




Bulgaria

Administrative Data Quality Review Report, 2025







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Administrative Data Quality Review

This report presents a systematic review of immunization administrative data quality. It is designed to support country-level data review discussions. Administrative ("admin") data can be affected by reporting errors, denominator inconsistencies, and supply disruptions. This report helps identify where data quality issues may exist and why admin coverage may diverge from the WHO/UNICEF Estimates of National Immunization Coverage (WUENIC), survey, and official government estimates.

This report covers the following data quality components:

Schedule & Supply Context

Vaccine schedule, introduction years, and recorded stockouts

Coverage Overview

WUENIC, admin, official government, and survey coverage across all vaccines and years.

Admin Coverage Flags

Years where admin coverage exceeds 100% or changes by more than ± 10 percentage points.

Admin vs. Estimates

Gaps between admin and WUENIC estimates; gaps between admin and official government estimates.

Numerator Checks

Percent change from the previous year in the number of children vaccinated; co-administration consistency checks.

Denominator Checks

Percent change from the previous year in target population size; live births vs. surviving infants over time.

Admin Data Availability Heatmap

Heatmap showing which vaccines have missing or present administrative data by year.

Admin Data Comments

Country-reported explanations for numerator accuracy, denominator source, and denominator accuracy.

Flags in this report indicate areas that warrant further review — they do not necessarily indicate errors. Country context, schedule changes, and reporting system updates should be considered alongside these findings.

The electronic Joint Reporting Form (eJRF)

Since 1998, in an effort to strengthen collaboration and minimize the reporting burden of countries, WHO and UNICEF have jointly collected immunization system and related information through a standard questionnaire (the Joint Reporting Form) sent to all Member States. In 2021, the form was updated to a cloud-based solution known as the electronic Joint Reporting Form (eJRF).

The eJRF serves three core functions:

Mission-Critical Data	Strategic Utility	Comprehensive Scope
Serves as the primary data source for tracking the **Immunization Agenda 2030 (IA2030)** and the Sustainable Development Goals (SDGs).	Informs WUENIC estimates, guides global funding decisions, and populates the UNICEF *State of the World's Children* reports.	Captures national and subnational coverage, vaccination schedules, vaccine stockouts, and disease trends.

All data in this presentation is sourced from the eJRF.

Definitions of immunization terms

Vaccine coverage
Percentage of infants (children under one year of age) who received certain vaccine-doses. For example, coverage of DTP3 is the percentage of infants who received all three doses of diphtheria, tetanus, and pertussis (DTP) vaccine.

Unvaccinated
An infant that did not receive the first dose of a vaccine series. The term zero-dose is used to describe children unvaccinated with DTP1.

Under-vaccinated
An infant who received some but not all the recommended vaccine-doses in the national schedule.

Vaccine-Doses
- Bacillus Calmette-Guerin (BCG): vaccine against tuberculosis
- Hepatitis B birth dose, given within 24 hours after birth (HepBB)
- Diphtheria, tetanus, and pertussis vaccine, first dose (DTP1) and third dose (DTP3)
- Hepatitis B vaccine, third dose (HepB3)
- Haemophilus influenzae type b vaccine, third dose (Hib3)
- Inactivated polio vaccine, first dose (IPV1) and last dose (IPVC)
- Measles containing vaccine, first dose (MCV1) and second dose (MCV2)
- Rotavirus vaccine, last dose (RotaC)
- Pneumococcal vaccine, last dose (PCVC)
- Yellow Fever vaccine (YFV)
- Meningococcal A vaccine (MengA)
- Human papillomavirus vaccine, first dose (HPV1) and last dose (HPVc): vaccine to protect against certain types of human papillomavirus that can lead to cancer or genital warts

The Immunization Agenda 2030 (IA2030)
The IA2030 is a global strategy endorsed by the World Health Assembly aiming to ensure everyone, everywhere, at every age benefits from vaccines for improved health and well-being by 2030. It focuses on increasing vaccine coverage, equity, sustainability and pandemic preparedness while promoting life-course immunization and integrating immunization with other health services.

Data Sources Presented

This report presents data from the following sources:

WUENIC	Administrative ("Admin")	Official	Survey
WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) provides annual country-level immunization coverage estimates produced jointly by WHO and UNICEF. These estimates are derived from a systematic review of all available data sources and are adjusted to account for data quality issues.	Reported by national authorities and based on aggregated administrative reports from health service providers on the number of vaccinations administered during a given period (numerator) and reported target population data (denominator).	Estimated coverage reported by national authorities that reflects their assessment of the most likely coverage based on any combination of administrative coverage, survey-based estimates, or other data sources or adjustments.	Based on estimated coverage from population-based household surveys among children aged 12–23 months or 24–35 months. Survey results are considered for the appropriate birth cohort based on the period of data collection. Coverage information is based on the combination of vaccination history from documented evidence or caregiver recall.

Vaccine Schedule

		Dose number and age administered			
Level	**Vaccine**	**1**	**2**	**3**	**4**
National	BCG	Birth	7 years		
National	DTAP				
National	DTP	6 weeks	10 weeks	14 weeks	
National	DTAPHIBIPV (booster)				16 months
National	HEPB (pediatric)	Birth	1 months	6 months	
National	HPV (females and males)	10 to 14 years	txt_timepoint_10_15years		
National	MCV	13 months	12 years		
National	PCV	6 weeks	14 weeks	12 months	
National	RotaC	6 weeks	10 to 24 weeks	20 to 32 weeks	

This table shows the 2025 national immunization schedule for routine services in Bulgaria, reported through the WUENIC Joint Reporting Form on Immunization (JRF).

Each row corresponds to a vaccine or combination vaccine, indicating whether it is delivered at the national or subnational level. The schedule outlines the number of doses and the recommended ages for administration. Only childhood and adolescent vaccines relevant to WUENIC are included.

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Vaccine Introductions

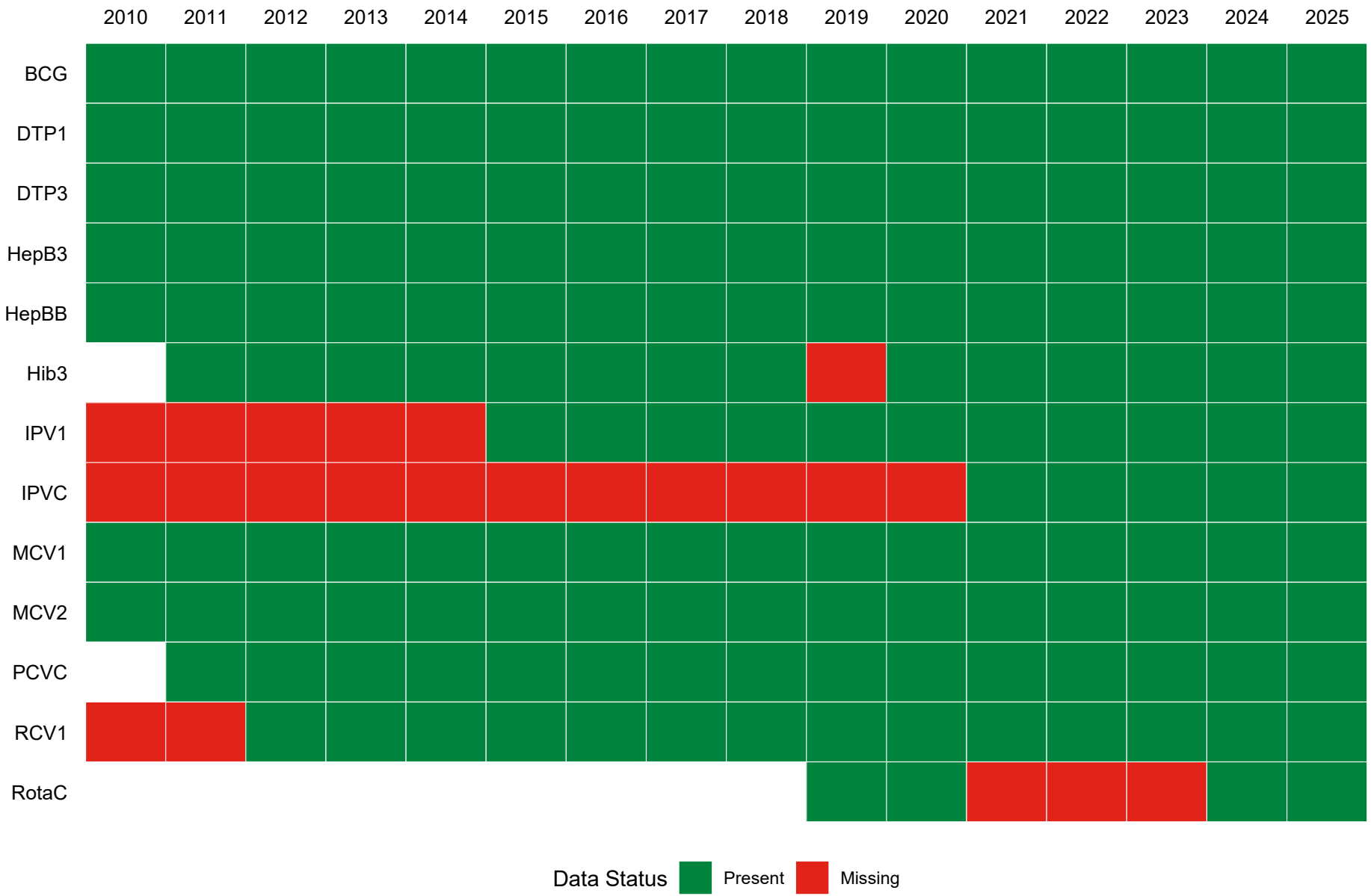
Vaccine	National introduction
HPV (Human papillomavirus) vaccine	2017
HepB birth dose	1998
Hepatitis B vaccine	1991
Hib (Haemophilus influenzae type B) vaccine	2010
IPV (Inactivated polio vaccine)	2007
IPV (Inactivated polio vaccine) 2nd dose	2007
Malaria vaccine	Not introduced
Measles-containing vaccine 2nd dose	1983
Meningococcal meningitis vaccines (any strain)	Not introduced
Mumps vaccine	1995
PCV (Pneumococcal conjugate vaccine)	2010
RSV (Respiratory syncytial virus) immunization strategy	Not introduced
Rotavirus vaccine	2018
Rubella vaccine	1992
Typhoid conjugate vaccine	Not introduced
YF (Yellow fever) vaccine	Not introduced

