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Overcoming HPV vaccine hesitancy: insights from a successful school-based vaccination campaign in the Saa health district of Cameroon

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Abstract

Background Vaccination against human papillomavirus (HPV) represents a critical strategy in the global effort to eradicate cervical cancer. Nonetheless, the uptake of HPV vaccination in Cameroon has been slow, resulting in vaccine wastage during a period of constrained global supply. In the Saa health district, factors such as concerns about infertility, fears of COVID-19 infection, and restrictions on HPV awareness initiatives in Catholic churches and schools have been identified as contributors to vaccine hesitancy. This report outlines the observations from a successful impromptu HPV vaccination campaign conducted in the context of this hesitancy within the Saa health district.

Methods The campaign took place from the 9th to 25th of May 2023 and targeted 853 adolescents aged 9–13 years. A single-dose schedule with Gardasil was used mainly through the school strategy. Community health workers, teachers and priests participated in sensitization activities via door-to-door sensitization for parents, sensitization in schools for students and in churches for faithfuls respectively. Health facilities vaccinated schools in their catchment area. Vaccination data were recorded in routine vaccination registers.

Results A total of 1321 adolescents (154%) were vaccinated, 48.9% ($n=646$) of whom were boys. Thirty-four primary and two secondary schools participated in the campaign. Health workers, teachers and Catholic priests all participated in sensitization activities. No backlash was reported from parents after vaccination.

Conclusion The successful execution of the campaign can be attributed to the active involvement of key stakeholders within the health district. Continuous advocacy for HPV vaccination, even in a climate of vaccine hesitancy, plays a significant role in positively altering perceptions. Recognizing stakeholders and their influence is essential for tailoring strategies aimed at enhancing HPV vaccine uptake.

Keywords Human papilloma virus, Vaccination, Hesitancy, Cameroon, Adolescents

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Introduction

The World Health Organization (WHO) identifies cervical cancer as the fourth leading cause of cancer-related deaths among women worldwide [1]. Cervical cancer, caused by human papillomavirus (HPV), is vaccine preventable [2]. To eliminate cervical cancer by 2030, the WHO has set three primary goals: 90% of women with precancerous lesions should be treated, and 90% of women with invasive cancer should be managed; 70% of women should undergo screening with a high-performance test by the age of 35 and again by 45; and 90% of girls should be vaccinated by the age of 15 [1]. Currently, six licensed HPV vaccines are available for use (Gardasil [Quadrivalent], Gardasil 9, Cervarix [single dose], Cecolin, Walrinvax, Cevarix [two dose]) with the primary target population being girls aged 9–14 years [3, 4]. However, due to HPV-related cancers in males, boys have also been included in the target group [3]. Depending on the vaccine, a two- or three-dose schedule is recommended based on the recipient's age; however, evidence has demonstrated that a one-dose schedule offers similar efficacy and duration of protection as a two-dose schedule [3]. In December 2022, the WHO recommended a one-dose schedule for both girls and boys aged 9–20 years [3]. As of June 2023, 131 countries, including 20 African countries, had integrated the HPV vaccine into their national immunization programs (NIPs). Despite this progress, global coverage for the first dose of the HPV vaccine (HPV1) remains suboptimal, with coverage rates ranging from 87% in Canada to just 6% in Indonesia [3].

Sub-Saharan Africa bears a disproportionate share of the global cervical cancer burden [5]. Nevertheless, fewer than 50% of countries in the region have introduced the HPV vaccine into their national immunization programs. This slow uptake has been largely attributed to associated programmatic costs and various health system barriers [6, 7]. In 2016, Gavi, the Vaccine Alliance, modified its HPV program strategy, enabling countries to apply for full national introduction support without requiring evidence from demonstration projects and recommending the vaccination of multiage cohorts (MACs). This led to increased demand for the vaccine, which, in turn, contributed to a global shortage [8]. In response, the WHO advised in 2019 that countries halt the use of MAC vaccinations, as well as the vaccination of boys and older age groups, until vaccine supplies were more stable [9]. Since then, the HPV vaccine supply has stabilized, with the WHO reporting sufficient vaccines to meet global demand [10]. However, careful attention must still be given to how vaccination programs are rolled out and how effectively vaccines are utilized, especially given the limited supply buffers.

