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REVIEW

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Characterizing adolescent vaccination in publicly funded national immunization programs in Latin America and the Caribbean: A review of the literature

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ABSTRACT

This review aimed to characterize adolescent vaccination schedules in publicly funded national immunization programs in Latin America and the Caribbean. The initial review identified vaccine type, target age and gender, dose schedule, and vaccination coverage rate (VCR) across 50 countries/territories in the region. A systematic review from January 2010–October 2023 was then conducted to identify primary data collection studies reporting VCRs. Overall, 42 webpages and 23 primary studies were identified. Among 47 countries/territories with ≥1 vaccine for adolescent immunization, human papillomavirus (HPV) vaccine was included in 45, tetanus component vaccines in 43, and meningococcal vaccines in 10. Catch-up vaccination for hepatitis B in 17, and yellow fever in all 13 endemic countries/territories. VCRs were primarily available for HPV. The findings of this review underscore the need to prioritize adolescent vaccination, improve accessibility, and strengthen tracking infrastructure to ensure comprehensive protection of this age group across the region.

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Introduction

Adolescence, defined by the World Health Organization (WHO) as the period between 10 and 19 y, is characterized by rapid physical, cognitive, and psychosocial development.[1,2] Health interventions tailored to the unique needs of adolescents are essential for promoting physical and mental well-being, enabling individuals to contribute meaningfully to society.[3] Among these interventions, immunization stands out as one of the most cost-effective strategies for preventing diseases and reducing long-term healthcare burdens.[4,5]

In 2021, vaccine-preventable diseases accounted for a significant portion of the 1.5 million deaths among adolescents and young adults globally.[6] To address this, health authorities – including the WHO – have long recommended routine vaccination for adolescents against diseases such as diphtheria, tetanus, pertussis, meningococcal disease, human papillomavirus (HPV), and hepatitis B. These recommendations are informed by local epidemiological patterns and implementation feasibility.[1,2,7,8] For example, in Latin America and the Caribbean, where yellow fever and dengue are endemic, these vaccines are incorporated into adolescent national immunization programs (NIPs).[9–11]

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Despite adolescents aged 9–19 y comprising 17.2% of the population in Latin America and the Caribbean, representing approximately 114 million young people, investment in adolescent health remains limited.[12] This review aims to assess and characterize the status of adolescent vaccination schedules in publicly funded NIPs in Latin America and the Caribbean. To the best of our knowledge, no previous review has specifically addressed this topic in this region. Identifying gaps in current vaccination schedules is crucial for informing strategies to enhance adolescent immunization programs.

Materials and methods

This review followed the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[13] The protocol for the review was registered in PROSPERO.[14] Inclusion criteria were outlined based on the PICOTS framework (Population, Intervention, Comparator, Outcome, Time, and Study design; Supplementary Table S1). The population of interest was males and females aged 9–19 y eligible for vaccination in publicly funded NIPs in Latin America and the Caribbean. The lower age limit of 9 years was selected to capture HPV vaccination, which is offered from this age in some NIPs.[9] The definition used for the Latin American and Caribbean region follows the United Nations Statistics Division geoscheme, which is widely accepted for geographic analysis.[15] Of the 50 countries/territories in the region, 42 report immunization data via the Pan American Health Organization (PAHO)-WHO /UNICEF Electronic Joint Reporting Form (e-JRF), accessible through the WHO Immunization Portal.[9,16] Eight countries/territories do not report to e-JRF, and 13 are considered endemic for yellow fever.[17] There was no comparator in this study. Outcomes of interest included the type of vaccines included in adolescent immunization programs, target age range and gender, recommended dose schedule, and vaccination coverage rates (VCRs) for each vaccine. The review also examined the timeline and gender-specific dynamics of HPV vaccine introduction, which initially targeted females before expanding to include males. Puerto Rico and the United States (US) Virgin Islands were excluded from this review due to the absence of universally government-funded adolescent vaccination programs. Programs limited to outbreak response or targeting only high-risk populations were also excluded.

Search strategy and screening

Data collection was conducted in two stages: first, a structured search of web-based official sources (gray literature); second, a systematic review of peer-reviewed studies. The first stage involved using Google to gather immunization information from the WHO immunization data portal, PAHO, and official government webpages. The goal was to characterize adolescent immunization schedules in publicly funded NIPs in Latin America and the Caribbean. The search employed free-text terms and keywords such as country names, "vaccine," "vaccination," "adolescent," "immunization schedule," "coverage," and "uptake," with terms adapted to the official languages of each country (Supplementary Table S2). Identified websites (Supplementary Table S3) were scanned for information on vaccines offered to adolescents in each country's NIP. These were then screened against the PICOTS criteria. In-country vaccine experts were consulted to validate findings and to provide contextual insights. Consulted experts included Ministry of Health focal points ($n = 2$), academic experts ($n = 7$), and representatives of pharmaceutical companies supplying vaccines ($n = 8$).

The second stage involved a systematic literature review to identify primary data collection studies reporting VCR outcomes using individual-level data for the eligible population identified during the initial structured review. As most VCR data from WHO, PAHO, and country-specific webpages are based on administrative coverage, primary data collection studies can offer a more comprehensive understanding of VCRs in the region.[18]

To identify studies, bibliographic database searches were conducted via PubMed, Embase, Cochrane Database of Systematic Reviews (CDSR), LILACS, and SCOPUS for studies published between January 2010 and October 2023. Comprehensive search strategies were developed using Boolean, truncation, and proximity operators adapted for each database. Both free-text terms and controlled vocabulary were used, including Medical Subject Headings [MeSH] for Pubmed, Emtree [EMB] for Embase, and Descriptores en Ciencias de la Salud [DeCS] for LILACS (Supplementary Table S4). Reference lists of systematic reviews and

Google Scholar were searched to identify additional peer-reviewed and gray literature. Searches were conducted from September 2021–December 2021, with an update in October 2023 for peer-reviewed literature and in December 2023 for gray literature. Titles and abstracts of articles were screened against the PICOTS criteria by two independent reviewers (MR and CIP). Full-text articles of included abstracts were then screened by the same reviewers, with discrepancies resolved by a third senior reviewer (MEP).

