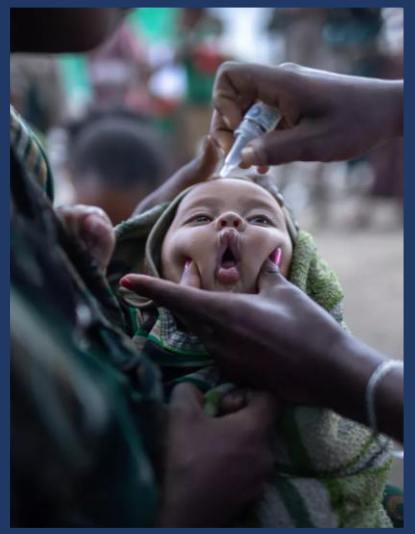





# Serbia

## 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 | | | |
| National | DTAPHIBIPV | 8 weeks | 14 weeks | 20 weeks | |
| National | DTAPHIBIPV (booster) | | | | 18 months |
| National | HEPB (pediatric) | Birth | 4 weeks | 6 months | |
| National | HPV (females and males) | 9 to 19 years | + txt_timepoint_2_6months | + 6 months | |
| National | MCV | 12 months | 7 years | | |
| National | PCV | 8 weeks | 20 weeks | 18 months | |

This table shows the 2025 national immunization schedule for routine services in Serbia, 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 | Partial introduction | Risk groups |
|---|---|---|---|
| HPV (Human papillomavirus) vaccine | 2022 | | |
| HepB birth dose | 2006 | | |
| Hepatitis B vaccine | 2006 | 2002 | |
| Hib (Haemophilus influenzae type B) vaccine | 2006 | | |
| IPV (Inactivated polio vaccine) | 2015 | | |
| IPV (Inactivated polio vaccine) 2nd dose | 2015 | | |
| Malaria vaccine | Not introduced | | |
| Measles-containing vaccine 2nd dose | 1994 | | |
| Meningococcal meningitis vaccines (any strain) | Not introduced | | 2005 |
| Mumps vaccine | 2002 | | |
| PCV (Pneumococcal conjugate vaccine) | 2018 | | 2014 |
| RSV (Respiratory syncytial virus) immunization strategy | Not introduced | | |
| Rotavirus vaccine | Not introduced | | |
| Rubella vaccine | 1994 | | |
| 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, Serbia, 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: 2025

| Comment Type | Comment |
|---|---|
| Denominator Accuracy | The denominator does not include children that have medical records in private health care institutions. Population movement from one municipality to another also affects accuracy of the denominator |
| Denominator Source | The denominator at the national level is obtained by summarizing denominators at the municipality levels. The denominator for each municipality is based on the number of children in specific age group planned for immunization according to the National Immunization Schedule during reporting year, that are registered (i.e. have medical records) in the primary health care institution of the corresponding municipality. |
| Numerator Accuracy | National electronic immunization register is not implemented.<br>The numerator does not include children vaccinated in private health care institutions |

Summary of all admin data comment fields for the most recent year with available data (2025).

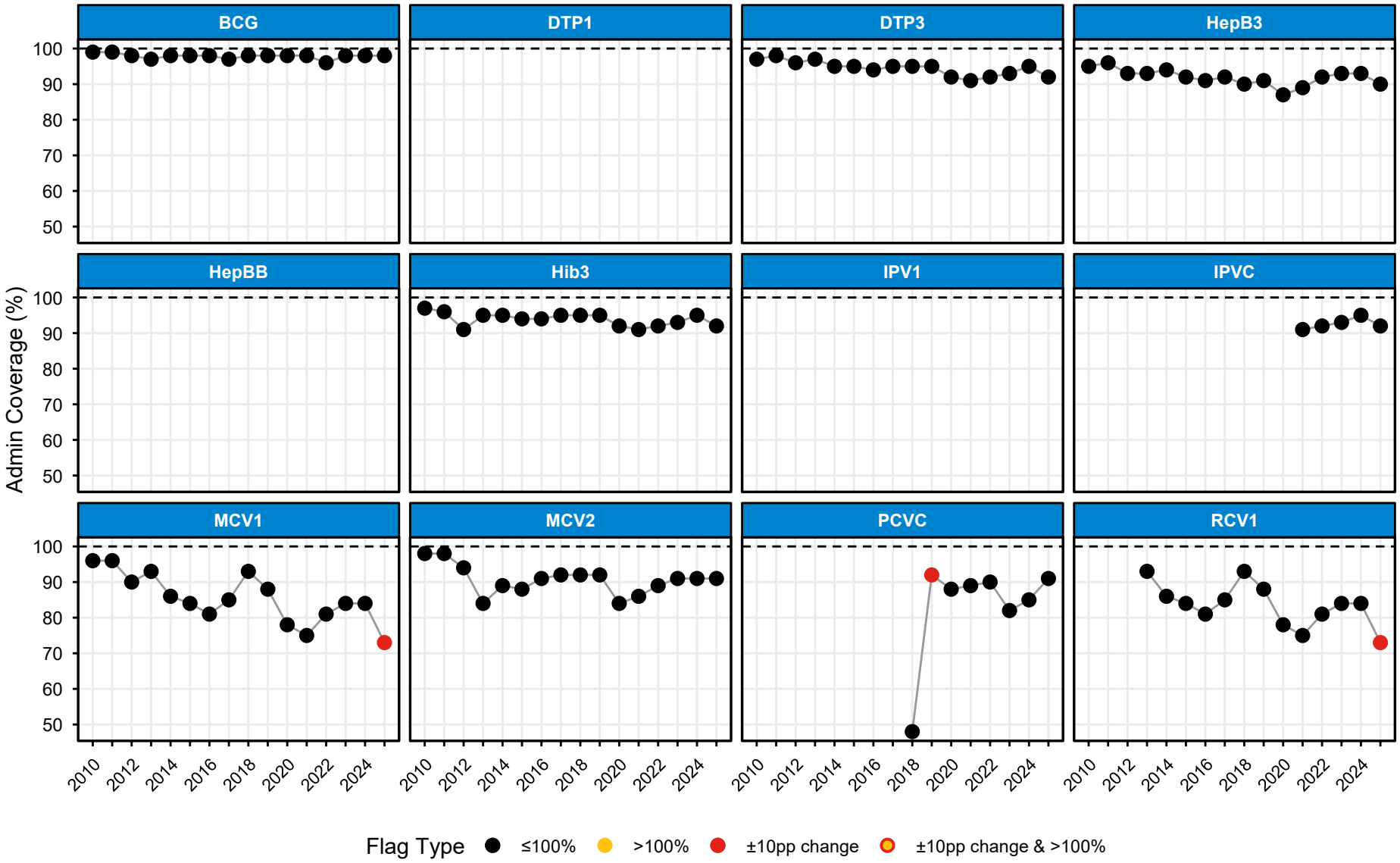
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# Admin Coverage Flags

