

# Impact of the COVID-19 pandemic on HPV vaccination coverage in the general population and in PLWHs

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**Abstract. – OBJECTIVE:** On March 11, 2020, the World Health Organization (WHO) has declared the novel coronavirus (COVID-19) outbreak as a global pandemic. COVID-19 pandemic has impacted health services, including immunization programs, with a consequent reduction in vaccination coverage in those categories for which the prevention of vaccine-preventable diseases is strongly recommended.

**SUBJECTS AND METHODS:** We conducted a retrospective cross-sectional study on the general population and on PLWHs, comparing anti-human papillomavirus (HPV) vaccination coverage data in 2019, before COVID-19 pandemic, and the 2020 data, after the announcement of the pandemic state and the lockdown and the implementation of restrictive measures to contain the contagion.

**RESULTS:** Compared to 2019, 2020 data show a 42% reduction in HPV vaccine coverage in the general population and 36% in PLWHs. The greatest reduction in anti-HPV vaccination coverage occurred during periods of greatest restriction and mainly concerned the general population.

**CONCLUSIONS:** The prevention of vaccine-preventable diseases remains essential. Above all, it is essential to increase and recover the anti-HPV vaccine coverage, in consideration of the data that show its preventive oncological efficacy.

*Key Words:*

HPV vaccine, COVID-19 pandemic, Oncological prevention.

## Introduction

On March 11, 2020, the World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic<sup>1</sup>. In a short time, the cases increased, and health care, systems and societies were seriously questioned from the emerging virus<sup>2</sup>. The COVID-19 pandemic has impacted the delivery of health services, including immunization programs<sup>3</sup>. Most of the resources related to routine preventive activities have been transferred to interventions related to the pandemic to control the circulation of the virus<sup>4,5</sup>.

The reduction in vaccination coverage affected various age groups and categories of people who could be immunized against vaccine-preventable diseases. According to the data collected by the WHO, the United Nations Children's Fund (UNICEF), the Global Alliance for Vaccines and Immunizations (GAVI), and the Sabin Vaccine Institute, the suspension of vaccination services in over 68 countries have put at least 80 million children under the age of one at risk<sup>6</sup>.

Studies<sup>7</sup> have shown that due to the social isolation measures adopted to reduce the risk of transmission from SARS-CoV-2, the vaccination services have been adapted to the individual territorial situations based on the circulation of the virus and the restrictive measures implemented; this has led to a reduction in vaccination coverage<sup>4</sup>.

Da Silva et al<sup>8</sup> showed that the number of MMR vaccine doses injected between April 2020 and September 2020 was significantly lower than in the period from April 2019 to March 2020, highlighting how social isolation triggered by the COVID-19 pandemic, has greatly contributed to the reduction in the number of applied MMR vaccines.

In their report, Muhoza et al<sup>9</sup> showed how global vaccination coverage decreased in 2020 compared with 2019 estimates for the completed series of *Haemophilus influenzae* type b (Hib), hepatitis B vaccine (HBV), human papillomavirus vaccine (HPV), and rubella-containing vaccine (RCV).

The control of infectious diseases is of paramount importance to Public Health and the availability of an efficacy vaccination is crucial<sup>10</sup>. Particularly, the vaccine against the HPV is a fundamental weapon of prevention against this oncogenic virus. It is appropriate to encourage information campaigns about this important public health issue focusing mainly on vaccinations in general and anti-HPV to improve coverages and avoid epidemics of vaccination-preventable infections that have recently affected our territory<sup>11</sup>.

HPV is the second cause of virus-related cancer, colorectal cancer as well as cervical cancer also bladder cancer, urinary bladder cancer, urinary tract cancer, squamous cell carcinoma and oral cancer with viral persistence in saliva<sup>12-25</sup>.

The introduction of the effective Highly Active Anti-Retroviral Therapy (HAART) in the treatment of HIV, have turned this infection in a chronic condition with an increase in life expectancy of people living with HIV (PLWH), but with a parallel increase in cancer incidence as a whole and especially for some kinds of cancers<sup>26</sup>.

The compromised immune status of people living with HIV (PLWHs), associated with risky sexual behaviors such as unprotected sex (anal, vaginal, or oral sex) increases the risk of HPV-associated cancers among PLWHs<sup>27,28</sup>. This requires an effective HPV infection prevention strategy by vaccination<sup>29</sup>.

Since 2007/2008, in all Italian Regions and Autonomous Provinces, HPV vaccination has been offered free and actively to girls in their twelfth year of life (eleven years old)<sup>30</sup>. In addition, some Regions have extended the active offer of vaccination to girls of other age groups. Subsequently, three Regions (Sicily, Apulia, Molise) have introduced, as early as 2015, the anti-HPV vaccination also for males in the twelfth year of life and,

in 2016, other regions (Calabria, Liguria, Friuli Venezia Giulia and Veneto) did so for kids born in 2004. In addition, the Emilia Romagna and Friuli-Venezia Giulia regions also offer the vaccine to HIV positive individuals, males, and females<sup>31,32</sup>. The aim of our study is to evaluate the impact of the COVID-19 pandemic on HPV vaccination coverage in the general population and, above all, in a high-risk category such as PLWHs.

## Subjects and Methods

We conducted a retrospective cross-sectional study on the general population and on PLWHs, examining the HPV vaccination coverage data from the Immunization Centre of the Hospital Hygiene Operative Unit of the Messina University Hospital "G. Martino". The study has been conducted according to the Helsinki Declaration and our Institutional policy about retrospective studies.

We compared anti-HPV vaccination coverage data in 2019, before COVID-19 pandemic, and the 2020 data, after the announcement of the pandemic state and the lockdown and the implementation of restrictive measures to contain the contagion.