Data extraction and synthesis

All references were managed using reference management software. Data from online resources and publications were extracted using a standardized Microsoft Excel spreadsheet by one reviewer (MR), and verified by a second reviewer (CIP), with discrepancies resolved by a third senior reviewer (MEP).

From WHO, PAHO, and government webpages, extracted data included vaccine type, target age and gender, dose schedule for each vaccine, and vaccination coverage. The most recent available data were used, specifically 2023 for adolescent vaccination schedules and 2022 for official coverage validated by national authorities. For HPV vaccination, WHO-UNICEF Estimates of National Immunization Coverage (WUENIC) by age 15 was used to assess and compare VCRs across countries, following the cumulative, cohort-based method recommended to assess completion of the HPV vaccine series by the end of the primary target age group.[19] Historical VCR data from official web-sources were reviewed and, where necessary, aligned with the timeframes of the respective primary data collection studies to enable comparison.[9]

For primary data collection studies reporting VCRs, extracted variables included: first author, year of publication, study period, study location, region (municipality, state/department, country), gender, age of eligible population, study design, vaccine type, sample size, and VCR. In cases of missing or incomplete data, up to three attempts were made to contact the corresponding principal investigators.

Quality assessment of included articles

To assess the quality of the primary data collection studies, a modified version of the Newcastle-Ottawa Quality Scale (NOS) for cross-sectional studies was used (Supplementary Table S5). Two independent researchers (CIP and JCO) conducted the quality appraisal, with any discrepancies resolved through consensus with a third reviewer (MR). The assessment covered three domains: (1) selection – representativeness of the sample, sample size, nonrespondents, and ascertainment of exposure; (2) comparability; and (3) outcome – assessment of the outcome and statistical test. Studies were scored on a 10-point scale, with predefined thresholds indicating quality: 9–10 (very good), 7–8 (good), 5–6 (satisfactory), and 0–4 (unsatisfactory). Due to the nature of the data sources, formal quality assessment was not applied for the initial structured review.

Results

Characteristics of publicly funded adolescent immunization programs

A total of 42 online documents provided information on the characteristics of publicly funded adolescent immunization programs.[9,20–61] The WHO Immunization Data Portal was the primary source for vaccination schedules.[9] For countries and territories not reporting through the e-JRF, data were obtained from country-specific governmental websites (Supplementary Table S3).[25,26,45,48,49,55] As of 2023, 47 Latin American and Caribbean countries/territories (41 reporting to the e-JRF and 6 not reporting) included at least one vaccine in their publicly funded adolescent immunization program.

The characteristics of adolescent vaccination schedules in NIPs are detailed in Table 1 and Figure 1. Routine HPV vaccination was included in 45 countries/territories, while 10 included meningococcal disease vaccination (meningococcal C [MenC]/meningococcal ACWY [ACWY]). Booster doses were offered for tetanus, either alone or in combination with diphtheria and pertussis components (tetanus toxoid and diphtheria [Td] or tetanus toxoid, diphtheria, and acellular pertussis vaccine [Tdap]) in 43 countries/territories, and for poliomyelitis (oral poliomyelitis vaccine [OPV]/intramuscular poliomyelitis vaccine

Table 1. Adolescent vaccine schedules and target ages in publicly funded national programs within Latin America and the Caribbean, 2023.

	Routine vaccination					Booster vaccination			Catch-up vaccination				
	HPV			Meningococcal		Seasonal Influenza	Tetanus, Diphtheria, pertussis		Poliomyelitis				
Country	Type	Target Age Females (# Doses)	Target Age Males (# Doses)	Type	Target Age (Years)	Target Age (Years)	Type	Target Age (Years)	Type	Target Age (Years)	Hepatitis B	Yellow fever	Source
Anguilla	4HPV	9–15 (2)	–	–	–	>18	Td	15	OPV	15	Yes	–	9
Antigua & Barbuda	4HPV	9–26 (2/3)[a]	9–26 (2/3)[a]	–	–	>18	Td	15	OPV	15	Yes	–	9
Argentina	4HPV[bc]	11–24 (2)	11–18 (2)	ACWY	11	–	Tdap	11	–	–	Yes	Yes[fg]	9,32,33,36
Aruba	4HPV	9–10 (2)	–	–	–	>18	Tdap	10	IPV	10	HR	–	9,45,48,49
Bahamas	4HPV	9–12(2)	9–12(2)	–	–	–	Tdap	12	–	–	HR	–	9
Barbados	4HPV	9–20 (1)	9–20 (1)	–	–	–	Td	10–11	OPV	10–11	Yes	–	9,42,56
Belize	9HPV	9–14 (1)	9–14 (1)	–	–	–	Td	12	IPV	12	HR	–	9,54
Bermuda	4HPV	11–26 (2/3)[a]	11–26 (2/3)[a]	–	–	>18	Tdap	11–18	–	–	HR	–	9,22
Bolivia	4HPV	10 (1)	–	–	–	–	Td	7–49	–	–	HR		9,61
Bonaire	4HPV	9 (2)	9 (2)	ACWY	14	–	Td	9	IPV	11–13	HR	–	45,48,49
Brazil	4HPV	9–14 (2)	9–14 (2)	ACWY	11–14	–	Td	≥7	–	–	Yes	Yes	9,27,28
Cayman Islands	4HPV	11–12 (2)	–	–	–	>18	Tdap	14–16	–	–	HR	–	9,23
Chile	4HPV[b]	9–14 (2)	9–14 (2)	–	–	5–10	Tdap	13	–	–	HR	Yes[g]	9,29,30
Colombia	4HPV	9–17 (1)	9 (1)	–	–	–	–	–	–	–	HR	Yes[g]	9,50
Costa Rica	4HPV	10 (2)	–	–	–	–	Td	10	–	–	HR	–	9,31
Cuba	–	–	–	–	–	–	T	14	OPV	9	HR	–	9
Curaçao	4HPV	9–10 (2)	9–10 (2)	–	–	–	Td	10	–	–	HR	–	9,45,48,49
Dominica	4HPV	11–12 (1)	11–12 (1)	–	–	>18	Td	10–12	OPV	10–12	Yes	–	9
Dominican Republic	4HPV	9–14 (2)	–	–	–	–	–	–	–	–	HR	–	9,41
Ecuador	4HPV[d]	9 (2)	–	–	–	>18	Td	15	–	–	HR	Yes	9,37
El Salvador	4HPV	9–10 (2)	9, 10 (2)	–	–	–	Td	10	–	–	HR	–	9,38
French Guiana	4HPV	11–14 (2)	11–14 (2)	MenC	10–19	–	Tdap	11–13	IPV	11–13	Yes	Yes	25,26,55
Grenada	9HPV	9–10 (2)	9–10 (2)	–	–	>18	Td	14–15	OPV	14–15	HR	–	9
Guadeloupe	4HPV	11–14 (2)	11–14 (2)	MenC	10–19	–	Tdap	11–13	IPV	11–13	Yes	–	25,26
Guatemala	4HPV[de]	9–10 (2)	–	–	–	–	Td	10	IPV	7–15	HR	–	9,58,59
Guyana	4HPV	9–16 (2/3)[a]	9–16 (2/3)[a]	–	–	–	–	–	–	–	Yes	Yes	9
Honduras	4HPV	11–12 (2)	–	–	–	–	Td	11	–	–	HR	–	9,60
Jamaica	4HPV	9–26 (1/2)	9–14 (1)	–	–	–	Td	11–12	–	–	HR	–	9,24,43
Martinique	4HPV	11–14 (2)	11–14 (2)	MenC	10–19	–	Tdap	11–13	IPV	11-13	Yes	–	25,26
Mexico	4HPV	9–14 (1)	–	–	–	–	Td	≥15	–	–	Yes	–	9,20,51
Monserrat	9HPV	13 (2)	13 (2)	–	–	–	Td	15	OPV	15	HR	–	9
Nicaragua	2HPV	10–14 (2)[e]	–	–	–	–	Td	10	–	–	HR	–	9,46
Panamá	4HPV	10 (2)	10 (2)	–	–	>18	Tdap	10	–	–	HR	Yes[g]	9,40
Paraguay	4HPV	9–14 (2)	–	–	–	>18	Tdap	9–14	–	–	HR	Yes	9,21
Peru	4HPV	9–13 (1)	9–13 (1)	–	–	–	Td	12	–	–	Yes	Yes	9,34,35
Saba	4HPV	9–27 (2)[a]	9–27 (2)[a]	ACWY	14	–	Tdap	9	–	–	HR	–	45,48,49
Santa Lucia (WHO data)	4HPV	11–12 (2)	11–12 (2)	–	–	>18	Td	11–12	OPV	11-12	No	–	9
Sint Eustatius	4HPV	10 (2)	10 (2)	ACWY	14	–	Td	9	IPV	9	No	–	9,45,48,49
Sint Maarten	9HPV	10 (2)	10 (2)	ACWY	14	–	Td	9	IPV	9	No	–	9,45,48,49