Year in which each vaccine was introduced nationally, partially, for risk groups, or risk areas.

We present the vaccination introductions table here to contextualize the data availability heatmap on the following slide.

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Admin Data Availability Heatmap by Vaccine, Bulgaria, 2010–2025



Heatmap showing whether admin data are present (green), missing (red), or not applicable because the vaccine had not yet been introduced or reporting had not started (white), by vaccine and year.

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Admin Data Comments Summary: 2024

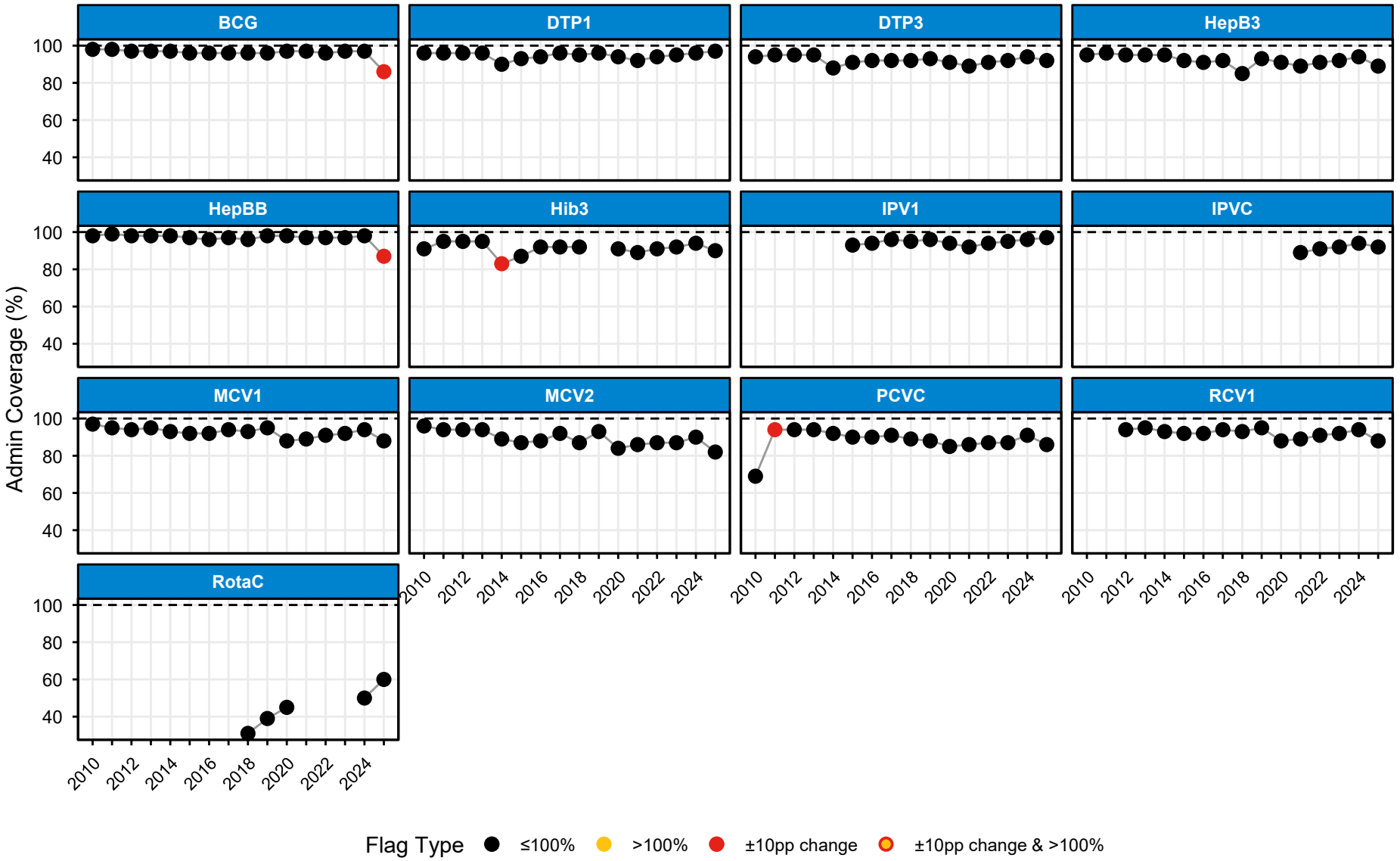
Comment Type	Comment
Denominator Accuracy	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
Denominator Source	The National Statistical Institute provides data presenting the official denominator for 2024 but still the data by age groups are not available.
Numerator Accuracy	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.

Summary of all admin data comment fields for the most recent year with available data (2024).

Admin Coverage Flags

Admin Coverage Flags by Vaccine and Year, Bulgaria, 2010–2025

Orange = coverage > 100% | Red = ± 10pp



Gaps in line indicate missing admin data for that year.

Admin coverage flagged where values exceed 100% (orange) or change by more than ±10 percentage points from the previous year (red), 2010–2025.

Two types of data quality issues are highlighted: coverage values above 100%, which suggest errors in the reported number of vaccinations or the denominator used, and year-on-year changes greater than 10 percentage points, which may reflect inconsistent reporting rather than true changes in vaccination coverage.

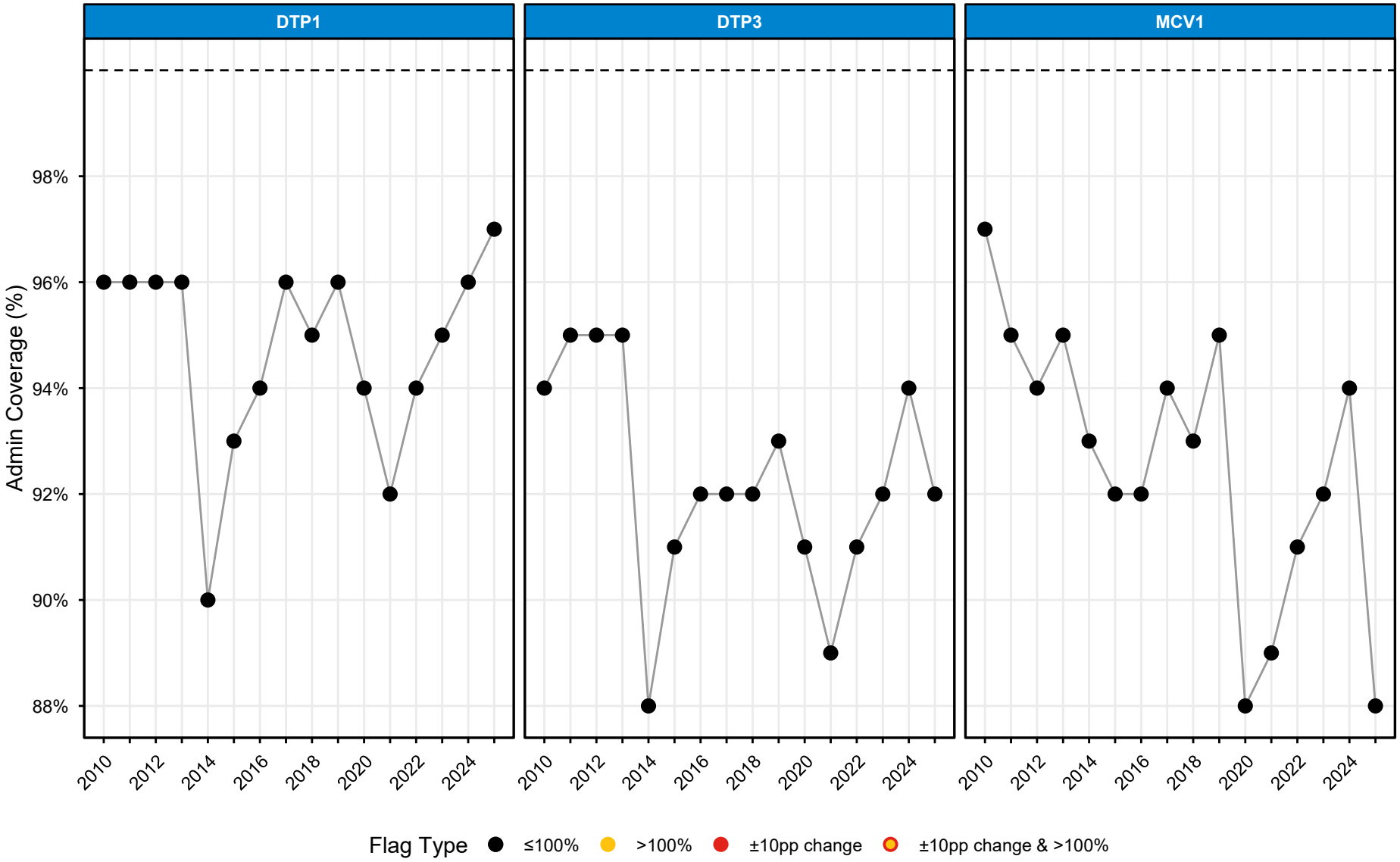
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DTP1, DTP3, and MCV1 Admin Coverage Flags by Year, Bulgaria, 2010–2025

