</b>	

## Appendix H: Budget by biennium

HPV PROVISIO STRATEGIES COST DETAILS	Biennium 1	Biennium 2	Biennium 3	Biennium 4	Total	Budget Justification
<b>Public Health - Seattle &amp; King County</b>						
<b>Personnel</b>						
PPM 2 (1 @ 1.0FTE)	\$ 191,660	\$ 197,985	\$ 204,222	\$ 209,327	\$ 803,194	Increases reflect blended labor rate from KC BPPA worksheet, with 2027-2028 estimated
PPM 2 (1 @ 1.0FTE)*	\$ 191,660	\$ 197,985	\$ 204,222	\$ 209,327	\$ 803,194	Increases reflect blended labor rate from KC BPPA worksheet, with 2027-2028 estimated
Education Specialist (1 @ .50FTE)	\$ 69,894	\$ 72,290	\$ 74,475	\$ 76,336	\$ 292,995	Increases reflect blended labor rate from KC BPPA worksheet, with 2027-2028 estimated
Educator Consultant 2 (1 @ .80FTE)		\$ 157,819	\$ 162,790	\$ 166,860	\$ 487,469	Increases reflect blended labor rate from KC BPPA worksheet, with 2027-2028 estimated
Public Health Nurse (1 @ 1.0FTE)		\$ 208,564	\$ 215,134	\$ 220,512	\$ 644,210	Increases reflect blended labor rate from KC BPPA worksheet, with 2027-2028 estimated
<b>Salaries</b>	<b>\$ 453,214</b>	<b>\$ 834,553</b>	<b>\$ 860,842</b>	<b>\$ 882,363</b>	<b>\$ 3,030,972</b>	
Medical	\$ 96,652	\$ 175,385	\$ 184,505	\$ 193,915	\$ 650,457	Annual medical, prorated per FTE with increases reflecting biennial Seattle inflation estimates from KC BPPA worksheet
Social Security	\$ 34,671	\$ 63,843	\$ 65,854	\$ 67,501	\$ 231,869	7.65% of salary, no change from one biennium to another
Retirement	\$ 52,392	\$ 92,302	\$ 95,209	\$ 97,589	\$ 337,492	Used average of annual rate per KC Budget and Financial Planning Assumptions worksheet
Paid Family Leave	\$ 680	\$ 1,252	\$ 1,291	\$ 1,374	\$ 4,546	.0015% of salary, no change from one biennium to another
<b>Fringe Benefits</b>	<b>\$ 184,394</b>	<b>\$ 332,782</b>	<b>\$ 346,860</b>	<b>\$ 360,328</b>	<b>\$ 1,224,364</b>	
<b>Total Personnel</b>	<b>\$ 637,609</b>	<b>\$ 1,167,335</b>	<b>\$ 1,207,701</b>	<b>\$ 1,242,691</b>	<b>\$ 4,255,336</b>	
<b>Travel</b>						
3 travelers	\$ 11,733	\$ 12,378	\$ 13,022	\$ 13,686	\$ 50,818	Assumes 2 staff, 1 student. Includes registration, airfare, ground travel and MIE. Inflated per BPPA Seattle inflation
<b>Total Travel</b>	<b>\$ 11,733</b>	<b>\$ 12,378</b>	<b>\$ 13,022</b>	<b>\$ 13,686</b>	<b>\$ 50,818</b>	
<b>Other</b>						
Design and print materials	\$ 14,000	\$ 20,000	\$ 30,000	\$ 20,000	\$ 84,000	\$7K yr, \$10K yr, \$15K yr, \$10K yr respectively - multiplied by 2 for each biennium
Large scale social marketing campaign		\$ 200,000	\$ 200,000	\$ 200,000	\$ 600,000	\$100,000 per year campaign advertising, multiplied by 2 for each biennium
Website maintenance	\$ 10,000	\$ 10,550	\$ 11,099	\$ 11,645	\$ 43,313	\$5K-yr, \$10K biennium with increases following Seattle inflation per KC BPPA worksheet
Social Media campaign		\$ 25,000	\$ 35,000	\$ 35,000	\$ 95,000	High end of development, similar to HIV "We Are One" project
IIS reminder/recall with postcards	\$ 100,000	\$ 105,500	\$ 110,986	\$ 116,646	\$ 433,132	About \$90K/yr. Centralized reminder for 75K adolescents and design, print and mail postcards
Mobile Vaccination Unit purchase			\$ 150,000		\$ 150,000	Includes van purchase and outfitting. One time cost
Mobile Vaccination Unit operations			\$ 15,000	\$ 15,000	\$ 30,000	Gas, parking, etc annual amount
Community forums			\$ 2,525	\$ 2,654	\$ 5,178	2 per yr/25 participants per forum. Costs include child care, incentives, bus pass, facilitators, dinner and room rental
SBHC campaign incentives	\$ 14,700	\$ 14,700	\$ 14,700	\$ 14,700	\$ 58,800	\$350 per school, 21 schools, no change over time
SBHC HPV campaign materials	\$ 16,912	\$ 17,842	\$ 18,770	\$ 19,727	\$ 73,251	Includes posters, snacks, and give aways, increased following Seattle inflation - BPPA estimates
Space vehicles, prorated for FTE	\$ 28,481	\$ 51,681	\$ 54,369	\$ 57,142	\$ 191,673	Assume \$5389 yr, per cube, with increase reflecting biennial Seattle inflation estimates from KC BPPA worksheet
Contract administration (1 set up, 1 amend per yr per contract)	\$ 7,832	\$ 7,832	\$ 15,664	\$ 11,748	\$ 43,076	Contract set up and amendment, each year, cost remaining flat @ \$979 for set up and \$979 for one amendment per year
<b>Total Other</b>	<b>\$ 191,925</b>	<b>\$ 453,106</b>	<b>\$ 658,112</b>	<b>\$ 504,281</b>	<b>\$ 1,807,424</b>	
<b>Contracts</b>						
Supplemental contract with AAP*	\$ 400,000	\$ 400,000	\$ 400,000	\$ 400,000	\$ 1,600,000	\$200K per year, this assumes BSK funding does not continue, no inflationary factor
Within Reach contract for webinar development			\$ 5,000		\$ 5,000	One time contract
VAX NW contract			\$ 300,000	\$ 300,000	\$ 600,000	\$150K per year, no inflationary factor
Two Neighborhood Health Educators (@.05FTE, 10 mo school yr)	\$ 18,037	\$ 19,029	\$ 20,018	\$ 21,039	\$ 78,123	\$8332 yr, increased to reflect biennial Seattle inflation estimates from KC BPPA
<b>Total Contracts</b>	<b>\$ 418,037</b>	<b>\$ 419,029</b>	<b>\$ 725,018</b>	<b>\$ 721,039</b>	<b>\$ 2,283,123</b>	
<b>Subtotal Direct Costs</b>	<b>\$ 1,259,303</b>	<b>\$ 2,051,847</b>	<b>\$ 2,603,853</b>	<b>\$ 2,481,697</b>	<b>\$ 8,396,701</b>	
<b>Indirect Costs @ 43.2% of Sal</b>	<b>\$ 195,789</b>	<b>\$ 360,527</b>	<b>\$ 371,884</b>	<b>\$ 381,181</b>	<b>\$ 1,309,380</b>	No change in indirect rate over time
<b>Total All Costs</b>	<b>\$ 1,455,092</b>	<b>\$ 2,412,374</b>	<b>\$ 2,975,737</b>	<b>\$ 2,862,878</b>	<b>\$ 9,706,081</b>	

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