(*Continued*)

Table 1. (Continued).

	Routine vaccination					Booster vaccination			Catch-up vaccination				
	HPV			Meningococcal		Seasonal Influenza	Tetanus, Diphtheria, pertussis		Poliomyelitis				
Country	Type	Target Age Females (# Doses)	Target Age Males (# Doses)	Type	Target Age (Years)	Target Age (Years)	Type	Target Age (Years)	Type	Target Age (Years)	Hepatitis B	Yellow fever	Source
St Kitts & Nevis	4HPV	11(2)	11 (2)	–	–	–	Td	16	OPV	16	Yes	–	[9]
St Vincent & Grenadines	4HPV	11–12 (2)	–	–	–	–	Td	10	–	–	Yes	–	[9]
Suriname	4HPV	12–13 (2)	–	–	–	>18	–	–	–	–	HR	Yes[g]	[9]
Trinidad & Tobago	4HPV	9–45 (2/3)[a]	9–26 (2/3)[a]	–	–	>18	Td	9–12	–	–	Yes	Yes[fg]	[9,44]
Turks & Caicos Islands	4HPV	11–26 (2/3)[a]	11–26 (2)[a]	–	–	>18	Td	11	–	–	Yes	–	[9]
Uruguay	4HPV	11–26 (2/3)[a]	11–26 (2/3)[a]	–	–	>18	Tdap	11	–	–	Yes	–	[9,39,57]
Venezuela	–	–	–	–	–	–	Td	10	–	–	No	Yes	[9,52]
British Virgin Islands	4HPV	11–12 (2)	–	MenC	15	–	Td	14	–	–	HR	–	[9]

4HPV: quadrivalent human papillomavirus vaccine; 9HPV: nonavalent human papillomavirus vaccine; MenC: meningococcal C vaccine; ACWY: meningococcal vaccine ACWY; T: Tetanus vaccine; Td: tetanus and diphtheria vaccine; Tdap: Tetanus, diphtheria, and acellular pertussis vaccine; OPV: oral poliomyelitis vaccine; IPV: Inactivated polio vaccine, HR: only for high-risk population.
[a]3 doses for ≥15 years; [b]Announced switch from 4HPV to 9HPV in 2024; [c]Data available for 2019; [d]Announced switch to one dose in 2024; [e]Announced expansion to boys in 2024; [f]Only in endemic areas; [g]Booster at 11 y on Argentina and 9–12 y in Trinidad & Tobago.

