2-2024

2023 Supplementary Immunization Coverage Survey in Super High Risk Union Councils of Pakistan (TPVICS-SHRUCs Rounds 1-3)

Muhammad Ahmed Kazi
Federal Directorate of Immunization, Pakistan

Sajid Bashir Soofi
Aga Khan University, sajid.soofi@aku.edu

Imtiaz Hussain
Aga Khan University, imtiaz.hussain@aku.edu

Masawar Hussain
Aga Khan University, masawar.hussain@aku.edu

Muhammad Umer
Aga Khan University, muhammad.umer@aku.edu

See next page for additional authors

Authors

Muhammad Ahmed Kazi, Sajid Bashir Soofi, Imtiaz Hussain, Masawar Hussain, Muhammad Umer, Ahmad Khan, Khalid Feroz, Uzair Ansari, Imran Ahmed, Dale A. Rhoda, Jennifer Brustrom, Caitlin Clary, and Khurram Butt

Expanded Program on Immunization
Government of Pakistan

2023 Supplementary Immunization Coverage Survey in Super High Risk Union Councils of Pakistan (TPVICS-SHRUCs Rounds 1-3)

Survey Report

Centre of Excellence in Women and Child Health
The Aga Khan University
and
Biostat Global Consulting

February 2024

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

BIOSTAT
GLOBAL CONSULTING

This page is intentionally blank.

Authors:

Team Federal Directorate of Immunization (FDI):

Muhammad Ahmed Kazi
Federal Directorate of Immunization, Islamabad, Pakistan.

Team Aga Khan University (AKU):

Sajid Bashir Soofi
Centre of Excellence in Women and Child Health and Department of Pediatrics & Child Health, Aga Khan University, Karachi, Pakistan, Corresponding author.

Imtiaz Hussain
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan.

Masawar Hussain
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan

Muhammad Umer
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan.

Ahmad Khan
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan.

Khalid Feroz
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan.

Uzair Waheed Ansari
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan.

Imran Ahmad
Centre of Excellence in Women and Child Health, Aga Khan University, Karachi, Pakistan.

Team Biostat Global Consulting:

Dale A. Rhoda
Biostat Global Consulting, Worthington, Ohio, US.

Jennifer Brustrom
Biostat Global Consulting, Worthington, Ohio, US.

Caitlin Clary
Biostat Global Consulting, Worthington, Ohio, US.

Team Bill & Melinda Gates Foundation (BMGF):

Khurram Butt
Bill & Melinda Gates Foundation (BMGF) Seattle, Washington, United States

Table of contents

List of figures

List of tables

Abbreviations

AKU	Aga Khan University
BCG	Bacille Calmette-Guérin
BeSD	Behavioral and Social Drivers of Vaccination
BMGF	Bill and Melinda Gates Foundation
CAPI	Computer Assisted Personal Interviews
CI	Confidence Interval
cVDPV2	Circulating Vaccine-derived Poliovirus Type 2
DMU	Data Management Unit
EB	Enumeration Block
EPI	Expanded Program on Immunization
ERC	Ethical Review Committee
HH	Household
HRUC	High Risk Union Council
IPV	Inactivated Polio Vaccine
KP	Khyber Pakhtunkhwa
LHRUC	Lahore High Risk Union Council Coverage Survey
LICS	Lahore Immunization Coverage Survey
MCV	Measles-Containing Vaccine
MDGs	Millennium Development Goals
MoNHSRC	Ministry of National Health Services Regulation & Coordination
MOSV	Missed opportunities for simultaneous vaccination
NBC	National Bioethics Committee
NEAP	National Emergency Action Plan
NEOC	National Emergency Operations Center
NISP	National Immunization Support Project
NOCs	No Objection Certificates
OPV	Oral Polio Vaccine
OPWC	Oral Polio Vaccine With Campaigns (considering doses from RI and from campaigns)
PBS	Pakistan Bureau of Statistics
PCV	Pneumococcal Conjugate Vaccine
PENTA	Pentavalent vaccine for: Diphtheria, Pertussis, Tetanus, Haemophilus influenza type b & Hep B
PEOC	Provincial Emergency Operations Center
PSU	Primary Sampling Unit
RI	Routine Immunization
ROTA	Rotavirus Vaccine
RV	Rotavirus Vaccine
SHRUC	Super High-Risk Union Council
SOP	Standard Operating Procedure
SSU	Secondary Sampling Unit
TAG	Technical Advisory Group
TPVICS	Third-party Verification Immunization Coverage Survey
ToR	Terms of Reference
UC	Union Council
VPD	Vaccine-preventable Diseases
VCQI	Vaccination Coverage Quality Indicators
WB	World Bank
WHO	World Health Organization
WPV1	Wild Poliovirus Type 1

Key definitions

Fully Vaccinated: A child who has completed their vaccinations through the first dose of measles-containing-vaccine (MCV1; given at 9 months of age) per the schedule of the Expanded Program on Immunization (EPI; i.e., BCG, OPV0, OPV1, OPV2, OPV3, Penta1, Penta2, Penta3, PCV1, PCV2, PCV3, IPV, and MCV1). ROTA1 and ROTA2 are excluded from this analysis because they are the doses introduced into the EPI schedule most recently.

Partially Vaccinated: A child who has received at least one, but also missed any of the vaccines given under the national immunization program until one year of age is classified as partially vaccinated.

Mother's/Father's Education Level: The parental education level is classified into four categories: None (has not attended formal schooling), Primary education (1-5 years of formal education), Middle (6-8 years of formal education), Secondary (9-10 years of formal education), Higher (formal education of 11 years and above).

Literate: Those who have attended one or more years of formal education.

Formal Education: Formal education means schooling of one or more years at a public or a recognized private institution.

Household: A household is either one person living alone or a group of people, who may or may not be related, living at the same address, with common housekeeping, who either share at least one meal a day or share common living accommodations (i.e. a living room or sitting room).

Wealth Quintiles: Households are divided into five equal categories (poorest, poor, middle, rich, and richest), each with 20% of the population, based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, and housing characteristics such as source of drinking water, toilet facilities, and flooring materials.

Suggested citation

Center of Excellence in Women and Child Health, Aga Khan University, and Biostat Global Consulting, 2023 Supplementary Immunization Coverage Survey in Super High-Risk Union Councils of Pakistan – (TPVICS-SHRUCs Rounds 1-3) Survey Report, February 2024.

Available at: http://www.biostatglobal.com/downloads/TPVICS_SHRUCS_Survey_2023_Report.pdf

Supplemental files

There is a set of files in an online folder that are intended to supplement the tables and figures in this report. They include:

- **Supplement 01 - TPVICS-SHRUC-R3 Questionnaire ENG ver 3.10_ with_BeSD.docx**
  Lists the questions used for the SHRUC Round 3 survey in English.
- **Supplement 02 - TPVICS-SHRUC-R3 Questionnaire URD ver 3.10_ with_BeSD.pdf**
  Lists the questions used for the SHRUC Round 3 survey in Urdu.
- **Supplement 03 - VCQI output tables - SHRUCs R3 - District and SHRUC level.xlsx**
  Holds VCQI output at both the district and the SHRUC level. Readers are cautioned that SHRUC level results for SHRUCs with fewer than 30 primary sampling units (PSUs or clusters) may exhibit more variability in results and may vary from the true population coverage figures to a degree that is larger than for those SHRUCs with 30 or more PSUs. Results at the SHRUC level should be interpreted in light of the limited number of sampling units and not be considered to be robustly representative of all children ages 12-23 months in those union councils.
- **Supplement 04 - VCQI output tables - TPVICS and SHRUCs and LICS 2023 and LHRUCS 2023.xlsx**
  Holds VCQI output for all of the surveys mentioned in this report, side-by-side.
- **Supplement 05 - BeSD Table-SHRUCS R3-ALL.xlsx**
  Holds results on all the questions about behavioral and social drivers of vaccination from the SHRUCs Round 3 survey, summarized by district.
- **Supplement 06 - VCQI output tables - Lahore LICS 2023.xlsx**
  Holds VCQI output for all indicators for the LICS survey.
- **Supplement 07 - VCQI output tables - Lahore LHRUCS 2023.xlsx**
  Holds district and HRUC level results for the 2023 survey. Readers are cautioned that HRUC-level results for union councils with fewer than 30 primary sampling units (PSUs or clusters) may exhibit more variability in results and may vary from the true population coverage figures to a degree that is larger than for those HRUCs with 30 or more PSUs. Results at the HRUC level should be interpreted in light of the limited number of sampling units and not be considered to be robustly representative of all children ages 12-23 months in those union councils.

Executive summary

Vaccination programs are key to averting vaccine-preventable diseases. The Expanded Program on Immunization (EPI) was launched in 1994 in Pakistan. Since that time, the Program has been delivering services extensively to reduce the burden of vaccine-preventable disease in the country. To augment this effort, Pakistan started its National Immunization Support Project (NISP) in 2016 to coordinate efforts for vaccination and reduce vaccine-preventable diseases. Additionally, to address the recurring endemic poliovirus in the country, the National and Provincial Emergency Operations Centers (NEOC and PEOCs) for polio eradication identified 40 union councils as Super-High Risk Union Councils (SHRUCs) for targeted interventions. The national EPI and the co-financing partners of NISP (the World Bank; the United States Agency for International Development [USAID]; Gavi, the Vaccine Alliance; and the Bill and Melinda Gates Foundation [BMGF]) agreed to carry out a Union Council (UC)-specific vaccination survey in these SHRUCs.

To obtain granular information on vaccine coverage and vaccination service delivery, a team from Aga Khan University (AKU), supported by EPI Pakistan, implemented Round 1 of a supplementary vaccination coverage survey in 39 SHRUCs in 2021 and repeated it in the same SHRUCs in 2022 (Round 2) and 2023 (Round 3). In 2023, surveys were also administered in the city of Lahore. One of the key survey indicators was the assessment of full vaccination among children ages 12-23 months in the target SHRUCs. For the purposes of the survey, a fully vaccinated child was a child who had completed all of their vaccinations through Measles dose 1 (given at 9 months of age) per the EPI schedule (i.e., BCG, OPV0, OPV1, OPV2, OPV3, Penta1, Penta2, Penta3, PCV1, PCV2, PCV3, IPV, and MCV1[1]). The Round 3 survey also included a series of questions to assess behavioral and social drivers of vaccination (BeSD). The team conducted the survey in 39 SHRUCs from seven districts in three provinces: eight SHRUCs from three districts in Sindh, 17 SHRUCs from one district in Khyber Pakhtunkhwa (KP), and 14 SHRUCs from three districts in Balochistan. The timeframe for survey data collection were Round 1: July to October 2021; and Round 2: June to August 2022; and Round 3: October & November 2023.

In Round 1, the survey enrolled 610 clusters, 7,549 households, and 6,976 children ages 12-23 months and born between July 2019 and October 2020. Girls comprised 47% and boys comprised 53% of the sample. In Round 2, 612 clusters, 7,930 households, and 7,846 children (again, 53% boys and 47% girls) born between June 2020 and August 2021 were enrolled. In Round 3, 612 clusters, 7,829 households,

[1] Rotavirus doses 1 and 2 are excluded from the analysis of fully vaccinated children because they are the newest vaccine in the national schedule and may not have been available when these children assessed in Round 1 were scheduled to receive them.

and 8,058 children (52% boys and 48% girls) born between October 2021 and December 2022 were enrolled.

The survey sample size was calculated with the goal of detecting change over several years at the level of districts that hold several SHRUCs. Results in this report are aggregated up to the district level. SHRUCs survey results are portrayed beside the corresponding outcome from the recent TPVICS survey for context. Note that the SHRUCs constitute a subset of these districts, so the SHRUCs results are not meant to represent the entire district.

Of the SHRUCs covered in Rounds 1-3, those from district Peshawar recorded higher rates of vaccination coverage indicators and the SHRUCs from the districts in Balochistan recorded comparatively low rates of home-based record (HBR or vaccination card) availability and low rates for the vaccination indicators.

The proportion of respondents who showed HBRs increased over time in the SHRUCs surveys and coverage improved from Round 1 to Round 3, sometimes by double-digit percentage points. Statistically significant improvement was observed on most indicators in all seven SHRUC districts, with the largest improvement observed between Round 2 in 2022 and Round 3 in 2023.

Vaccination coverage of OPV doses tended to be higher in SHRUCs than in the surrounding district as estimated in TPVICS. This finding is especially evident when OPV doses from both routine immunization and campaigns are counted (documented in this report as OPWC where WC means *with campaign*). Coverage of all other antigens tended to be (with a few exceptions) lower in the SHRUCs than in the district as a whole in the early rounds. The proportion of unvaccinated, or zero-dose children in Balochistan SHRUC districts was much lower in the SHRUCs than in the TPVICS survey, expressly because OPV coverage is higher in the SHRUCs than in the remainder of those districts.

Timeliness of vaccination in SHRUCs showed similar patterns as TPVICS, with a notable portion of children with HBRs indicating that they received the EPI doses quite late – more than two months after the age when they were scheduled. The portion of respondents who received doses more than two months late grew over time, with doses due at 14 weeks and 9 months more likely to be late than the earlier doses. There is clearly much room for improvement in the timeliness of vaccination in the SHRUCs and in these districts as a whole.

Encouragingly, the EPI doses are given in most cases in the groupings reflected in the national immunization schedule, with most children who showed HBRs showing evidence of receiving most doses at the first vaccination visit when they were eligible for the dose. Missed opportunities for

simultaneous vaccination (MOSVs) were rare for most doses. For three-dose antigens, MOSVs were more common for the first dose than the later two doses, and most of the MOSVs were corrected when the child received the dose at a later visit. IPV showed a noticeably high rate of MOSVs and a concerningly high proportion of those MOSVs had not been corrected by the time of the survey. IPV is scheduled to be delivered at age 14 weeks with OPV3, Penta3, and PCV3. Because of poor timeliness and delayed vaccination visits, many children with HBRs show evidence of receiving their 10-week doses (OPV2, Penta2, PCV2, and Rota2) after age 14 weeks. Some even receive the six-week doses (OPV1, Penta1, PCV1, and Rota1) after age 14 weeks. If the child is 14 weeks old, they could also receive IPV along with those 6- or 10-week doses, but that is not the standard practice, so the child experiences a MOSV for IPV and spends more time under-protected against polio than would be the case if every child received IPV at the earliest visit after age 14 weeks. The median time to IPV MOSV correction was more than two months in most districts and the 90th percentile was six months or longer in many cases.

The consistently high delivery of OPV in the SHRUCs is commendable. Some work is warranted to increase OPV coverage elsewhere in those districts up to the SHRUC levels. And work is warranted inside the SHRUCs to bring the delivery of other doses up to the level of OPV and to deliver doses in a more timely fashion – *ideally the doses should be administered as near as possible to the ages in the national immunization schedule*, to minimize the time children spend under-protected. The EPI staff are doing a good job administering all the doses that are scheduled to be delivered together. In cases where the 6-week or 10-week doses are given to children who are 14 or more weeks old, it may be worthwhile to consider guidance also to deliver the IPV dose at that time. If card availability were higher in all districts, then even more coverage evidence would be from documented dates and we would have an even more complete picture of where the system is performing well and where there is room for improvement.

Results from the surveys in Lahore showed a decline in outcomes between TPVICS Round 1 in 2020 and Round 2 in 2022. After a series of interventions, the LICS survey was conducted in 2023 to re-assess coverage there. The LICS results are much much better than those observed in TPVICS Round 2, with all first-year doses showing coverage over 93%.

1. Background and objectives

Pakistan's National and Provincial Emergency Operations Centers (NEOC and PEOCs) for polio eradication have identified 40 union councils (UCs) in the country as Super-High Risk Union Councils (SHRUCs) because they are significant poliovirus reservoirs (1). There are eight UCs from Sindh, 18 from Khyber Pakhtunkhwa, and 14 from Balochistan identified as super-high risk. Together, these areas have an estimated population of around three million, including 574,000 children under five years of age (1).