Between 2010 and 2016, three HPV vaccination demonstration projects were carried out in Cameroon to

assess the feasibility of introducing the vaccine. These projects targeted girls aged 9–13 years, with the first project funded by Axios Healthcare Development held in the Southwest, Northwest and Centre regions between 2010 and 2014, achieving 84.6% coverage for the third dose of the HPV vaccine [11]. Following this success, the program funded by Gavi expanded to two additional health districts from 2014 to 2016. These demonstration projects using facility and community-based strategies provided valuable insights, showing that HPV vaccination was both feasible and acceptable in Cameroon [11, 12]. In 2020, the Cameroonian government decided to integrate the HPV vaccine into the national immunization program, initially targeting 9-year-old girls with two doses administered six months apart. In January 2023, the vaccine schedule was revised to reduce the number of doses to one and expand the target population to include boys.

Vaccine hesitancy remains a significant barrier to the effective use of vaccines. Unused vaccines are subject to expiration, preventing other adolescents from accessing potentially life-saving immunizations. In recent years, vaccine hesitancy toward traditional infant vaccines has been increasing across Africa, with many countries lagging behind high income countries in terms of vaccination coverage [13]. One of the primary drivers of this increase in hesitancy is the widespread mistrust of government institutions [13], which exacerbates concerns about new vaccines, especially the HPV vaccine, which initially targeted only girls. Studies conducted in Africa have also highlighted stigma, misinformation, safety concerns, and rumors spread through social media as key drivers of HPV vaccine hesitancy [14, 15].

The Centre Region of Cameroon has experienced particularly high levels of HPV vaccine hesitancy among both community members and healthcare staff. In the Saa health district, various efforts have been made to improve vaccine uptake, including advocacy meetings with local authorities and school principals, frequent sensitization campaigns, and the first periodic intensification of routine immunization (PIRI) for HPV in 2021. Unfortunately, these initiatives yielded limited success. Stakeholder involvement in vaccination activities is important and they are seen as reliable sources of information for vaccination activities and boost vaccine uptake [16–18]. Despite being one of the top-performing districts in the Centre region regarding HPV vaccination, coverage rates remain suboptimal. Based on administrative data of the Saa health district, in 2021, only 176 girls out of 1,117 (15.7%) received the first dose of the HPV vaccine, whereas in 2022, only 109 girls out of 1,136 (9.5%) were vaccinated. With the inclusion of boys in 2023, only 107 out of 1,969 adolescents (5.4%) in the district had been vaccinated between January and April.

A survey conducted in 2021 among vaccinators in the district to determine the reasons for hesitancy identified multiple factors, including fears of COVID-19 infection, concerns about infertility, and inadequate community sensitization by health authorities [19]. While the vaccinators had a strong understanding of the vaccine, some expressed skepticism. Additionally, the Catholic Church discouraged its congregants from vaccinating their children [19]. As a result, vaccine hesitancy, combined with the inability to redistribute unused vaccines to other districts due to similarly low demand, led to the expiration of 193 doses of the HPV vaccine in the district's cold chain in 2021 and 99 doses in 2022.

To address the low demand for HPV vaccines in the Centre Region and prevent overstocking in the regional cold chain, a push system was adopted to distribute vaccines to districts, regardless of demand. The same system was employed at the district level to distribute vaccines to health facilities, although at a reduced rate to avoid overstocking. An inventory of the district's cold chain in April 2023 revealed 792 doses of the HPV vaccine near expiration within two months, with an additional 61 doses in health facility cold chains. The utilization of these vaccines before they expired rather than allowing them to be wasted became urgent. With the school year approaching its end in the third week of May, there would be limited opportunity to reach adolescents in the community without additional resources, further reducing the chances of using the vaccine stock before expiration. Despite the ongoing community hesitancy, the District Management Team decided to organize a PIRI to prevent vaccine wastage targeting 853 boys and girls aged 9–13 years using the school strategy. This target of 853 corresponded to the number of available doses in the district. No external funding was received for this PIRI; all activities were carried out on a voluntary basis. In this article, we share our observations during the PIRI and highlight that a positive shift in perceptions toward HPV vaccination among health workers and community members contributed significantly to the success of the initiative.

