

Study on the Knowledge of Mothers or Guardians of Girls Aged 9 - 14 from the Langu de Barbarie in Saint-Louis, Senegal about Cervical Cancer and Its Relationship to HPV Vaccination in 2024

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Abstract

Introduction: The relationship between knowledge of HPV and vaccination has been established. The aim of this study was to investigate the knowledge of mothers or guardians of girls aged 9 - 14 about cervical cancer and their attitudes to HPV vaccination. **Methodology:** This was a descriptive cross-sectional survey. The sample size was calculated using the Schwartz formula and distributed proportionally to the size of the neighbourhood population. Data was collected between 2nd to 19th January 2024 using anonymous questionnaires configured on tablets with Survey 123 software and analysed using R software. **Results:** A total of 799 people were interviewed. The average age of the respondents was 35.67 years, with a standard deviation of 7.08 and a range of 17 and 49 years. The information channels for cervical cancer were the media (82.8%), health facilities (47.7%) and community intermediaries (23.3%). Only 53.7% had information about the vaccine and 25.5% about the vaccination strategy. The main reason for accepting the vaccine was awareness of the seriousness of cervical cancer (55.1%). **Conclusion:** It is essential to take stock of knowledge about cervical cancer and attitudes to vaccination to assess the impact of interventions and redirect strategies to improve vaccination coverage.

Keywords

Cervical Cancer, HPV, Vaccine, Knowledge, Girls, Senegal

1. Introduction

In 2020, cancer was responsible for 10 million deaths and was one of the leading causes of death in the world [1]. In the same year, the International Agency for Research on Cancer (IARC) estimated that more than 11,000 people were affected by cancer in Senegal each year, and that nearly 8000 died from it. Cervical cancer is the leading cause of cancer mortality in the country and one of the five main causes of death in general. These figures are expected to rise substantially, reaching over 16,000 new cases and more than 11,000 deaths by 2030.

Cervical cancer is one of the few cancers that can be prevented. In fact, to reduce the incidence of cervical cancer, in addition to screening and early management of precancerous lesions in women, the World Health Organisation (WHO) recommends that girls aged between 9 and 14 should be vaccinated before any sexual activity [2]. The HPV vaccine has been shown to be highly effective in preventing persistent HPV infection and precancerous cervical cancer caused by HPV-16 and HPV-18 in women who were not yet infected at the time of vaccination [3] [4].

Many vaccines have been shown to be effective in reducing the incidence of HPV infections [5]:

- A bivalent vaccine (Cervarix®) against genotypes 16 and 18.
- A quadrivalent vaccine (Gardasil®) against genotypes 6, 11, 16 and 18.
- A nonavalent vaccine (Gardasil 9®) against genotypes 6, 11, 16, 18, 31, 33, 45, 52 and 58.

As part of its cervical cancer prevention strategy, Senegal has opted since October 2018 to introduce the HPV vaccine into its expanded vaccination programme [2].

The aim of the Expanded Programme on Immunisation is to make vaccines more accessible to everyone. It has its origins in the smallpox eradication programme initiated by the WHO in 1967. This programme has evolved considerably over time, considering the changing context and the emergence of new diseases, particularly in children.

Internationally, new vaccines were introduced rapidly, between 2010 and 2019: Pneumococcal Conjugate Vaccine (PCV), rubella-valent vaccine, and Human Papillomavirus Vaccine (HPV), thanks to the support of global partners (WHO, UNICEF), which are supporting the pre-qualification and purchase of vaccines, and the GAVI Alliance, which is providing funding for developing countries [6].

In Senegal, HPV vaccination is provided through routine services. This strategy, which is less costly than organising a campaign, is combined with dispensing the vaccine in health facilities, schools and at community level [7]

This programme has encountered some difficulties in its implementation, with low vaccination coverage of around 32% for HPV1 and 22% for HPV2, according to Senegal's Ministry of Health and Social Action [8].

Lack of information about the vaccine has been identified as one of the main barriers to vaccination [9]. It has been shown that parents' knowledge about the vaccine and cervical cancer, and about the vaccination strategies, can positively

influence their decision to vaccinate their daughter [10]. Vaccine acceptability therefore remains closely linked to knowledge of cervical cancer and assurance of its safety and efficacy in preventing cervical cancer.