# Admin Coverage Flags by Vaccine and Year, Serbia, 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.

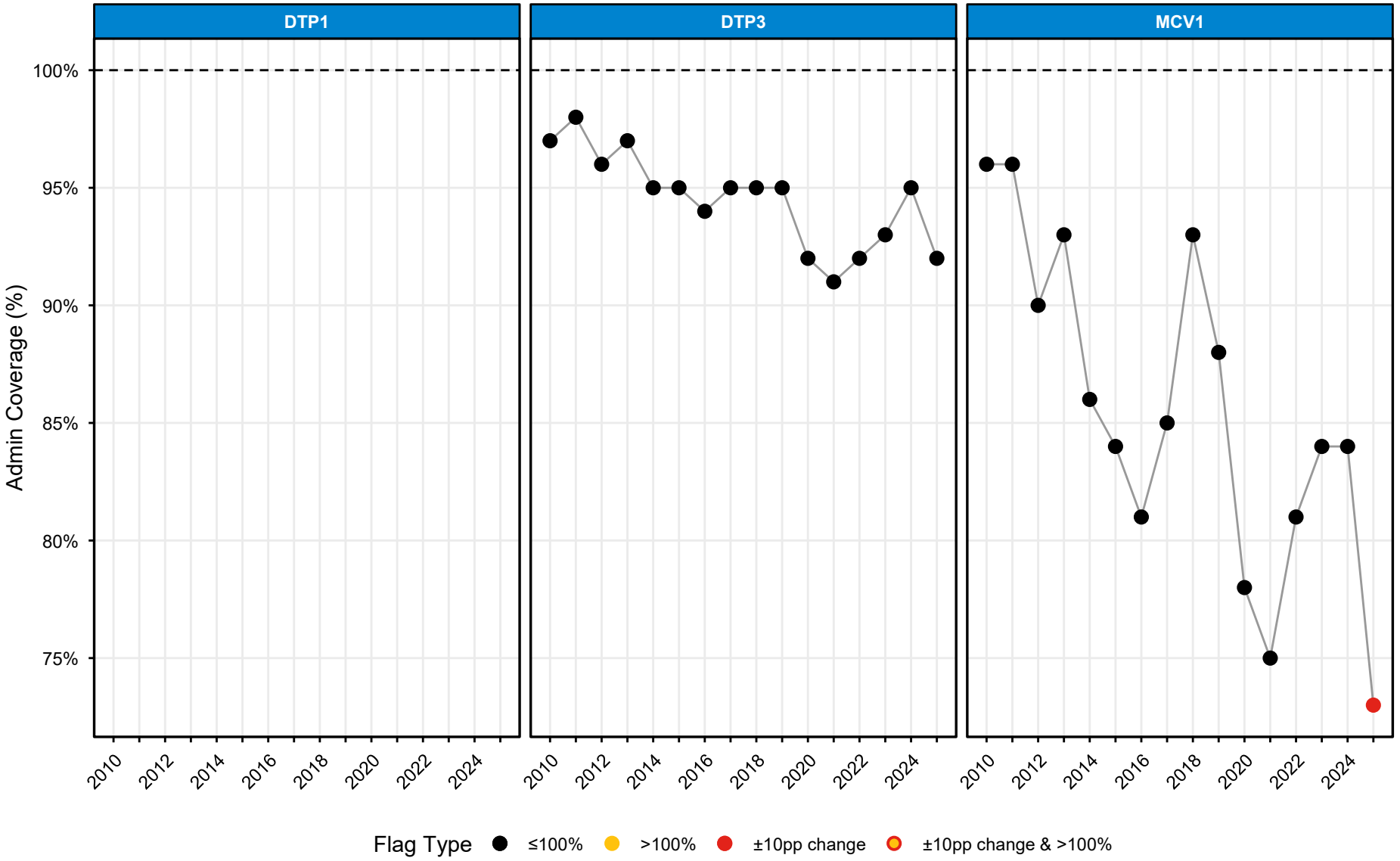
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# DTP1, DTP3, and MCV1 Admin Coverage Flags by Year, Serbia, 2010–2025