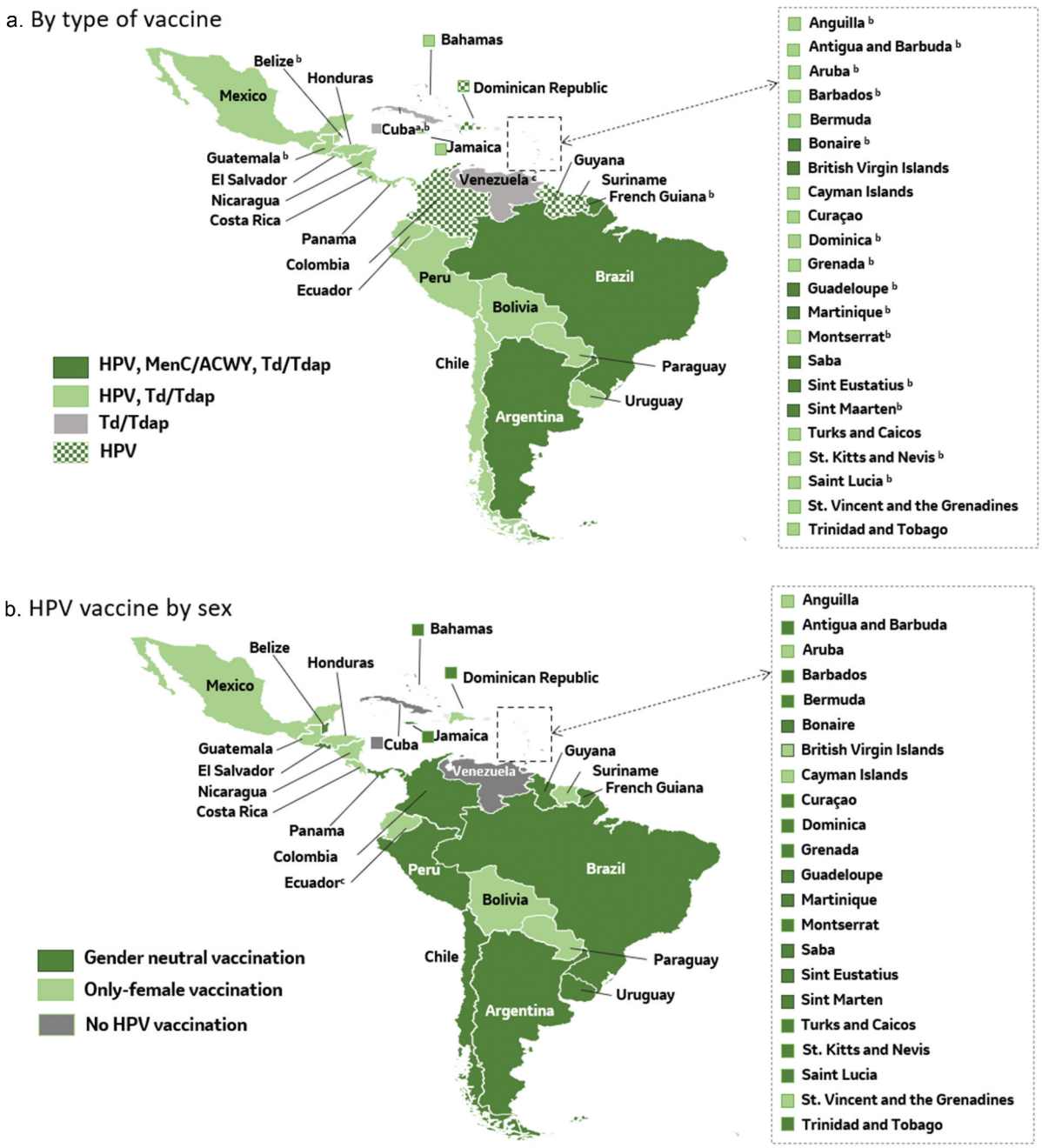

Figure 1. Adolescent immunization schedule in national immunization programs in Latin America and the Caribbean by type of vaccines, 2023. [a]Cuba has only tetanus toxoid component; [b]Countries that offer IPV/OPV booster or catch-up as part of adolescent schedule; [c]Starting GNV in 2024 GNV: gender-neutral vaccination (females and males); HPV: Human papillomavirus vaccine; ACWY: Meningococcal group A, C, W-135 and Y conjugate vaccine; Td: tetanus and diphtheria toxoid vaccine; Tdap: tetanus and diphtheria toxoid and acellular pertussis vaccine.

[IPV]) in 18 countries/territories. Catch-up vaccinations were available for hepatitis B in 17 countries/territories and for yellow fever in all 13 endemic countries/territories. Although adolescents fall within the eligible age range, seasonal influenza vaccination is not explicitly included in adolescent immunization schedules. In the region, it is included in the Chilean childhood program for children aged 5–10 y, and in adult programs targeting individuals over 18 years in 16 countries/territories.

HPV vaccination was first introduced in Bermuda in 2007, with most countries/territories launching their programs between 2012 and 2019. These initial programs predominantly targeted females, using either the bivalent or quadrivalent vaccine, and were generally recommended for individuals aged 9–14 y. In 11 countries, eligibility was extended to those older than 15 years. As programs evolved, 20 countries expanded vaccination to include males, with a notable acceleration in gender-neutral adoption from 2019 to 2023. By the end of 2023, two-thirds of HPV vaccination programs (30 of 45 countries) were gender-neutral. In 10 countries/territories, vaccination was introduced for both genders simultaneously, while in others, there was an average 6.2-year gap between the introduction of vaccination for females and males (Table 1; Figure 2). Regarding vaccine type, the majority of countries that initially used the bivalent vaccine transitioned to the quadrivalent vaccine over time. By 2023, 40 of 45 countries/territories had adopted the quadrivalent vaccine, four used or announced switching to nonavalent vaccines (Argentina, Belize, Monserrat, and Sint Maarten) and one used the bivalent vaccine (Nicaragua) (Figure 2). In terms of the number of age cohorts included in the HPV vaccination programs, 10 countries/territories offered vaccination to a single age cohort, whereas 35 implemented multi-age cohort strategies.

Among the 10 countries/territories with MenC/ACWY in the NIP, it was offered to adolescents aged between 10–19 y. For the 43 countries/territories with Td/Tdap, the recommended age for a booster dose ranged between 9–16 y. Argentina and Trinidad and Tobago recommended a yellow fever booster dose during adolescence, restricted to endemic areas, at 11 y and 9–12 y, respectively.

