### Supplementary Material

**supplementary Table 1. Socio-demographic part of the survey**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td></td>
</tr>
<tr>
<td>2. Place of residence</td>
<td>1. Urban</td>
</tr>
<tr>
<td></td>
<td>2. Rural</td>
</tr>
<tr>
<td>3. Region of residence</td>
<td>List of regions is provided</td>
</tr>
<tr>
<td>4. Education</td>
<td>1. incomplete secondary school</td>
</tr>
<tr>
<td></td>
<td>2. secondary school</td>
</tr>
<tr>
<td></td>
<td>3. specialised secondary school</td>
</tr>
<tr>
<td></td>
<td>4. higher</td>
</tr>
<tr>
<td></td>
<td>5. academic degree or two or more university degrees</td>
</tr>
<tr>
<td>5. Your nationality</td>
<td></td>
</tr>
<tr>
<td>6. What is your monthly income?</td>
<td>1. up to 142,000 KZT</td>
</tr>
<tr>
<td></td>
<td>2. more than 142,000 KZT</td>
</tr>
<tr>
<td>7. Marital status</td>
<td>1. single</td>
</tr>
<tr>
<td></td>
<td>2. married</td>
</tr>
<tr>
<td></td>
<td>3. civil marriage</td>
</tr>
<tr>
<td></td>
<td>4. divorced</td>
</tr>
<tr>
<td></td>
<td>5. widowed</td>
</tr>
<tr>
<td>8. Your employment status</td>
<td>1. student</td>
</tr>
<tr>
<td></td>
<td>2. employee</td>
</tr>
<tr>
<td></td>
<td>3. entrepreneur</td>
</tr>
<tr>
<td></td>
<td>4. civil servant</td>
</tr>
<tr>
<td></td>
<td>5. housewife</td>
</tr>
<tr>
<td></td>
<td>6. self-employed</td>
</tr>
<tr>
<td></td>
<td>7. recipient of social assistance</td>
</tr>
<tr>
<td></td>
<td>8. pensioner</td>
</tr>
<tr>
<td></td>
<td>9. unemployed</td>
</tr>
<tr>
<td></td>
<td>10. other (can enter own answer)</td>
</tr>
</tbody>
</table>
9. How religious are you on a scale of 1 to 5?
   1. not religious
   2. not quite religious
   3. moderately religious
   4. quite religious
   5. strongly religious

10. What religion do you practice?
    1. Islam
    2. Christianity
    3. Judaism
    4. Buddhism
    5. not religious

11. Specify your field of activity
    1. education
    2. medicine
    3. journalism, blogger
    4. politics
    5. other (fit, can enter own answer)

12. Indicate your gender
    1. female
    2. male

Questions for those who was indicated as female:
1. Have you had a cervical cancer screening (smear for oncocytology) before?
2. Have you ever been tested for HPV?
3. Do you have regular cervical cancer screening (at least once every four years)?

supplementary Table 2. Questions on knowledge about HPV

<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you ever heard of HPV?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>0. no</td>
</tr>
<tr>
<td>2. Did you know that HPV is a sexually transmitted infection?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>2. no</td>
</tr>
<tr>
<td></td>
<td>3. I find it difficult to answer</td>
</tr>
<tr>
<td></td>
<td>Question</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 3 | Do you think HPV causes warts on the body and genitals?                   | 1. yes  
2. no  
3. I find it difficult to answer |
| 4 | Do you think HPV causes uterine cervical cancer?                         | 1. yes  
2. no  
3. I find it difficult to answer |
| 5 | Do you think HPV causes oral, throat, and penile cancer?                 | 1. yes  
2. no  
3. I find it difficult to answer |
| 6 | Who do you think can become infected with HPV?                           | 1. only women  
2. men only  
3. both sexes - men and women  
4. I find it difficult to answer |
| 7 | Do you think HPV infection can be asymptomatic?                          | 1. yes  
2. no  
3. I find it difficult to answer |
| 8 | Do you think HPV can be transmitted from asymptomatic carriers?          | 1. yes  
2. no  
3. I find it difficult to answer |
| 9 | Do you think HPV is common among our population?                         | 1. yes  
2. no  
3. I find it difficult to answer |
|10 | How do you think HPV can be transmitted (several options can be indicated)? | 1. when shaking hands  
2. through the blood  
3. by air  
4. through kissing  
5. during sexual intercourse  
6. during pregnancy from mother to foetus  
7. during childbirth from mother to foetus  
8. through the water in the pool  
9. through insect bites  
10. in case of bodily contact |
11. Have you ever heard about vaccination against HPV?
   1. yes
   2. no