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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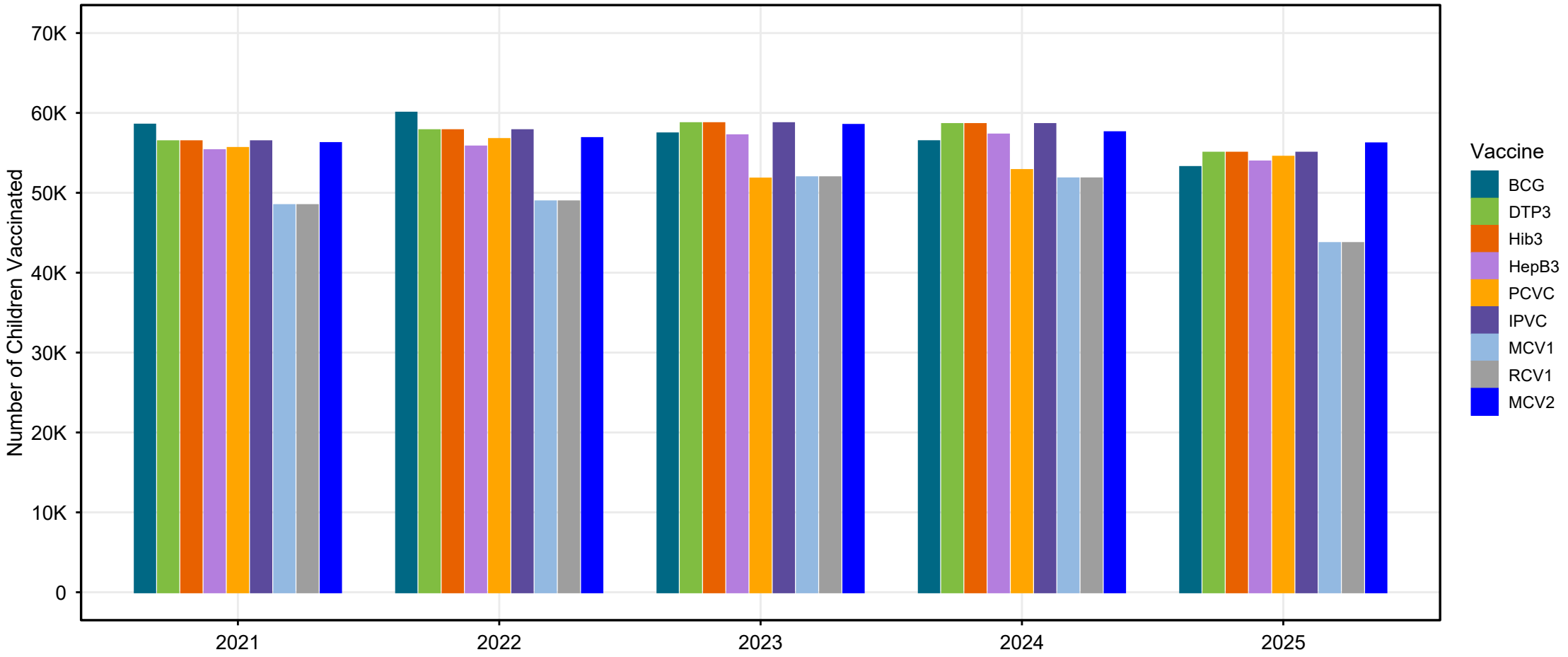
# Numerator Checks

# Admin Data Comments:
# Numerator Accuracy (2021–2025)

| Year | Comment |
|---|---|
| 2025 | National electronic immunization register is not implemented.<br>The numerator does not include children vaccinated in private health care institutions |
| 2024 | National electronic immunization register is not implemented.<br>The numerator does not include children vaccinated in private health care institutions |
| 2023 | National electronic immunization register is not implemented.<br>The numerator does not include children vaccinated in private health care institutions |
| 2022 | National electronic immunization register is not implemented.<br>The numerator does not include children vaccinated in private health care institutions |
| 2021 | National electronic immunization register is not implemented, numerator does not include children vaccinated in private health care institutions |

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

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



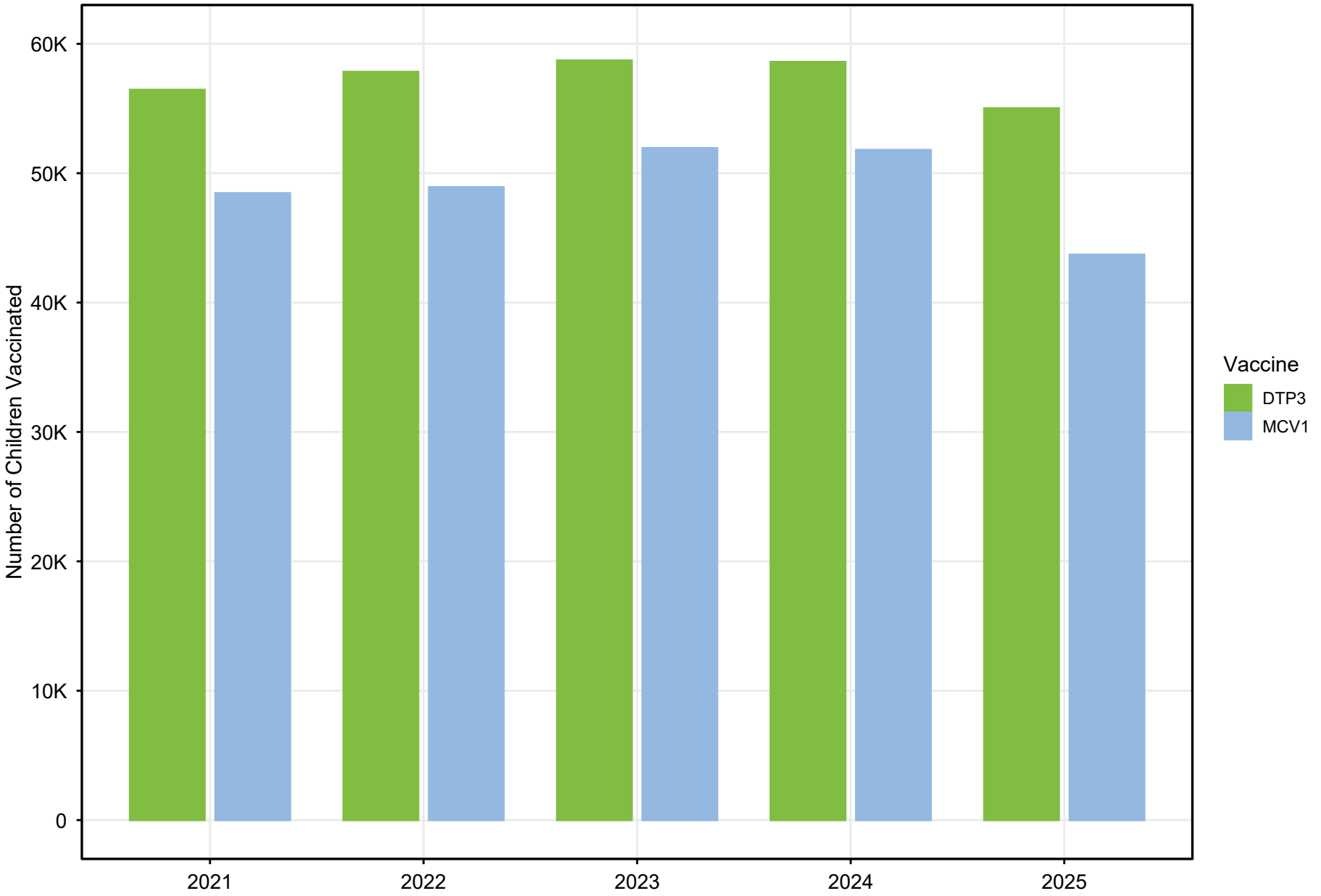

This chart shows number of children vaccinated (numerator) by vaccine and year.