The aim of this study was to investigate the knowledge of mothers or guardians of girls aged 9 - 14 in the Langue de Barbarie area of Saint-Louis about cervical cancer and their attitudes to vaccination in 2024.

2. Methodology

2.1. Study Location

The Langue de Barbarie is in the Saint-Louis region on Senegal's north coast, approximately 250 km from Dakar. The city of Saint-Louis is located in the estuary of the Senegal River. It extends over an area comprising three entities: the Langue de Barbarie, the island of Saint-Louis and the large suburb of Sor. The Langue de Barbarie is where the Senegal River meets the Atlantic Ocean. It is a very narrow strip of land bounded by the Atlantic Ocean on the west coast and by the Senegal River on the east coast. The northern limit of the Langue de Barbarie is the border with Mauritania, less than 3 km from Goxu-Mbacc, while in the south, the strip of land ends at the mouth of the Senegal River.

The population of the Langue de Barbarie is divided between the 3 main neighbourhoods: Guet-Ndar/Hydrobase, Santhiaba and Goxu-Mbacc. It is subdivided into 12 sub-neighbourhoods (Table 1).

The population of the Langue de Barbarie was estimated at more than 60,549 in 2013, according to figures from the general census of population and housing, agriculture, and livestock (RGPHAE 2013). It represented almost a quarter of the population of the commune of Saint-Louis, which stood at 253,392.

The Langue de Barbarie is part of the Saint-Louis health district. In terms of health infrastructure, the Langue de Barbarie currently has:

- 3 functional public health posts (Guet-Ndar, Santhiaba and Goxu Mbaac).
- 1 "community health" post in the process of being turned into a health post at Hydrobase.
- 1 private health facility in Santhiaba, which focuses on nutritional monitoring and child growth, as well as primary curative consultations.

On the other side of the river, on the island, the Guet-Ndar neighborhood faces the Saint-Louis regional hospital.

Table 1. Subdivision of Langue de Barbarie.

Guet-Ndar/Hydrobase	Santhiaba	Goxu-Mbacc
Lodo	Bas Ndartoute	Premier Bayal
Pond Khollé	Haut Ndartoute	Deuxième Bayal
Dack	Camp Gazell	Troisième Bayal
Bas Hydrobase		
Haut Hydrobase		
Keur Ibra Dièye		

In terms of education infrastructures, according to datas for 2022 from the education and training inspectorate of Saint-Louis (IEF), the Langue de Barbarie has 11 elementary schools, 2 secondary schools, 3 pre-schools and several daaras (koranic school).

Regarding socio-economic aspects, the three neighborhoods of the Langue de Barbarie have the highest concentration of fishermen in Senegal. Most of their inhabitants depend on sea fishing for their livelihood [11].

Indeed, the male population is almost exclusively made up of fishermen, with more than 86% of male heads of household engaged in fishing [12].

Artisanal processing of fish products is mainly carried out by women and is a source of income. It is an old tradition among the women of the Langue de Barbarie, particularly in Guet-Ndar, who are known for their long experience and know-how in this profession [13].

The Langue de Barbarie is characterised by a strong contrast with the rest of the Commune of Saint-Louis in terms of population density, lifestyle, land use, etc. For example, according to the regional statistics service, in 2012, the Guet-Ndar neighborhood, had the highest population density in Africa and ranks fifth in the world with a population of more than 25,206 and a density of 1491 inhabitants/ha. It is the oldest neighborhood of Saint-Louis in Senegal, with a strong community personality and a deeply rooted, uniform socialisation based on work. This has earned it the label of a hard-working population [14].

2.2. Study Design

This is a descriptive and analytical cross-sectional study of households in the Langue de Barbarie, Saint-Louis.

2.3. Study Population

The study population consisted of women of reproductive age, mothers or guardians of daughters aged between 9 and 14.

2.4. Selection Criteria

Inclusion criteria: All mothers or guardians of girls aged between 9 and 14 who have lived in the Langue de Barbarie for more than 6 months at the time of the study and who have given their consent to take part in the research.

Non-inclusion criteria: Any mother or guardian absent or unavailable at the time of the survey.

2.5. Sampling

The minimum sample size is calculated using the Schwartz formula:

$$n = t^2 \times p \times (1 - p) / m^2$$

- n = minimum sample size;
- t = confidence level (1.96);

- p = probability of the event occurring (0.5);
- m = margin of error (5%).