The Aga Khan University (AKU) with the support of EPI Pakistan conducted a district-specific Third-party Verification Immunization Coverage Survey (TPVICS) from September 2020 to January 2021 (2,3). The survey was meant to assess the progress of four out of the ten disbursement linked indicators under the National Immunization Support Project (NISP). TPVICS covered all four provinces, i.e. Sindh, Punjab, Khyber Pakhtunkhwa (KP), and Balochistan and three federal regions, i.e. Islamabad, Azad Jammu and Kashmir (AJK), and Gilgit-Baltistan (GB). After reviewing the results of the TPVICS, the National Immunization Program Pakistan and the key partners supporting NISP enlisted AKU to conduct a supplementary survey targeting 39 out of the 40[2] SHRUCs (4). The three objectives of the supplementary survey were:

- To assess vaccination coverage precisely in the target SHRUCs.
- To compare coverage in SHRUCs with coverage in the districts that contain the SHRUC, as estimated in the 2021 TPVICS survey (hereafter called "TPVICS Round 1" or "TPVICS R1").
- To create a baseline for the SHRUCs to assess the impact of interventions over time.

In 2022, AKU carried out a second round of TPVICS and SHRUCs surveys (denoted in this report with the suffix "Round 2" or "R2") (5). In 2023, AKU carried out a third round of the SHRUCs survey (denoted "Round 3" or "R3") as well as surveys in the city of Lahore. The results from Rounds 1 and 2 have been summarized in earlier reports and peer-reviewed manuscripts (6).

The purpose of this report is to summarize coverage outcomes from the SHRUCs Rounds 1-3 surveys, comparing those outcomes with TPVICS Rounds 1 and R2 for the districts and provinces that contain the SHRUCs. The report also summarizes coverage outcomes across seven high-risk UCs in Lahore.

[2] One SHRUC in Peshawar located in the Cantonment area has been dropped from the scope of survey, as the Cantonment areas do not allow private organizations to carry out such surveys due to security concerns.

2. Survey design and methods

This section describes the survey sampling methods; development of the survey instrument, manuals, and standard operating procedures (SOPs); approval processes; hiring of field teams for data collection and supervision; and training and fieldwork. Pilot testing of the survey instruments and protocol and the data collection process and timeline are also described here. The same methods have been employed in all three rounds of SHRUCs surveys. One notable change in Round 3 was to ask respondents a panel of questions recommended by the World Health Organization concerning behavioral and social drivers of vaccination (BeSD).

2.1. Sampling

The team employed a two-stage, stratified cluster, cross-sectional survey. Details about the survey and sampling design for the SHRUCs surveys are provided in Table 1 and for the Lahore surveys in Table 2.

2.1.1 Selection of primary sampling units:

To demarcate and select SHRUC sample areas/clusters, in Round 1 the survey team used maps developed and finalized during the 2020 provincial workshops organized by BMGF for the operationalization of essential vaccination work plans in SHRUCs. A total of 2,447 clusters containing 100 to 150 households were demarcated in all 39 SHRUCs. Of the demarcated clusters, 612 PSUs were selected randomly by the team from Biostat Global Consulting. New independent sets of 612 PSUs were selected from the same sampling frame in Rounds 2 and 3.

Table 1. Summary of SHRUC survey design

Survey design	Two-stage stratified cluster, cross-sectional survey
Target age group	The primary target group was all children ages 12-23 months. Data were also collected on the convenience sample of younger children ages 6-11 months in the households that had children ages 12-23 months. It is not common for a household to have two children born in a span of 18 months, so the sample of younger children is comparatively small and not discussed further in this report.
Unit/domain of analysis (strata)	Samples from selected Primary Sampling Units (PSUs) (also known as clusters) were aggregated at the UC level and analysis was conducted on UCs and then at the district level. This report summarizes outcomes at the district level. SHRUC level outcomes are documented in the folders of supplementary files (7–9).
Sampling design and strategy	Maps developed and finalized during provincial workshops organized by BMGF in 2020 for the operationalization of Essential Immunization work plans in SHRUCs were used to demarcate PSUs.
Selection of primary sampling units, households, and respondents	A two-stage cluster sampling technique was adopted for implementing the SHRUCs surveys. ***Stage I:*** In Round 1, the required number of PSUs from each SHRUC were selected randomly with necessary identification information and boundary demarcations using the maps developed by BMGF. In Round 2, in the interest of time, the same SHRUCs PSUs from Round 1 were re-visited and used again. In Round 3 a new set of PSUs was randomly selected. ***Stage II:*** In all rounds, all households in each selected PSU were visited to screen for the presence of children ages 12-23 months. Households with children in that age range were treated as Secondary Sampling Units (SSUs). In every PSU, 13 households with eligible children were selected using systematic random sampling. Those households were visited to collect data for the survey. ***Stage III:*** Vaccination status data were collected for all children ages 12-23 months and all children ages 6-11 months in the selected households.

Table 2. Summary of Lahore LICS and LHRUCS 2023 survey designs

Survey design	Both the LICS 2023 and LHRUCS 2023 surveys were two-stage stratified cluster design, cross-sectional surveys with a focus on updating estimates of vaccination coverage: the LICS survey was meant to document coverage after TPVICS Round 2 results prompted a targeted set of interventions. The LHRUCS survey was meant to document coverage in a set of seven union councils that are considered to be at high risk (but not super high risk) of polio outbreaks.
Target age group	The primary target group was all children ages 12-23 months. Data were also collected on the convenience sample of younger children ages 6-11 months in the households that had children ages 12-23 months. It is not common for a couple to have two children born in a span of 18 months, so the sample of younger children is comparatively small and not discussed further in this report.
Unit/domain of analysis (strata)	For the LICS survey, data from PSUs across the district were combined to generate district level coverage estimates. For the LHRUCS survey, results were analyzed at the UC level and combined across the seven districts for an estimate of coverage across the seven HRUCs. As is true with the SHRUCs survey in other districts, only outcomes across UCs are reported here.
Sampling design and strategy	For the LICS survey, the district was divided into 161 mutually exclusive primary sampling units using GIS software, and 64 PSUs were selected, by simple random sampling without replacement, for the survey sample. For the LHRUCS survey, in each of seven high-risk union councils, fifteen random starting locations were selected using GIS software and those locations were taken to be the PSU starting point for sampling proximal households.
Selection of primary sampling units, households, and respondents	For the LICS survey, households within each PSU were screened for the presence of a child ages 12-23 months. That list was the sampling frame for 13 selected households. For the LHRUCS survey, interview teams began with the house nearest the random starting point and then proceeded to select nearby households, moving along streets in a serpentine fashion, and continuing to visit households until a quota of 13 interviews had been conducted in households with a child ages 12-23 months. For both surveys, immunization data were collected for all children ages 6-23 months in the households with a child ages 12-23 months. Only the data for children ages 12-23 months are analyzed here.

2.1.2 SHRUC sample size calculation and estimated vaccination coverage

Before Round 1, the sample size estimates were finalized after a series of meetings with key technical stakeholders. The *2018 World Health Organization (WHO) Vaccination Coverage Cluster Surveys: Reference Manual* was consulted for sample size estimation (10).

The inferential goal was to have 80% statistical power to detect a 15% improvement in coverage outcomes in the SHRUCs within each district comparing outcomes in two surveys: Round 1 conducted in 2021 and Round 2 in 2022 or (more likely) Round 1 and a later round envisioned for two or more years hence. The 2018 WHO manual's Table B-4 indicates that an effective sample size of 183 respondents per district should yield 80% power with 95% confidence. Table 2 lists the number of SHRUCs per district and the target number of PSUs per SHRUC; 612 PSUs were targeted in total. With 90 PSUs per district and a target of at least ten eligible respondents per cluster, the achieved sample size was designed to be over 900 children per district, so the inferential goal should be achievable even if the observed design effect were as high as four or five. Recall that the effective sample size is the actual sample size divided by the design effect; 915 / 5 = 183. To be quite likely to find at least ten respondents ages 12-23 months per cluster, the team targeted visiting 13 households per cluster.

Following cluster selection, trained listing teams visited each cluster. Cluster boundaries were identified using cluster maps and local guides/knowledgeable persons. The teams visited all structures and dwellings in the cluster and identified households with children ages 12-23 months. To further increase the probability of achieving the target sample size, a central team at the district level randomly selected 13 households in each cluster that were known to house at least one child ages 12-23 months. Because of time limitations the same PSUs were used in SHRUCs Round 2 as in Round 1. A new set of PSUs were selected for Round 3. Eligible households were listed afresh in every round of the survey. In every round, 7,956 households (612 x 13 = 7,956) were targeted for visitation by survey interview teams.

Table 3, Table 4, and Table 5 document the number of PSUs per UC and per district in the surveys under consideration. Table 6 lists the 39 SHRUCs in Rounds 1-3 and the districts and provinces within which they fall.

Table 3. Number of PSUs per SHRUC by province and district

Province	District	Number of PSUs in TPVICS	Number of SHRUCs	PSUs per SHRUC
Sindh	Karachi East	64	1	45[a]
	Karachi West	64	5	18
	Malir	64	2	37[b] & 45
Balochistan	Quetta	64	6	15
	Killa Abdullah	64	5	18
	Pishin	64	3	15[c]
KP	Peshawar	49	17	10[d]

[a] It was considered that the design effect in Karachi East would probably be small enough for 45 PSUs to yield an effective sample size of 183.

[b] Fewer than 45 PSUs were selected in one SHRUC due to a small number of PSUs there.

[c] Due to small numbers of UCs

[d] Ten PSUs may be too small to characterize the heterogeneity of coverage across a SHRUC; the WHO 2018 reference manual recommends a minimum of 15 PSUs per stratum, but to strike a balance between precision and budget, a maximum of 170 PSUs were allocated to Peshawar district. More emphasis should be placed on estimates combined across SHRUCs in Peshawar than on outcomes in individual SHRUCs.

Table 4. Number of PSUs in the LICS 2023 survey

Province	District	Number of PSUs in the TPVICS and LICS 2023 surveys
Punjab	Lahore	64

Table 5. Number of PSUs in the LHRUCS 2023 survey

Province	District	Number of HRUCs	PSUs per HRUC
Punjab	Lahore	7	15

Table 6. List of SHRUCs by province and district

Province	District	Union Council
Khyber Pakhtunkhwa	Peshawar	Akhun Abad
		Bhana Mari
		Deh Bahadar
		Dheri Baghbanan
		Hazar Khawani I
		Hazar Khawani II
		Kakshal II
		Landi Arbab
		Nothia Jadeed
		Nothia Qadeem
		Shaheen Muslim Town I
		Shaheen Muslim Town II
		Sheikh Junaid Abad
		Wazir Bagh
		Yaka Toot I
		Yaka Toot II
		Yaka Toot III
Sindh	Karachi East	UC 4 Gujro
	Karachi West	UC 2 Ittehad Town
		UC 7 Chishti Nagar
		UC 8 Manghopir
		UC Islamia Colony
		UC 5 Songal
	Malir	UC 1 Muzaffarabad
		UC 2 Muslimabad
Balochistan	Killa Abdullah	Ashazai 1
		Ashazai 2
		Mabad 1
		Mabad 2
		Sirki Talar
	Pishin	Bazarkohna
		Pishin Town
		Karbala
	Quetta	10B
		11A
		11B
		Baleli A
		Kharotabad 1
		Kharotabad 2

Table 7. List of HRUCs in the LHRUCS 2023 Survey

Province	District	Union Council
Punjab	Lahore	UC-69
		UC-83
		UC-84
		UC-86
		UC-104
		UC-108
		UC-111

2.2. Survey instrument development

The surveys summarized in this report used the same tools developed and employed to implement the primary TPVICS surveys (2,3,11,12). Three sets of questionnaires were used in the survey: 1) a household line listing questionnaire to collect household information about key demographic indicators to generate a sampling frame for the selection of target households; 2) a household questionnaire which was used to collect basic demographic information on all de jure household members (usual residents), the household, and the dwelling; and 3) a questionnaire for eligible children to assess vaccination coverage in each targeted household. Questionnaires were adopted from the 2018 *WHO Vaccination Coverage Cluster Surveys: Reference Manual* (10) and modified in accordance with the objectives of the survey. To ensure that question meaning was consistent in both English and the local language (Urdu), questionnaires were translated into Urdu and translated back to English. Round 3 included questions on the behavioral and social drivers (BeSD) of vaccination as recommended by the World Health Organization (13). The SHRUCs questionnaire forms are available in folders of supplemental materials (7–9).

2.3. Survey manuals and standard operating procedures (SOPs)

This survey used SOPs for data collection and manuals developed to conduct the TPVICS line listing and household survey.

2.4. Approval processes

The AKU team prepared and submitted applications to the National Bioethics Committee (NBC) and AKU Ethical Review Committee (ERC) for approval to implement proposed survey activities in target areas of Pakistan. Both committees approved the survey activities.

No objection certificates (NOCs) and approvals were obtained from the provincial authorities with the support of provincial program leadership. Each province subsequently granted NOCs and approvals to carry out the survey operations.

2.5. Field teams for data collection and supervision

All field team staff hired for the project had the requisite qualifications, including field-based data collection experience, fluency in the local language, and willingness to travel. District-specific networks were used to identify experienced data collectors and supervisors who had worked with AKU in the past. Preference was given to candidates who were locals, were well versed with local languages and culture, had experience working with similar large-scale surveys, and could operate handheld data collection devices.

The hiring of the survey implementation team was initiated in two phases. In phase one, the core team including data supervisors, programmers, master trainers, district supervisors, and provincial managers were hired. In phase two, a district-specific team responsible for data collection and line listing was hired. In each district, three teams were hired for the household survey. Each team consisted of one team leader, two data collectors (one male, one female), and one data entry operator/logistics assistant.

- Provincial managers were responsible for district-specific hiring with the support of district supervisors. They were also responsible for conducting quality checks by revisiting a portion of randomly selected households already surveyed to verify that the household listing and interviews were conducted properly, that all eligible respondents in those households completed questionnaires, and that vaccination dates (and other responses) were recorded correctly in households where cards were available.

- District supervisors were responsible for coordination with the provincial managers for day-to-day progress and plans. District supervisors reported daily to the provincial managers.

- Team leaders were responsible for day-to-day supervision, monitoring, coordination, and providing logistical support to the team. Team leaders were also responsible for revisiting a set of households to ensure data accuracy.

- Data collectors were responsible for visiting sampled/selected households for interviews and completing the forms. Also, the data collectors were responsible for checking the completed forms and, where required, revisited households to correct any discrepancies or obtain missing information.

For the SHRUCs survey line listing/mapping of households, three teams were hired in each district, with each team consisting of three line listers. The supervisors in their respective jurisdiction did the identification of the boundaries of the clusters a day before the household line listing. The line listers

did the household listing and completed the household listing questionnaires. The three teams of line listers (nine in total) were able to cover all selected PSUs in a district in four weeks. District supervisors oversaw the household listing teams to ensure the household listing had been done correctly and tallied eligible respondents in each home. Line listers also accompanied the data collection teams to assist and guide them in the identification of areas and target households.

2.6. Training and fieldwork

Team leaders, data collectors, and line listers were trained using the survey questionnaires on handheld devices and were encouraged to give comments and suggestions to improve the clarity of the data collection instruments. An important additional benefit of this exercise was to provide an environment where the data collectors understood the questionnaire and the reasons behind each question. This exercise helped field staff to probe more effectively while conducting the interviews in the field. On the last day of the training, teams were sent to a nearby location and the questionnaire was tested in the field. This exercise ensured field staff comprehension of the survey questionnaires and field protocols. A feedback session with the data collectors was also conducted to address their comments and issues. To measure the impact of training on the knowledge and skills of participants, pre- and post-tests were conducted. Capable data collectors who passed the final test were deployed for the actual survey. In addition, each data collector was observed during the data collection process to assess their performance, and feedback was provided accordingly.