12. What's your attitude toward COVID-19 vaccination?
   1. positive
   2. doubtful
   3. negative

13. Do you know someone who has had a cervical cancer?
   1. yes
   2. no

**supplementary Table 3. Questions for parents: Immunisation attitudes**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you have children?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>2. no</td>
</tr>
<tr>
<td>2. How many children do you have?</td>
<td>Specify quantity</td>
</tr>
<tr>
<td>3. Gender of child(ren)</td>
<td>1. female</td>
</tr>
<tr>
<td></td>
<td>2. male</td>
</tr>
<tr>
<td></td>
<td>3. both sexes</td>
</tr>
<tr>
<td>4. Has(have) your child(ren) received the vaccinations recommended by a healthcare provider?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>2. no</td>
</tr>
<tr>
<td></td>
<td>3. not fully</td>
</tr>
<tr>
<td>5. What is your attitude to the vaccination of children according to the National Vaccination Calendar?</td>
<td>1. positive</td>
</tr>
<tr>
<td></td>
<td>2. positive, but not for all vaccines</td>
</tr>
<tr>
<td></td>
<td>3. doubtful</td>
</tr>
<tr>
<td></td>
<td>4. negative</td>
</tr>
<tr>
<td>6. Your general attitude to vaccination</td>
<td>1. positive</td>
</tr>
<tr>
<td></td>
<td>2. positive, but not for all vaccines</td>
</tr>
<tr>
<td></td>
<td>3. doubtful</td>
</tr>
<tr>
<td></td>
<td>4. negative</td>
</tr>
</tbody>
</table>
supplementary Table 4. Questions for parents: Barriers to HPV vaccination.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| 1. Has your child(ren) received the HPV vaccine?                        | 1. yes  
2. no  
3. not sure                                                                 |
| 2. Would you like to vaccinate your child against HPV?                   | 1. yes  
2. no  
3. can't answer, more information about the vaccine required  
4. difficult to answer                                                     |
| 3. Would you like this vaccination to be introduced into the National Immunisation Calendar of the Republic of Kazakhstan on a voluntary basis free of charge? | 1. yes  
2. no  
3. I find it difficult to answer                                                                 |
| 4. Would you agree to vaccinate your daughter against HPV if your family doctor (paediatrician, gynaecologist) recommended it? | 1. yes  
2. no  
3. I find it difficult to answer                                                                 |
| 5. Would you agree to vaccinate your son against HPV if your family doctor (paediatrician, gynaecologist) recommended it? | 1. yes  
2. no  
3. I find it difficult to answer                                                                 |
| 6. If you answered the previous question with "no", specify the reason for refusal (you can choose several options). | 1. fear of side effects  
2. fear of injections  
3. uncertainty about the effectiveness of this vaccine  
4. uncertainty about the quality of the vaccine |
5. I do not consider it necessary, since my daughter (son) does not have sexual relations.
6. I do not consider it necessary, since my child has no risk of developing cervical cancer.
7. there is not enough information about this vaccine.
8. the doctor has never informed me of the need for vaccination.
9. the child's age is too young for this vaccine.
10. religious reasons
11. high cost
12. believe that any vaccine is harmful to health
13. fear of my child's earlier onset of sexual activity after vaccination
14. other (can enter own answer)

supplementary Table 5. Questions for parents: Sources of information about HPV and the HPV vaccine