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), Serbia, 2021–2025



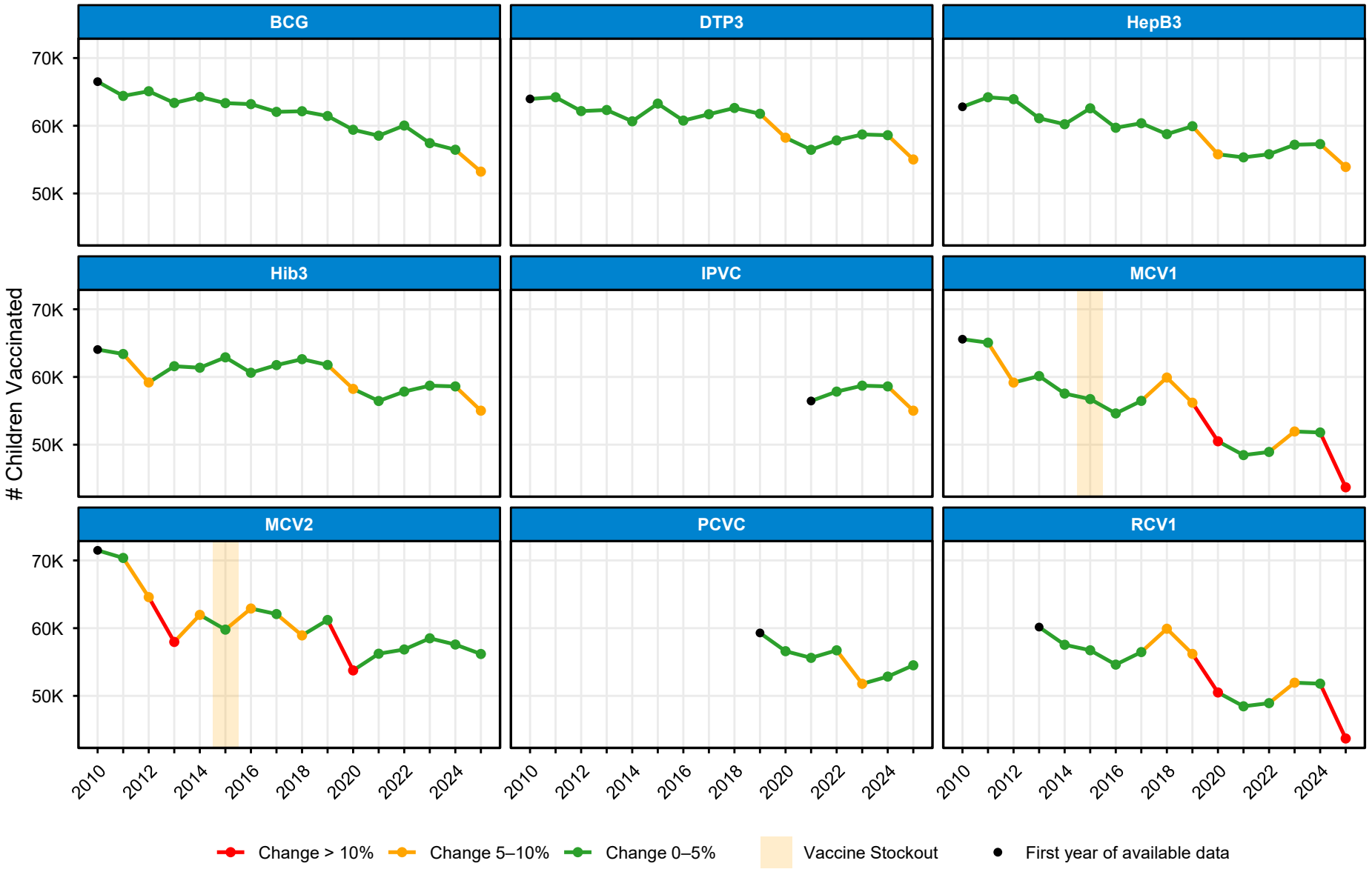

Number of children vaccinated (numerator) by vaccine (DTP1, DTP3, and MCV1 only) and year.

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

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WUENIC 2025 revision

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




NOTE: No numerator data: DTP1, HepBB, IPV1

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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WUENIC 2025 revision

# Denominator Checks

# Admin Data Comments: Denominator Source (2021–2025)

| Year | Comment |
|---|---|
| 2025 | The denominator at the national level is obtained by summarizing denominators at the municipality levels. The denominator for each municipality is based on the number of children in specific age group planned for immunization according to the National Immunization Schedule during reporting year, that are registered (i.e. have medical records) in the primary health care institution of the corresponding municipality. |
| 2024 | The denominator at the national level is obtained by summarizing denominators at the municipality levels. The denominator for each municipality is based on the number of children in specific age group planned for immunization according to the National Immunization Schedule during reporting year, that are registered (i.e. have medical records) in the primary health care institution of the corresponding municipality. |
| 2023 | The denominator at the national level is obtained by summarizing denominators at the municipality levels. The denominator for each municipality is based on the number of children in specific age group planned for immunization according to the National Immunization Schedule during reporting year, that are registered (i.e. have medical records) in the primary health care institution of the corresponding municipality. |
| 2022 | The denominator at the national level is obtained by summarizing denominators at the municipality levels. The denominator for each municipality is based on the number of children in specific age group planned for immunization according to the National Immunization Schedule during reporting year, that are registered (i.e. have medical records) in the primary health care institution of the corresponding municipality. |
| 2021 | Denominator at the national level is obtained by summarizing denominators at the municipality levels. Denominator for each municipality is based on the number of children in specific age group planned for immunization according to National Immunization Schedule during reporting year, that are registered (i.e have medical records) in the primary health care institution of the corresponding municipality |