The minimum sample size calculated was 768, rounded to 800 to take into account of possible non-responses. The sample was distributed proportionally to the population size by neighborhood in the Langu de Barbarie.

A cluster survey was used with:

- A first stage consisting of concessions in the neighborhoods.
- A second stage by households in the concessions.
- A third stage by mothers or guardians in the households.

To choose the starting point, the sub-neighborhoods were divided into sectors with an average of thirty concessions in each sector. The first concession was chosen at random by elementary sampling in the sector, which was also identified at random by drawing lots.

At the concession level, households are numbered, and one household drawn at random. All the women that met the selection criteria at the level of the household selected at random were surveyed. A mother or guardian who met the inclusion criteria would only be surveyed once. If she had several daughters/wards in the 9 to 14 age group, a draw was made to choose the girl around whom the interview would revolve.

2.6. Data Collection

Data collection was carried out from 2nd to 19th January 2024 based on anonymous questionnaires administered by interviewers to women in the targeted households. This questionnaire was structured in 4 parts: identification of the questionnaire, the respondent's profile including her socio-demographic characteristics and those of the girl about whom the interview focused, knowledge of the HPV vaccine and Senegal's vaccination strategy, the respondent's relationship to care and HPV vaccination including the girl's vaccination status and the number of doses received.

The questionnaire was configured on tablets using Survey 123 software to allow direct entry of information into the database.

The team of interviewers was made up of 3 men and 7 women and was trained in the use of the tablets for data collection and in the questionnaire so that the questions could be better formulated in the local language. The questionnaire was pre-tested after the training in the Khor area, another locality in Saint-Louis, with around twenty women, which enabled adjustments to be made to the wording of some of the questions and the answers given by the women during the pre-test.

The interviewers were distributed throughout the different zones and local resource persons were identified to facilitate their introduction to the local population. The data entered was protected and stored on the password-protected platform, with the possibility of monitoring the progress of the survey in real time.

2.7. Data Analysis

The data entered were exported in Excel format and then in csv and the analyses were carried out using R software, which is free and open source [15].

A descriptive analysis was carried out using frequencies for the qualitative variables. For quantitative variables, the basic parameters (mean, standard deviation, median, extremes) were presented [16].

2.8. Ethical Considerations

Participation in the survey was voluntary for all respondents. Comprehensive information on the study was shared in advance of the questionnaire being administered and the interviews proceeded only once informed consent was obtained.

The research protocol was submitted to and approved by Senegal's National Health Research Ethics Committee (CNERS) under number SEN23/84 on 25 October 2023.

3. Results

3.1. Socio-Economic Characteristics of Respondents

A total of 799 people were interviewed in the various districts of the Langue de Barbarie. No cases of refusal were documented. The average age of the respondents was 35.67, with a standard deviation of 7.08 and range of 17 and 49. The median age was 36. Respondents were most often aged 30 - 40 (47.6%).

Biological mothers were the main interviewees (82.7%). Educated participants accounted for just over half of the respondents (56.7%) and were mainly at primary school level (40.9%) (Table 2).

More than half of the respondents (63.7%) had their daughters educated in French and 23.3% in Arabic; 6.6% had not attended school and 6.4% had dropped out.

The mean age of girls was 11.4 ± 1.7 years, with and a range of 9 to 14. The median age was 11 (Table 3).

3.2. Knowledge of Cervical Cancer and Vaccination

The study showed that 77.3% of women said they had already heard about cervical cancer through one or more information channels. The media was the main source of information for 82.8% of respondents, followed by health facilities (47.7%) and social networks (23.3%). The bajenu gox¹ were also cited as an important player in raising awareness, ranking fourth among the sources of information cited by women (10.3%).

Regarding vaccination, only 53.7% of the women surveyed had ever heard of the HPV vaccine, while 46.3% said they had never heard of it or were simply unaware of its existence. It also emerged that even among those who had heard

¹The neighborhood godmothers, commonly known as Bajenu Gox, are women who are close to the communities and who play a relay role in raising awareness of health issues.

Table 2. Socio-demographic characteristics of respondents (n = 799).