Implementation of the PIRI

Setting

The Saa health district, a rural area situated in the Centre region, has an estimated population of 76,961, which comprises 8,465 adolescents between the ages of 9 and 13, as reported by the Ministry of Health in 2023. The district has 31 health facilities (1 district hospital, 30 integrated health centres) distributed across 11 health areas, 28 of which provide vaccination services each overseen by the chief of centre. Vaccination is conducted daily at facilities that have a cold chain, whereas those without such facilities offer vaccinations on a weekly basis. Additionally, the district has 62 primary schools and 19

secondary schools, which are located primarily within the Saa urban health area, as well as 52 churches, 33 of which are Catholic.

Vaccine distribution

The quadrivalent Gardasil vaccine was used for routine HPV vaccination and was administered intramuscularly. The 792 doses were distributed to each leading facility on the basis of their health area population. These facilities were responsible for further allocation to satellite facilities, considering the number of schools in their catchment area and demand. This approach aimed to improve accountability and stock management rather than the usual direct allocation to health facilities. District distribution began two days before the campaign. Leading facilities stored the vaccines in their cold chain and supplied satellite facilities a day before or on the vaccination day. On-site, vaccinators used vaccine carriers for transportation and storage. Midway through the campaign, due to unexpectedly high demand, an additional 480 doses from the same lot were collected from the regional warehouse and distributed to facilities.

Community mobilization

Advocacy and awareness efforts began one week prior to the vaccination initiative. The district management team dispatched letters to local authorities regarding the campaign. Health area chiefs subsequently conveyed these letters to religious and traditional leaders, increasing their awareness of HPV vaccination. Authorization for school vaccinations was secured from educational authorities, who also communicated this information to school principals. Announcements were disseminated through the local radio station, churches, and mosques. Vaccinators provided reminders to school principals about the campaign, scheduled vaccination dates, and engaged in sensitization efforts with students. Community health workers undertook door-to-door and group outreach to educate the public on HPV transmission, associated cancers, the advantages of vaccination, and the vaccination schedule.

Vaccination days

Vaccination took place from May 9 to 25, 2023, via a one-dose schedule. Each health facility was responsible for vaccinating schools in its catchment area, with additional facility-based and door-to-door strategies employed to meet targets. In schools, all eligible adolescents were vaccinated except those whose parents had not provided verbal or written consent. Vaccination occurred in classrooms with the class teacher or principal present. Adolescents whose parents later provided consent were vaccinated at health centers. For schools that had already been covered or where principals were hesitant, the door-to-door strategy was used. In the case of adverse

Table 1 Community mobilization coverage per target group

Target group	Baseline	Sensitized	Coverage
Health areas	11	11	100%
Catholic churches	33	31	93.9%
Primary schools	62	34	54.8%
Secondary schools	19	2	11%

reactions, the children were instructed to visit the nearest health facility with a parent or teacher. Vaccinators and mobilizers received no financial incentives for their work.

Data collection and analysis

All vaccination data were recorded in health facility registers and monthly reporting forms. Following standard data management procedures, a monthly data review meeting was held with health facilities to crosscheck figures between the digital monthly reporting form (DHIS2) and the registers, making corrections where needed. Data analysis was performed via Excel, with vaccination coverage reported as proportions. The review meeting also served as an evaluation of the campaign, assessing each step of the process.