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

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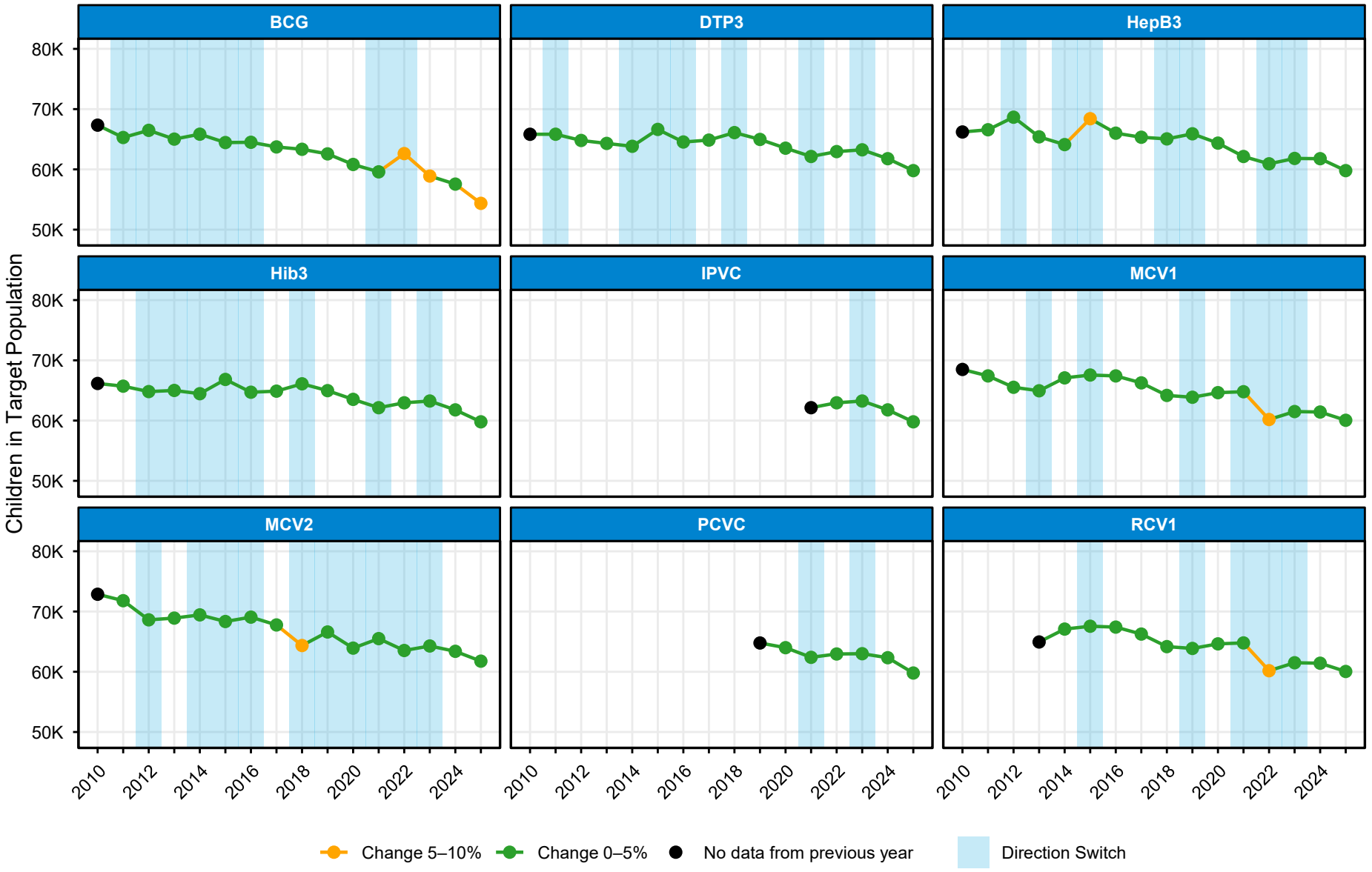
# Admin Data Comments:
# Denominator Accuracy (2021–2025)

| Year | Comment |
|---|---|
| 2025 | The denominator does not include children that have medical records in private health care institutions. Population movement from one municipality to another also affects accuracy of the denominator |
| 2024 | The denominator does not include children that have medical records in private health care institutions. Population movement from one municipality to another also affects accuracy of the denominator |
| 2023 | The denominator does not include children that have medical records in private health care institutions. Population movement from one municipality to another also affects accuracy of the denominator |
| 2022 | The denominator does not include children that have medical records in private health care institutions. Population movement from one municipality to another also affects accuracy of the denominator |
| 2021 | Denominator does not include children that have medical records in private health care institutions. Population movement from one municipality to another also affects accuracy of denominator |

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

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




NOTE: Not enough denominator data to calculate percent change for: DTP1, HepBB, IPV1

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.