Orange = coverage > 100% | Red = ± 10pp



Gaps in line indicate missing admin data for that year.

Same flag logic applied to DTP1, DTP3, and MCV1 only, 2010–2025.

Two types of data quality issues are highlighted: coverage values above 100%, which suggest errors in the reported number of vaccinations or the denominator used, and year-on-year changes greater than 10 percentage points, which may reflect inconsistent reporting rather than true changes in vaccination coverage.

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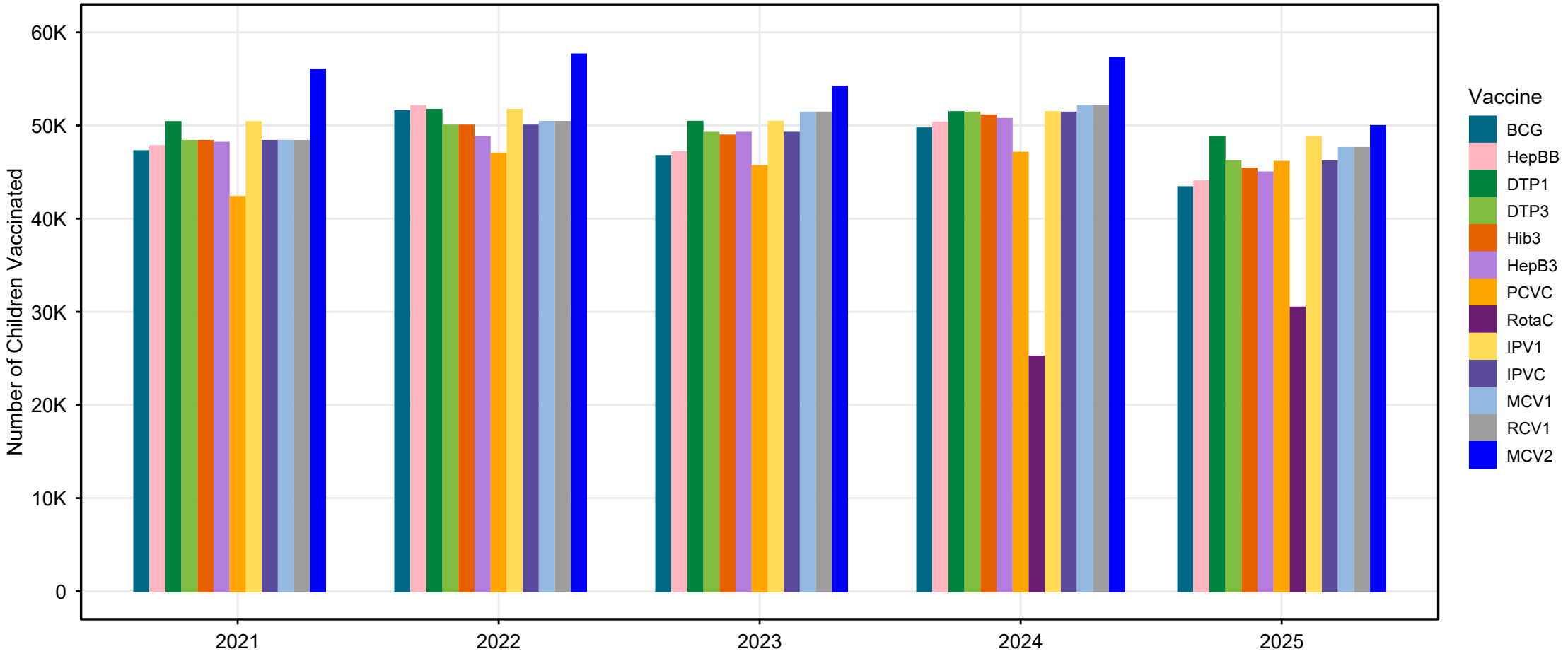
Numerator Checks

Admin Data Comments:
Numerator Accuracy (2021–2024)

Year	Comment
2024	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
2023	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
2022	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
2021	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.

Factors limiting the accuracy of the numerator as reported by Bulgaria.

Number of Children Vaccinated by Vaccine and Year, Bulgaria, 2021–2025



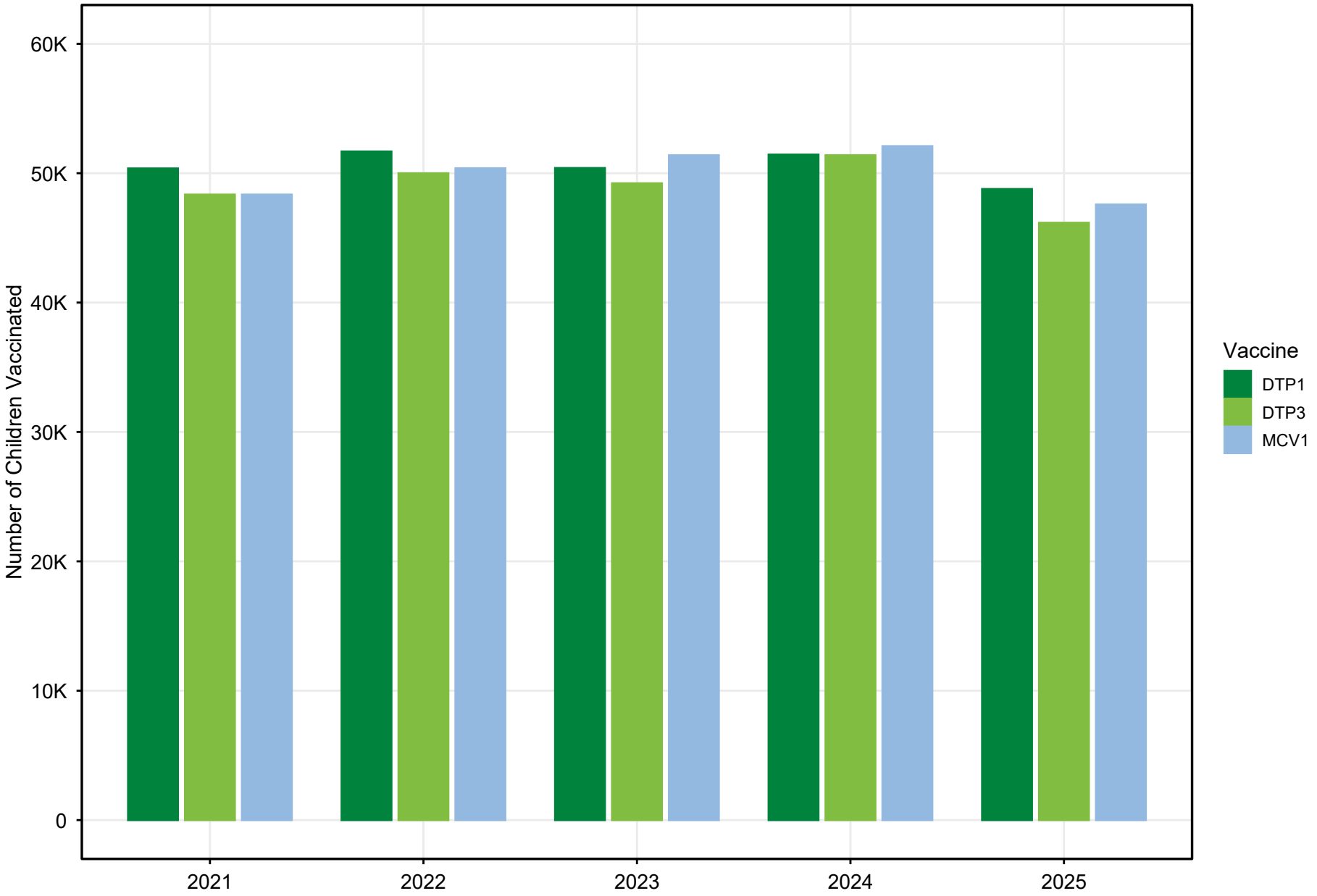
This chart shows number of children vaccinated (numerator) by vaccine and year.