Characteristics	n (%)
Neighbourhood	
Guet-Ndar/hydrobase	344 (43%)
Goxu Mbacc	304 (38%)
Santhiaba	151 (19%)
Age respondent	
<30 years	154 (19%)
30 - 40 years	388 (49%)
>40 years	257 (32%)
Type of household	
Married	714 (89%)
Non-married	85 (11%)
Relation between respondent and girl	
Other	138 (17%)
Biologic mother	661 (83%)
Has always lived in LDB	
No	83 (10%)
Yes	716 (90%)
Has an occupation	
No	334 (42%)
Yes	465 (58%)
Type residence	
Non-owner	188 (24%)
Owner	611 (76%)

Table 3. Socio-demographic characteristics of girls (n = 799).

Characteristics	n (%)
Neighbourhood	
Guet-Ndar/hydrobase	344 (43%)
Goxu Mbacc	304 (38%)
Santhiaba	151 (19%)
Age girl	
<11 years	277 (35%)
11 - 13 years	281 (35%)
>13 years	241 (30%)

Continued

Girls schooling	
No	104 (13%)
Yes	695 (87%)

of the vaccine, some still did not understand its role. Analysis of the results showed that 87.4% of those questioned knew that the vaccine prevents cervical cancer. However, 7.7% thought that the vaccine was curative, 2.6% that it played both roles, *i.e.* that it was preventive and curative at the same time, and the remaining 2% were unaware of its role.

3.3. Knowledge of the HPV Vaccination Strategy

Only 25.5% of respondents said they were aware of the HPV vaccination strategy adopted by Senegal. This strategy consists of integrating the HPV vaccine into the Expanded Programme on Immunisation (EPI), and in addition to the vaccination campaign and health facilities as sites for dispensing the vaccine, elementary schools and daaras were identified as sites for offering the vaccine to girls aged 9 to 14.

As for the places where the vaccine is given, 83.2% of the women questioned cited health facilities as the reference structure. French schools or daara and vaccination campaigns were also cited by 38.2% and 22.8% of respondents respectively.

As for how to obtain the vaccine, 93.9% of the women surveyed said it was free, while just over 6% did not know. About the age group targeted for vaccination, the 9 - 14 age group was cited by 59% of the women surveyed, while the single cohort of 9-year-olds was cited by 10% (**Table 4**).

3.4. Women's Attitudes to Vaccination and Cervical Cancer

The reasons for women's acceptance of the vaccine were diverse and the main one being awareness of the seriousness of cervical cancer (55.1%). Other factors were also cited as reasons for acceptability, including the recommendation of HPV vaccination by healthcare workers or community agents such as *bajenu gox* (37.1%), the effectiveness of the vaccine in preventing cervical cancer (21%) and the knowledge of a relative or person affected by gynecological cancer (8.4%).

Mothers and guardians were the main people authorising administration of the HPV vaccine, with 74.3% and 12% of respondents respectively. However, 3.9% of respondents did not know who had given permission for their daughter to be vaccinated. This mainly concerned vaccination in schools, where in principle parental permission is required before the vaccine is administered to girls.

In all cases, the decision to vaccinate was often accompanied by someone giving the right information or advice to make it easier to obtain the consent of the girls' parents/guardians. In addition to recommending the vaccine, the *Bajen gox*

(45.8%) and health workers (44.3%) were the main people who helped girls to take the HPV vaccine, with support and follow-up to help them take the second dose.

Table 4. Knowledge on cervical cancer and HPV vaccination.

Characteristics	n	Percentage (%)
Knowledge of vaccination		
Yes	429	53.7
No	370	46.3
Information channel		
Media	512	82.8
Health facilities	295	47.7
Social media	144	23.3
Bajen gox	64	10.4
School/daara	14	2.3
Understanding of role of vaccine		
Preventive	375	87.4
Curative	33	7.7
Preventive and curative	11	2.6
Don't know	9	2.1
Other	1	0.2
Knowledge of location for vaccination		
Health facilities	357	83.2
School/dara	125	38.2
Immunisation campaign	95	22.8
Don't know	10	2.3
Other	9	2.1
Knowledge of age for vaccination		
9 - 14	253	59.0
Don't know	71	16.6
9 only	43	10.0
other	35	8.2
Under 9	16	3.7
15 and +	11	2.6
Knowledge on the vaccination strategy		
No	595	74.5
Yes	204	25.5

The reasons for the reluctance to be vaccinated were also documented, the main one being that 78.7% of the women among those not taking the vaccine did not know about the vaccine. Unsuitable service times and rumors about vaccination were also cited by 9.5% and 5.4% of respondents respectively. Cases of unavailability of the vaccine were also reported in the Langue de Barbarie by 3.9% of women.