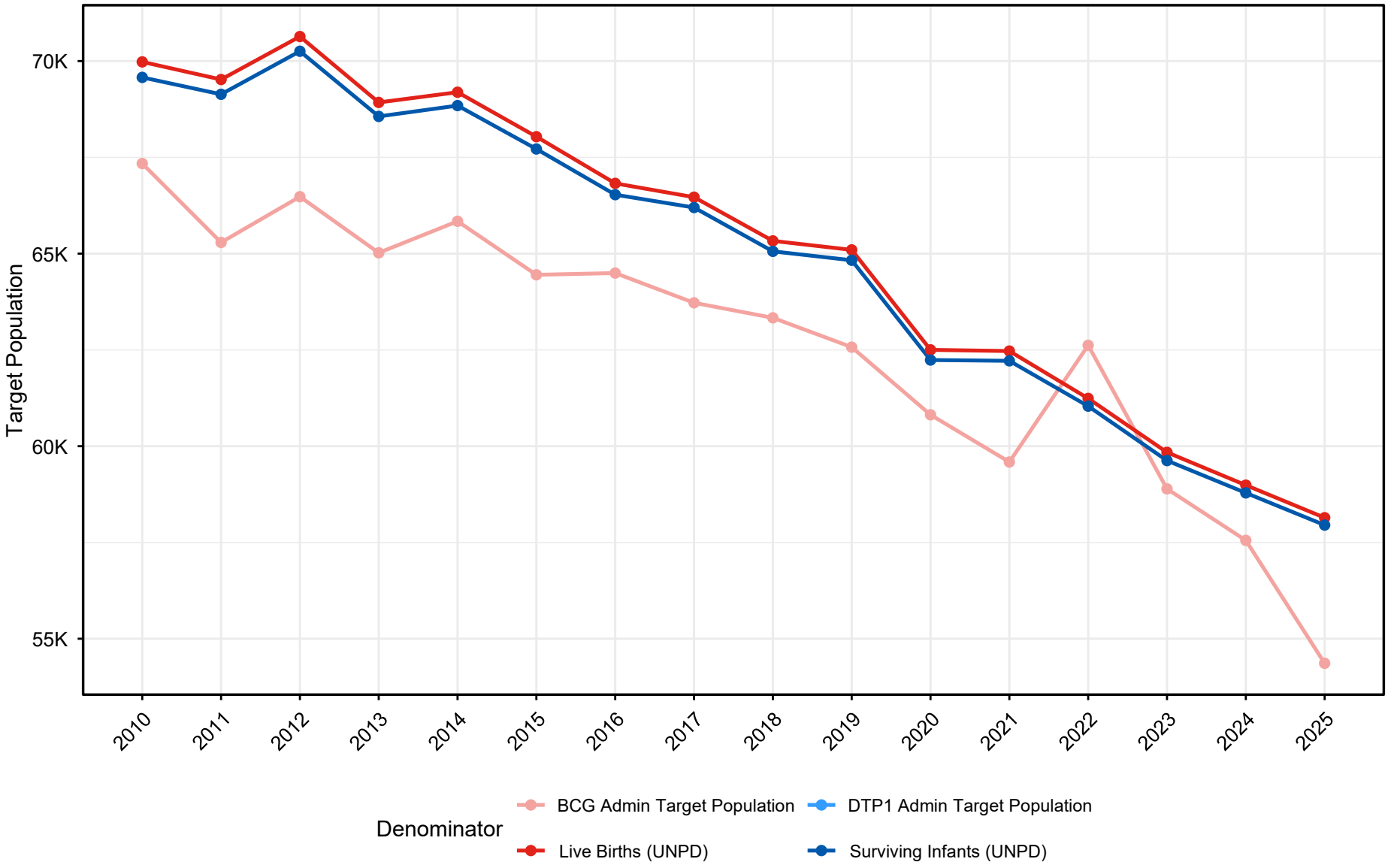
Target populations should follow a smooth, steady trajectory. Sudden directional switches are demographically unnatural and typically indicate administrative errors, shifting census boundaries, or changes in reporting sources.

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, Serbia, 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.

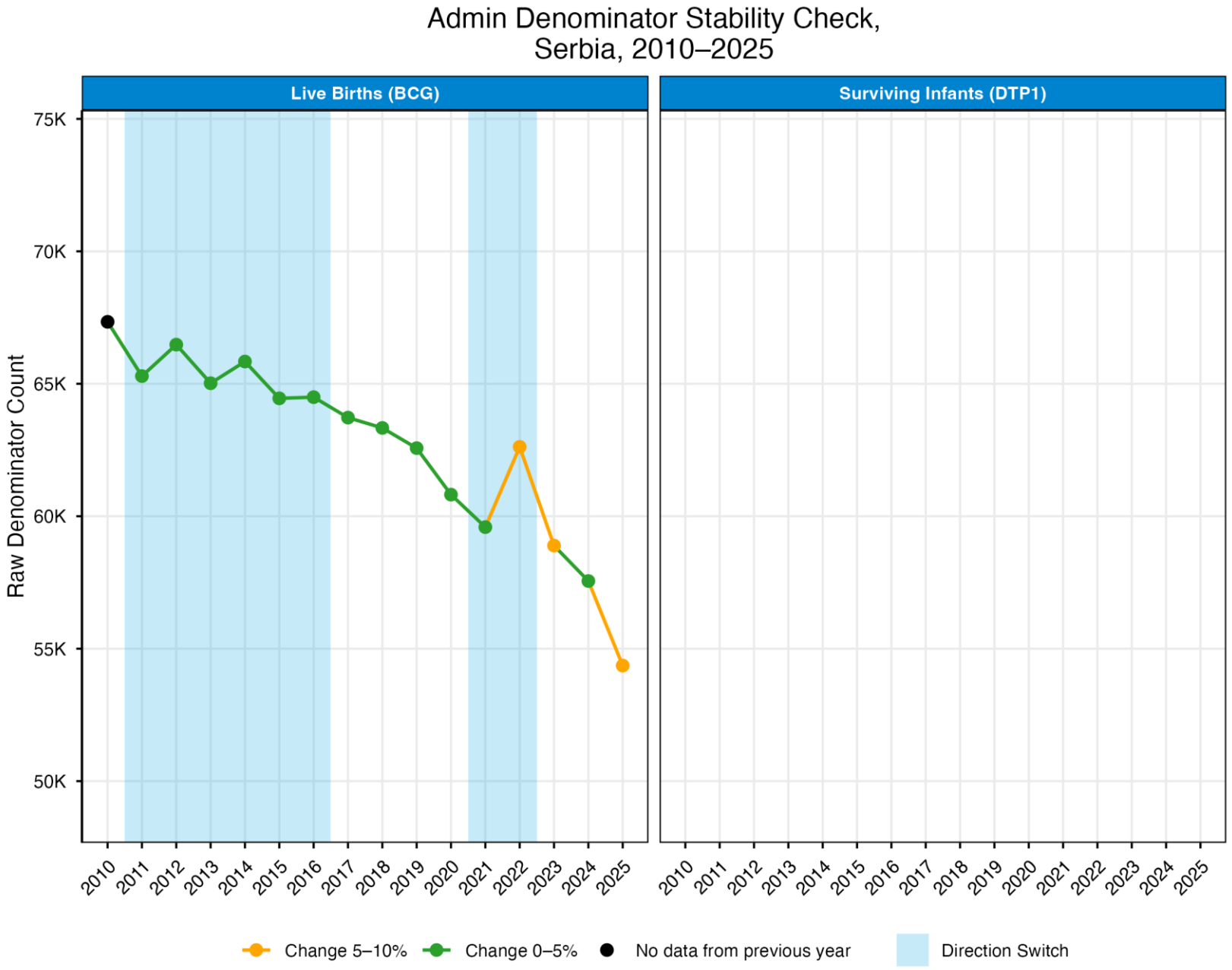
Surviving infants is used as the denominator for other vaccines given in the first year of life.