Results

Community mobilization

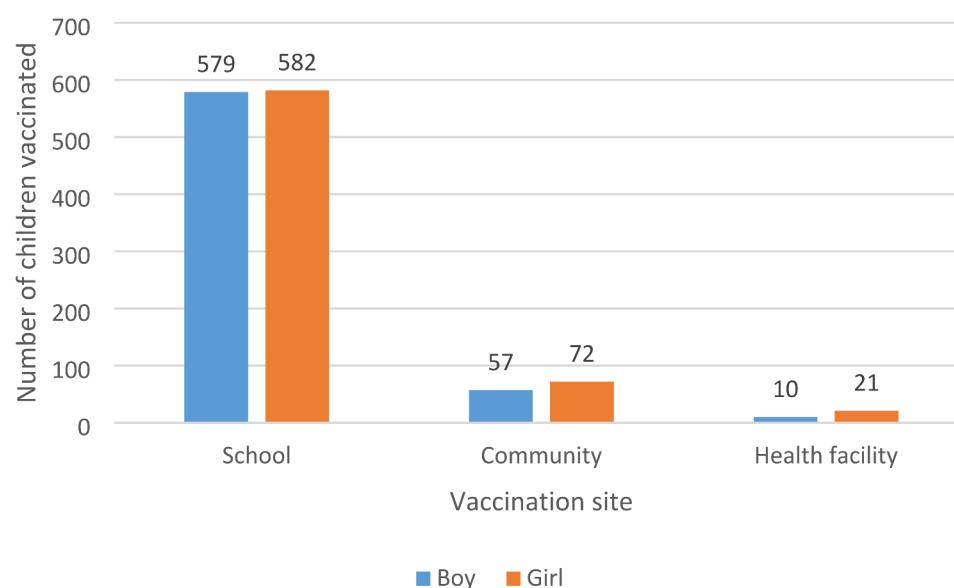
All 11 health areas participated in the campaign. The campaign announcement was read in all but one Catholic church. Vaccinators scheduled vaccinations and sensitized pupils and students in 34 primary and two secondary schools (Table 1). Fifty community health workers were deployed across the district, and they sensitized 24,000 people.

Vaccination coverage

A total of 1321 adolescents were vaccinated giving a coverage of 154% on the basis of the target for the campaign and a coverage of 15.6% on the basis of national estimates. Among them, 48.9% ($n=646$) were boys. Most adolescents (88%, $n=1161$) were vaccinated in schools, 9.7% ($n=129$) via a door-to-door strategy, and only 2.3% ($n=31$) were vaccinated in health facilities (Fig. 1). No adverse reactions were reported. Five vaccine doses were left at the end of the campaign, resulting in a consumption rate of 99.4%.

Discussion

We present the outcomes of a successful HPV vaccination initiative in the Saa health district, where 1,321 adolescents received vaccinations, primarily through a school-based approach, achieving a remarkable 99.4% utilization rate of available vaccines in the district. This campaign was conducted in the context of significant community hesitancy regarding the HPV vaccine, which was influenced by concerns over potential COVID-19 infection, fears of infertility, and opposition from the Catholic Church. Conversely, health professionals attributed this hesitancy to the government's insufficient efforts in educating the public prior to the introduction of the vaccine. The success of this campaign signifies a notable shift in attitudes toward the HPV vaccine among both health workers and the community. We aim to highlight the changes in perceptions that were observed throughout this initiative.

**Fig. 1** Number of children vaccinated by sex and vaccination site

Changes in attitude observed

Before the campaign, a significant number of health workers rarely engaged in sensitizing pupils and students about HPV, nor did they actively encourage parents to bring their children for vaccination, despite the availability of the vaccine within their cold chain. However, they did conduct sensitization efforts regarding other infant vaccines. Only a small fraction attempted to vaccinate within schools and proactively sought eligible children. During the campaign, nearly all the vaccinators engaged in sensitization activities at schools, churches, and within the community, persuading parents to permit their children to receive vaccinations. The campaign also fostered a sense of intragroup competition and motivation, as each vaccinator strived to match or exceed the performance of their colleagues. Those who were initially hesitant began to schedule vaccinations in schools, leading to a substantial increase in the number of vaccinated children. Notably, no financial incentives were provided to vaccinators for participating in this vaccination initiative. Intrapersonal and interpersonal pride have been identified as motivational factors in the workplace [20, 21], encouraging employees to achieve their goals or exceed their own expectations.

The introduction of the HPV vaccine in 2020 was met with significant opposition from the Vicar General of the Catholic diocese in the area, who strongly criticized the vaccine. He issued a directive prohibiting Catholic churches and schools from disseminating information related to HPV or allowing access to vaccination providers. This stance was unique to the HPV vaccine. However, a shift occurred as Catholic churches began to accept announcements about the vaccination campaign and permitted vaccinators to engage with congregants during services. Some priests even took the initiative to educate their congregations about cancer. A similar change was noted in Catholic schools. This transformation undoubtedly contributed to increased community acceptance of the HPV vaccine, particularly given that a large portion of the population identifies as Catholic. Religion has been cited as a social determinant of health, as believers tend to turn to their spiritual leaders for health guidance [22]. The church plays a significant role in health promotion [23], and organizations such as UNICEF encourage collaboration between the health sector and religious institutions to increase immunization efforts [24].