<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. From what sources did you receive information about HPV and cervical cancer (you can choose several options)?</td>
<td>1. medical workers 2. Internet 3. social networks 4. friends, acquaintances 5. television 6. brochures and billboards 7. medical literature 8. did not receive</td>
</tr>
<tr>
<td>2. What was the information you received about the HPV vaccine?</td>
<td>1. positive 2. rather positive 3. rather negative 4. negative 5. did not receive any information</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 3. | Would you like to improve your knowledge of HPV? | 1. yes  
2. no |
| 4. | In which format and from what sources would you like to receive information about HPV and vaccination against it (you can choose several options)? | 1. conversation with a medical professional in a healthcare clinic  
2. presentation at school  
3. video of a medical worker on the Internet, including in social media  
4. posts from celebrities and bloggers on social media  
5. videos of celebrities and bloggers  
6. on news sites and online magazines  
7. Internet  
8. in healthcare facilities as brochures or posters  
9. billboards and posters on streets and roads  
10. information on the official websites of the Ministry of Health and other state bodies  
11. books, magazines, and other printed publications  
12. TV programmes, advertising on television  
13. friends and acquaintances,  
14. other (please write down your option) |
| 5. | Which social networks do you visit more often (you can choose several options)? | 1. VK  
2. Instagram  
3. Facebook  
4. Telegram  
5. TikTok  
6. Twitter  
7. YouTube  
8. I don’t use  
9. other |
| 6. | How much time per day on average do you spend on social networks and the Internet (hours)? |   |
7. From whom would you prefer to receive an invitation to vaccinate against the HPV for your child?
   1. school doctor
   2. district, family doctor
   3. classroom teacher
   4. it doesn't matter
   5. I do not wish to receive invitations

8. How would you like to receive an invitation for HPV vaccination for your child?
   1. letter
   2. telephone call
   3. e-mail
   4. message to the phone
   5. notification from the e-government portal
   6. doctor in person
   7. doesn't matter
   8. I do not wish to receive invitations

9. Do you think teenagers should be informed about HPV?
   1. yes
   2. no

10. Who do you think should inform teenagers about HPV?
    1. parents
    2. school
    3. health professional
    4. adolescents to each other as peers
    5. media
    6. social networks

11. How do you feel about vaccinating children and adolescents based on educational organisations (schools, college)?
    1. positive
    2. negative