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.

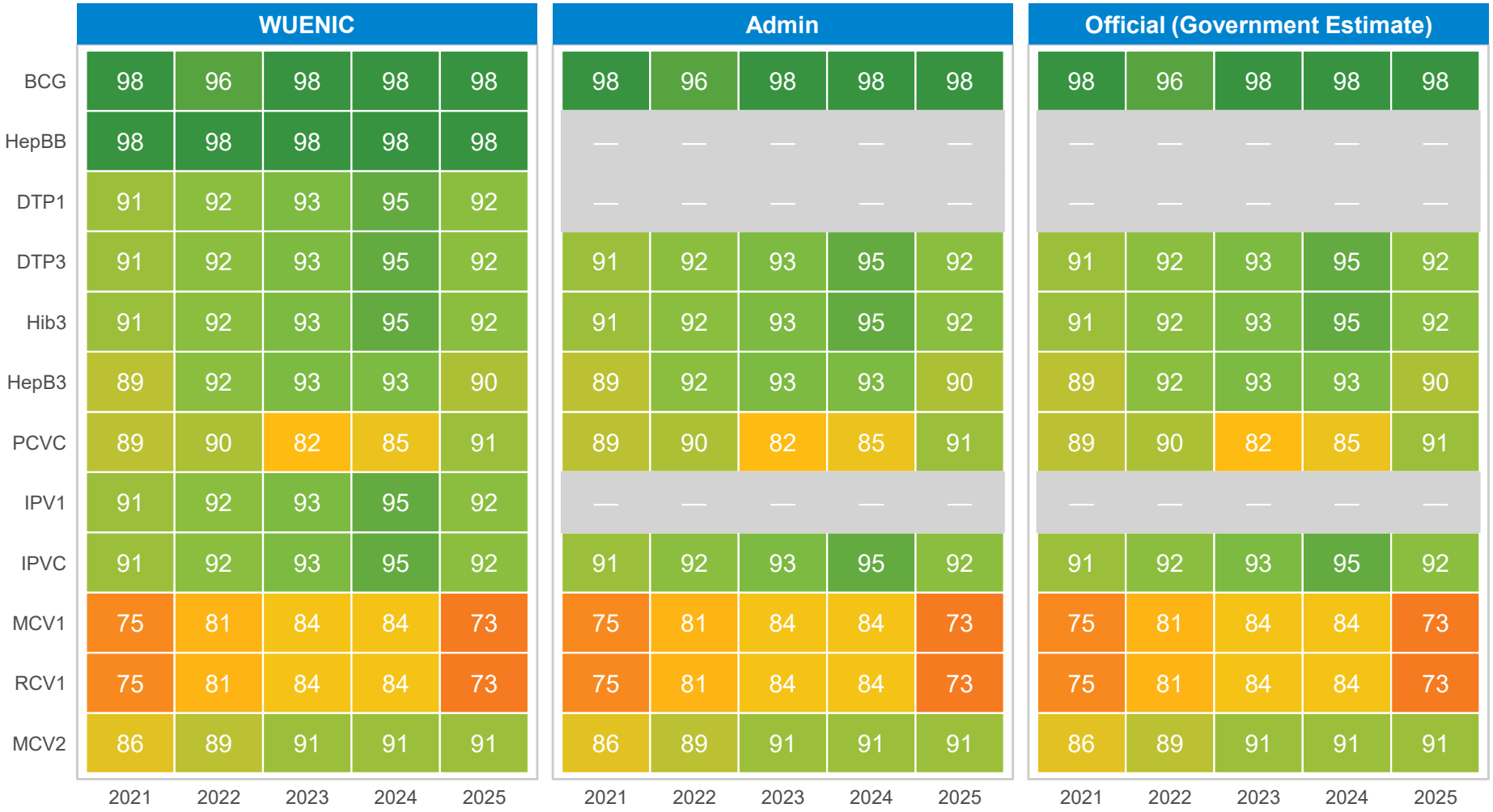
Under normal circumstances, target populations should follow a smooth, steady trajectory rather than fluctuating. Sudden switches in direction, such as an increasing population abruptly decreasing the following year, are demographically unnatural and typically indicate administrative errors, shifting 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 Comparison Between WUENIC, Admin, and Official Estimates