The only VCR reported on the e-JRF was for HPV vaccine, which also had the most widespread availability in web-based official sources. In 2022, a total of 32 countries reported national HPV VCRs via the WHO Immunization Data Portal, while 6 countries/territories provided data through country-specific governmental webpages (Table 2). Subnational HPV VCR data were accessible for governmental webpages in Argentina, Brazil, and Chile.[28,29,36]

Among the 22 countries that reported HPV vaccination rates by age 15 for either the first or last dose, 20 showed a notable drop in coverage for the final dose, with declines ranging from 2.0% to 42%. In the 9 countries that reported rates for both genders, males consistently had lower vaccination rates than females, especially for the final dose. Among females, 68.2% (15 of 22 countries) reported first-dose coverage above 50%, and 54.5% (12 of 22 countries) reported final-dose coverage above 50%. In contrast, among males, only

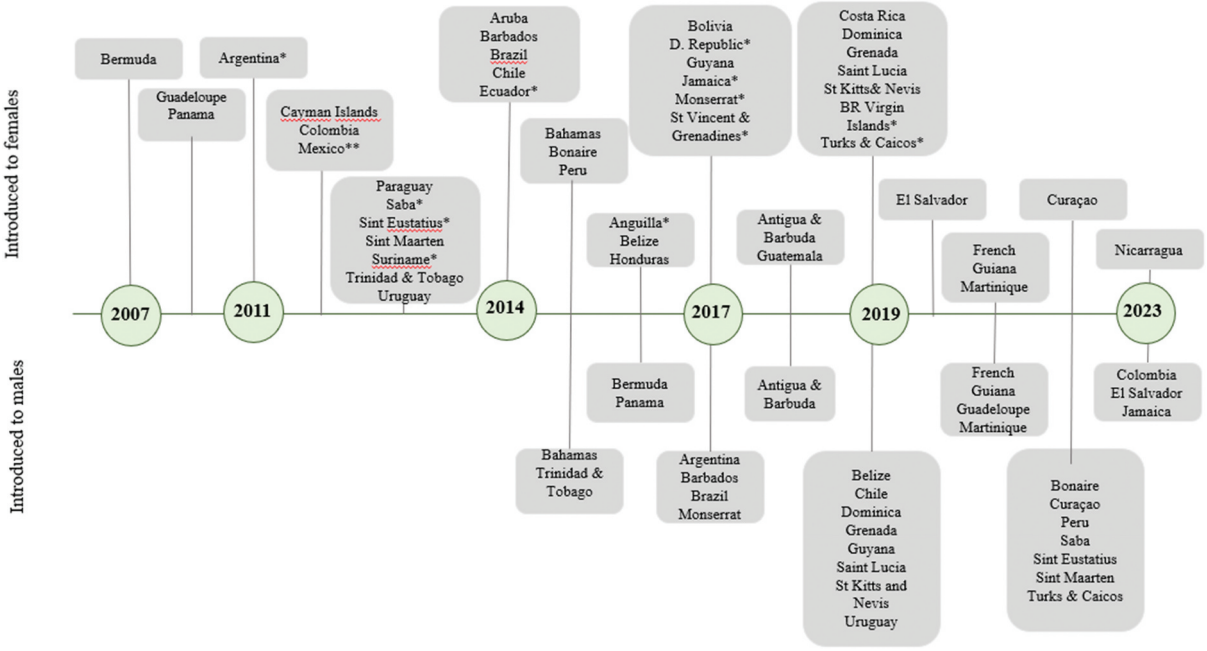

Figure 2. Evolution of the HPV vaccination by year, gender, and country. *Started with bivalent HPV vaccine in the national immunization program and later switched to quadrivalent HPV vaccine. BR: British; HPV: human papillomavirus vaccine; St: Saint.

Table 2. Vaccination coverage rates for adolescents in National Immunization Programs within Latin America and the Caribbean, 2022.

	HPV Female			HPV Male			Td/ Tdap	Meningococcal	Yellow Fever	
Country	Final dose (OC)	First Dose by Age 15 (WUENIC)	Last Dose by Age 15 (WUENIC)	Final dose (OC)	First Dose by Age 15 (WUENIC)	Last Dose by Age 15 (WUENIC)	OC	OC	OC	Source
Anguilla	60.1%	NR	NR	NR	NR	NR	NR	NR	NR	[9]
Antigua & Barbuda	2%	—	—	1%	—	—	NR	NR	NR	[9]
Argentina	54.3%	93%	71.0%	47.6%	79.0%	54.0%	81.2%	NR	60.2%	[9]
Aruba	59.7%	NR	NR	—	—	—	80.3%	NR	NR	[49]
Bahamas	NR	18%	8.0%	NR	18.0%	8.0%	NR	NR	NR	[9]
Barbados	43.5%	65%	27.0%	50.4%	60.0%	18.0%	NR	NR	NR	[9]
Belize	42.1%	76%	59.0%	30.3%	18.0%	15.0%	NR	NR	NR	[9]
Bolivia	47.7%	82%	69.0%	—	—	—	NR	NR	NR	[9]
Bonaire	16.4%	NR	NR	NR	NR	NR	54.5%	NR	NR	[49]
Brazil	57.7%	84%	69.0%	21.7%	63.0%	47.0%	NR	NR	NR	[9]
Chile	32.3%	85%	73.0%	30.6%	NR	NR	NR	NR	NR	[9]
Colombia	10.5%	42%	24.0%	NR	—	—	NR	NR	NR	[9]
Costa Rica	69.5%	NR	NR	NR	—	—	NR	NR	NR	[9]
Dominica	85.4%	NR	NR	87.4%	—	—	NR	NR	NR	[9]
Dominican Republic	26.5%	65%	40.0%	NR	—	—	NR	NR	NR	[9]
Ecuador	52.4%	99%	95.0%	NR	—	—	NR	NR	NR	[9]
El Salvador	28.1%	NR	NR	NR	—	—	NR	NR	NR	[9]
Grenada	NR	NR	NR	NR	—	—	NR	NR	NR	[9]
Guadeloupe	NR	NR	NR	NR	—	—	NR	MenC: 73% (10–14 y); 48% (15–19 y)	NR	[26]
Guatemala	92.3%	89%	71.0%	NR	—	—	NR	NR	NR	[9]
Guyana	29.0%	44%	22.0%	29.0%	30.0%	5.0%	NR	NR	NR	[9]
Honduras	50.1%	88%	57.0%	NR	—	—	NR	NR	NR	[9]
Jamaica	6.2%	21%	16.0%	NR	—	—	NR	NR	NR	[9]
Martinique	NR	NR	NR	NR	—	—	NR	MenC: 60.2% (10–14 y); 34% (15–19 y)	NR	[26]
Mexico	48.0%	99%	99.0%	NR	—	—	NR	NR	NR	[9]
Panama	¨(.0%	81%	71.0%	59%	75.0%	66.0%	NR	NR	NR	[9]
Paraguay	5.3%	77%	72.0%	NR	—	—	NR	NR	NR	[9]
Peru	74.8%	68%	66.0%	NR	—	—	NR	NR	NR	[9]
Saba	NR	NR	NR	NR	—	—	88.9%	ACWY: 62.5%	NR	[49]
Sint Eustatius	54.5%	NR	NR	NR	—	—	72.2%	ACWY: 6.5%	NR	[49]
Santa Lucia	76.0%	NR	NR	63.7%	—	—	NR	NR	NR	[9]
St Kitts & Nevis	71.9%	NR	NR	71.8%	—	—	NR	NR	NR	[9]
St Vincent & Grenadines	NR	18%	4.0%	NR	—	—	NR	NR	NR	[9]
Suriname	13.1%	34%	34.0%	NR	—	—	NR	NR	NR	[9]
Trinidad & Tobago	NR	28%	13.0%	NR	28.0%	13.0%	NR	NR	NR	[9]
Turks & Caicos Islands	77.7%	NR	NR	58.0%	—	—	NR	NR	NR	[9]
Uruguay	29.6%	70%	48.0%	18.3%	45.0%	23.0%	NR	NR	NR	[9]
British Virgin Islands	17.7%	NR	NR	NR	—	—	NR	NR	NR	[9]