**supplementary Table 6. Special questions for healthcare professionals**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| 1. Please state your educational background | 1. secondary special  
2. higher  
3. scientific degree |
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
</table>
| 2 | Please state your specialisation                                       | 1. GP  
2. obstetrics and gynaecology  
3. oncology  
4. otorhinolaryngology  
5. proctology  
6. dermatology  
7. specify otherwise |
| 3 | Work experience: (years)                                                |                                                                                                  |
| 4 | What cervical cancer prevention measures do you know (you can choose a few)? | 1. PAP smear (smear for oncocytoology)  
2. test for HPV oncogenic types  
3. HPV vaccination  
4. regular examination of the cervix on speculas  
5. pelvic ultrasound |
| 5 | What types of HPV are high-oncogenic (you can choose several options)?   | 1. 16, 18  
2. 31, 45  
3. 6, 11  
4. 3, 13  
5. 52, 56, 58, 59, 68, 73, 82  
6. other |
| 6 | Can cervical cancer be caused by types of HPV other than types 16 and 18? | 1. yes  
2. none  
3. I find it difficult to answer |
| 7 | Which of the ways do you think is effective in preventing infection with HPV (several options can be indicated)? | 1. using of birth control pills  
2. limiting the number of sexual partners  
3. observance of hygiene of the genital organs  
4. vaccination against HPV  
5. using of condoms  
6. difficult to answer |
| 8 | Does the HPV vaccine protect against all types of HPV?                  | 1. yes  
2. none  
3. I find it difficult to answer |
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>What is the age recommended by the WHO to start HPV vaccination?</td>
<td>1. at birth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. 9–14 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. 18–25 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. other</td>
</tr>
<tr>
<td>10.</td>
<td>How many shots of vaccine are needed for full HPV vaccination for adolescents under 15 years old?</td>
<td>1. one is enough</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. two</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. three</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. more than three</td>
</tr>
<tr>
<td>11.</td>
<td>Is further screening for cervical cancer necessary after HPV vaccination?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. I find it difficult to answer</td>
</tr>
<tr>
<td>12.</td>
<td>Is vaccination one of the important activities for the control of infectious diseases?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. none</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. I find it difficult to answer</td>
</tr>
<tr>
<td>13.</td>
<td>Do you recommend vaccination to your patients, relatives, acquaintances, friends, and their children within the framework of the National Vaccination Calendar of the Republic of Kazakhstan?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. no</td>
</tr>
<tr>
<td>14.</td>
<td>Do you recommend that your patients, relatives, acquaintances, friends, and their children be vaccinated with additional vaccinations that are not included in the National Vaccination Calendar of the Republic of Kazakhstan (e.g., vaccines against meningococcus, pneumococcus, HPV)?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. no</td>
</tr>
</tbody>
</table>
| 15. | From what sources have you received and are updating information about HPV and cervical cancer? | 1. university  
2. professional development courses  
3. Internet articles, magazines  
4. Internet - professional groups and forums in social networks  
5. conferences  
6. from colleagues  
7. other |
| --- | --- | --- |
| 16. | Would you like to improve your knowledge of HPV? | 1. yes  
2. no |
| 17. | Do you tell your patients about HPV and its link to cervical and other organ cancers? | 1. yes  
2. yes, when there is time  
3. no  
4. no, as there is not enough time at the appointments  
5. no, as this is a sensitive topic concerning sexual behaviour  
6. no, as my specialisation is not related to this topic  
7. other |
| 18. | Do you recommend HPV vaccination to your patients and their children? | 1. yes  
2. yes, when there is time  
3. yes, if they can afford it  
4. no |
| 19. | If you answered the previous question "no", please indicate the reason: | 1. there is not enough time at the appointment  
2. vaccine is not available  
3. the vaccine is expensive  
4. I have little information on its effectiveness and safety  
5. I consider the vaccine ineffective and/or dangerous, inappropriate  
6. the vaccine is not in the National Vaccination Calendar of the Republic of Kazakhstan  
7. other |
| 20. | What, in your opinion, are the barriers to obtaining a vaccine against HPV in the Republic of Kazakhstan? | 1. cost of the vaccine  
2. too young an age to be vaccinated against sexually transmitted infections  
3. vaccine availability  
4. fear of side effects among population  
5. absence of vaccinations in the National Vaccination Calendar of the Republic of Kazakhstan  
6. population’s distrust of any vaccines  
7. population’s distrust of medicine  
8. lack of information on the safety and efficacy of the vaccine among health workers  
9. lack of information on the safety and efficacy of the vaccine among parents  
10. lack of vaccine awareness  
11. lack of knowledge among health professionals about the vaccine  
12. other |
| 21. | When was the last time you updated your knowledge of HPV? (years) | 1. constantly following the news in this area  
2. 1–3 years ago  
3. 3–5 years ago  
4. 5–10 years ago  
5. more than 10 years ago |
| 22. | Do you have difficulty counselling patients about HPV vaccination? | 1. yes  
2. no |
| 23. | If you answered the previous question "yes", please indicate the reason: | 1. insufficient security information  
2. insufficient information on efficiency  
3. the issue is related to the sexual behaviour of children  
4. vaccine is not available  
5. lack of knowledge in this matter  
6. other |