2.7. Pilot testing of survey instruments and protocol

The survey instruments were initially pilot tested as part of TPVICS Round 1. Approximately 1,000 interviews were conducted in different locations of Pakistan in households with eligible children to identify potential problems with the survey instruments and protocol. The final version of the questionnaires was shared with the representatives of key project stakeholders for their review and feedback and was shared with members of the Technical Committee for their review and endorsement.

Before starting survey field activities, the team conducted a pilot survey in 20 different locations of the country. This exercise was done only in non-targeted PSUs. All steps of the survey data collection and quality analysis protocol were conducted, and revisions were made based on the lessons learned.

In Round 3, the instrument was pilot tested again to ensure that the BeSD questions were understood by respondents and coded correctly in the data collection system.

2.8. Data collection and timeline

Data collection was implemented in two stages in each district. In the first stage, household line listing was conducted in the selected PSUs. The household listing was used to select 13 eligible households in each PSU.

Stage two was dedicated to the collection of information on household socio-economic status, behavioral and social drivers of vaccination, and information about routine vaccination of children 12-23 months of age from each of the 13 sampled households in each PSU. Two custom-made data collection applications were designed using native Java language for the interface/front end with SQL Lite running at the backend. The data collection applications were Android compatible. The data stored in handheld devices were transmitted to the AKU data centre using the internet. At the AKU data centre, a dedicated database hosted on a Microsoft SQL Server was used to store and retrieve the data received from the handheld devices. For error checking, cleaning, data analysis, and final storage, data were transferred into Stata version 17. Data backups were conducted in accordance with the shared Data Management Unit (DMU) Data Back-up SOP.

During the data collection process, AKU staff adhered to guidelines for reducing risk and exposure to COVID-19. The timelines for survey implementation are summarized in Table 8 and Table 9.

Table 8. Timelines for SHRUCs survey implementation, Rounds 1 - 3

Districts	Round 1	Round 2	Round 3
Peshawar	5 Jul -24 Aug 2021	29 Jun-14 Aug 2022	21 Oct - 24 Nov 2023
Karachi West	10 Jul -31 Aug 2021	15 Jul -6 Aug 2022	4 - 28 Nov 2023
Karachi East	25 -27 Aug 2021	2 -16 Aug 2022	1 - 13 Dec 2023
Malir	7 Jul -20 Aug 2021	27 Jun -16 Jul 2022	16 Oct - 28 Nov 2023
Killa Abdullah	20 Sept -20 Oct 2021	28 Jun -20 Jul 2022	20 Oct - 9 Nov 2023
Quetta	13 Jul -8 Sep 2021	28 Jun -25 Jul 2022	18 Oct - 9 Nov 2023
Pishin	10 -26 Aug 2021	29 Jun -26 Jul 2022	14 - 30 Nov 2023

Table 9. Timelines for LICS 2023 and LHRUCS 2023 survey implementation in Lahore

Survey	Round 1
LICS 2023	2 Aug - 17 Aug 2023
LHRUCS 2023	18 Aug - 6 Sep 2023

2.9. Data collection monitoring and quality control procedures

A dedicated “TPVICS dashboard” was developed to provide live information on the progress of data collection activities and offered other features including functions for the survey managers to carry out randomization of the households, access soft copy of project documents, or print the list of

randomized households for each PSU. Access to the dashboard was also provided to key partners to check the day-to-day progress of the field activities.

The dashboard was developed using a SQL Server database and the PHP v8.1.2 programming language. The "CodeIgniter" framework was used for the backend, and HTML, CSS, JQUERY, and Bootstrap were used for front-end development.

There were four main user roles for dashboard, which were "Super Admin", "Admin", "Supervisor", and "User".

- The Super Admin group had all dashboard access rights, including adding, and editing. Users included Senior Managers, PI, etc.
- The admin group also had almost all rights. The group was mostly DMU staff, and coordinators.
- Site staff supervisors had limited rights; they could add or edit the users but cannot delete data.
- The user group had very limited rights; they could only view the data of their respective PSU.

Survey activities were regularly and rigorously monitored through the dashboard and in-field by the supervisors/managers. The district-level data collection was supervised by the district supervisors and monitored by the provincial manager, who was specially trained to supervise this task. All filled-in data was checked by the team leader/supervisor for completeness before leaving the field. After completing their work, each team leader/supervisor returned to the office and checked their collected data on the dashboard. The team leader checked the entire filled questionnaires for completeness, accuracy, and vaccination card visibility. The regional manager and district supervisors were responsible for reviewing vaccination cards on the dashboard to ensure the quality of data transcription by data collectors. The district supervisors were also responsible for timely syncing of line listing data and acquisition of randomization sheets as well as syncing of the household data along with vaccination cards.

The following steps were followed during monitoring and quality control in the field:

- Each data collector was expected to submit/sync only completed and accurate questionnaires. Every day, the supervisor checked data for completeness and timely syncing. The supervisor checked the household list indicating that questionnaires had been completed for all eligible children, and if not, ensured the reasons for missing questionnaires had been recorded (for example, caretaker not available after two visits or refused to participate). All forms were checked and corrected before leaving the cluster area and syncing data. The district supervisor/team leader gave feedback immediately to interviewers. Any discrepancy or missing data was resolved through discussions with the interviewers, a review of photographs of the vaccination card (if available),

or revisits to households if necessary.

- To ensure the quality of the data collected, the team leader/district supervisor validated household listing activities to check that the household lists had been done correctly, cluster or segment boundaries were correctly identified, that field workers did not skip (either intentionally or by mistake) interviews for eligible children, and that eligible respondents in each home were tallied. The selection of clusters was based on data indicators related to the number of listed households and eligible children. Clusters with a smaller number of reported households and eligible children than expected were selected for validation.

- A dedicated quality control associate at the data management unit reviewed pictures of vaccination cards taken by survey teams and compared them with the data entered from the card to validate the quality of data transcription by data collectors. This exercise was very helpful for notifying teams about possible errors in a timely fashion.

2.10. Data processing and analysis

2.10.1 Data cleaning

In addition to human-initiated review in the field, an automated data quality script was run regularly to evaluate relationships between vaccination dates, the child's date of birth, and the date of the interview. Discrepancies were identified and initiated another round of review of the photos of children's HBRs. Where a mistake was identified in the initial data entry, it was corrected. In some cases, logical discrepancies remained because they accurately reflect what was recorded on the HBR. Those discrepancies were handled downstream in the WHO Vaccination Coverage Quality Indicator (VCQI) software, described below (14).

Every HBR was reviewed at least twice, once by the primary data collector in the home and a second time by their supervisor using the dashboard. All records that contained logical discrepancies were reviewed a third time using the dashboard.

2.10.2 Weighting

Survey weights were calculated in accordance with Annex J of the 2018 *WHO Vaccination Coverage Cluster Surveys: Reference Manual* (10). Base weights were calculated as the inverse probability of respondent selection:

$$BaseWt = \frac{1}{P1\ x\ P2\ x\ P3\ x\ P4}$$

Where:

- ***P1*** is the probability the PSU was selected = number of PSUs selected in the UC / total number of PSUs in the UC
- ***P2*** is the probability the household has at least one child ages 12-23 months = number of HH found to hold a child 12-23 months / number of HHs listed
- ***P3*** is the probability of selecting a specific HH = number of HH selected (usually 13) / number of HH found to hold at least one child ages 12-23 months
- ***P4*** is the probability of selecting an eligible child in the household = 100% (because the teams collected data on all eligible children)

The base weights were inflated to represent a contribution for a small number of PSUs that contained only commercial buildings and a small number of households where residents were not at home when visited.

$$AdjWt1 = BaseWt\ x\ \frac{\#\ of\ clusters\ targeted\ for\ interview\ data\ collection\ in\ this\ UC}{\#\ of\ clusters\ where\ interviews\ were\ conducted\ in\ this\ UC}$$

$$AdjWt2 = AdjWt1\ x\ \frac{\#\ of\ HHs\ targeted\ for\ data\ collection\ in\ this\ cluster}{\#\ of\ HHs\ from\ which\ data\ were\ collected\ in\ this\ cluster}$$

Because data were to be combined across UCs to estimate SHRUC coverage at the district level, the weights were post-stratified so the sum of weights in each UC were proportional to the estimated population of eligible children there. Administrative estimates of the population of children under 5 years of age in each SHRUC were obtained from the BMGF polio program.

$$PsWt1 = AdjWt2\ x\ \frac{(Population\ of\ this\ UC)}{Sum\ of\ AdjWt2\ for\ children\ ages\ 12\ to\ 23\ months\ in\ this\ UC}$$

Weights for children ages 12-23 months were rescaled in a final step so the overall sum of weights was equal to the number of children in the survey sample.

$$PsWt2 = PsWt1\ x\ \frac{Total\ number\ of\ children\ ages\ 12\ to\ 23\ months}{Sum\ of\ PsWt1\ for\ children\ ages\ 12\ to\ 23\ months}$$

The values of PsWt2 were used in the analysis of vaccination coverage among children ages 12-23 months. Identical estimated proportions (coverage results) would be obtained if the analysis used PsWt1.

For the LICS 2023 survey, PSUs were selected via simple random sampling with no replacement, so every PSU had an equal probability of selection. For the LHRUCS survey, the sample design was closer to the WHO EPI survey methods before 2018, so the quota sample from each of 15 PSUs was selected with equal probability and the sample was self-weighted.

2.10.3 Data analysis – pre-processing

The survey dataset was designed to provide estimates of key indicators at the UC level but some UCs sampled a small number of PSUs so primary analytic emphasis was focused at the level where all SHRUCs within a district are combined. WHO resources recommend having at least 30 PSUs in a stratum where coverage is to be estimated precisely (10). Analyses were performed after data cleaning and satisfactory quality assurance. The SHRUC data were combined with TPVICS data from the SHRUC districts and analyzed in a way to show TPVICS district results alongside results from the SHRUCs within those districts. Vaccination coverage and its associated indicators were calculated using the freely available software known as Vaccination Coverage Quality Indicators (VCQI) (14). VCQI analyses were conducted using Stata version 18 (15). The primary analysis examined coverage for children ages 12-23 months to compare directly with TPVICS.

VCQI employs its own data cleaning process that makes edits to the data. Vaccination evidence can take the form of a date from an HBR, a tick mark from an HBR (indicating that there was a pen or pencil mark or signature to indicate that the child received the dose, but no date, or that the date was illegible), or yes/no caregiver recollection concerning whether the child received each dose. In several well-defined circumstances, VCQI converts a date to a tick mark before estimating coverage indicators. Dates are converted to simple yes/no tick marks under these conditions:

- If the date is only partially specified
- If the date is nonsensical (e.g., February 30 or September 31)
- If the date falls outside the possible period for eligible respondents (in this case, dates of birth should fall between 12 and 24 months before the survey interview and dates of vaccination should fall between the child's date of birth and the date of the survey interview)
- If doses in a series have dates that are equal (e.g., Penta1 date is the same as Penta2)
- If doses in a series have dates that are out of order (e.g., Penta2 date is before Penta1)

2.10.4 Data analysis – indicators

After the data were cleaned using the process described above, coverage indicators were calculated. Indicators reported here include:

- Card availability – proportion of children for whom an HBR was seen.
- Crude coverage – What proportion of children had any evidence of receiving the dose, either via the HBR or via the recollections of the child's caregiver?

- Drop-out – What portion of children who began a dose series, did not complete the series?

Date-based analyses – For children with vaccination dates on HBRs, several other indicators may be calculated.

- Timeliness – What portion of children have documented evidence of receiving the dose too early? Within 28 days of the appropriate age? 1-2 months late? Or more than two months late?
- Dose interval assessment – What portion of dose pairs in a series are given with an interval that is < 28 days? An interval of 28-56 days? What portion of intervals exceeds 56 days?
- Missed opportunities for simultaneous vaccination (MOSVs) – An MOSV occurs when a child receives one or more doses on a particular day but does not receive all the doses that s/he was eligible for.
    - Visits with MOSVs – What portion of vaccination visits include one or more MOSVs?
    - Children with MOSVs – What portion of children experience one or more MOSVs? Overall? By dose?
        - Corrected MOSVs – What portion of those doses that were missed at the first eligible visit were received at a later visit? What portion of MOSVs were still uncorrected at the time of the survey?
        - Time-to-MOSV-correction – Among children who missed a dose at their first eligible visit and received it later, what was the median time to correction, in days?

These indicators are described in detail in the VCQI documentation (16–18).

In this report, if a difference in coverage between two rounds of the survey is described as being *statistically significant* it means that the p-value from a Rao-Scott survey adjusted chi-square test was smaller than 0.05 (10,19–23).

3. Survey results

Results in this report are aggregated to the district level. Additional tables and figures are available in folders of supplemental materials for each survey (7–9,24,25).

The survey results are presented in eight sections. Section 3.1 presents findings related to survey coverage, and household demographic characteristics for each district. Section 3.2 provides survey findings regarding vaccination card availability and reasons associated with the non-availability of vaccination cards. Section 3.3 presents findings regarding vaccination coverage and timeliness among children ages 12-23 months; Section 3.4 describes antigen coverage status in districts and SHRUCs; Section 3.5 presents drop-outs between vaccination visits; Section 3.6 reports results on dose intervals, and Section 3.7 presents findings related to MOSV, and Section 3.8 reflects on reasons associated with not vaccinating the children.

3.1. Survey coverage and household demographic characteristics

The survey targets and demographic characteristics of the target districts are presented in this section.

Survey targets and coverage

Each of the three rounds of SHRUCs survey targeted 612 clusters from 39 SHRUCs that are part of seven districts. Seventeen SHRUCs were located in district Peshawar in KP, eight SHRUCs in four districts in Sindh, and 14 SHRUCs in three districts of Balochistan. The LICS 2023 survey was intended to be like a third round of TPVICS in the Lahore District in Punjab. The LHRUCS 2023 survey was conducted in seven high-risk union councils in Lahore District. In all the surveys summarized here, interviews were successfully accomplished in the majority of selected households. District-wise survey targets and completion rates are summarized in Table 10 through Table 13.

Table 10. Survey targets and coverage by district, SHRUCs Round 1

Districts	Number of SHRUCs	Clusters			Households			
		Sampled	Randomized	Surveyed	Target	Randomized	Completed	Response rate
Overall	**39**	**612**	**610**	**610**	**7,956**	**7,904**	**7,549**	**94.9%**
Peshawar	17	170	170	170	2,210	2,205	2,049	92.7%
Karachi East	1	45	45	45	585	585	585	100%
Karachi West	5	90	90	90	1,170	1,170	1,170	100%
Malir	2	82	82	82	1,066	1,066	1,066	100%
Killa Abdullah	5	90	90	90	1,170	1,170	1,163	99.4%
Pishin	3	45	43	43	585	538	466	79.7%*
Quetta	6	90	90	90	1,170	1,170	1,051	89.8%

* In Round 1, two PSUs in Pishin were commercial neighborhoods with no residents.