Black diagonal lines indicate years with a national- or subnational-level vaccine stockout, which may explain any drops in the number of children vaccinated.

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Number of Children Vaccinated by Vaccine and Year (DTP1, DTP3, MCV1), Bulgaria, 2021–2025



Number of children vaccinated (numerator) by vaccine (DTP1, DTP3, and MCV1 only) and year.

Black diagonal lines indicate years with a vaccine stockout, which may explain any drops in the number of children vaccinated.

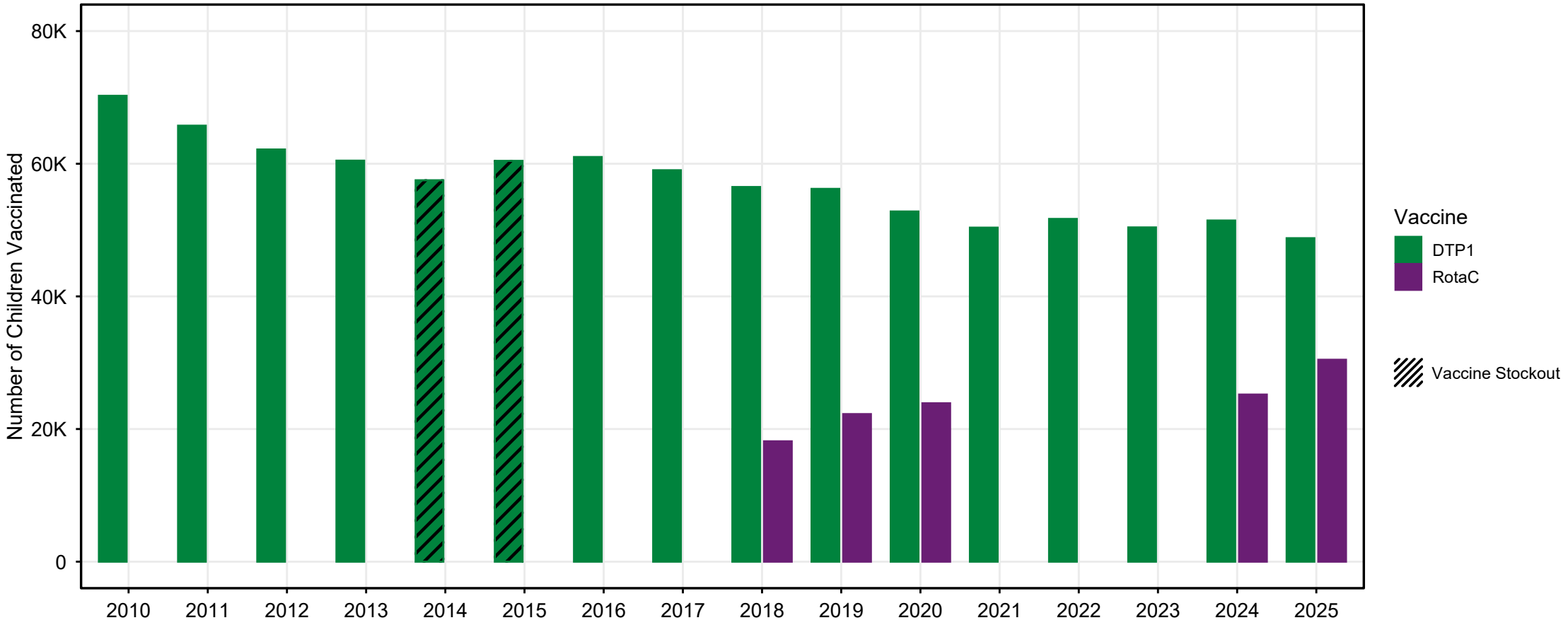
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Number of Children Vaccinated by Vaccine and Year, Bulgaria, 2010–2025

WUENIC vaccines administered at 6 weeks of age

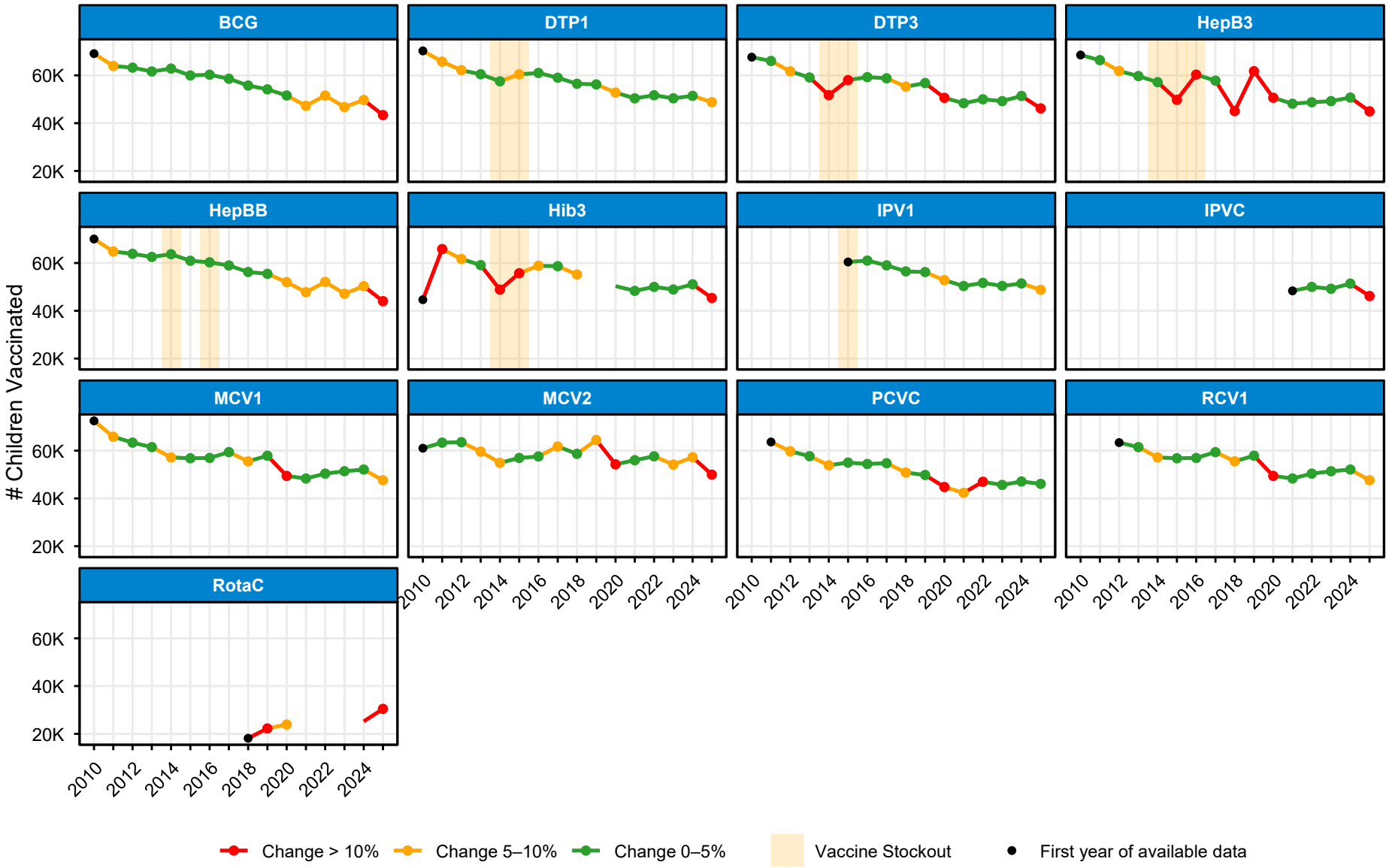


Number of children vaccinated with vaccines co-administered at the 6 weeks visit per the national schedule.

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Number of Children Vaccinated by Vaccine and Year, Bulgaria, 2010–2025



Gaps in line indicate missing admin data for that year.

Raw counts of children vaccinated (numerator) by vaccine and year. Points are colored by the percent change from previous year in the number of children vaccinated.

Green point = stable year-to-year count of children vaccinated.

Orange/red point = high fluctuation in number of children vaccinated, which may indicate data quality issues.

Black point = first year of available numerator data for that vaccine.

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Denominator Checks

Admin Data Comments: Denominator Source (2021–2024)

Year	Comment
2024	The National Statistical Institute provides data presenting the official denominator for 2024 but still the data by age groups are not available.
2023	The National Statistical Institute provides data presenting the official denominator for 2023.
2022	The National Statistical Institute provides data presenting the official denominator for 2021.
2021	The National Statistical Institute provides data presenting the official denominator for 2020.