It was noted that 27.5% of the women surveyed had already undergone cervical cancer screening and only 2.1% had been vaccinated against HPV.

As for recommending the vaccine to others, 79.5% of the women surveyed said they would recommend the HPV vaccine for use in girls aged 9 to 14 in Langue de Barbarie (Table 5).

4. Discussion

The level of education is low in the Langue de Barbarie. Although 56.7% of the women surveyed had attended school, the level did not exceed primary school for most of them. Only 4% had completed secondary school and 1% had completed higher education. One of the findings in the Langue de Barbarie is that girls are often taken out of school at an early age to help their parents with domestic chores. Some are also in Koranic schools, which is a well-respected tradition in the area.

Regarding cervical cancer and vaccination, the most widespread information channel was the media (television and radio), with 77.3% of people surveyed receiving information via this channel. However, the information received through this channel is generally not very detailed or comprehensive enough to enable them to fully understand the issues and challenges of HPV vaccination. In contrast, the information received from health facilities and Bajen gox gave more details about cervical cancer and vaccination. Interacting with these people means that women can get answers to their questions and receive clarifications and additional informations to help them better understand the disease and how to prevent it. The lack of clear, comprehensive information, combined with misinformation about the side effects of vaccination, make it difficult for people of Langue de Barbarie to accept the vaccine. This misinformation, which is also circulating on social media, one of the information channels used by 10.4% of women does not make it any easier to understand what is at stake with vaccination. One of the most widely spread rumour in the Langue de Barbarie was that the vaccine's side-effects would reduce fertility in vaccinated girls.

These results corroborate those found in the case-control study conducted by Mbouma Ndiaye *et al.* on the “factors associated with HPV vaccination in a context of scaling up in Senegal”, where the media and referrals were among the main sources of information for parents/guardians of children, with 82.4% of cases and 66.7% of controls citing community referrals as a source of information, and 84.7% of cases and 80.6% of controls citing the media [17].

Knowledge of where the vaccine is given was fairly good, with 83.2% citing health facilities, 38.2% elementary schools and 22.8% vaccination campaigns.

Table 5. Women's relationship to vaccination and cervical cancer.

Characteristics	n	Percentage (%)
Daughter vaccinated		
2-No	409	51.2
1-Yes	334	41.8
3-Don't know	56	7.0
Reason for vaccination		
Seriousness of cancer	184	55.1
Effectiveness of vaccine	70	21.0
know someone affected by cancer	28	8.4
Recommendation	124	37.1
School	12	3.6
Other	3	0.9
Consent for vaccination		
Mother	248	74.3
Guardian	40	12.0
Don't know	13	3.9
Father	9	2.7
Teacher	7	2.1
Grand-ma	5	1.5
Sister	3	0.9
Coranic teacer	3	0.9
Bajen gox	2	0.6
aunt	2	0.6
Health worker	1	0.3
Other	1	0.3
Respondant HPV vaccination status		
No	782	97.9
Yes	17	2.1
Reason for non-vaccination		
Not aware	322	78.7
Hour of service not adapted	39	9.6
Vaccine non-available	16	3.9
Vaccine not effective	3	0.7
Side effects	11	2.7

Continued

Rumors	22	5.4
Refusal parents	18	4.4
Difficulty of geographical access	4	1
Others	19	4.6
Vaccination strategy adapted to context		
Yes	181	88.7
No	17	8.3
Don't know	6	2.9
Has been screened for cervical cancer		
No	579	72.5
Yes	220	27.5
Opinion on vaccination		
Good	604	75.6
No opinion	175	21.9
Not good	20	2.5
Person who helped for girl vaccination		
Bajenu gox	153	45.8
Teacher	75	22.5
Neighbourhood	16	4.8
Healthcare workers	148	44.3
Don't know	11	3.3
Other	14	4.2

The strategy adopted by the Ministry of Health is to dispense the vaccine in health facilities, but also in primary schools and daara where the targeted girls are more accessible, with the collaboration of the Ministry of Education and the parents of the girls concerned [18].

The vaccine is also available during EPI vaccination campaigns, as well as at events organised from time to time by partners in the health districts to encourage girls aged 9 to 14 to be vaccinated to prevent cervical cancer.