Table 11. Survey targets and coverage by district, SHRUCs Round 2

Districts	Number of SHRUCs	Clusters			Households			
		Sampled	Randomized	Surveyed	Target	Randomized	Completed	Response rate
Overall	**39**	**612**	**612**	**612**	**7,956**	**7,949**	**7,856**	**98.7%**
Peshawar	17	170	170	170	2,210	2,210	2,201	99.6%
Karachi East	1	45	45	45	585	585	583	99.7%
Karachi West	5	90	90	90	1,170	1,165	1,164	99.5%
Malir	2	82	82	82	1,066	1,066	1,066	100.0%
Killa Abdullah	5	90	90	90	1,170	1,169	1,145	97.9%
Pishin	3	45	45	45	585	584	575	98.3%
Quetta	6	90	90	90	1,170	1,170	1,122	95.9%

Table 12. Survey targets and coverage by district, SHRUCs Round 3 & LICS 2023 & LHRUCS 2023

Districts	Number of SHRUCs	Clusters			Households			
		Sampled	Randomized	Surveyed	Target	Randomized	Completed	Response rate
Overall	**39**	**612**	**612**	**612**	**7,956**	**7,955**	**7,829**	**98.4%**
Peshawar	17	170	170	170	2,210	2,210	2,138	97.7%
Karachi East	1	45	45	45	585	585	579	99.0%
Karachi West	5	90	90	90	1,170	1,170	1,165	99.6%
Malir	2	82	82	82	1,066	1,066	1,051	98.6%
Killa Abdullah	5	90	90	90	1,170	1,169	1,156	98.9%
Pishin	3	45	45	45	585	585	585	100%
Quetta	6	90	90	90	1,170	1,170	1,155	98.7%

Table 13. Survey targets and coverage, Lahore LICS 2023 & LHRUCS 2023

Survey	Number of HRUCs	Clusters			Households			
		Sampled	Randomized	Surveyed	Target	Randomized	Completed	Response rate
LHRUCS 2023	7	105	105	105	1,365	1,365	1,365	100%
LICS 2023	N/A	64	64	64	832	832	767	92.2%

Demographic characteristics of survey sample

Table 14 summarizes several demographic aspects of the survey samples.

Table 14. Demographic characteristics of survey samples

Districts	Children 12-23 months			Education (% literate*)	
	N	Age in months (mean ± sd)	% male children	Mothers	Fathers
KP - Peshawar - TPVICS R1	646	16.9±3.2	51.9	33.3	57.0
-TPVICS R2	636	17.6±3.2	49.2	37.0	51.8
- SHRUCs R1	2,007	17.5±3.5	51.3	37.9	60.1
- SHRUCs R2	2,205	17.6±3.3	50.4	38.8	46.9
- SHRUCs R3	2,224	17.2±3.6	52.3	49.1	69.2
Sindh - Karachi East - TPVICS R1	819	16.7±3.4	55.3	72.4	77.6
-TPVICS R2	793	17.4±3.3	53.8	62.1	68.6
- SHRUCs R1	571	17.0±3.4	55.2	21.9	27.5
- SHRUCs R2	578	17.8±3.8	48.1	47.3	47.7
- SHRUCs R3	579	16.8±3.3	54.4	29.8	45.3
Sindh - Karachi West - TPVICS R1	832	17.1±3.3	50.4	57.4	63.3
-TPVICS R2	804	17.5±3.3	51.7	59.0	61.4
- SHRUCs R1	1,150	17.3±3.5	51.9	39.1	46.6
- SHRUCs R2	1,158	18.1±3.7	52.7	48.5	52.3
- SHRUCs R3	1,183	17.0±3.5	50.6	48.3	59.5
Sindh - Malir - TPVICS R1	837	16.9±3.6	51.0	55.1	66.3
-TPVICS R2	821	17.8±3.2	49.9	54.6	65.8
- SHRUCs R1	1,036	17.3±3.5	54.0	44.4	54.4
- SHRUCs R2	1,054	17.9±3.3	53.1	47.1	52.9
- SHRUCs R3	1,059	17.1±3.5	50.6	48.4	64.3
Balochistan - Killa Abdullah -TPVICS R1	728	17.8±2.8	66.5	10.2	9.5
-TPVICS R2	717	17.1±3.3	56.8	33.9	35.2
- SHRUCs R1	896	15.8±2.5	52.0	1.5	1.7
- SHRUCs R2	1,135	16.7±3.1	58.1	0.9	0.9
- SHRUCs R3	1,150	16.6±2.9	54.1	0.3	16.6
Balochistan - Pishin - TPVICS R1	745	17.5±2.4	56.6	14.4	37.6
-TPVICS R2	730	16.6±3.4	56.4	6.4	14.8
- SHRUCs R1	420	17.1±3.3	55.0	10.5	19.3
- SHRUCs R2	524	16.6±3.2	53.4	6.9	56.0
- SHRUCs R3	614	17.4±2.9	54.6	6.8	21.9
Balochistan - Quetta - TPVICS R1	821	17.0±3.1	53.8	25.3	28.5
-TPVICS R2	767	16.9±3.4	52.9	34.0	36.9
- SHRUCs R1	896	16.9±3.2	55.5	11.9	26.1
- SHRUCs R2	1,166	16.8±3.3	54.2	10.4	24.6
- SHRUCs R3	1,249	16.6±3.2	51.6	17.2	26.9
Punjab - Lahore - TPVICS R1	815	16.8±3.3	55.1	84.7	84.9
-TPVICS R2	773	17.7±3.3	50.8	76.0	79.3
- LICS 2023	779	18.0±3.4	51.5	83.9	81.8
- LHRUCS 2023	1,394	17.5±3.6	52.7	78.8	80.9

* literate means respondents have one or more years of education

3.2. Card availability and vaccination coverage

Figures 1-14 summarize HBR availability along with vaccination coverage for the seven SHRUC districts. Each district is represented by three pages: one that summarizes outcomes for SHRUCs, one that summarizes outcomes for TPVICS, and a third that summarizes statistically significant improvements or declines from round to round of the surveys. Each set of three pages concludes with a short paragraph summarizing what the figures and tables portray.

In figures summarizing outcomes from SHRUC surveys, data about doses are arranged from bottom to top following the order of Pakistan's vaccination schedule. Each coverage estimate is accompanied by a two-sided survey-adjusted Wilson confidence interval. The top of each figure summarizes the proportion of respondents who showed an HBR, who had received any vaccination, and who were fully-, partially-, or not-vaccinated. Whether outcome changes from round to round were statistically significant[3] is indicated using symbols on the right side of the plot: significant increases from the earlier round are represented with an up arrow (▲), significant decreases with a down arrow (▼), and insignificant changes with a dash (–). In the SHRUC figures, from left to right, the symbols represent changes from Round 1 to Round 2, from Round 2 to Round 3, and from Round 1 to Round 3.

For example, in the image below the symbols indicate that:

- There was a significant decrease in Penta3 coverage from Round 1 to Round 2 (▼)
- There was a significant increase in Penta3 coverage from Round 2 to Round 3 (▲)
- The difference in Penta3 coverage from Round 1 to Round 3 was not statistically significant (–)

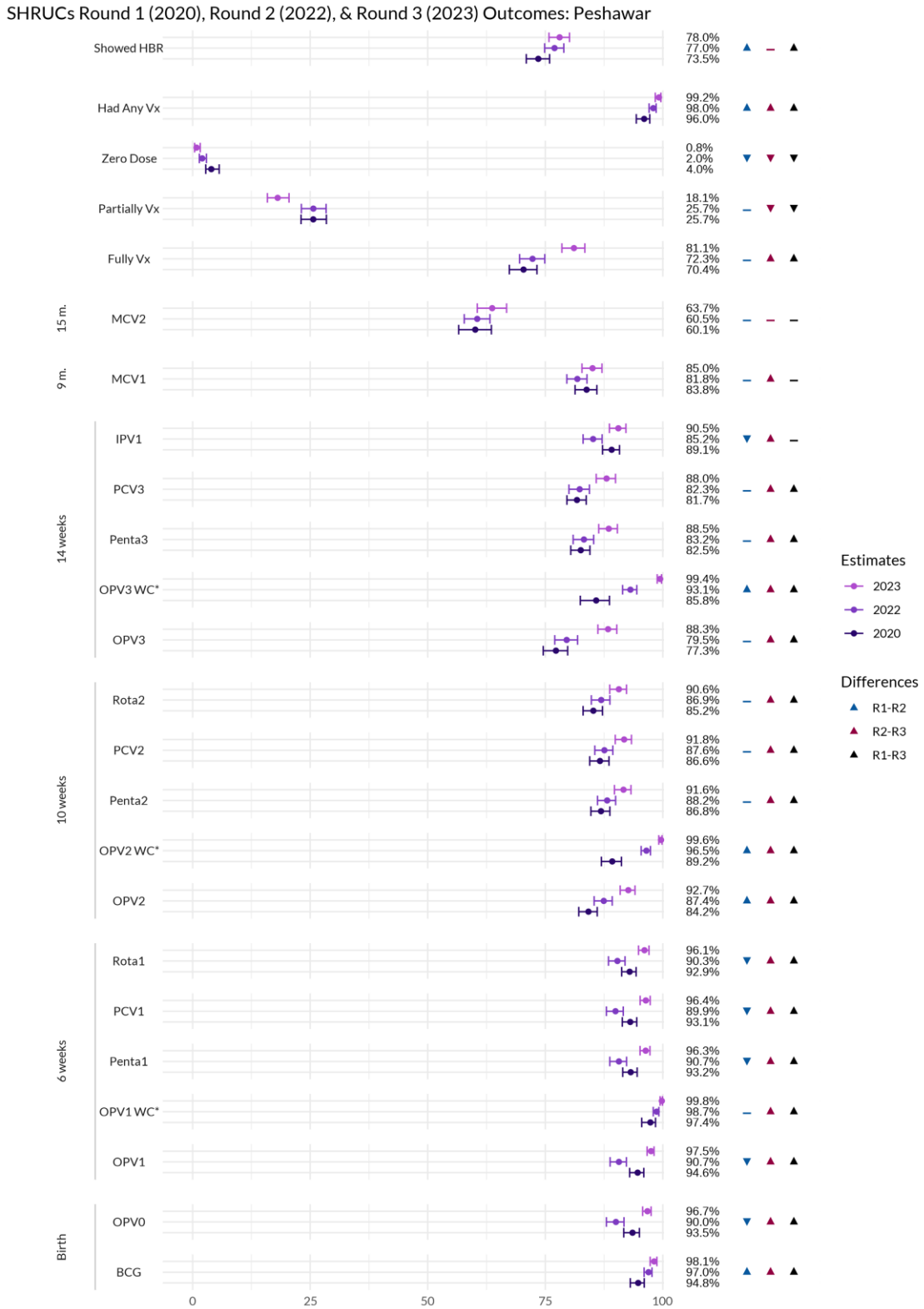
The figures that summarize TPVICS outcomes are like the SHRUC figures. Statistically significant changes are indicated there with a star (★) at the far right and an arrow pointing up or down to convey whether the outcome increased or decreased between Rounds 1 and 2. Changes that were not statistically significant do not show any annotation at the far right.

Table 15 through Table 21 show the same statistically significant improvements and declines as Figure 1 through Figure 14. Improvements are shown with green bars and declines in performance are shown in red. Changes that were not statistically significant are represented with empty table cells.

[3] In this context, the phrase *statistically significant* means that the p-value for a 2-sided Rao-Scott survey-adjusted chi-square test was < 0.05.

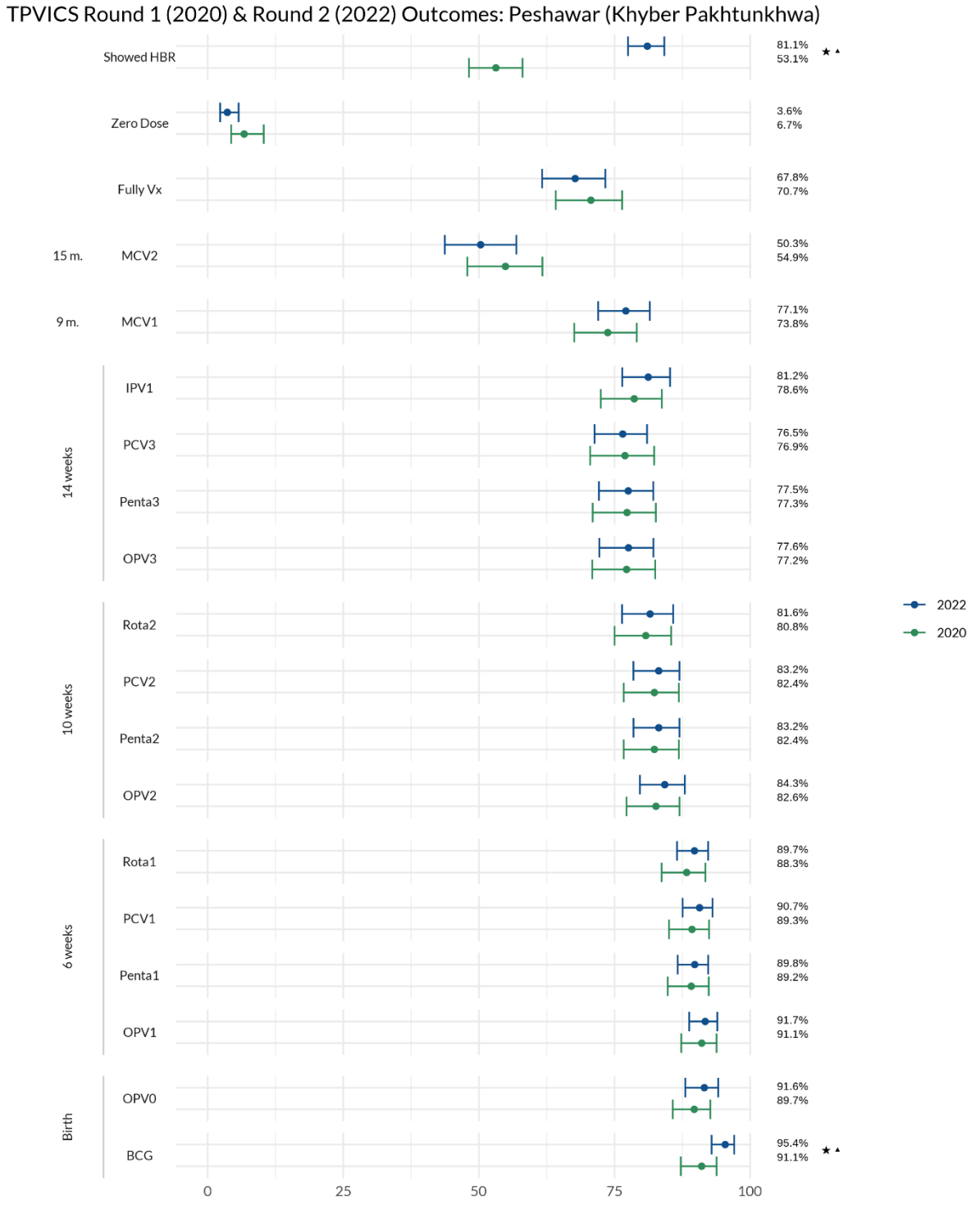
This page is intentionally blank.