All enrolled subjects received active and free vaccination in accordance with current guidelines and recommendations<sup>33,34</sup>. The sample was composed by men and women over 18 years old of age able to understand the informed consent and in absence of other diseases. PLWHs came from Infectious Diseases hospital ward of the Messina University Hospital "G. Martino" and presented CD4 count for live attenuated viral vaccines of 350/ $\mu$ L.

### Statistical Analysis

Statistical analysis was performed using software R (available at: <https://www.rproject.org>), version 4.2.0. Results are expressed as frequencies (percentages). Categorical data were compared using the Chi-square test. A level of significance of  $p < 0.05$  was considered.

## Results

In 2019, we administered 330 doses of anti-HPV vaccine in the general population and 66 doses in PLWHs, using as per technical indications the 3 doses schedule (0, 2, 6 months)<sup>35</sup>.

In 2020, we administered 190 doses of anti-HPV vaccine in general population and 42 in PLWHs with a decrease, compared to 2019, of 42% in general population and of 36% in PLWHs (Chi square = 0.123; *p*-value = 0.726) (Figure 1).

Particularly, from January to May 2020, we administered only 15 doses of anti-HPV vaccine in general population compared to 90 doses of anti-HPV vaccine administered from January to May 2019 (percentage decrease = -83%) and 9 doses of anti-HPV vaccine from January to May 2020 in PLWHs compared to 20 doses administered in the same period in 2019 with a percentage decrease of -55% (Chi square = 3.271; *p*-value = 0.071) (Figure 2).

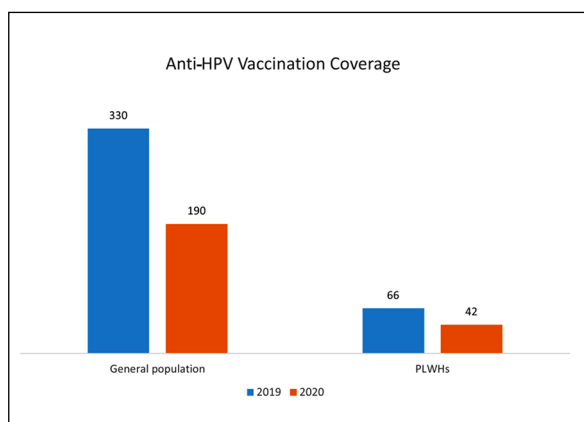
The data collected show an important decrease in anti-HPV vaccination coverage, especially during times of greater social restrictions.

### Discussion

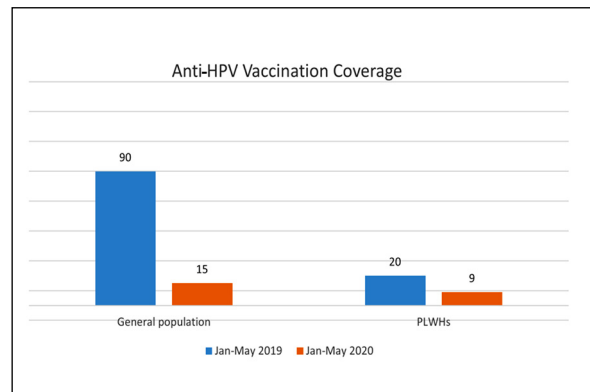
The COVID-19 pandemic from SARS-CoV-2, causing pneumonia and other complications<sup>36</sup>, has radically changed global healthcare, orienting on some priority aspects. Despite this, the prevention of vaccine-preventable diseases remains essential.

In particular, regarding the pathologies associated with HPV infection, data<sup>37</sup> from national and international literature show that improving human papillomavirus (HPV) vaccine uptake could prevent tens of thousands of cancer cases each year.

The greatest decrease in anti-HPV vaccination coverage was observed during periods with more social restrictions. In fact, to reduce the possible



**Figure 1.** Anti-HPV vaccine doses administered in 2019 and 2020 in general population and PLWHs.



**Figure 2.** Doses administered from January to May 2019 and from January to May 2020 in general population and PLWHs.

infection with COVID-19 of patients and health-care professionals, all non-priority procedures had been suspended. The Immunization Centre of the Hospital Hygiene Operative Unit of the Messina University Hospital “G. Martino” was closed during the lockdown and consequently the execution of vaccinations and the completion of the vaccination schedule postponed.

Drop in anti-HPV vaccination mainly affected the general population compared to PLWHs. Adherence to the anti-HPV vaccination of PLWHs followed in our Immunization Center it has always been high also for the anxiety often related to risk behaviors for their immunocompromised status (i.e., unsafe sex)<sup>38,39</sup>.

The main causes of the decline in vaccination coverage were: the closure of the center, the isolation and quarantine measures that coincided with the dates of the vaccination and then, with the restart of the assistance activities, the fear of contagion and not considering the anti-HPV vaccination essential compared to the anti-COVID-19 vaccination, postponing its execution.

### Conclusions

The COVID-19 pandemic has posed multiple substantial challenges, affecting not just public health but also economic systems, socio-cultural models and political institutions.

The impact of a global pandemic on vaccination programs is an important topic because delays or disruptions to such programs are likely to cause outbreaks and epidemics of other infectious diseases.

For this reason, it is essential, especially after the impact of the COVID-19 pandemic, to recover the lost vaccine doses necessary to complete the vaccination cycle (i.e., by telephone call) and the enrollment of new patients for whom the anti-HPV vaccination is strongly recommended.

### Conflict of Interest

The Authors declare that they have no conflict of interests.

### Funding

This research received no external funding.

### Ethics Approval

The study has been conducted according to the Helsinki Declaration and our Institutional policy about retrospective studies. The Ethics Committee was released by the Policlinico "G. Martino" of Messina, study number 34/17.

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