Regarding the age groups of girls targeted by the vaccination campaign, the results of the study show that 59% of women cited the 9 to 14 age group, while the single cohort of 9-year-olds was cited by 10% of respondents. This could be explained by changes in communication about HPV vaccination and targets. Indeed, during the first few years after the vaccine was introduced, awareness-raising by healthcare workers and Bajenu Gox focused on the fact that the HPV vaccine was free and on targeting the 9-year-old cohort. It was only recently that the ministry of health decided to target the multi-age cohort of 9- to 14-year-olds. This

follows WHO recommendations that if countries have limited resources that prevent initial multiple cohort vaccination, a single year cohort in the 9 - 14 age group can be selected as the target population for HPV vaccination [2]. In Senegal, the cohort of 9-year-old girls was initially identified as the target group after the vaccine was introduced in 2018. However, HPV vaccination existed long before, but the vaccine was only available in pharmacies at a fairly high price, making it difficult for people to access. This could explain the HPV vaccination coverage found among the women surveyed, which was only 2.1%.

The vaccination coverage rate for girls was 41.9%, which is consistent with data from the Ministry of Health, which puts coverage at less than 50% for the Saint-Louis health district [8]. In 74% of cases where girls were vaccinated, the decision to use the vaccine on their daughters was taken by the mother and 12% by the guardians. However, cases where the mother or guardian did not know who took the decision to vaccinate her daughter have been documented, which raises the problem of parental consent before girls get vaccinated in schools. This shows the complexity of the decision-making process in the vaccination of girls, which involves several actors at different levels and should be considered in analysis of vaccination and associated factors.

In 55.1% of responses, acceptance and use of the HPV vaccine was justified by awareness of the seriousness of cervical cancer on the part of the mothers or guardians of the girls targeted by the vaccination campaign. Some 37% of the respondents accepted the vaccine on the recommendation of *bajenu Gox* or healthcare workers whom the mothers or guardians trusted to manage their health problems. Indeed, the proximity of these *bajenu Gox* to the communities and their commitment to the well-being of the people in their neighbourhood mean that they generally have the full confidence of the population.

Furthermore, 21% of the women surveyed said that they had correct knowledge and information about the HPV vaccine and were aware of its effectiveness and therefore agreed to have their daughters vaccinated. The knowledge of a relative or another person with gynaecological cancer was also cited as a reason for vaccination uptake to prevent cervical cancer, and lastly, vaccination at school, since the authorities (Ministry of Health and Ministry of Education) are aware of and authorise HPV vaccination campaigns for targeted girls, which reassures some parents.

In all cases, the decision to vaccinate girls is very often supported by a third party, and the *Bajen gox* is the most frequently cited, followed by health staff, teachers or Koranic teachers and, lastly, neighbors. Although access to the vaccine was not cited as a determining factor in girls' vaccination, with just under 4% citing a problem of availability, it was noted that socio-economic activities linked to fishing (locally known as "diamalaye"), fish processing and petty trading mobilise some women who are away from home for most of the day and are only available late in the afternoon, whereas the vaccination service is only available during the day. This was cited by 9.5% of women as the reason why their daughters had not been vaccinated.

5. Conclusions

This study showed that improving the level of knowledge of women of Languede Barbarie about cervical cancer and HPV vaccination is still a challenge. Indeed, HPV vaccination is largely determined by access to the right information, and the understanding and appropriation of the strategies developed by the health authorities to improve vaccine acceptability and vaccination coverage among girls.