Figure 1. SHRUCs Rounds 1 to 3 Outcomes for Peshawar District



* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 2. TPVICS Round 1 & Round 2 Outcomes for Peshawar District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 15. Statistically significant coverage changes between survey rounds, Peshawar District

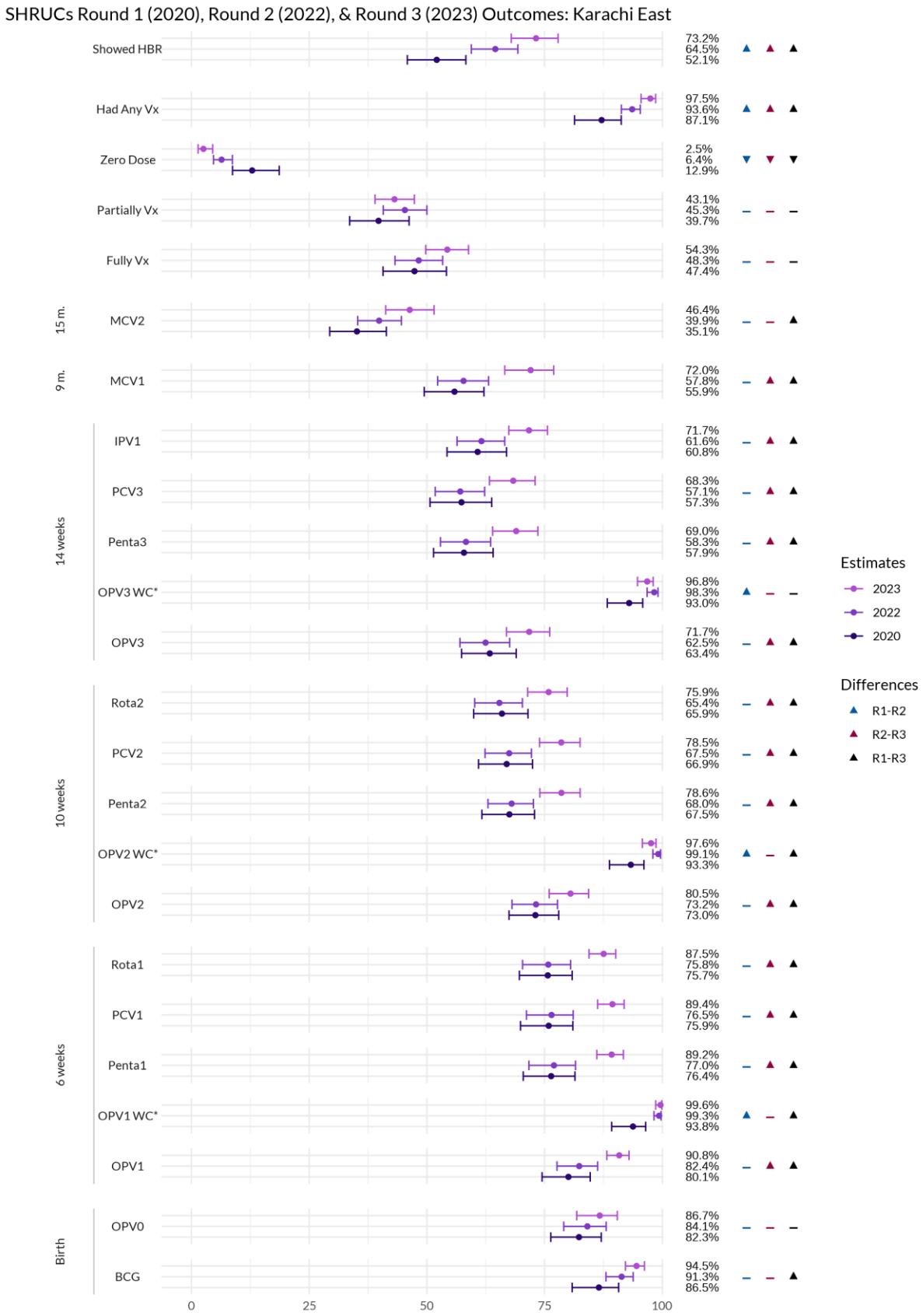
		Peshawar			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR	27.9	3.5		4.5
	Fully vaccinated			8.8	10.7
	Zero dose		-1.9	-1.2	-3.1
	Received any doses		1.9	1.2	3.1
15 months	MCV2				
9 months	MCV1			3.2	
14 weeks	IPV1		-3.9	5.4	
	PCV3			5.7	6.3
	PENTA3			5.3	5.9
	OPV3			8.8	11.1
	OPWC3	11.6	7.3	6.3	13.6
10 weeks	ROTA2			3.7	5.4
	PCV2			4.2	5.1
	PENTA2			3.5	4.8
	OPV2		3.3	5.2	8.5
	OPWC2	9.5	7.3	3.1	10.4
6 weeks	ROTA1		-2.6	5.8	3.2
	PCV1		-3.1	6.5	3.3
	PENTA1		-2.5	5.7	3.2
	OPV1		-4.0	6.8	2.9
	OPWC1	6.9		1.1	2.4
Birth	OPV0		-3.5	6.7	3.2
	BCG	4.3	2.2	1.2	3.4

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

From TPVICS Round 1 to Round 2 there were significant improvements in percent of respondents who showed an HBR and in coverage of OPV when campaign doses are counted, and in BCG. In the series of SHRUC surveys, there were some small setbacks from Round 1 to Round 2, but then notable improvement from Round 2 to Round 3 and net improvement on all indicators except IPV and MCV between R1 and R3 (meaning between 2021 and 2023). Coverage of fully vaccinated children among SHRUCs in Peshawar improved 10.7% from 2021 to 2023.

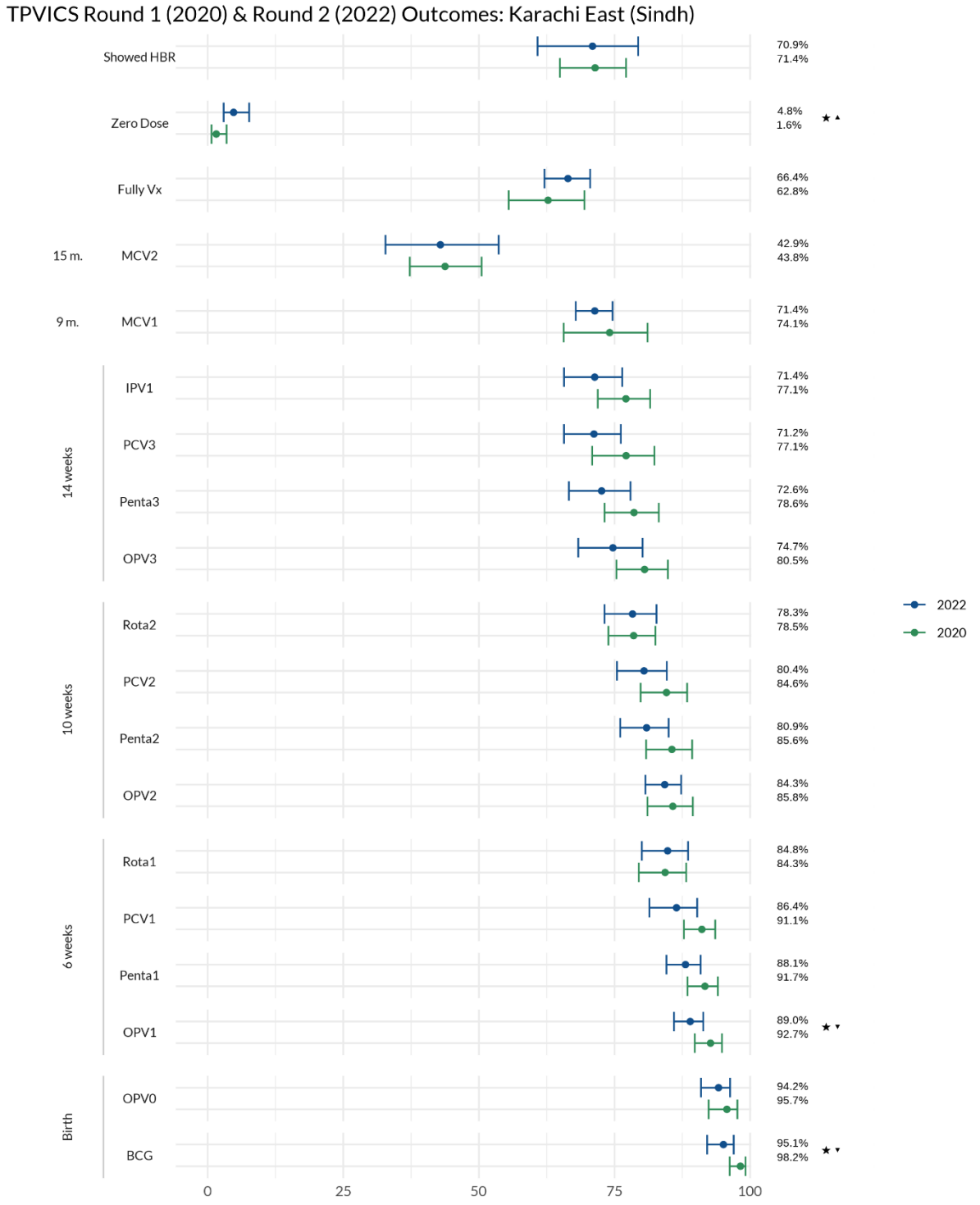
This page is intentionally blank.

Figure 3. SHRUCs Rounds 1 to 3 Outcomes for Karachi East District



* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 4. TPVICS Round 1 & Round 2 Outcomes for Karachi East District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 16. Statistically significant coverage changes between survey rounds, Karachi East District

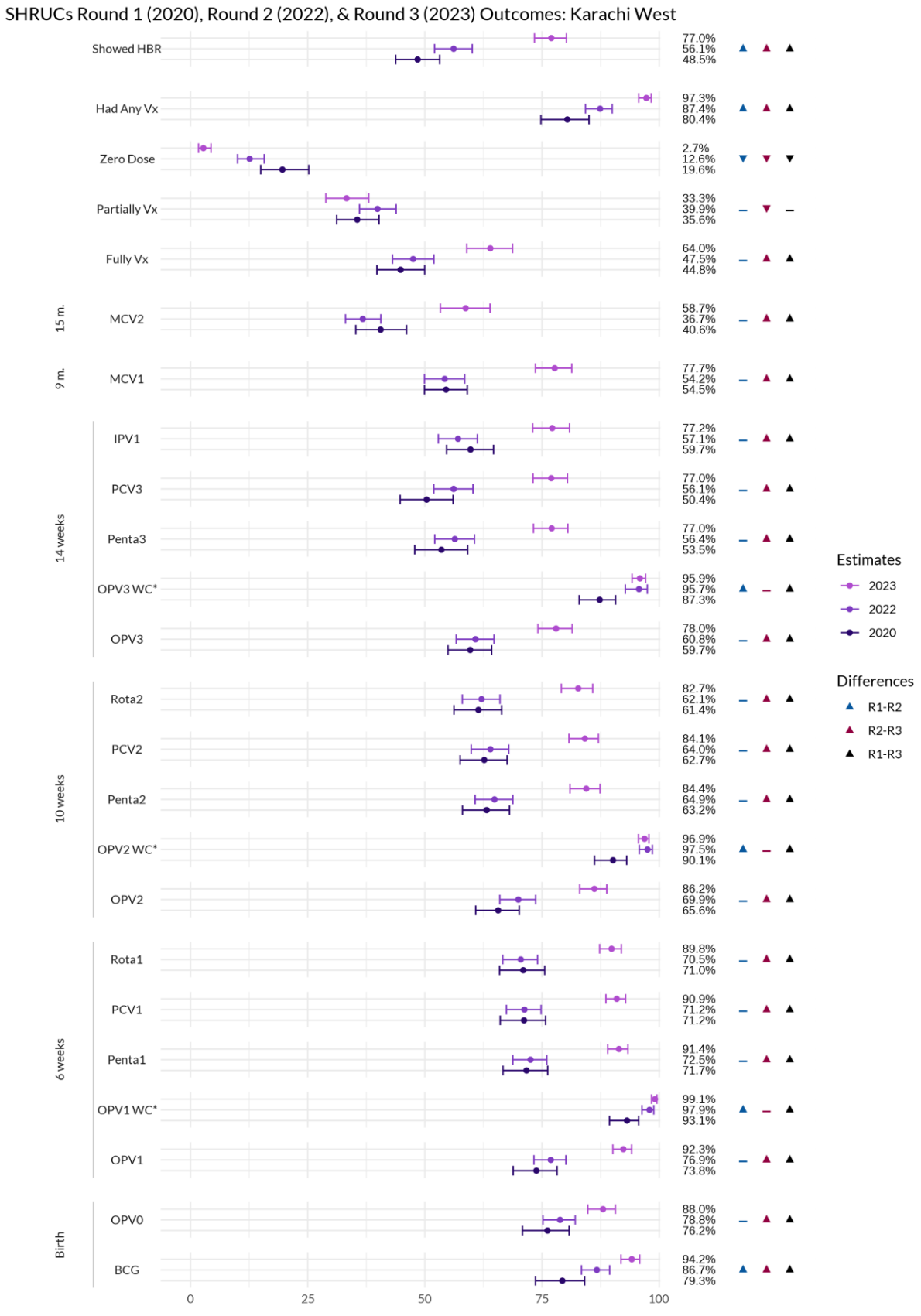
		Karachi East			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR		12.4	8.6	21.1
	Fully vaccinated				
	Zero dose	3.2	-6.5	-3.9	-10.3
	Received any doses	-3.2	6.5	3.9	10.3
15 months	MCV2				11.2
9 months	MCV1			14.2	16.2
14 weeks	IPV1			10.1	10.9
	PCV3			11.2	11.0
	PENTA3			10.7	11.1
	OPV3			9.3	8.4
	OPWC3		5.3		
10 weeks	ROTA2			10.5	9.9
	PCV2			11.1	11.6
	PENTA2			10.6	11.1
	OPV2			7.3	7.5
	OPWC2		5.8		4.3
6 weeks	ROTA1			11.8	11.9
	PCV1			12.9	13.5
	PENTA1			12.2	12.8
	OPV1	-3.7		8.5	10.8
	OPWC1		5.5		5.8
Birth	OPV0				
	BCG	-3.1			8.0

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

From TPVICS Round 1 to Round 2 there were small statistically significant setbacks in zero dose, OPV1, and BCG coverage. In the series of SHRUC surveys, there were some improvements from Round 1 to Round 2 in card availability, OPWC, and zero dose. There were also improvements in double-digit percentage points from Round 2 to Round 3 for numerous doses. In 2023, percent of respondents with HBRs seen was up by more than 20% over 2021 and percent fully vaccinated increased by 10.3% and coverage among most doses improved by 10% or more.

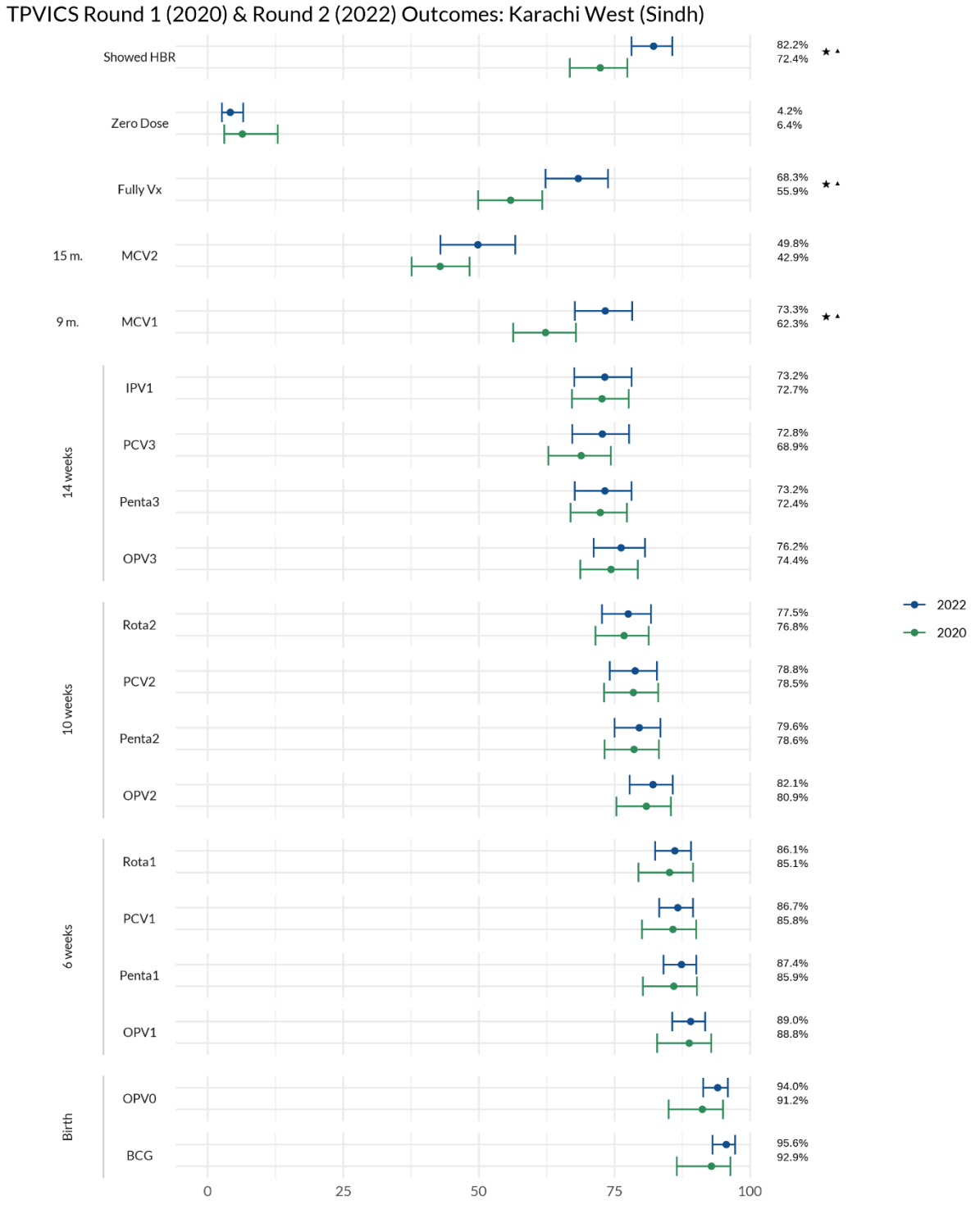
This page is intentionally blank.