HPV: human papillomavirus vaccines; IPV: Inactivated polio vaccine; MenC: meningococcal C vaccine; ACWY: meningococcal vaccine ACWY; OC, official coverage; OPV: oral poliomyelitis vaccine; St: Saint; Td: tetanus toxoid and diphtheria; Tdap: Tetanus toxoid, diphtheria, and acellular pertussis vaccine; YF: yellow fever vaccine. WUENIC, WHO-UNICEF Estimates of National Immunization Coverage.

No VCR reported for any vaccine in adolescent schedule for Bermuda, Cayman Islands, Cuba, Curaçao, French Guiana, Montserrat, Nicaragua, Sint Maarten and Venezuela.

44.4% (4/9 countries) reported first-dose coverage above 50%, and just 22.2% (2 of 9 countries) reported final-dose coverage above 50%.

VCRs for other adolescent vaccines were limited and inconsistently reported, available from country-specific websites. Td/Tdap VCRs were reported in five countries, with rates ranging from 54.5% (Bonaire) to 88.9% (Saba). MenC/ACWY VCRs were reported in four countries, ranging from 6.5% (Sint Eustatius) to 72.9% (Guadeloupe). Yellow fever booster VCR from Argentina were obtained from the official government website.

Studies containing primary data on vaccination coverage rates

The systematic search identified 13,728 articles, of which 316 were reviewed in full text. The PRISMA flow diagram is shown in Supplementary Figure S1 and the excluded articles are listed in Supplementary Table S6. A total of 23 cross-sectional studies conducted between 2011 and 2022 met the eligibility criteria and were included (Table 3 and Supplementary Appendix 1).[62–84]

Most studies (18 of 23) were conducted in Brazil, followed by Mexico (2 studies), Argentina (1 study), French Guiana (1 study) and Uruguay (1 study). Among the included studies, six were population-based surveys: two conducted in Brazil (the Brazilian National Adolescent School-Based Health Survey – PeNSE 2015 and 2019), two in Mexico (Mexican National Health and Nutrition Survey – ENSANUT 2012 and 2022), and one in French Guiana (via the national health insurance system). The remaining 17 studies assessed VCR at subnational or local level, and most were conducted in schools or health community centers.

VCRs were most frequently reported for HPV (18 studies), followed by hepatitis B (7 studies), Td/Tdap (5 studies), MenC/ACWY (2 studies), OPV/IPV (1 study), and yellow fever (1 study). The most frequently used instrument to confirm vaccination status was the vaccination card, used in 13 studies, either alone (10 studies) or supplemented by self or parent reported survey (3 studies). There was a trend of reduction of VCRs in all vaccines over time. In all eight studies that reported VCRs by gender, males consistently had lower coverage than females, particularly for HPV vaccine. Among the six studies that assessed HPV series completion (5 from Brazil and 1 from Uruguay), a substantial drop in coverage was observed between the first and second doses, with declines ranging from 11.3% to 31%.

The comparison between national HPV VCR for ≥1 dose from primary data collection studies and administrative data reported via the WHO Immunization Portal revealed notable discrepancies in both Brazil and Mexico. In Brazil, the PeNSE survey reported higher coverage: 83.5% in 2015 and 76.0% (females) and 49.1% (males) in 2019, compared to 75%, 68%, and 48%, respectively, in administrative data. Other primary studies conducted between 2014–2016 at regional or local levels in Brazil showed varying VCR from 46.1% to 96.5%. In contrast, Mexico's ENSANUT 2022 reported 69.1% coverage among 15-year-old females, while administrative data from WHO Immunization portal indicated 99%.

While most studies were rated as good or very good quality, common limitations included insufficient reporting on non-respondents and lack of detail in statistical analysis (Supplementary Table S7).

Discussion

This review provides a comprehensive overview of adolescent vaccination schedules and coverage rates across Latin America and the Caribbean, offering valuable insights into areas requiring further attention and improvement. While most countries in the region have incorporated at least one vaccine into their publicly funded adolescent immunization programs, the availability, quality, and consistency of VCR data remain highly variable across vaccines and countries/territories.

HPV vaccination was the most widely implemented adolescent immunization initiative in the region, followed by Td/Tdap; aligned with WHO and PAHO strong endorsement based on cost-effectiveness and public health impact.[1,6] However, despite broad adoption, coverage remains suboptimal for all vaccines. Notably, among countries reporting HPV VCRs by age 15, a consistent drop was observed between the first and final doses, with males showing notably lower coverage than females. These trends were consistently observed across administrative VCR data from the WHO immunization portal and primary data collection studies, reinforcing the robustness of this finding.