Schools, much like churches, serve as significant platforms for health promotion [25]. Despite directives from educational authorities, many principals initially denied access to vaccinators for HPV vaccination, primarily due to concerns about potential backlash from parents. However, during the campaign, the majority of principals embraced the vaccinators, facilitated the sensitization of students, and assisted in obtaining parental

consent. Notably, after the immunization efforts, no principal reported experiencing any backlash from parents. Research indicates that teachers' beliefs about vaccination can significantly affect their attitudes toward parental hesitancy [26, 27] and their willingness to allow vaccinations on school grounds [28]. Enhancing teachers' understanding of the vaccine in question has been proposed as a means to foster a more positive attitude toward vaccination initiatives [26, 29, 30]. Ongoing community sensitization and advocacy efforts with teachers likely played a crucial role in increasing their knowledge about HPV.

Concerns regarding infertility associated with the HPV vaccine have been identified as a significant factor contributing to vaccine hesitancy in various contexts [31, 32], including the Saa health district [19]. The perception that a vaccine aimed solely at girls (who are often viewed as bearers of future generations) poses a threat to reproductive capabilities fueled these fears. Infertility remains a sensitive subject in numerous African communities [33]. However, during the vaccination campaign, the decision to include boys in the vaccination initiative appeared to alleviate some of the anxiety surrounding infertility among local residents. Vaccinators noted that parents exhibited greater openness when informed that boys would also receive the vaccine. Additionally, the occurrence of some teenage pregnancies among girls who had been vaccinated at the program's inception provided further evidence that the vaccine does not lead to infertility.

The COVID-19 pandemic generated significant fear within communities globally and led to considerable prejudice against immunization services [34]. The introduction of the COVID-19 vaccine presented an opportunity to mitigate the morbidity and mortality associated with the virus. In Cameroon, five rounds of COVID-19 vaccination campaigns were conducted, with each subsequent round achieving a greater number of vaccinations in the Saa health district. This increasing uptake of the COVID-19 vaccine indicated increasing confidence among the community regarding its efficacy. However, the launch of the HPV vaccine coincided with the pandemic, resulting in heightened community hesitancy driven by fears of infection. During the vaccination campaign, community health workers encouraged parents to permit their children to receive the HPV vaccine, highlighting that they themselves had been vaccinated against COVID-19 without experiencing severe side effects or contracting the virus. It appears that the community adopted a wait-and-see approach regarding the HPV vaccine, uncertain about its benefits or potential risks, preferring to observe its effects on other children before making a decision. This cautious parental attitude toward the HPV vaccine has been documented in various contexts [35, 36]. The

delay in vaccine uptake hampers disease prevention initiatives and facilitates the transmission of diseases within the community [37, 38].

Numerous systematic reviews have assessed various interventions aimed at improving HPV vaccine uptake among adolescents [39–42]. Mavundza et al. examined interventions implemented in high-income countries and reported that narrative education, outreach efforts, financial incentives, reminders, and brief motivational strategies directed at recipients significantly increased the initiation of HPV vaccination [39]. Rani et al. focused on interventions in the United States (U.S.) and reported that HPV-related education provided by credible sources positively influenced vaccination rates among adolescents [40]. Conversely, another review investigating interventions among minority populations in the U.S. revealed limited evidence supporting the effectiveness of HPV education and reminders in improving vaccination rates [41]. Oketch et al. analyzed communication strategies for HPV vaccination in Sub-Saharan Africa and concluded that targeting community leaders, educators, school administrators, and health workers effectively enhanced HPV vaccine uptake, owing to their influence on parents and adolescents within the community [42]. Collectively, these studies underscore the necessity for context-specific interventions to boost HPV vaccine uptake. Oketch's findings resonate with our experiences during the campaign, where the active involvement of key stakeholders—such as health workers, educators, and religious leaders—was instrumental in guiding parents and adolescents to engage with the campaign.