Figure 5. SHRUCs Rounds 1 to 3 Outcomes for Karachi West District



* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 6. TPVICS Round 1 & Round 2 Outcomes for Karachi West District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 17. Statistically significant coverage changes between survey rounds, Karachi West District

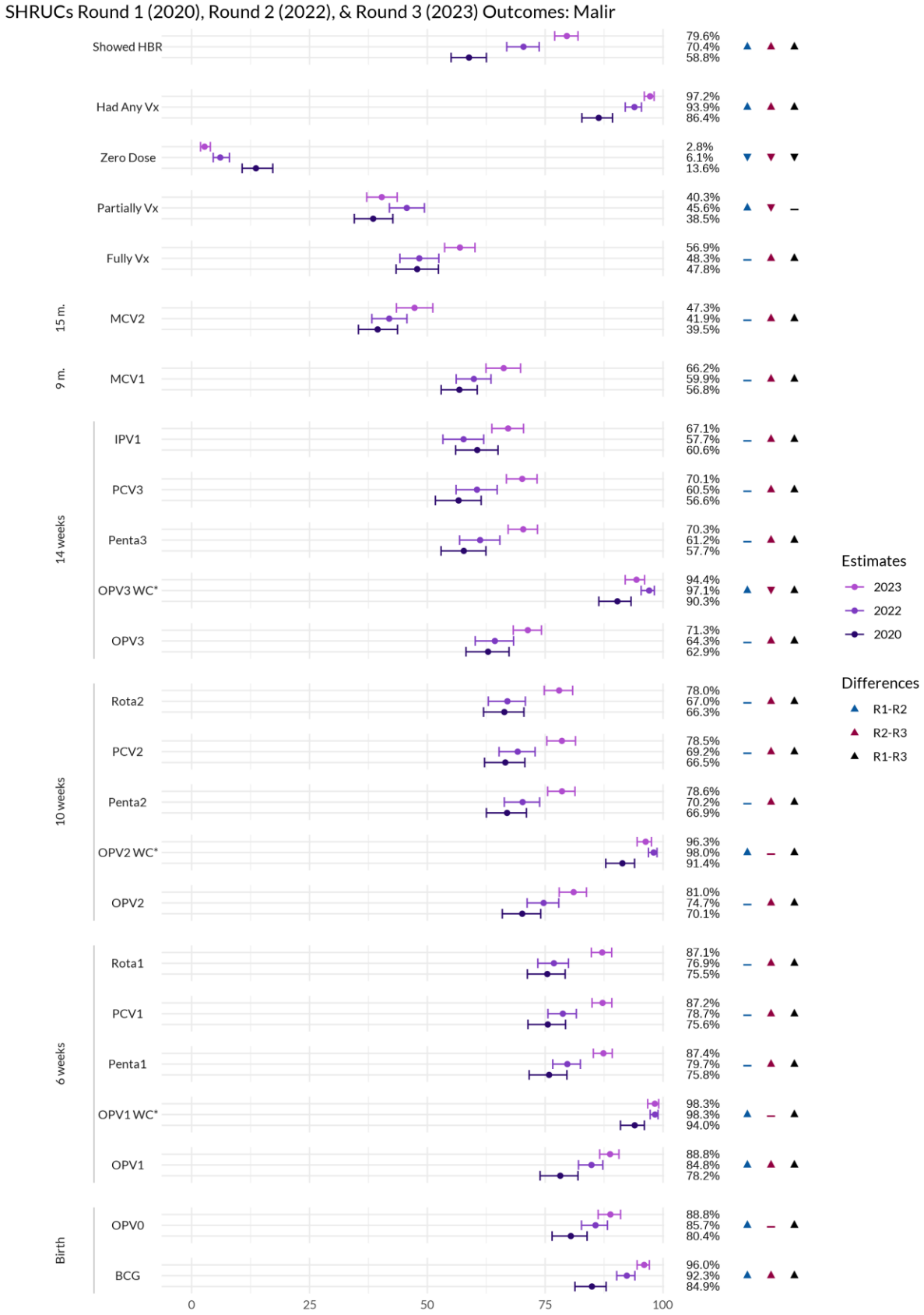
		Karachi West			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR	9.8	7.7	20.8	28.5
	Fully vaccinated	12.5		16.5	19.2
	Zero dose		-7.0	-9.9	-16.9
	Received any doses		7.0	9.9	16.9
15 months	MCV2			22.0	18.1
9 months	MCV1	11.0		23.5	23.2
14 weeks	IPV1			20.1	17.4
	PCV3			20.8	26.6
	PENTA3			20.7	23.5
	OPV3			17.2	18.3
	OPWC3	7.7	8.4		8.6
10 weeks	ROTA2			20.6	21.3
	PCV2			20.1	21.5
	PENTA2			19.6	21.3
	OPV2			16.2	20.5
	OPWC2	6.4	7.4		6.7
6 weeks	ROTA1			19.4	18.8
	PCV1			19.7	19.8
	PENTA1			18.9	19.7
	OPV1			15.5	18.6
	OPWC1	5.9	4.8		6.0
Birth	OPV0			9.2	11.9
	BCG		7.4	7.4	14.8

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

From TPVICS Round 1 to Round 2, Karachi West showed double-digit gains for percent fully vaccinated and percent with MCV1 along with significant improvement for OPWC. Similar improvements were observed from SHRUCs Round 1 to 2. A very substantial improvement was observed from 2022 to 2023 between SHRUC rounds, with percent showing an HBR improving by 28.5% over two years and coverage for many doses improving by about 20 percentage points. The SHRUCs zero dose outcome dropped by 16.9% from 2021 to 2023.

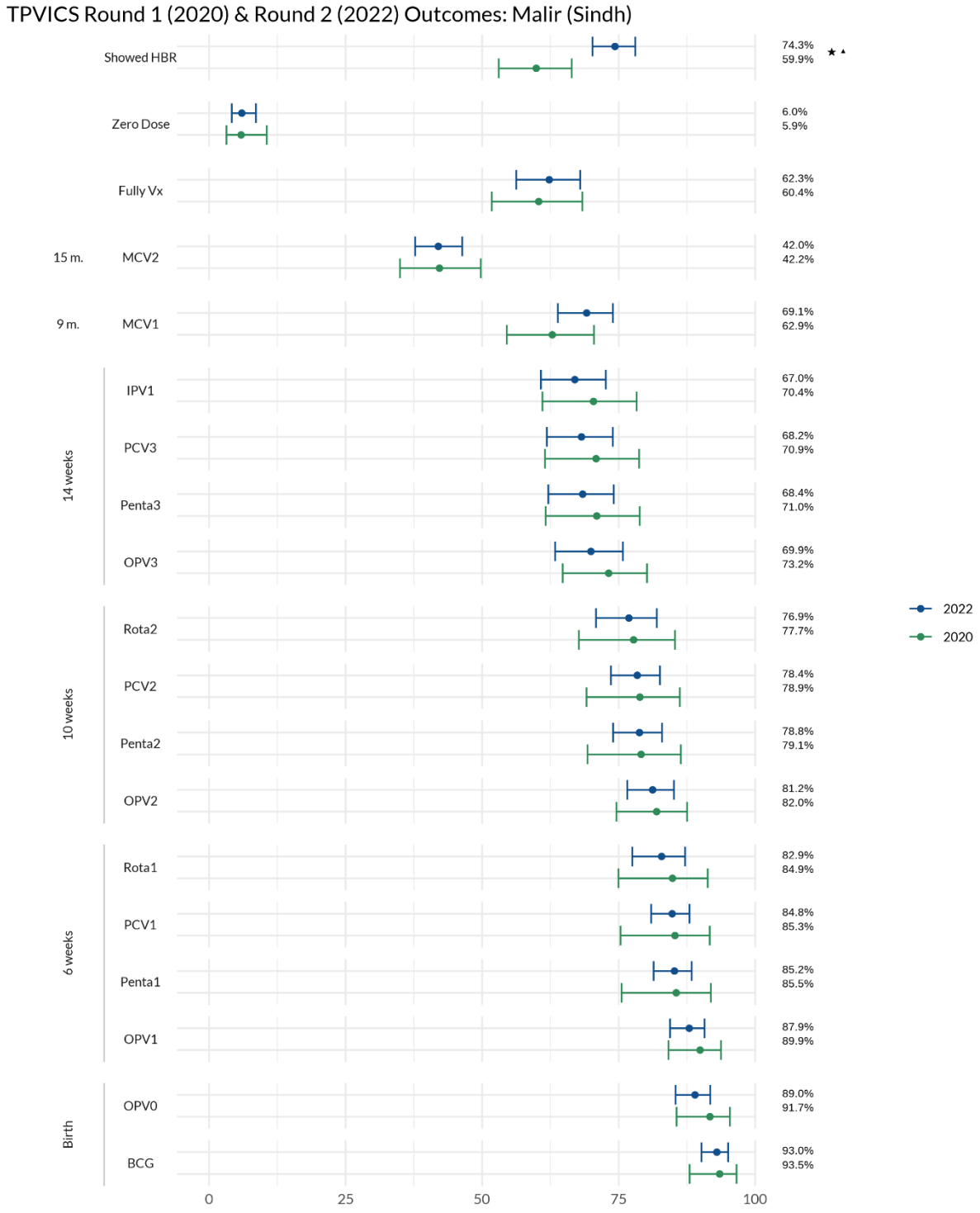
This page is intentionally blank.

Figure 7. SHRUCs Rounds 1 to 3 Outcomes for Malir District



* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 8. TPVICS Round 1 & Round 2 Outcomes for Malir District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 18. Statistically significant coverage changes between survey rounds, Malir District

		Malir			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR	14.4	11.6	9.2	20.8
	Fully vaccinated			8.6	9.1
	Zero dose		-7.6	-3.3	-10.9
	Received any doses		7.6	3.3	10.9
15 months	MCV2			5.4	7.8
9 months	MCV1			6.3	9.4
14 weeks	IPV1			9.4	6.5
	PCV3			9.6	13.5
	PENTA3			9.1	12.6
	OPV3			7.0	8.4
	OPWC3	5.5	6.7	-2.7	4.1
10 weeks	ROTA2			11.0	11.6
	PCV2			9.4	12.0
	PENTA2			8.4	11.6
	OPV2			6.4	10.9
	OPWC2	5.3	6.6		4.9
6 weeks	ROTA1			10.2	11.6
	PCV1			8.4	11.6
	PENTA1			7.7	11.5
	OPV1		6.6	3.9	10.6
	OPWC1	4.5	4.3		4.3
Birth	OPV0		5.2		8.4
	BCG		7.4	3.7	11.1

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

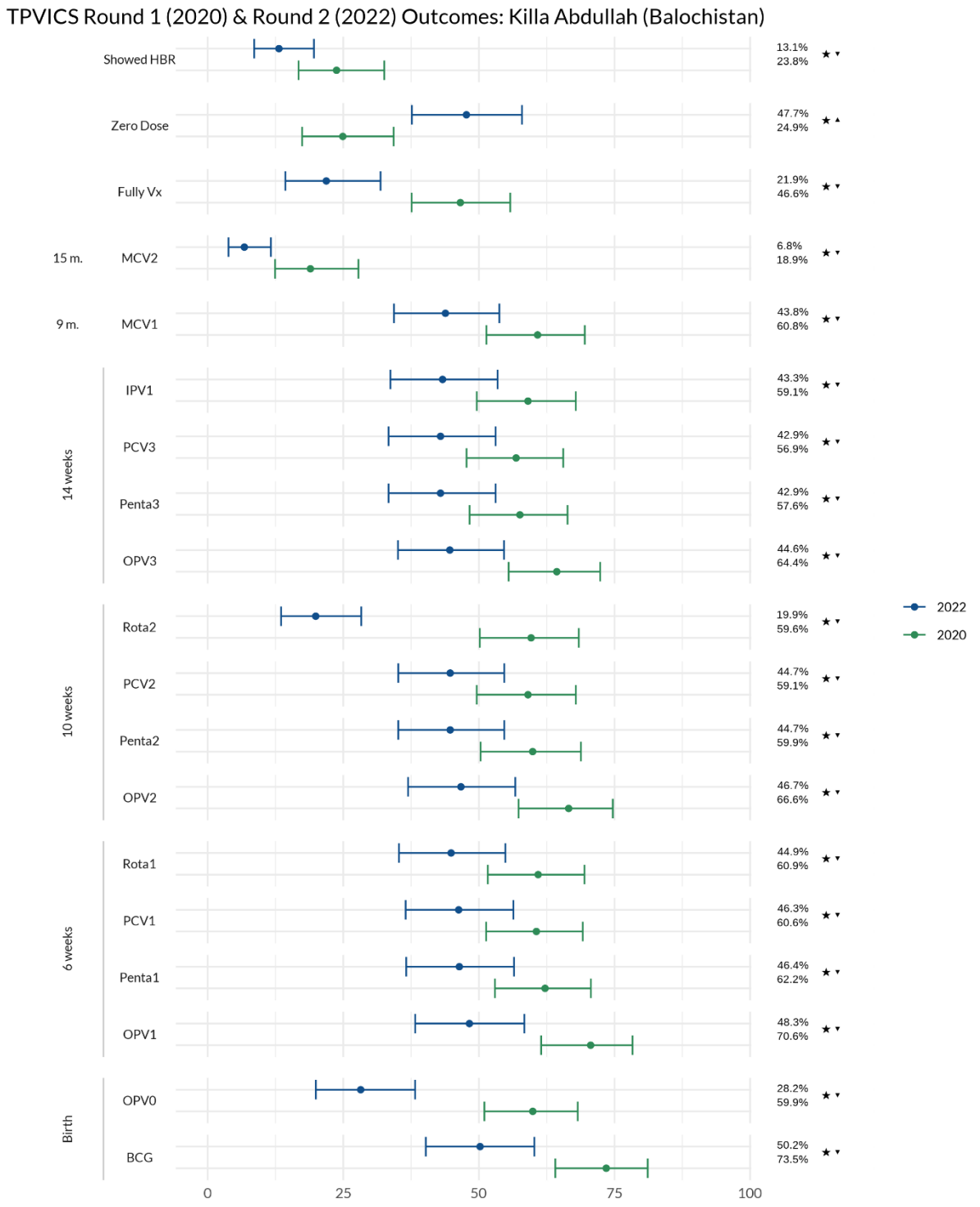
Malir district shows a pattern similar to Karachi East, with TPVICS Round 1 to Round 2 improvements in percent of respondents showing a card and coverage of OPV when including campaign doses. Similarly, SHRUCs Round 1 to Round 2 showed improvements in percent of children with HBR seen as well as zero dose and several vaccine doses. Like the other districts, SHRUC outcomes improved across nearly all doses and often by nearly 10 percentage points between SHRUC R2 and R3, yielding a net Round 1 to Round 3 improvement just above 10% for most outcomes.