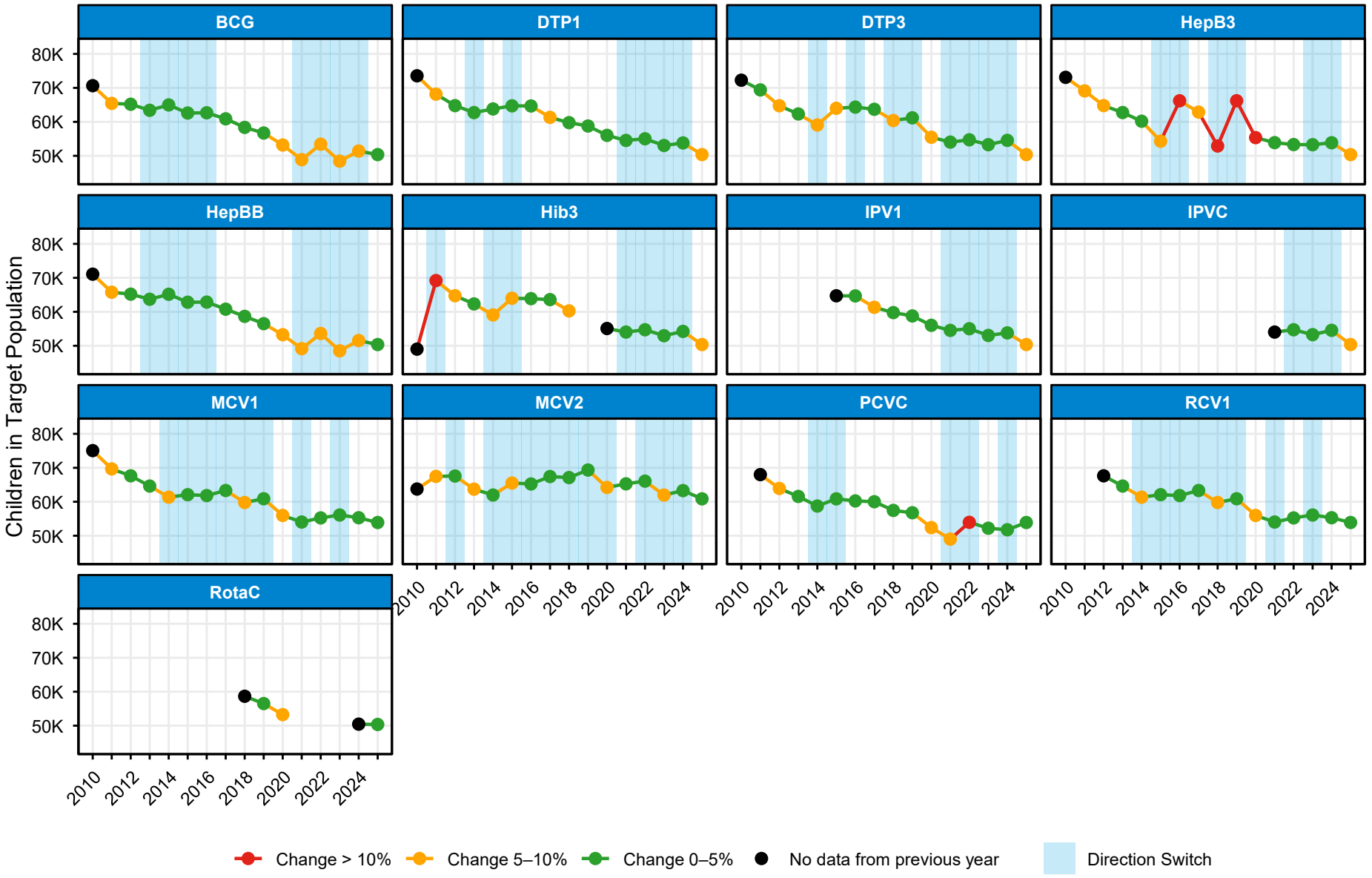
Explanation of how the denominators (target population) are obtained.

Admin Data Comments:
Denominator Accuracy (2021–2024)

Year	Comment
2024	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
2023	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
2022	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only children belonging to the age group that should have been immunized according to the schedule.
2021	We were used the sum of the denominators by the 28 Regional Health inspectorates (RHI) to calculate the national coverage. However, it is possible that these denominators include all non-immunized children who should have received the given dose, not only

Factors limiting the accuracy of the denominator as reported by Bulgaria.

Number of Children in Target Population by Vaccine and Year, Bulgaria, 2010–2025



Gaps in line indicate missing admin data for that year.

Target population (denominator) by vaccine and year. Points are colored by the magnitude of year-on-year change: green for less than 5%, orange for 5–10%, and red for greater than 10%. Black points indicate there was no denominator data in the previous year (unable to calculate percent change). Light blue shading highlights years where the direction of change switches unexpectedly.

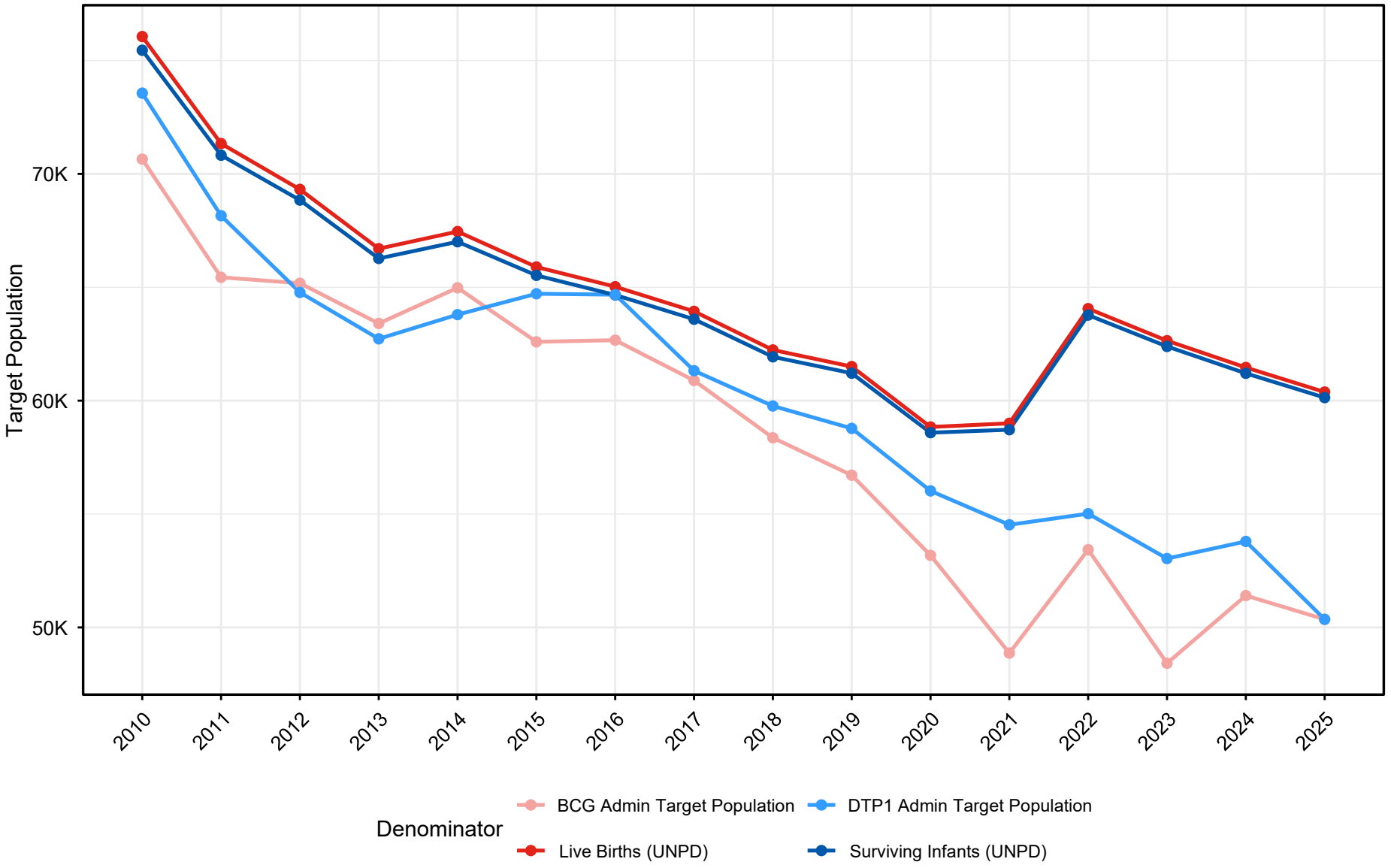
Target populations should follow a smooth, steady trajectory. Sudden directional switches are demographically unnatural and typically indicate administrative errors, shifting census boundaries, or changes in reporting sources.

Genuine switches are rare and generally limited to extreme disruptions such as humanitarian crises, cross-border migrations, or very small island populations.