**supplementary Table 7. Special questions for schoolteachers**
<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What type of educational organisation do you work in?</td>
<td>1. school</td>
</tr>
<tr>
<td></td>
<td>2. boarding school</td>
</tr>
<tr>
<td></td>
<td>3. college</td>
</tr>
<tr>
<td></td>
<td>4. university, academy</td>
</tr>
<tr>
<td></td>
<td>5. other</td>
</tr>
<tr>
<td>2. Please indicate your work experience (years)</td>
<td></td>
</tr>
<tr>
<td>3. Do you think it is necessary to raise the awareness of students about HPV?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>2. no</td>
</tr>
<tr>
<td>4. Who should be vaccinated against HPV?</td>
<td>1. boys only</td>
</tr>
<tr>
<td></td>
<td>2. girls only</td>
</tr>
<tr>
<td></td>
<td>3. both sexes</td>
</tr>
<tr>
<td>5. Do you think vaccination against HPV will help reduce infection with HPV and therefore cervical cancer?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>2. none</td>
</tr>
<tr>
<td></td>
<td>3. I find it difficult to answer</td>
</tr>
<tr>
<td>6. Do you consider infection with HPV a serious health problem?</td>
<td>1. yes</td>
</tr>
<tr>
<td></td>
<td>2. none</td>
</tr>
<tr>
<td></td>
<td>3. I find it difficult to answer</td>
</tr>
<tr>
<td>7. Would you recommend that your students get vaccinated against HPV?</td>
<td>1. definitely yes</td>
</tr>
<tr>
<td></td>
<td>2. yes</td>
</tr>
<tr>
<td></td>
<td>3. yes, if the doctor recommends</td>
</tr>
<tr>
<td></td>
<td>4. no</td>
</tr>
<tr>
<td></td>
<td>5. definitely not</td>
</tr>
</tbody>
</table>

Appendixes

supplementary Appendix 1. Voluntary informed consent

Informed consent to the online survey. Dear participant: This survey is conducted as part of a scientific study. We would like to ask you a few questions about human papillomavirus (HPV) and vaccination against it. Your participation in this study is important, as your
answers will help to understand the extent to which the public is aware of HPV as the main cause of cervical cancer in women. This will improve communication in the prevention of one of the most common types of cancer in the Republic of Kazakhstan. Your participation in the study is voluntary. It does not carry any risk of participating, and the information collected will not identify you. Before answering a question, please read all the answer options carefully and select one or more of the options. The correctness of our conclusions and recommendations will depend on the sincerity, correctness, and accuracy of your answers. Thank you very much for your participation!

By proceeding to the next section, you consent to the survey and confirm that you are over 18 years of age.
Researcher contact: hpv.syrveykz@gmail.com

supplementary Appendix 2. Focus group discussion topic guide

**Focus Group Discussion Guide**

1. Moderator and assistant introduction

2. Research proposal and discussion information

Welcome speech: Thank you for coming today to participate in a focus group as part of a research study on HPV and VPV vaccine awareness. We value each one of you, and we will try to make it safe for you to participation and contribution to science. You are all parents, and no one but you knows what is best for your children.

This meeting will be recorded for scientific purposes, and your answers will be presented in scientific papers anonymously as numbers.

We would like to know your thoughts and opinion regarding HPV vaccination, which is able to prevent cancers such as cervical and vulvar cancer in women and oral, throat, and anal cancer in both women and men. This vaccine is recommended by the WHO for children 9–14 years old and adolescents to prevent certain cancers later in life.

Our meeting will take about one hour.

Before we start, please tell us: are there any questions about our meeting?

Then we will start!
**In order to make** our meeting as effective as possible and to keep everyone happy, we can set a few things for communication: Suggestion for group rules: please chat to see if you agree with the rules of our **meeting**.

All opinions are important. Do not insult participants if you do not agree with them. Do not judge other participants for expressing ideas: everyone should be comfortable expressing their opinions even if there are people who would disagree with them.

Please, feel free to take the microphone and type in the chat.

Please put + if you agree.

### 3. Discussion questions (assistant is chatting about the questions in a chat box)

1. How do you feel about the introduction of HPV vaccination in Kazakhstan?
   Please share your opinion: do we need this vaccination? What would be the advantages and disadvantages?

2. Would you agree to vaccinate your child against HPV? Please put + or - in the chat box.

3. What emotions do you feel when you decide to get vaccinated? Please tell us what you mean (enthusiasm, fear, anxiety, calmness, etc.).

4. What questions do you want to be answered before deciding to vaccinate your child against HPV?

5. Would you allow your child to get vaccinated if he or she asked for it?

6. Do you think children should be informed about HPV? How should children be informed? Who should provide this information to children, and how?

7. Now that we have discussed vaccination together, please answer the question again: Would you agree to vaccinate your children against HPV? Please put + or - in the chat box while the assistant is chatting about the question.

8. Is there anything else you would like to tell me or that still seems important to you?

**Thank you very much for attending our meeting!**