This page is intentionally blank.

Figure 9. SHRUCs Rounds 1 to 3 Outcomes for Killa Abdullah District

* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 10. TPVICS Round 1 & Round 2 Outcomes for Killa Abdullah District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 19. Statistically significant coverage changes between survey rounds, Killa Abdullah District

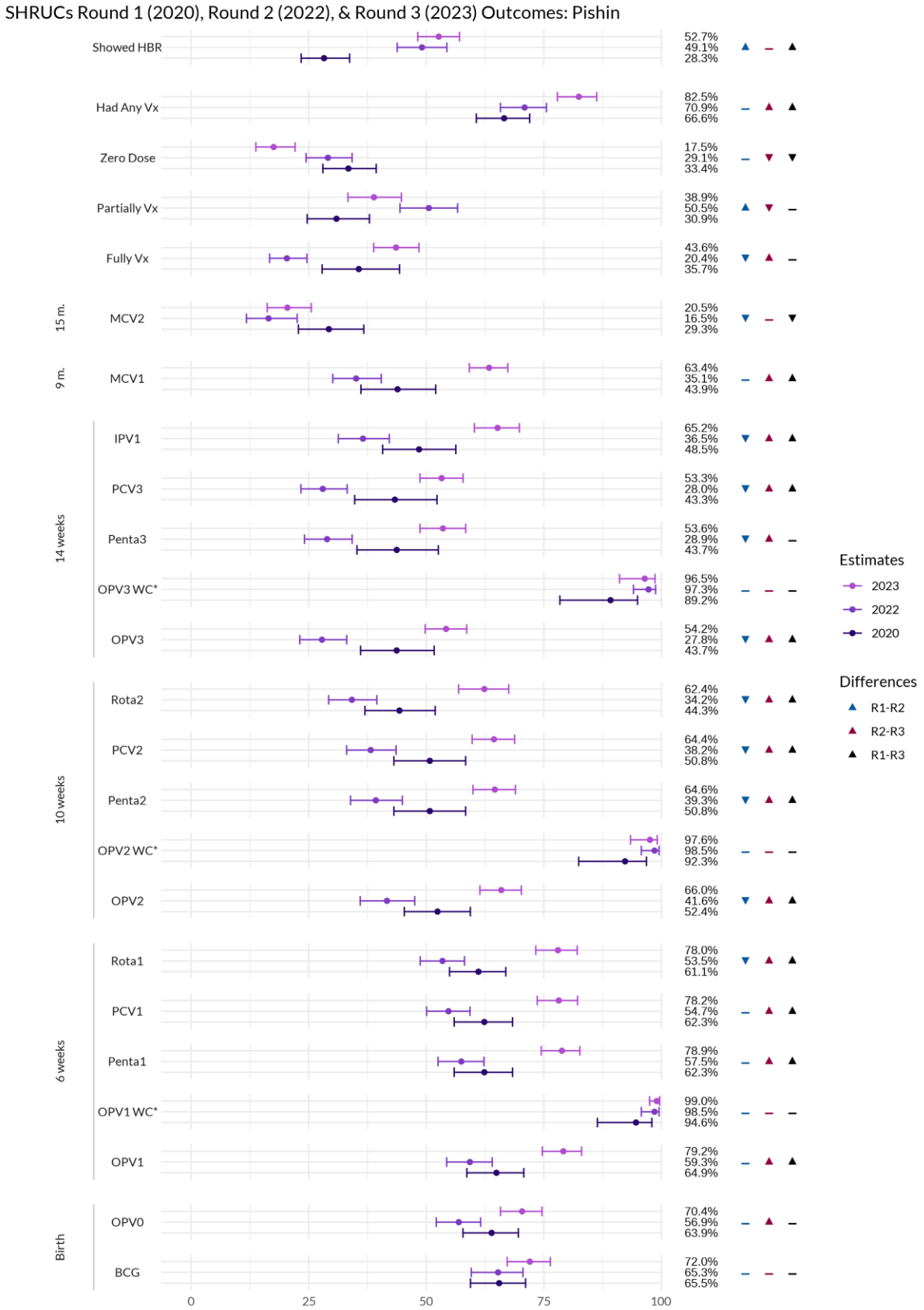
		Killa Abdullah			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR	-10.6	18.2		16.8
	Fully vaccinated	-24.7		18.4	23.4
	Zero dose	22.8	12.9	-17.7	-4.8
	Received any doses	-22.8	-12.9	17.7	4.8
15 months	MCV2	-12.2	-7.8	18.4	10.6
9 months	MCV1	-17.0		22.5	17.0
14 weeks	IPV1	-15.7		34.0	24.3
	PCV3	-13.9	10.9	34.9	45.8
	PENTA3	-14.6	10.2	33.9	44.1
	OPV3	-19.7		30.3	21.3
	OPWC3		13.4	9.7	23.2
10 weeks	ROTA2	-39.7		26.2	22.0
	PCV2	-14.3		33.1	36.8
	PENTA2	-15.2		32.2	34.5
	OPV2	-19.9		31.2	23.9
	OPWC2		-5.6	10.4	4.8
6 weeks	ROTA1	-16.0		21.7	25.1
	PCV1	-14.3	9.3	26.6	36.0
	PENTA1	-15.8		25.6	30.7
	OPV1	-22.3		27.7	19.7
	OPWC1	12.7	-7.0	6.9	
Birth	OPV0	-31.7	-11.5	16.0	
	BCG	-23.3	-22.9	12.7	-10.3

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

Killa Abdullah showed concerning double-digit declines on nearly every outcome from TPVICS Round 1 to Round 2 and showed a mix of declines and improvements from SHRUCs Round 1 to Round 2. The outcomes showed uniform improvements from SHRUCs Round 2 to Round 3 with many indicators improving by about 25 percentage points. The percent of SHRUC respondents fully vaccinated in 2023 (Round 3) was 23.4% higher than in 2021 (Round 1) and Penta3 coverage improved by 44.1% over those same two years. Even after improvement, card availability among the SHRUCs was quite low: 35% in 2023.

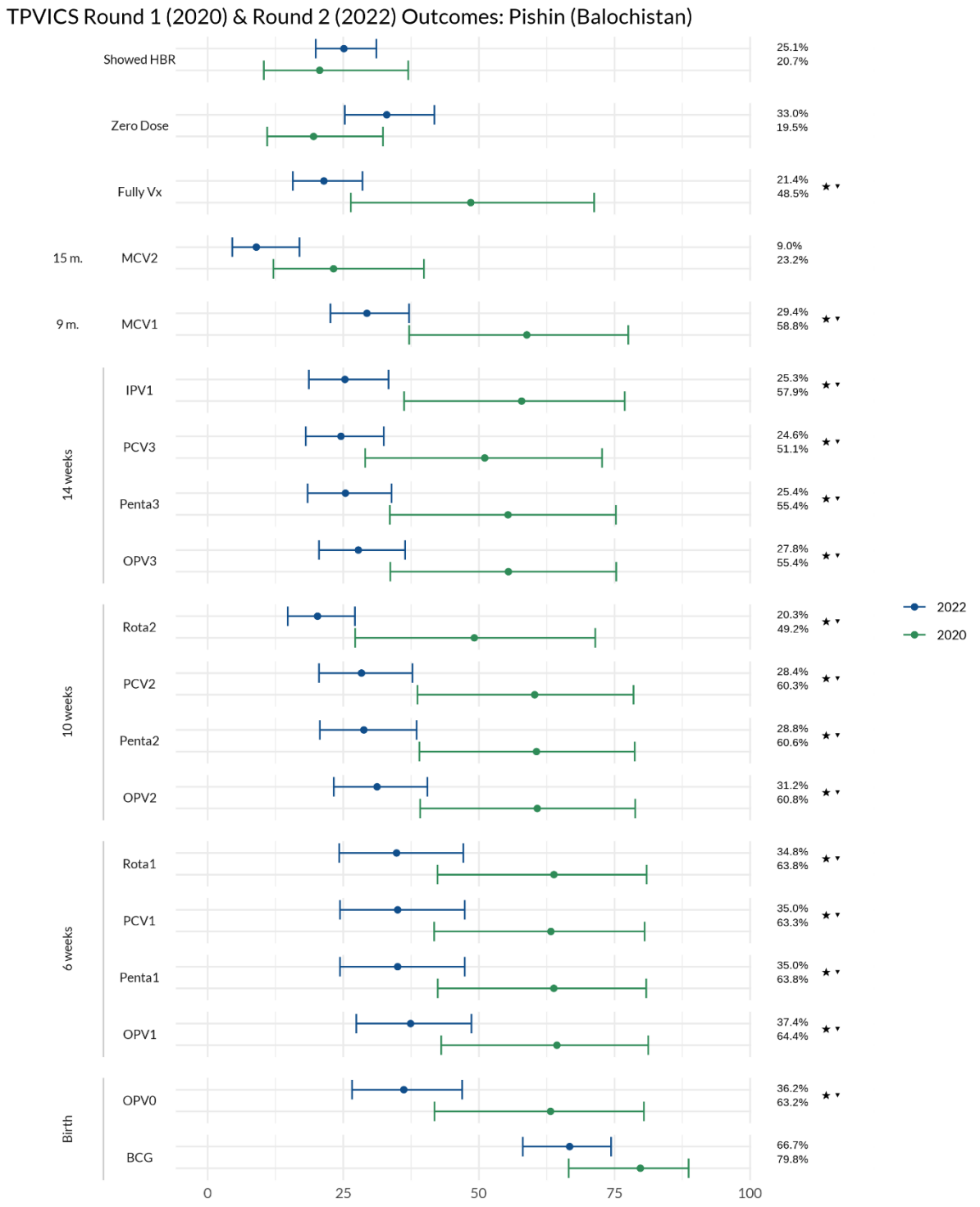
This page is intentionally blank.

Figure 11. SHRUCs Rounds 1 to 3 Outcomes for Pishin District



* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 12. TPVICS Round 1 & Round 2 Outcomes for Pishin District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 20. Statistically significant coverage changes between survey rounds, Pishin District

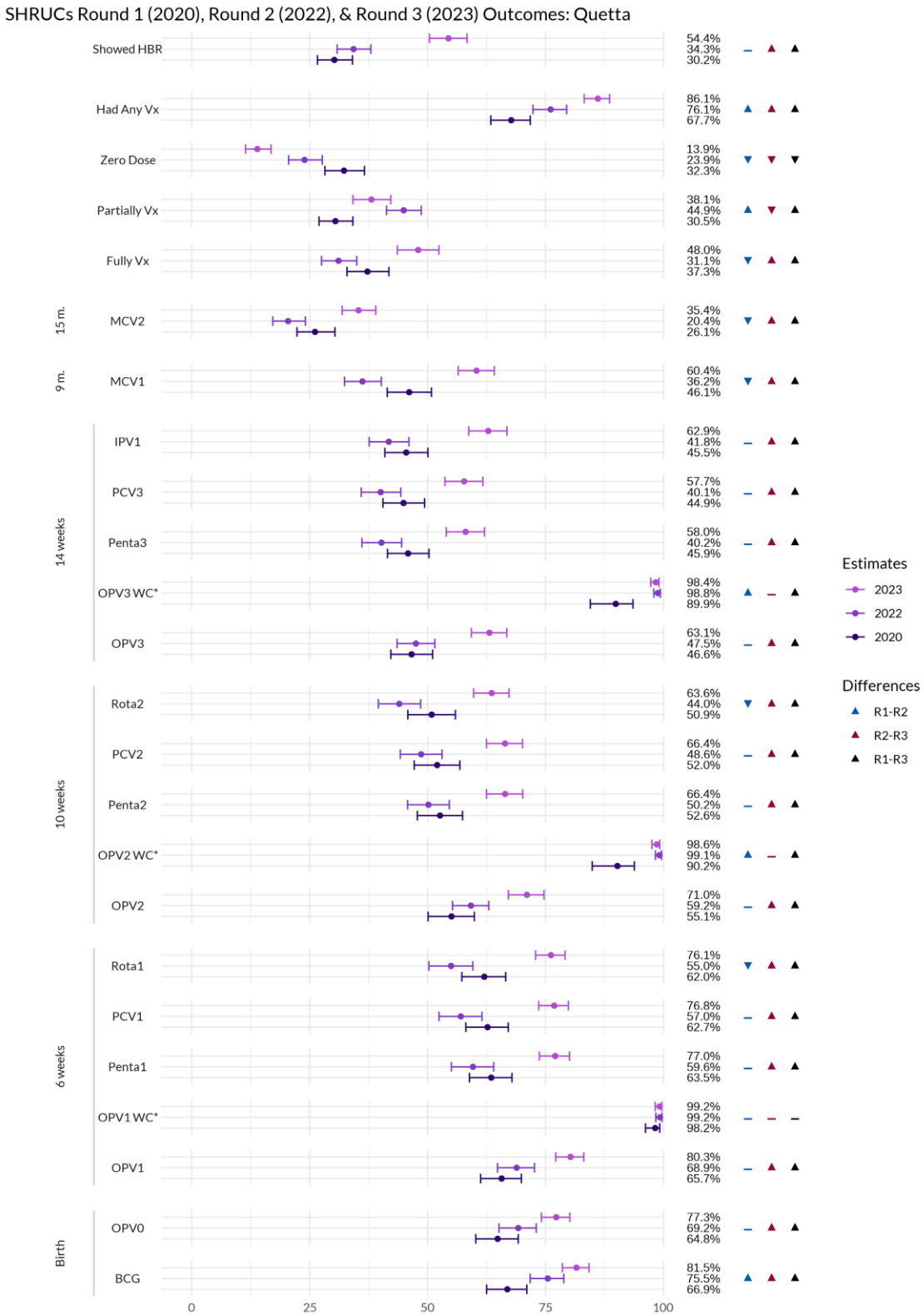
		Pishin			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR		20.8		24.4
	Fully vaccinated	-27.1	-15.3	23.2	
	Zero dose			-11.5	-15.9
	Received any doses			11.5	15.9
15 months	MCV2		-12.8		-8.8
9 months	MCV1	-29.5		28.3	19.4
14 weeks	IPV1	-32.6	-11.9	28.6	16.7
	PCV3	-26.5	-15.3	25.3	9.9
	PENTA3	-30.0	-14.8	24.6	
	OPV3	-27.7	-15.9	26.4	10.5
	OPWC3				
10 weeks	ROTA2	-28.9	-10.1	28.2	18.1
	PCV2	-31.9	-12.6	26.2	13.6
	PENTA2	-31.8	-11.5	25.3	13.8
	OPV2	-29.5	-10.8	24.3	13.6
	OPWC2				
6 weeks	ROTA1	-29.0	-7.6	24.6	16.9
	PCV1	-28.2		23.5	15.8
	PENTA1	-28.8		21.4	16.5
	OPV1	-27.0		19.9	14.2
	OPWC1	28.6			
Birth	OPV0	-27.1		13.5	
	BCG				

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

Pishin district outcomes look like those in Killa Abdullah in that there were large declines in most doses and in the percent fully vaccinated from TPVICS Round 1 to Round 2. Many of those declines also appear in the SHRUCs Round 1 to Round 2 comparison except for an improvement in percent of respondents who showed a card. There were large double-digit improvements in most indicators from Round 2 to Round 3 that outweigh the declines from Round 1 to Round 2, meaning that most SHRUC indicators yielded a net improvement of 10 to 20 percentage points from 2021 to 2023. Notably, the percent of zero dose children dropped by 15.9 percentage points in that period. While the percent of children with cards has increased over time in the Pishin SHRUCs, reaching 52.7% in 2023, there is still room for improvement.