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Live Births & Surviving Infants (UNPD) vs. Admin Denominators, Bulgaria, 2010–2025



Data from 2024 World Population Prospects (WPP) revision.

Comparison of trends in live births and surviving infants, 2010–2025.

Live births is used is the denominator for BCG and HepBB.

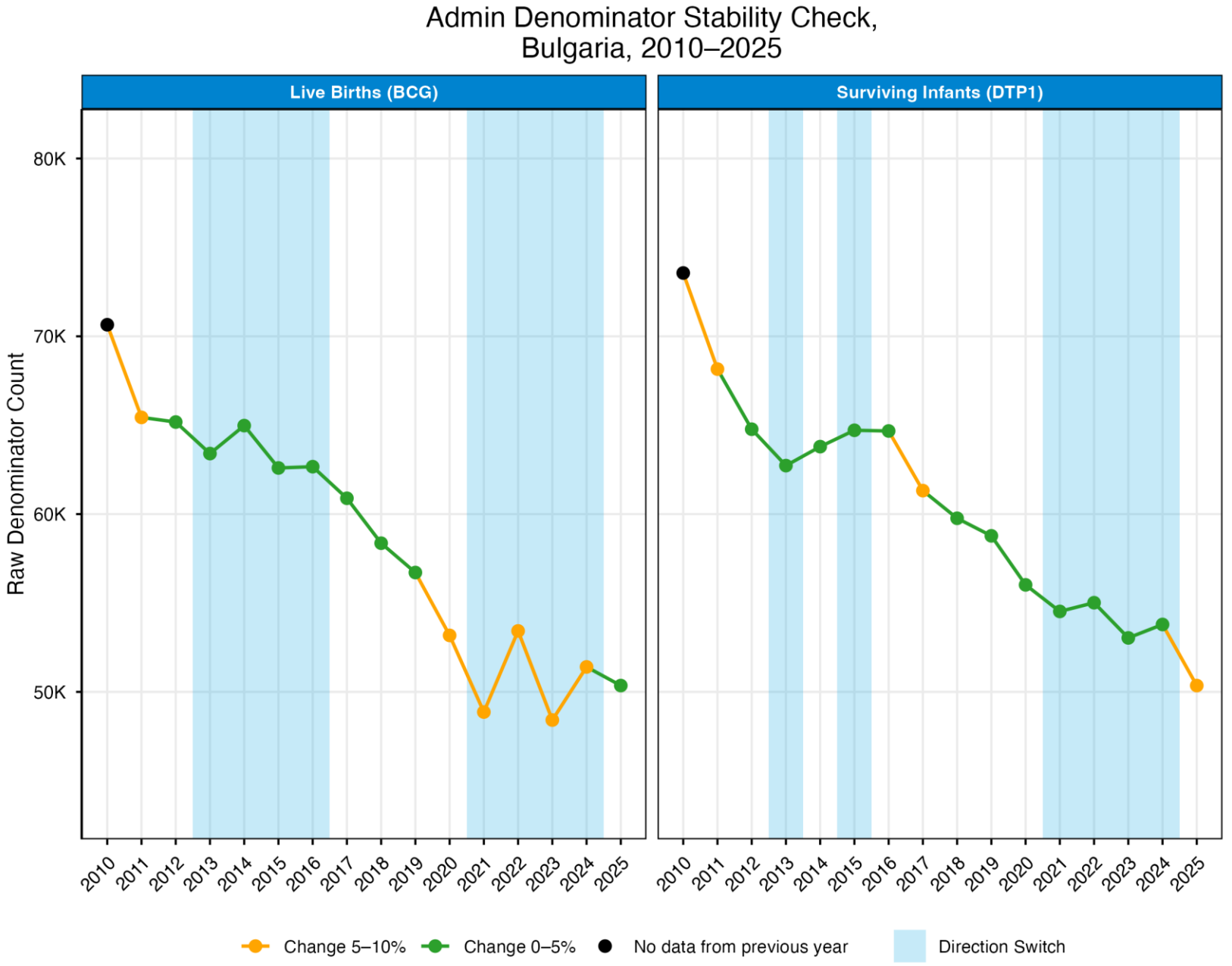
Surviving infants is used as the denominator for other vaccines given in the first year of life.

Admin target populations are reported by the country, while the United Nations Population Division (UNPD) produces the World Population Prospects (WPP) data.

UNPD is the United Nations Population Division.

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Number of children in the live births (BCG) and surviving infants (DTP1) administrative populations by year. Points are colored by the magnitude of year-on-year change: green for less than 5%, orange for 5–10%, and red for greater than 10%. Black points indicate there was no denominator data in the previous year (unable to calculate percent change). Light blue shading highlights years where the direction of change switches unexpectedly.

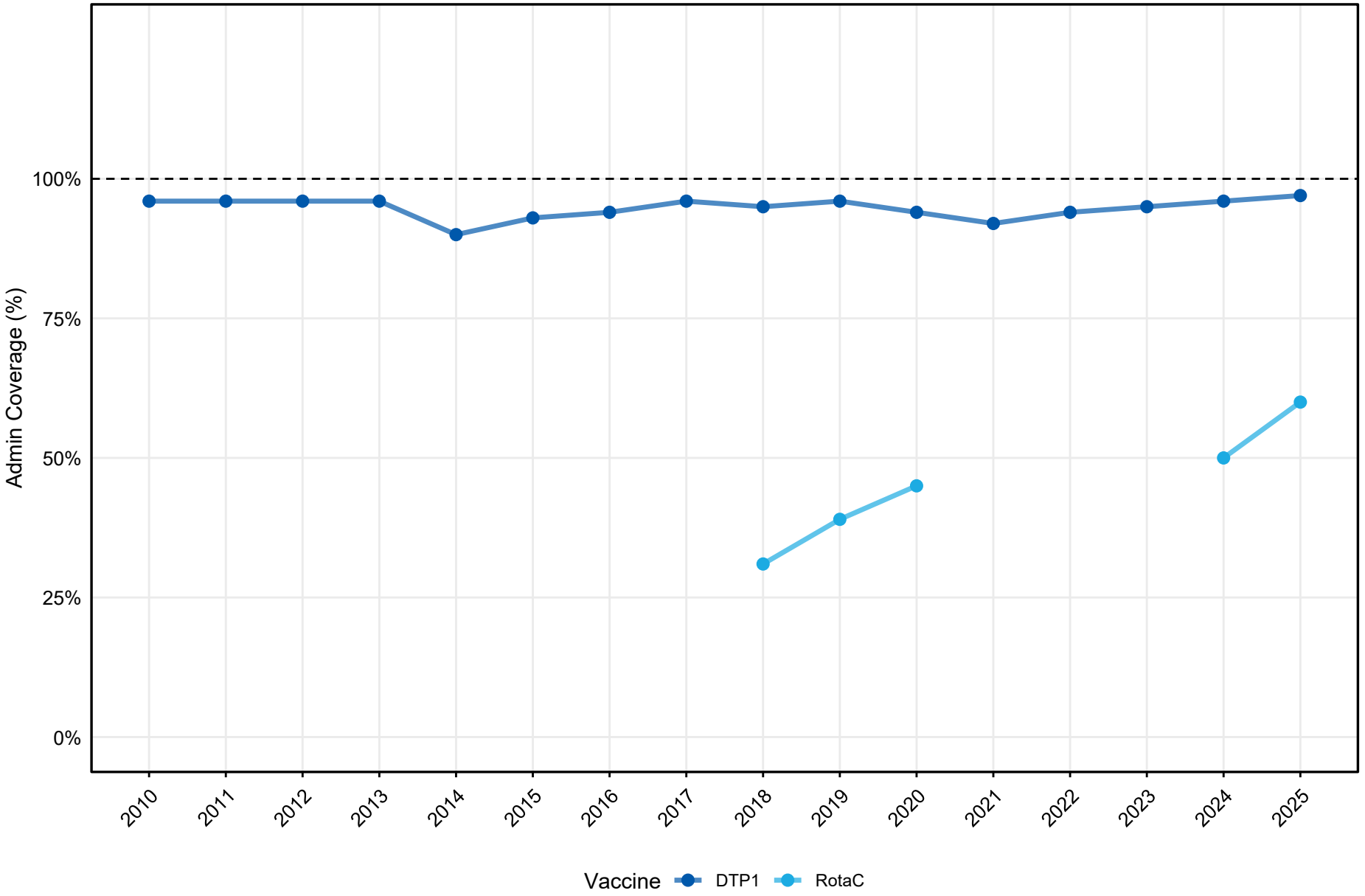
Under normal circumstances, target populations should follow a smooth, steady trajectory rather than fluctuating. Sudden switches in direction, such as an increasing population abruptly decreasing the following year, are demographically unnatural and typically indicate administrative errors, shifting census boundaries, or changes in reporting data sources without historic time series adjustment.

Genuine switches in growth direction are rare and generally limited to extreme disruptions like humanitarian refugee crises, cross-border migrations, or very small island populations.