The development of a communication plan on cervical cancer and HPV vaccination based on an analysis of the factors associated with HPV vaccination and the state of knowledge would be a way of providing appropriate responses to the constraints identified in access to good information for the population. This could certainly help to strengthen the strategy put in place to significantly improve the knowledge about cervical cancer and consequently HPV vaccination coverage among girls aged 9 - 14 in the Languede Barbarie area of Saint-Louis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Sung, H., Ferlay, J., *et al.* (2021) Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*, **71**, 209-249. <https://doi.org/10.3322/caac.21660>
- [2] Organisation Mondiale de la Santé (2017) Plaidoyer pour la prévention et la lutte contre le cancer du col de l'utérus en Afrique: Guide du formateur. <https://iris.who.int/bitstream/handle/10665/260512/9789290312468-fre.pdf>
- [3] Belot, A., Grosclaude, P., Bossard, N., *et al.* (2008) Cancer Incidence and Mortality in France over the Period 1980-2005. *Revue d'Épidémiologie et de Santé Publique*, **56**, 159-175. <https://doi.org/10.1016/j.respe.2008.03.117>
- [4] de Martel, C., Plummer, M., Vignat, J., *et al.* (2017) Worldwide Burden of Cancer Attributable to HPV by Site, Country and HPV Type. *International Journal of Cancer*, **141**, 664-670. <https://doi.org/10.1002/ijc.30716>
- [5] Wu, T., Hu, Y.M., Li, J., *et al.* (2015) Immunogenicity and Safety of an *E. coli*-Produced Bivalent Human Papillomavirus (Type 16 and 18) Vaccine: A Randomized Controlled Phase 2 Clinical Trial. *Vaccine*, **33**, 3940-3946. <https://doi.org/10.1016/j.vaccine.2015.06.052>
- [6] Pierre, A. and Bernard-Alex, G. (2024) Du Programme Élargi de Vaccinations aux Programmes Nationaux de Vaccination systématique. <http://medecinetropicale.free.fr/cours/vaccinations.pdf>
- [7] Organisation Mondiale de la Santé (2017) Plaidoyer pour la prévention et la lutte contre le cancer du col de l'utérus en Afrique: Guide du formateur. <https://iris.who.int/bitstream/handle/10665/260512/9789290312468-fre.pdf>
- [8] Ministère de la Santé et de l'Action Sociale (2021) Bulletin d'information de la Division de l'immunisation. <https://www.sante.gouv.sn/projets-et-programmes>
- [9] LaMontagne, D.S., Bloem, P.J.N., Brotherton, J.M.L., *et al.* (2017) Progress in HPV

- Vaccination in Low- and Lower-Middle-Income Countries. *International Journal of Gynecology and Obstetrics*, **138**, 7-14. <https://doi.org/10.1002/ijgo.12186>
- [10] Faye, A., Ndiaye, S., Niang, K., et al. (2016) Determinants of Vaccination Coverage against Human Papillomavirus in 10-Year-Old Girls in 2016 in Rural Senegal. *Science Journal of Public Health*, **5**, 464-468. <https://doi.org/10.11648/j.sjph.20170506.19>
- [11] Sy, B.A., Bilbao, I.A., Sy, A.A., et al. (2013) Résultats du suivi 2010-2012 de l'évolution de la brèche ouverte sur la Langue de Barbarie au Sénégal et de ses conséquences. *Physio-Géo*, **7**, 223-242. <https://doi.org/10.4000/physio-geo.3569>
- [12] ANSD, Service Régionale de la Statistique et de la Démographie de Saint-Louis (2015) ANSD, Situation Economique et Sociale de la Région de Saint-Louis. <https://www.ansd.sn/>
- [13] Ministère de l'Urbanisme de l'Habitat, de l'Hydraulique, de l'Hygiène Publique et de l'Assainissement (2008) Plan Directeur d'Urbanisme PDU-Saint-Louis Horizon 2025. https://www.pdudakar.gouv.sn/IMG/pdf/rapport_de_presentation_du_pdu_de_saint_louis.pdf
- [14] Agence Nationale de la Statistique et de la Démographie (ANSD) (2013) Enquête Démographique et de Santé Continue (EDS-Continue 2012-2013). <https://dhsprogram.com/pubs/pdf/fr288/fr288.pdf>
- [15] de Micheaux, P.L., Drouilhet, R. and Liquet, B. (2014) Présentation du logiciel R. In: de Micheaux, P.L., Drouilhet, R. and Liquet, B., Eds., *Le Logiciel R*, Springer, Paris, 1-29. https://doi.org/10.1007/978-2-8178-0535-1_1
- [16] Astagneau, P. and Ancelle, T. (2021) Surveillance épidémiologique/Principes, méthodes et application en santé publique. Lavoisier Msp, Paris.
- [17] Ndiaye, M., Sawadogo, B., Sonko, I., Ba, I.O. and Leye, M.M.M. (2021) Facteurs associés à la vaccination contre le virus du papillome humain dans un contexte de passage à l'échelle au Sénégal: Enquête cas-témoins auprès des parents. *Pan African Medical Journal*, **39**, Article 137. <https://doi.org/10.11604/pamj.2021.39.137.29229>
- [18] PATH (2011) Mise en oeuvre de programmes de vaccination anti-HPV. Expérience Pratique de PATH. https://media.path.org/documents/RH_ccp_hpv_vaccination_fr.pdf