Several factors may contribute to the lower VCR in adolescent males globally.[85,86] Firstly, parents often lack sufficient knowledge about the importance of vaccination for their sons and may perceive them to be at lower risk of HPV-related diseases.[74,75] Cultural factors and societal norms also play a role, as there is a historical belief that HPV is solely a problem for women.[67] In addition, health professionals may have knowledge gaps regarding the effects of HPV on adolescent health and the benefits of the vaccine for males.[87,88] To address these barriers, it is crucial to promote accurate information and raise awareness about the benefits of HPV vaccination for males. Culturally sensitive educational initiatives can challenge misconceptions and provide accurate information about the risks and benefits of HPV vaccination in males.

Table 3. Vaccination coverage rates in immunization programs for adolescents in Latin America and the Caribbean in primary data collection studies.

Author, Study details	Country	Location	Vaccination status confirmation	Study period	Age (Gender)	Vaccine	Sample size[a]	VCR
National VCR								
PeNSE 2015 - Brazilian National Adolescent School-Based Health Survey[65]	Brazil	National	Self-reported	2015	13–17 y (Female)	4HPV (≥1 dose)	2378	83.5%
PeNSE 2019 -Brazilian National Adolescent School-Based Health Survey[80]	Brazil	National	Self-reported	2019	13–17 y (Female)	4HPV (≥1 dose)	159,245	76.1%
					13–17 y (Male)	4HPV (≥1 dose)	159,245	49.1%
ENSANUT 2012 Mexican national Health and Nutrition Survey[64]	Mexico	National	Immunization record cards and/or self-reported	2012	12–19 y (Female)	Hepatitis B	1,322	45.1%
					12–19 y (Male)	Hepatitis B	1,173	45.9%
					12–19 y (Female)	Td	1,685	56.6%
					12–19 y (Male)	Td	1,411	55.1%
ENSANUT 2022 Mexican national Health and Nutrition Survey[72]	Mexico	National	Immunization record cards and/or self-reported	2022	15 y (Female)	HPV (1 dose)	922	69.1%
					10–19 y (Female)	HPV (1 dose)	4,758	43.7%
					10–19 y (Female)	Hepatitis B	3,738	34.3%
					10–19 y (Male)	Hepatitis B	3,281	29.4%
					10–19 y (Female)	Td	4,199	38.6%
					10–19 y (Male)	Td	4,298	38.5%
Wendland et al. 2021[84]	Brazil	National	Self-reported	2017	16–17 y (Female)	4HPV (≥1 dose)	787	51.3%
Koïvogui et al. 2018[70]	French Guiana	National	Self-reported	2014	13–18 y (Both)	Yellow Fever	337	82.2%
					13–18 y (Both)	Diphtheria	337	41.8%
					13–18 y (Both)	Tetanus	337	39.5%
					13–18 y (Both)	Polio	337	38.9%
Regional level								
Mendes Lobão et al. 2018[71]	Brazil	Main capitals of states in Brazil	Parent-reported	2015–2016	12–14 y (Female)	4HPV (≥1 dose)	291	71.1%
					12–14 y (Female)	4HPV (2 doses)	291	58.4%
Municipaly level								
Santana et al. 2019[69]	Brazil	São Paulo City (São Paulo state)	Immunization record cards and/or self-reported	2014–2015	12–19 y (Female)	Hepatitis B	305	81.3%
					12–19 y (Male)	Hepatitis B	293	81.4%
					12–15 y (Female)	4HPV (≥1 dose)	432	66.7%
Community level								
Gentile et al. 2021[69]	Argentina	Health community centers in Buenos Aires (CABA)	Immunization record cards	2018–2019	12–15 y (Both)	Tdap	220	91.4%
					12–15 y (Both)	4HPV (≥1 dose)	181	75.1%
Pereira et al. 2013[71]	Brazil	Health community agents in Belo Horizonte (Minas Gerais state)	Immunization record cards and/or self-reported	2011	10–19 y (Both)	Hepatitis B	150	79.3%
					10–19 y (Both)	Yellow fever	150	44%
Viegas et al. 2019[83]	Brazil	Local schools Divinópolis (Minas Gerais state)	Immunization record cards	2013–2015	13–18 y (Both)	Td	475	74.7%
					13–18 y (Both)	Yellow fever	475	64%
					13–18 y (Both)	Hepatitis B	475	93.3%
Santos et al. 2018[79]	Brazil	Local shools in Lagarto and Tobias Barreto (Sergipe state)	Immunization record cards	2014–2015	15–19 y (Female)	Hepatitis B	138	75.2%
					15–19 y (Male)	Hepatitis B	45	24.8%

(*Continued*)

Table 3. (Continued).

Author, Study details	Country	Location	Vaccination status confirmation	Study period	Age (Gender)	Vaccine	Sample size[a]	VCR
Santos et al. 2020[78]	Brazil	Health community centers in Ouro Preto (Minas Gerais state)	Immunization record cards	2014–2016	11–13 (Female) 11–13 (Female)	4HPV (≥1 dose) 4HPV (2 doses)	666 666	96.5% 65.5%
Farias et al. 2016[66]	Brazil	Parents of female students in Boa Vista (Roraima state)	Parent-reported	2015	12–15 y (Female) 12–15 y (Female)	4HPV (≥1 dose) 4HPV (2 doses)	797 797	95.1% 82.7%
Oliveira et al. 2020[74]	Brazil	Health community centers in Cruzeiro do Sul (Acre state)	Self-reported	2017	10–19 y (Both)	4HPV (≥1dose)	115	46.1%
Galvão et al. 2022[77]	Brazil	Local schools in Teresina (capital of Piaui state)	Self -reported	2018	15 y (Female) 15 y (Male)	4HPV (2 doses) 4HPV (2 doses)	287 185	92.7% 46.5%
Souza et al. 2023[82]	Brazil	Health community centers in Terrenos (Mato Grosso do Sul state)	Immunization record cards	2018	9–15 y (Female) 11–15 y (Male)	4HPV (2 doses) 4HPV (2 doses)	82 39	73.2% 53.8%
Carvalho et al. 2021[63]	Brazil	Local schools of Teresina (capital of Piaui state)	Immunization record cards	2018	15 y (Female) 15 y (Male)	4HPV (2 doses) 4HPV (2 doses)	378 246	31.0% 10.2%
Ferreira et al. 2022[67]	Brazil	Communities attended by the Family Health Strategy in Montese (Pará state)	Parent-reported	2019	9–14 y (Female) 11–14 y (Male)	4HPV (≥1 dose) 4HPV (≥1 dose)	133 114	74.4% 55.3%
Rezende et al. 2020[81]	Brazil	Local schools in Anapolis (Goias state)	Immunization record cards	2020	11–14 y (Both) 11–14 y (Both) 11–14 y (Both) 11–14 y (Both)	4HPV (≥1 dose) 4HPV (2 doses) Yellow Fever Hepatitis B	132 132 132 132	54.5% 43.2% 90.9% 31%
Abella et al. 2021[62]	Brazil	Local schools in Palmas (capital of Tocantins state)	Immunization record cards	2020–2021	9–15 y (Both) 9–15 y (Both) 9–15 y (Both)	4HPV (≥1 dose) 4HPV (2 doses) MenC/ MenACWY	145 145 145	49% 29.6% 28.2%
Souza et al. 2022[81]	Brazil	Health service in Recife (Pernambuco state)	Immunization record cards	2020–2021	10–18 y (Both)	MenC/ MenACWY	108	45.2%
Notejane et al. 2018[73]	Uruguay	Health service in Montevideo	Self-reported	2016	12–14 (Female) 12–14 (Female)	4HPV (1 dose) 4HPV (2 doses)	112 112	40.1% 27.7%