# Coverage Trends by Vaccine and Source, Serbia, 2021–2025



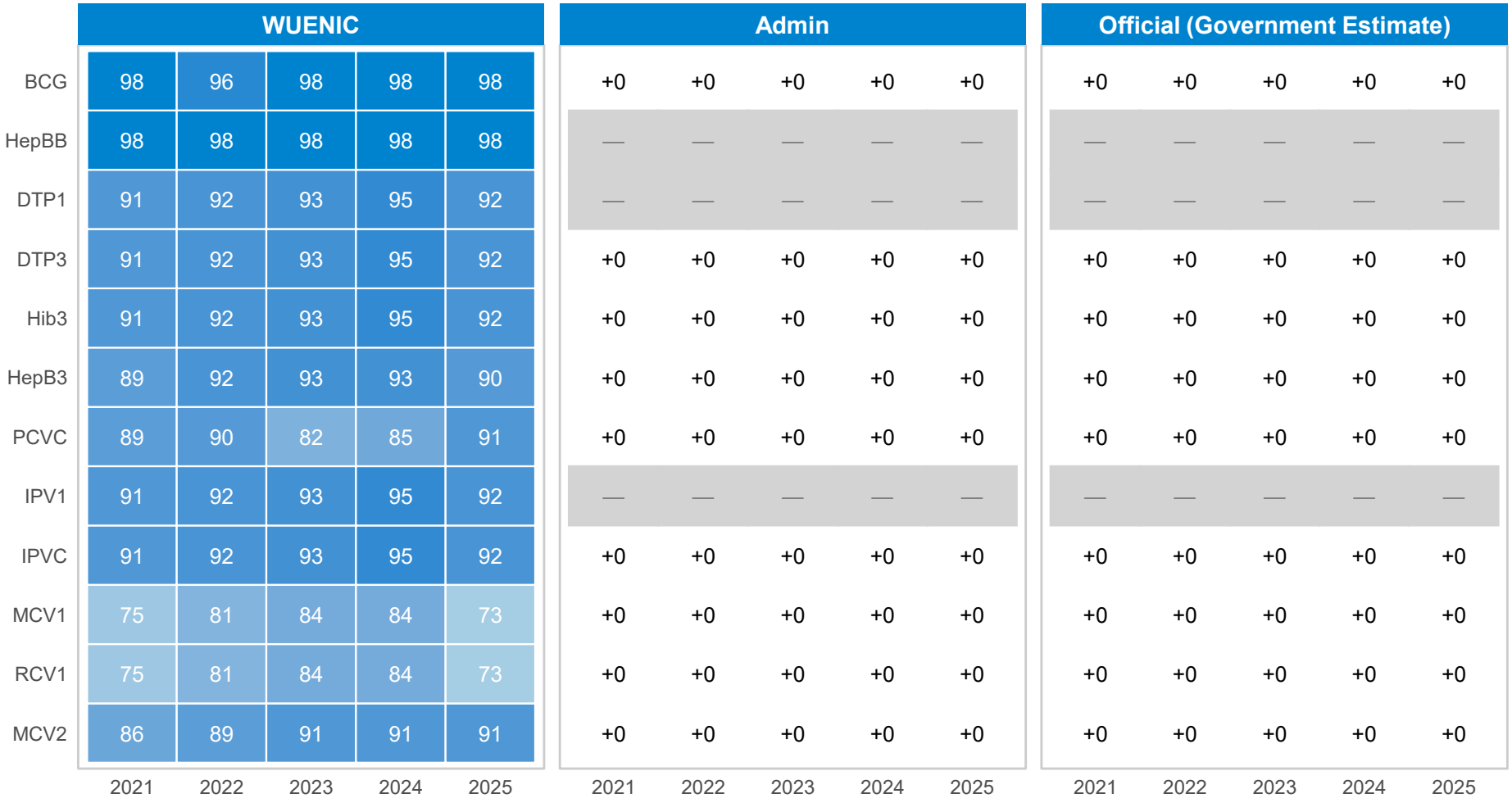

WUENIC HPV coverage estimates not included.
White = not yet introduced or not reported. Grey = missing data.
Survey panel not presented as Serbia reported no survey data.

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, Serbia, 2021–2025




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

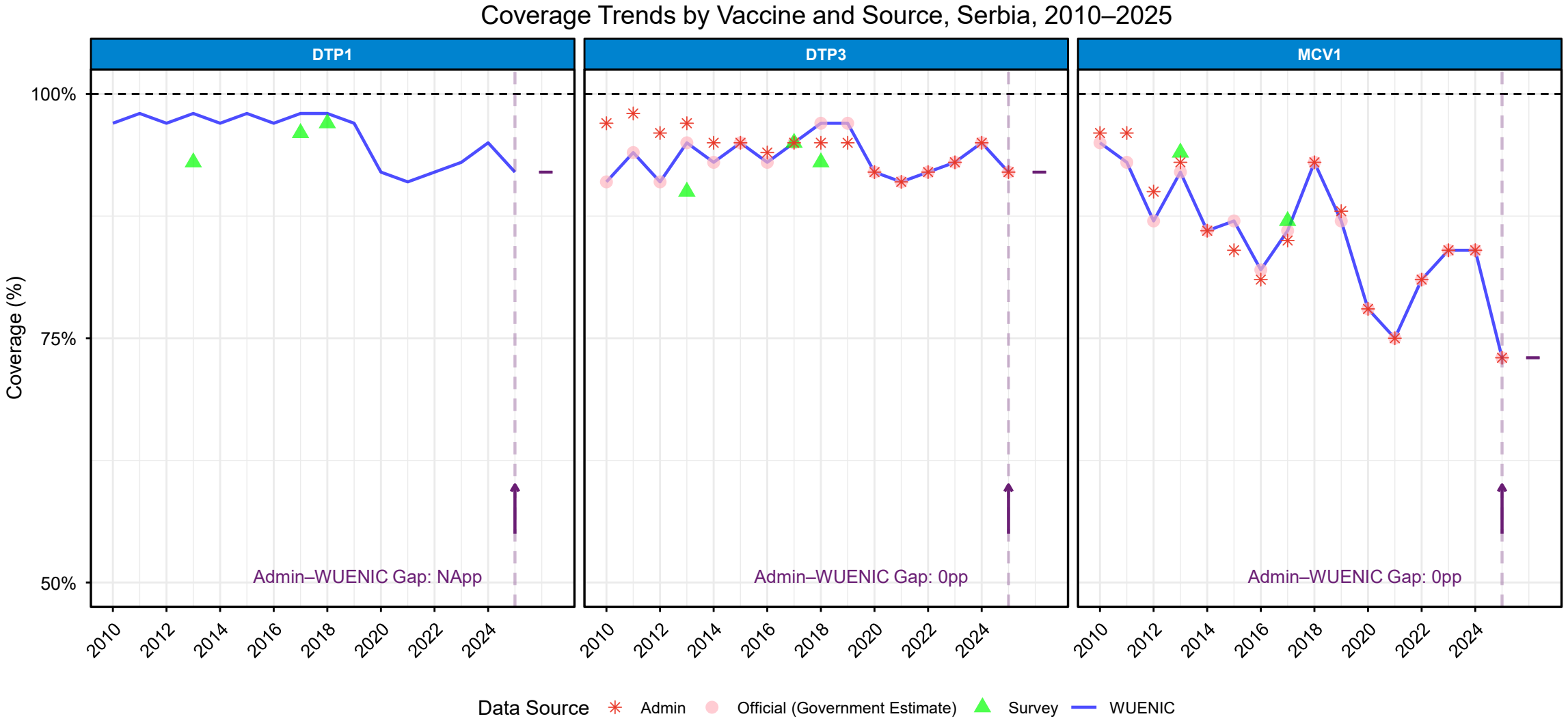
White = not yet introduced or not reported. Grey = missing data.
Survey panel not presented as Serbia reported no survey data.

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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WUENIC 2025 revision




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