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Coverage of Vaccines Recommended at the Same Age

Admin Coverage of Vaccines Administered at 6 weeks, Bulgaria, 2010–2025



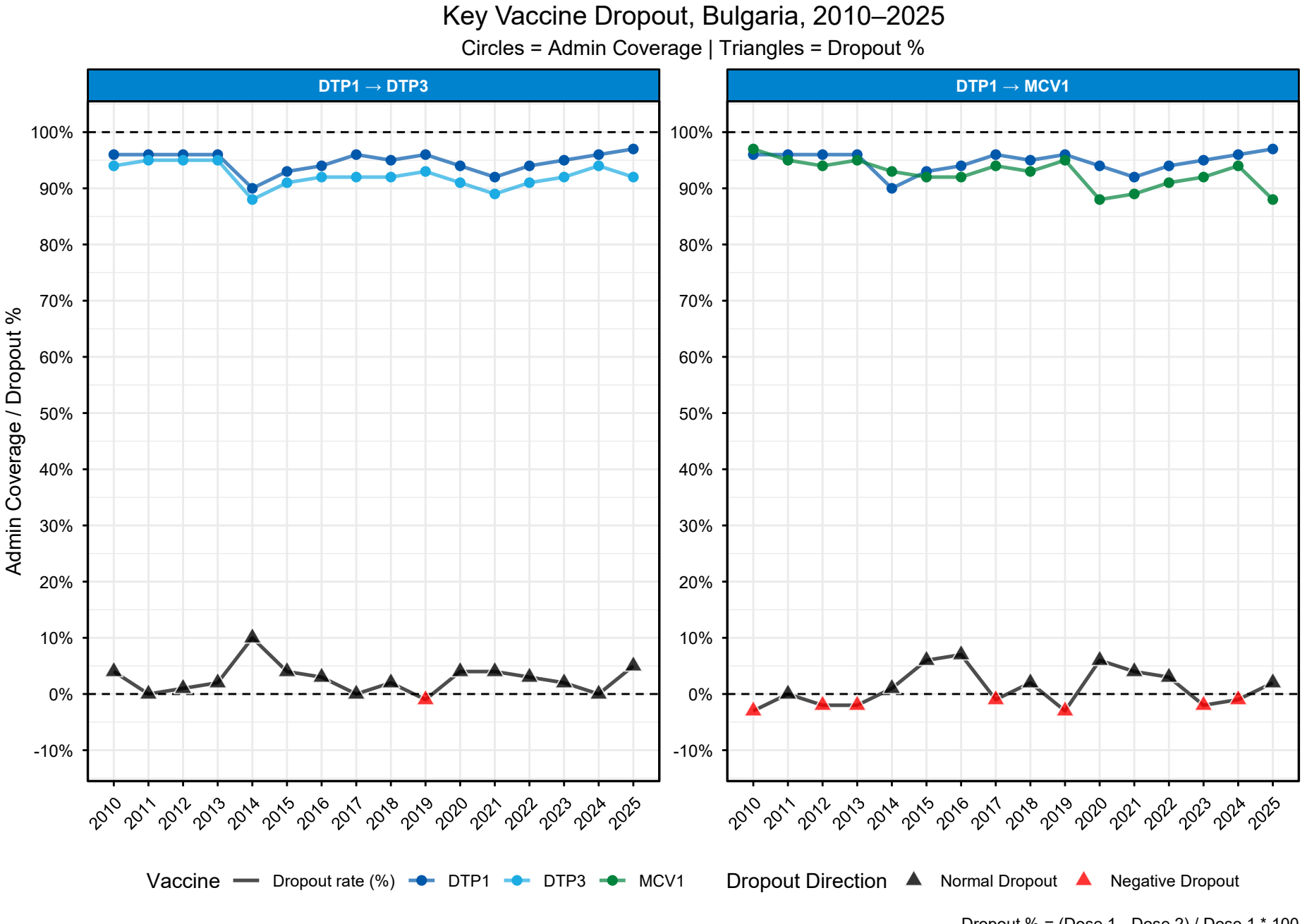
Admin coverage of WUENIC vaccines co-administered at the 6 weeks visit per the national schedule.

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Vaccine Dropout



Admin coverage for key vaccine pairs (DTP1→DTP3, DTP1→MCV1) with dropout rate shown as triangles. High dropout may indicate supply, access, or demand barriers.

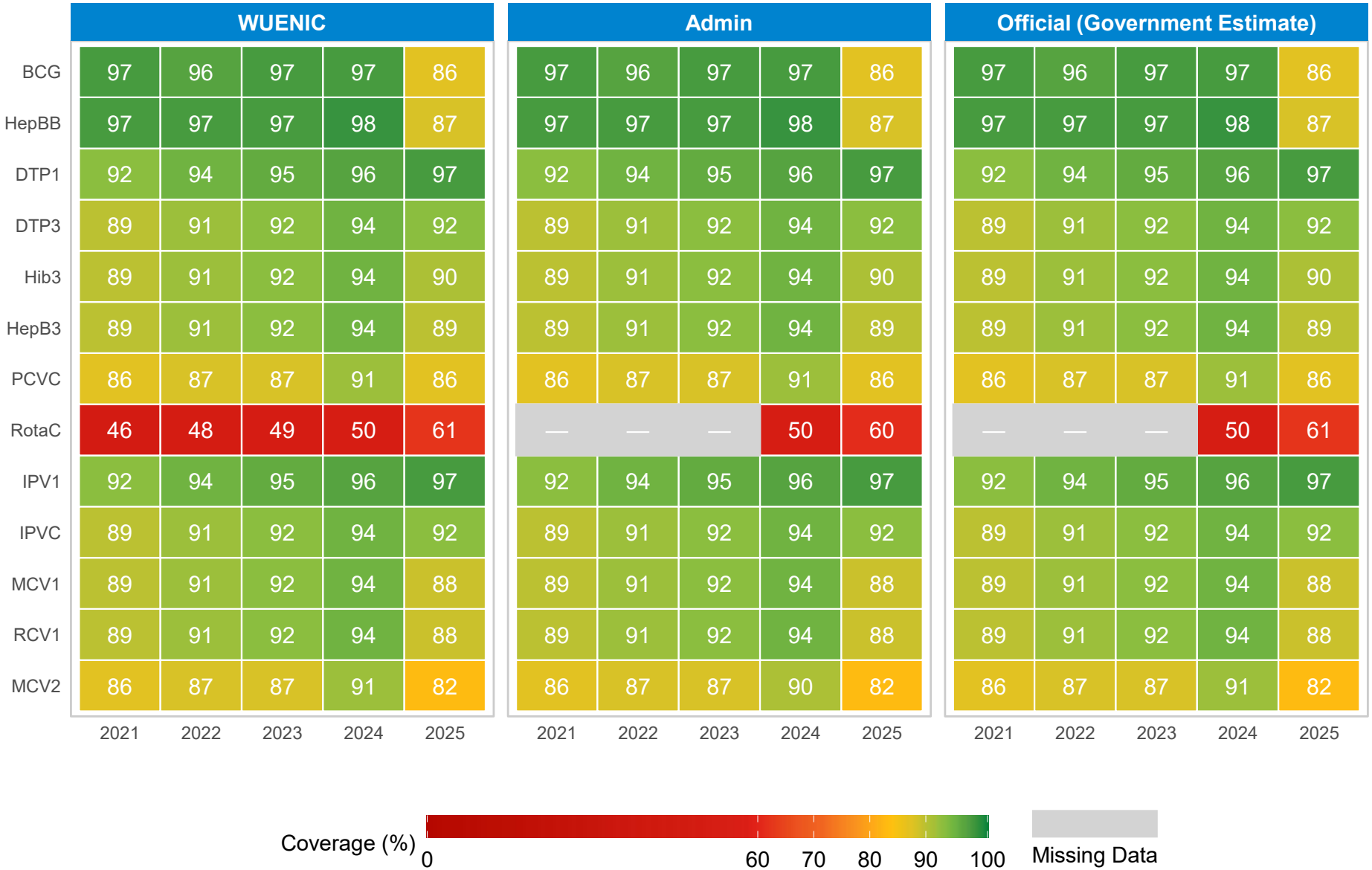
A normal dropout rate means more children received DTP1 than DTP3 or MCV1, which is expected. A negative dropout rate means more children received DTP3/MCV1 than DTP1.

For DTP1–DTP3, negative dropout almost certainly reflects data quality issues, as a child cannot receive the third dose without first receiving the first dose.

While a child can receive MCV1 without DTP1, negative dropout is generally unusual as MCV1 is recommended later in infancy. Negative dropout may occur in instance of outbreak response, but campaigns often include older children, which may contaminate the numerator and lead to misinterpretation.