[a]When the number of doses is not specified within parentheses, it refers to the complete vaccination schedule as recommended by the national Ministry of Health.
HPV: human papillomavirus; ACWY: meningococcal ACWY; MenC: meningococcal C; Td: tetanus toxoid and diphtheria.

The relatively higher availability of HPV VCR data, compared to other adolescent vaccines, is largely due to the structured reporting requirements of the WHO/UNICEF e-JRF, which mandates HPV coverage reporting from all WHO Member States. In contrast, VCR data for other adolescent vaccines—such as Td/Tdap, MenC/ACWY, and yellow fever—are limited and inconsistently reported, available from country-specific websites. This lack of data limits the ability to identify equity gaps and implement targeted interventions to improve coverage. The experience of United States demonstrates that improving the granularity, timeliness, and accuracy of VCR measurement can lead to substantial gains in vaccine uptake and reductions in vaccine-preventable diseases.[18,89] Similar investments in data infrastructure and reporting mechanisms in Latin America and the Caribbean are essential to enhance program performance, accountability, and health outcomes.

Sustained efforts are needed to ensure equitable access to vaccines across gender, geography, and socioeconomic backgrounds. Programmatic models, such as Argentina's birth cohort eligibility for HPV vaccination, Brazil's universal hepatitis B catch-up, and PAHO's Technical Advisory Group (TAG) recommendation for HPV vaccination catch-up for adolescents aged 9–18 y, including males, older female cohorts, and immunocompromised individuals—offer valuable guidance for closing immunization gaps across the region.[33,90,91] Additionally, epidemiological needs should guide the introduction of new vaccines in the NIP like dengue.

Historically, immunization efforts in Latin America and the Caribbean have largely focused on childhood vaccination, resulting in successful control of diseases such as polio, measles, and rubella.[92] However, there is now a need to extend these efforts to adolescent and young adults, in line with the WHO's life-course vaccination framework.[2] School- or community-based campaigns have been proven effective in reaching this group, especially when supported by intersectoral collaboration and health education. Countries such as Chile and Panama highlight the success of centrally coordinated school-based programs, which enhance access and build trust through structured health promotion.[93] Additionally, adolescent-friendly services that meet global quality standards and integrate immunization, education, nutrition, and mental health are critical pillars for achieving the 2030 Sustainable Development Goals.[94]

Several limitations should be considered. First, interpreting the reported VCRs requires caution due to the methodological differences across countries and over time. Variability in program funding, reporting systems, and data collection methods can affect the accuracy of coverage estimates. In some cases, countries/territories in the region reported rates exceeding 100% due to the use of programmatic targets instead of actual eligible population figures as denominators, leading to inflated coverage. Second, many studies highlighted challenges in obtaining vaccination cards from adolescents, often relying on self-reported data, which may be subject to recall bias. Third, the limited number of primary data collection studies outside Brazil restricts generalizability of findings across the broader Latin American and Caribbean region.

Overall, this review provides a comprehensive overview of vaccination for adolescents in Latin America and the Caribbean, highlighting critical areas for action. Key priorities include expanding vaccination to reach additional adolescent cohorts, implementing catch-up strategies for missed doses, and enhancing community engagement to improve vaccine acceptance and uptake. Strengthening national vaccination registries and ensuring timely, detailed assessments of VCRs across all adolescent vaccines are also essential. By addressing these gaps and leveraging regional collaboration among communities, civil societies, and health authorities, and both public and private sectors, countries/territories in Latin America and the Caribbean can build more resilient, equitable, and effective adolescent immunization programs – laying the foundation for healthier generations to come.

Conclusion

This review provides country-specific insights to support researchers and policymakers in Latin America and the Caribbean in planning and strengthening adolescent vaccination programs. It highlights the urgent need to enhance vaccine accessibility, data tracking infrastructure, and reporting systems to ensure all adolescents are adequately protected. Strengthening policies and establishing robust evaluation metrics are essential to increasing uptake and monitoring progress. Achieving these goals will require coordinated efforts among governments, health authorities, and civil society aligned with the United Nation's 2030 vision: *A world where everyone, everywhere, at every age, fully benefits from vaccines for good health and well-being.*[3]

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Monica Rojas, Jessica Webster, Juan Carlos Orengo and Cintia Irene Parellada contributed to the conception and design of the work, and the acquisition, analysis and interpretation of the data for the work. Maria Florencia Lución, Ricardo Becker Feijó, Antonio Luevanos, Ivan Felipe Gutierrez Tobar, Dora Estripeaut, Andrea Schilling, Maria Eugenia Perez and Luciana Hirata also contributed to the analysis and interpretation of the data. All authors contributed to drafting the manuscript and critically reviewing the work. The final version to be published was approved by all authors who agree to be accountable for all aspects of the work.

Data availability statement

The data reviewed as part of this literature review were available in the public domain.

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Ethics approval was not required as information reviewed as part of this literature review were available in the public domain.

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