Public health implications

This vaccination activity had several public health implications. Efficient mobilization of resources and active engagement of key stakeholders significantly reduced vaccine wastage. This is particularly crucial in light of the global limitations on HPV vaccine supply and the necessity for equitable distribution. In addition, the participation of teachers, healthcare professionals, and even Catholic priests in awareness initiatives helped build community trust and enhance vaccine acceptance, potentially leading to increased uptake in future routine immunization initiatives. Most notably, the campaign led to a considerable rise in HPV vaccination rates, safeguarding both girls and boys from HPV-related illnesses. Including boys in vaccination efforts plays a vital role in achieving herd immunity, thereby diminishing overall viral transmission and the long-term risk of HPV-associated cancers in both genders. Furthermore, enhancing HPV vaccination coverage is in line with the World Health Organization's objective of eliminating cervical cancer as a public health issue. This campaign has made significant contributions to primary prevention efforts, ultimately

aiding in the reduction of cervical cancer incidence and mortality in Cameroon. The success of the campaign further demonstrates that a school-based strategy should be prioritized for HPV vaccination in the country, particularly in the prevailing context of vaccine hesitancy. Advocacy with local authorities and the implementation of school-based vaccination programs can be replicated in similar environments to enhance HPV vaccine uptake across the nation.

Limitations

The primary limitation encountered during implementation of the campaign was the lack of adequate microplanning, which stemmed from the context and urgency of the organization. This oversight resulted in an inability to assess the size of the target population of 9 to 13-year-olds accurately and the necessary doses to achieve at least 25% coverage. Despite an increase in demand, a cautious strategy was adopted, leading to the procurement of only a limited number of doses from the regional warehouse to avoid surplus vaccines within the district's cold chain. As a result, certain schools were left unvaccinated due to vaccine shortages. Another issue arose from the failure to schedule some schools, as vaccinators mistakenly believed that the school principals would be reluctant to participate.

Given that this report is purely observational, the success of the campaign may not necessarily translate into sustained behavioral change. Additionally, the effectiveness of a campaign can be influenced by a range of factors, including logistical challenges, varying capacities within the healthcare system, and differences in government and community support. These contextual variables make it difficult to generalize the findings, limiting their applicability across diverse settings and populations.

Conclusion

We present the successful implementation of the PIRI for HPV in the Saa health district of the Centre region, Cameroon, which indicates a positive change in the perception of the HPV vaccine among all key stakeholders in the district. We attribute this positive change significantly to ongoing advocacy for HPV vaccination, even in the context of widespread hesitancy toward the vaccine. Identifying stakeholders and understanding their influence is crucial for developing strategies that effectively promote the uptake of the HPV vaccine. The involvement of key stakeholders in immunization initiatives is crucial for the effectiveness of these efforts. Most research assessing interventions for HPV vaccine uptake has been conducted in high-income countries, underscoring the necessity for localized evidence from Africa. Although our findings are primarily observational, sharing our experiences from this pioneering district-led initiative

will provide valuable insights for other districts, both within and outside our region, on effective strategies to increase HPV vaccine uptake. Nevertheless, additional research is needed to explore other factors contributing to this change in perception.

Abbreviations

COVID-19	Coronavirus Disease 2019
HPV	Human papilloma virus
HPV1	1st-dose HPV vaccine
HPV3	3rd-dose HPV vaccine
MAC	Multiage cohorts
NIP	National immunization programme
PIRI	Periodic intensification of routine immunization
SIA	Supplementary immunization activities
WHO	World Health Organization

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Author contributions

E.H. designed the study. D.E., C.B. and V.N. contributed in data collection, analysis of the results and writing of the manuscript. All authors approved the final version of the manuscript.

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Data availability

All data generated or analyzed during this study are included in this article.

Declarations

Ethics approval and consent to participate

This manuscript is a report of routine immunization activities whereby routine immunization data is reported. As such, no ethical clearance is required or submission to an ethical committee, as it is considered public data. The law governing human health research in Cameroon Law 2022/008 of 27 April 2022 pertains to studies carried out on humans or corpses related to diseases or the functioning of the human body [43].

However, verbal informed consent for adolescents to be vaccinated was obtained from their parents according to national guidelines for routine immunization.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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