Coverage Comparison Between WUENIC, Admin, and Official Estimates

Coverage Trends by Vaccine and Source, Bulgaria, 2021–2025



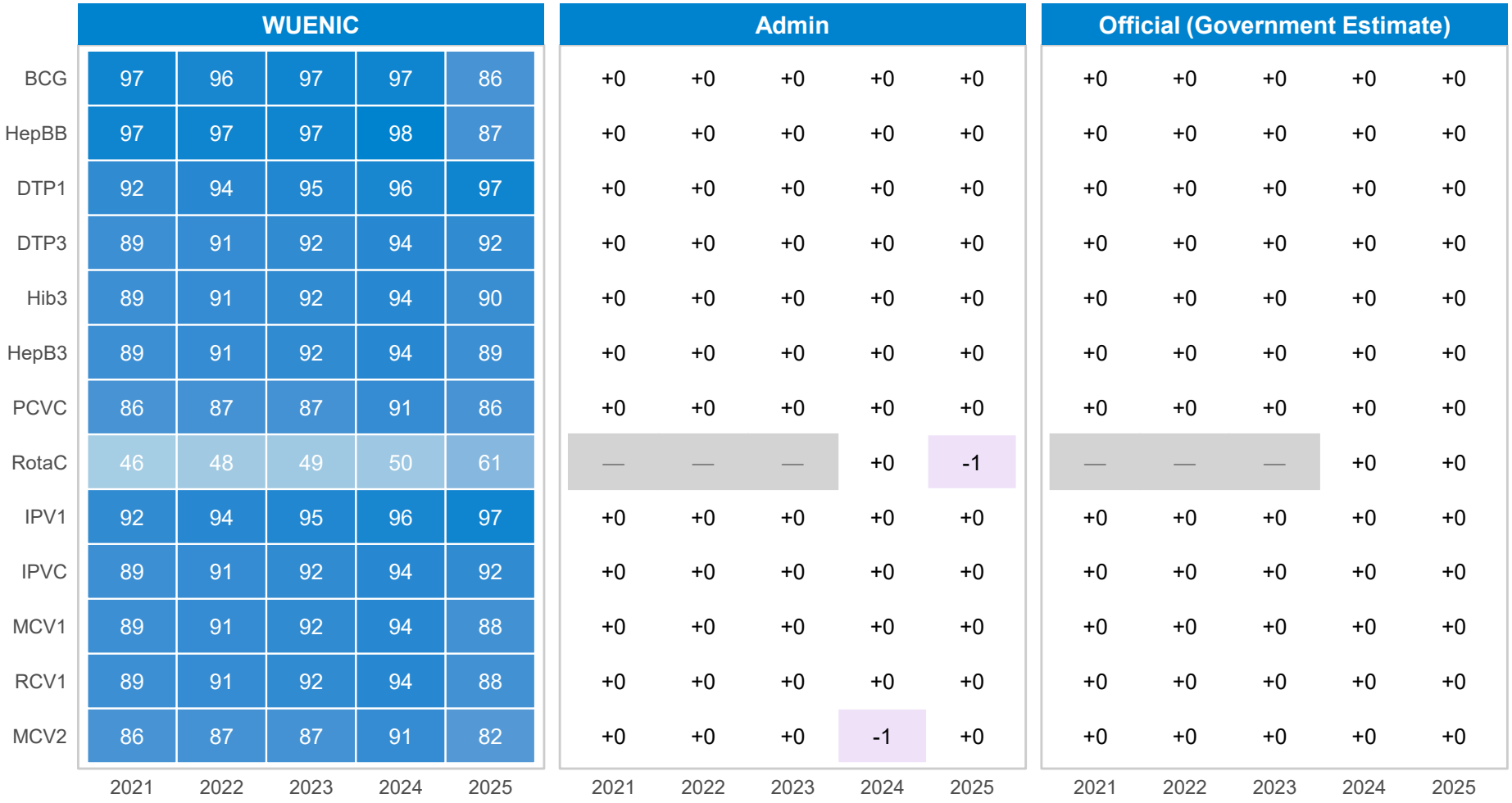
WUENIC HPV coverage estimates not included.
White = not yet introduced or not reported. Grey = missing data.
Survey panel not presented as Bulgaria reported no survey data.

Coverage by vaccine and data source (WUENIC, Admin, Official, Survey) for the most recent 5 years.

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Coverage vs. WUENIC Estimates by Source, Bulgaria, 2021–2025



WUENIC panel shows absolute coverage. All other panels show percentage point difference vs. WUENIC estimate.

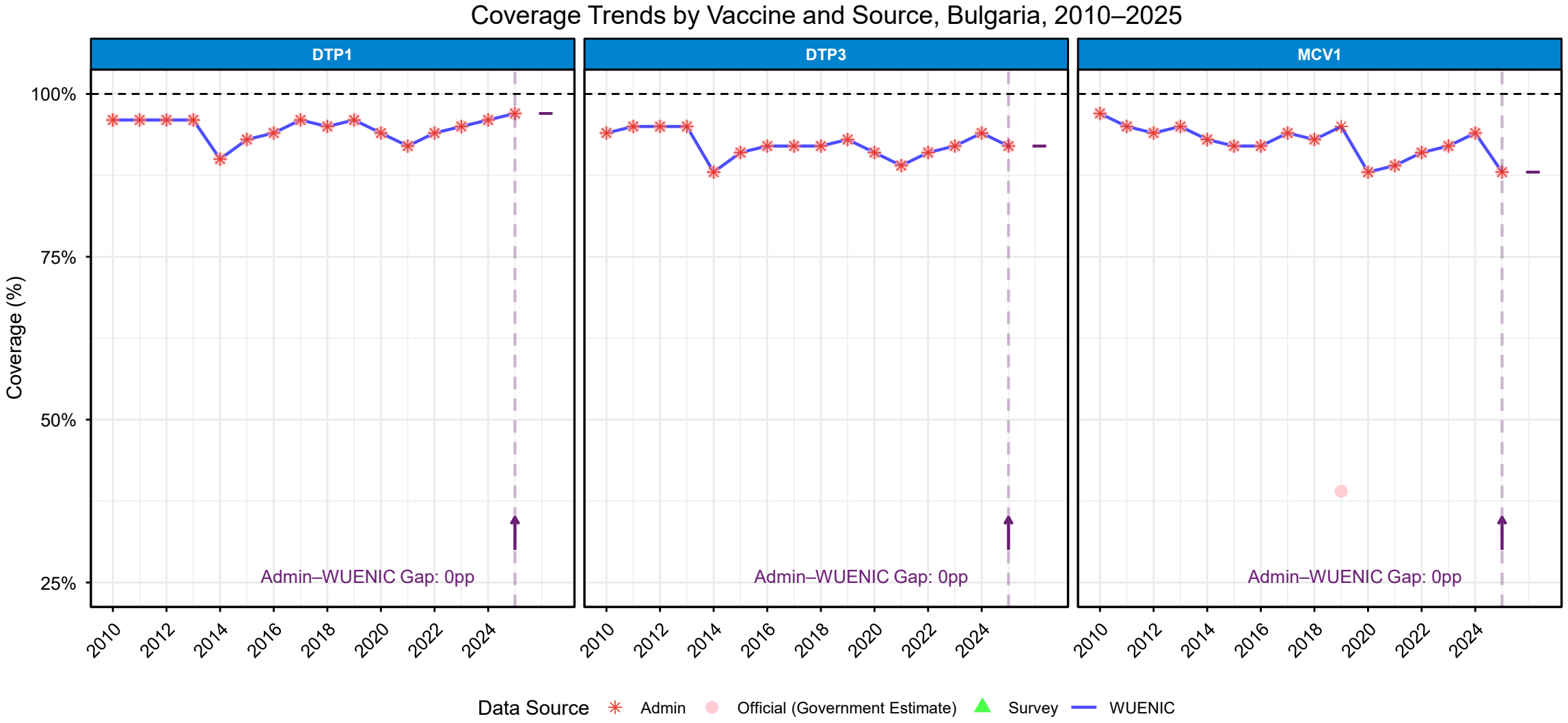
White = not yet introduced or not reported. Grey = missing data.
Survey panel not presented as Bulgaria reported no survey data.

Difference in percentage points between administrative, official, and survey coverage and WUENIC estimates (e.g., Admin - WUENIC) for the most recent 5 years.

A difference of zero indicates that the coverage source and WUENIC estimate are identical, usually indicating that source informed the WUENIC estimate.

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Coverage trends for DTP1, DTP3, and MCV1 by data source, 2010–2025.

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Actionable Health Analytics for Decision-making (AHEAD)

AHEAD is a UNICEF initiative that strengthens the quality and use of routine immunization data by working closely with Ministries of Health and national Expanded Programme on Immunization (EPI) teams.

AHEAD begins with a systematic review of routine immunization data to identify and address data quality issues, including missing or inconsistent reporting, internal inconsistencies, implausible year-to-year fluctuations, and inaccuracies in target population denominators. Through a collaborative process with national teams, reported data are reviewed, cleaned, and validated, while alternative denominator sources are assessed to improve the accuracy and interpretation of vaccination coverage estimates.

Building on these strengthened data, AHEAD produces timely subnational immunization analytics at regional, district, and health facility levels to identify priority areas, monitor trends, and support evidence-based planning and targeted interventions.

Please contact UNICEF for more information at: data@unicef.org

AHEAD