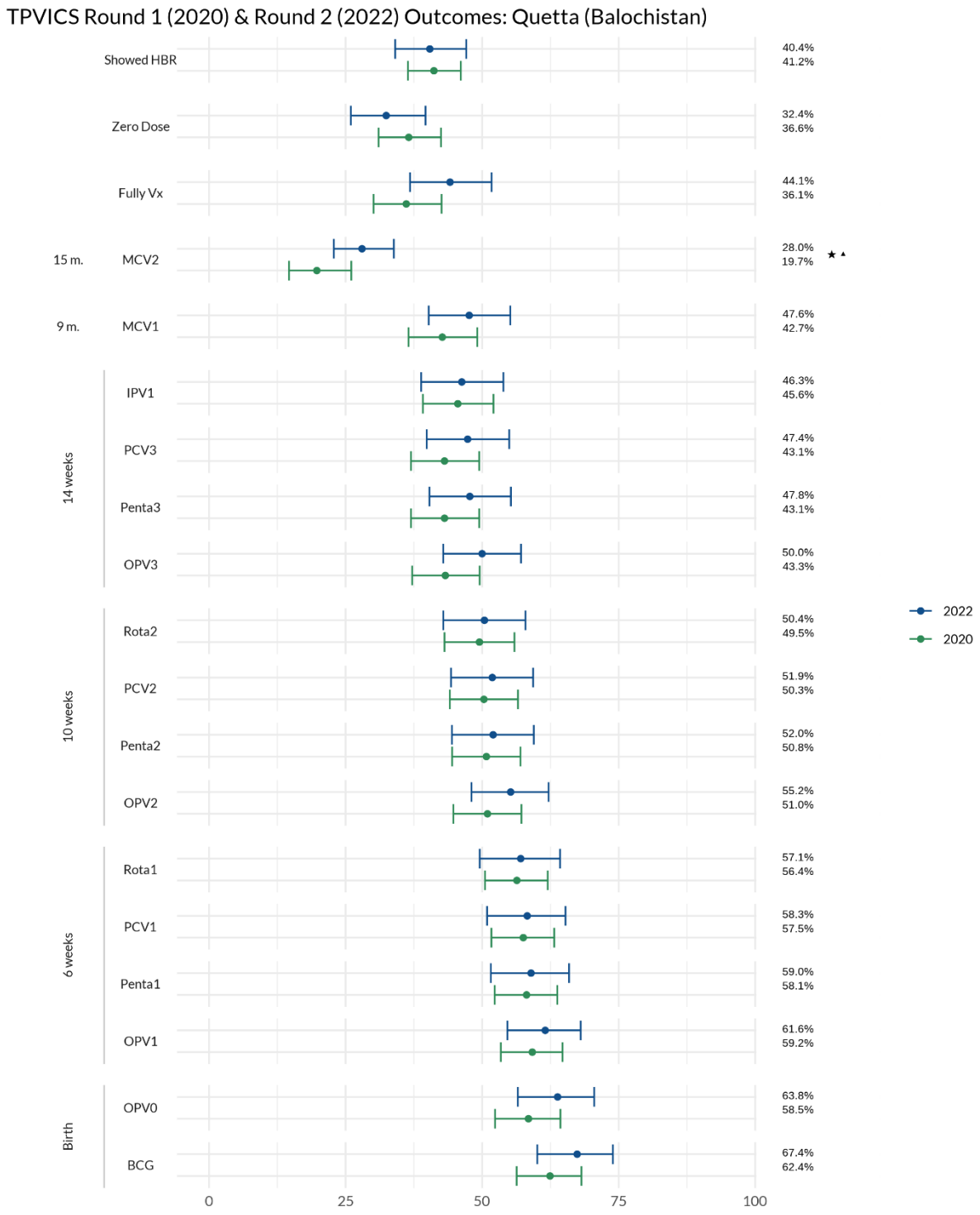
This page is intentionally blank.

Figure 13. SHRUCs Rounds 1 to 3 Outcomes for Quetta District



* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1. Zero dose means the child did not receive any of the doses in that list.
Arrows indicate statistically significant differences ($p < 0.05$) and their direction. Differences that are not significant are represented with a dash.

Figure 14. TPVICS Round 1 & Round 2 Outcomes for Quetta District



Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate is significantly higher or lower than the Round 1 estimate.

Table 21. Statistically significant coverage changes between survey rounds, Quetta District

		Quetta			
		TPVICS R1 to R2	SHRUCs R1 to R2	SHRUCs R2 to R3	SHRUCs R1 to R3
	Showed an HBR			20.1	24.2
	Fully vaccinated		-6.1	16.9	10.7
	Zero dose		-8.4	-10.0	-18.4
	Received any doses		8.4	10.0	18.4
15 months	MCV2	8.3	-5.7	14.9	9.2
9 months	MCV1		-9.9	24.2	14.3
14 weeks	IPV1			21.1	17.4
	PCV3			17.7	12.8
	PENTA3			17.8	12.2
	OPV3			15.6	16.5
	OPWC3	40.5	8.9		8.5
10 weeks	ROTA2		-6.9	19.6	12.7
	PCV2			17.8	14.4
	PENTA2			16.3	13.8
	OPV2			11.9	16.0
	OPWC2	39.7	8.9		8.4
6 weeks	ROTA1		-7.0	21.2	14.1
	PCV1			19.8	14.1
	PENTA1			17.4	13.5
	OPV1			11.4	14.6
	OPWC1	37.8			
Birth	OPV0			8.1	12.4
	BCG		8.6	6.1	14.6

Green bars indicate that outcomes improved by a statistically significant degree.
Red bars indicate that outcomes got worse by a statistically significant degree.
Color bars are scaled such that a 100% improvement or 50% decline would fill half the cell with color.

From TPVICS Round 1 to Round 2, Quetta province showed large improvements in OPWC outcomes and 8.3% improvement in MCV2 coverage. The SHRUCs Round 1 to Round 2 comparison yielded a mix of gains and losses and many indicators showed no statistically significant change. Nearly all indicators showed significant improvement from SHRUCs Round 2 to Round 3, netting double-digit improvements from Round 1 to Round 3 for nearly all outcomes, including a 10.7% increase in percent fully vaccinated and an 18.4% decrease in prevalence of zero dose children in the 12-23 months age group. It would be helpful for the percent of children whose cards are seen to improve further, beyond the 54.4% observed in SHRUCs in 2023.

3.3. Reasons for never receiving a vaccination card

Reasons for never having received a vaccination card are summarized in Table 22. In the target districts, a primary reason for the non-availability of vaccination cards was unawareness of the importance of the card. Another important reason was that family members never visited a health facility to obtain a vaccination card for their child.

Table 22. Reasons for never having received a vaccination card, by district

		Why not?						
	Never received a card (%)	Don't think it's important (%)	Never visited a facility (%)	Card not available health provider (%)	Vaccinator didn't provide card (%)	Not aware of such cards (%)	Other (%)	N
KP - Peshawar - TPVICS R1	11.7	2.9	2.4	0.6	0.1	2.0	3.6	646
-TPVICS R2	5.6	1.3	0.9	0.2	0.5	0.0	2.7	636
- SHRUCs R1	8.6	2.3	2.6	2.9	0.3	0.0	0.4	2,007
- SHRUCs R2	5.1	1.0	0.3	0.2	0.0	0.1	3.5	2,205
- SHRUCs R3	0.7	0.2	0.4	0.1	0.0	0.0	0.1	2,224
Sindh - Karachi East - TPVICS R1	10.1	1.0	0.6	6.5	0.6	0.2	1.1	819
-TPVICS R2	12.1	2.2	2.9	0.1	0.2	0.0	6.6	793
- SHRUCs R1	19.0	10.1	7.3	0.3	0.0	0.3	0.9	571
- SHRUCs R2	16.0	6.2	3.6	0.2	0.2	0.2	5.6	578
- SHRUCs R3	3.3	0.7	0.9	0.0	0.0	0.0	1.7	579
Sindh - Karachi West - TPVICS R1	12.6	2.7	1.5	4.2	0.4	2.2	1.6	832
-TPVICS R2	10.4	1.5	2.8	0.7	0.1	0.0	5.3	804
- SHRUCs R1	25.2	7.5	12.5	0.6	0.1	0.3	4.2	1,150
- SHRUCs R2	26.1	9.0	5.9	0.2	0.5	0.2	10.2	1,158
- SHRUCs R3	4.4	0.6	1.3	0.0	0.0	0.0	2.5	1,183
Sindh - Malir - TPVICS R1	12.4	2.5	6.2	0.2	0.3	0.4	2.8	837
-TPVICS R2	13.3	1.1	4.1	0.0	0.2	0.0	7.9	821
- SHRUCs R1	18.3	7.4	8.2	0.2	0.0	0.3	2.3	1,036
- SHRUCs R2	16.8	3.5	3.0	0.0	0.6	0.2	9.5	1,054
- SHRUCs R3	5.1	0.7	1.2	0.0	0.0	0.0	3.2	1,059
Balochistan - Killa Abdullah - TPVICS R1	51.4	20.7	12.3	9.7	2.6	4.2	1.9	728
-TPVICS R2	21.8	7.3	7.9	1.8	3.8	0.0	0.9	717
- SHRUCs R1	65.7	38.3	2.4	0.5	0.5	18.8	5.1	896
- SHRUCs R2	29.0	8.1	11.9	1.5	2.7	1.2	3.6	1,135
- SHRUCs R3	14.5	5.0	3.5	5.4	0.4	0.2	0.0	1,150
Balochistan - Pishin - TPVICS R1	59.9	23.1	8.8	0.5	7.2	3.1	17.1	745
-TPVICS R2	45.9	21.8	17.0	0.9	2.7	0.0	3.5	730
- SHRUCs R1	33.1	18.9	13.0	0.2	0.0	0.2	0.9	420
- SHRUCs R2	40.3	8.7	24.0	2.3	3.8	1.1	0.4	524
- SHRUCs R3	18.4	10.8	6.0	0.1	0.0	1.5	0.0	614
Balochistan - Quetta - TPVICS R1	42.0	5.7	18.3	7.7	0.3	4.6	5.4	821
-TPVICS R2	38.3	18.3	13.7	0.1	0.1	0.0	6.0	767
- SHRUCs R1	32.5	6.2	25.5	0.3	0.1	0.2	0.1	896
- SHRUCs R2	34.1	18.1	15.6	0.0	0.0	0.3	0.1	1,166
- SHRUCs R3	16.1	7.5	5.3	0.2	0.9	1.5	0.8	1,249
Punjab - Lahore - TPVICS R1	11.7	0.7	0.2	0.0	0.0	0.1	10.7	815
- TPVICS R2	8.2	0.9	0.5	0.1	0.1	0.0	6.6	773
- LICS 2023	0.4	0.0	0.0	0.0	0.0	0.0	0.4	779
- LHRUCS 2023	0.3	0.1	0.1	0.0	0.0	0.0	0.1	1,394

Each row's "Why not?" entries sum to the % of children who never received a card.
Respondents could only select one response to this question.
Note: This measure is a population estimate that incorporates survey weights.
Shaded cells are scaled such that if 100% of respondents gave that response, the cell would be filled with color.

3.4. Vaccination coverage and timeliness

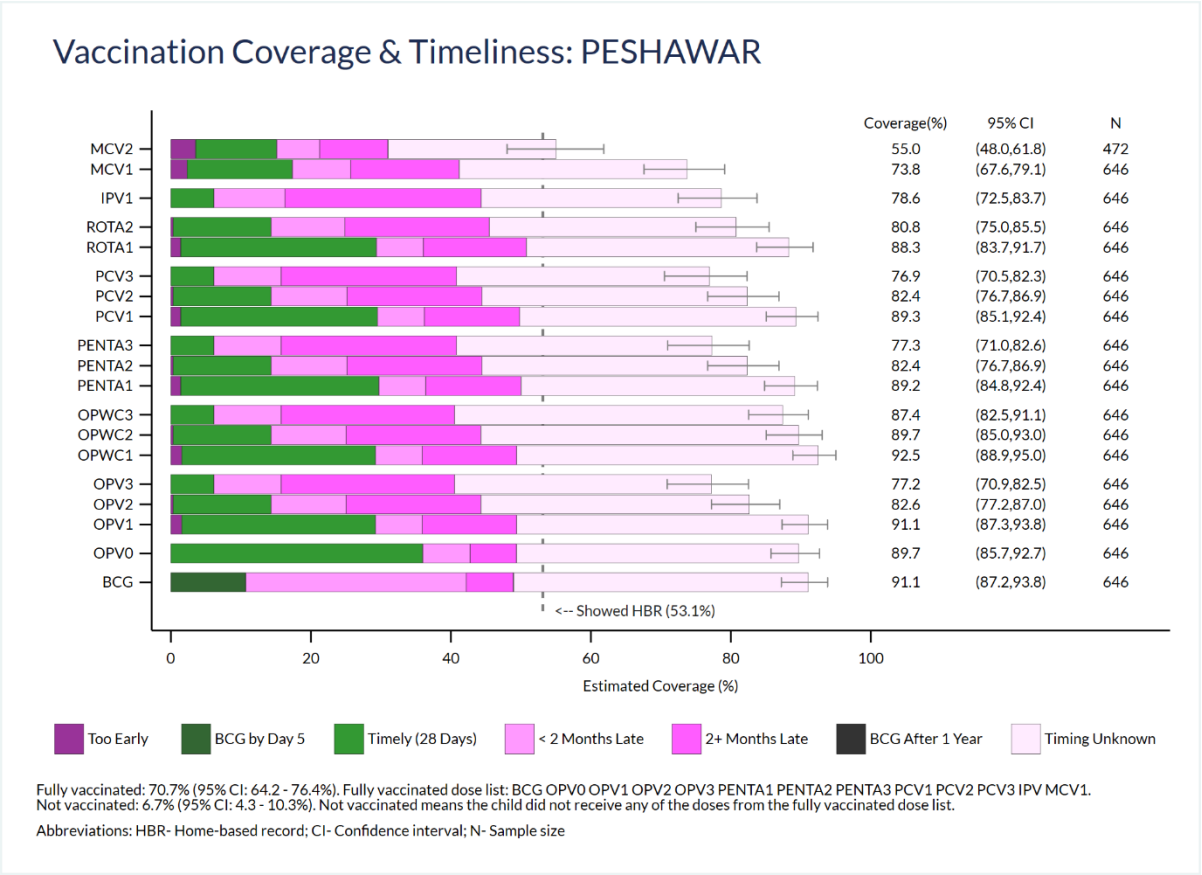
The pages of this section summarize district-level vaccination coverage among children ages 12-23 months in the TPVICS and SHRUC and Lahore surveys. In the figures, each dose is represented by a single bar and in the tables, by a single row. The proportion of respondents who showed an HBR is indicated in each figure. The saturated colors starting at the left side of the bar summarize the timeliness with which the doses were administered. Timeliness was calculated using the child's date of birth and the date when the vaccine was given. The lightest portion of the bar at the far right represents children for whom timeliness is unknown, perhaps due to an illegible date on the card or because the vaccination evidence is from the caregiver's recall instead of a documented date.

These figures help visualize several characteristics of coverage:

- The proportion of children for whom HBRs were seen is indicated with a dashed vertical line that passes behind the dose coverage bars.
- Most doses use the same colors to code timeliness, but BCG has two unique colors in the legend: the BCG dose is considered timely if it is given within five days of birth. This is indicated with a darker shade of green than the timely category for other doses. And BCG is sometimes considered to be egregiously late if it is given after the age of one year; those children are indicated with a black segment in the BCG bar.
- Crude coverage (based on either card or recall) is indicated by the overall length of each bar and listed on the right side of the figure.
- Uncertainty due to sampling variability is indicated with the two-sided Wilson type confidence interval, at the tip of the bar, and listed at the right side of the figure.
- The number of children in the sample who were age-eligible to have received the dose is listed at the right side of the figure.
- The estimated proportion of children who were fully vaccinated and who were zero-dose are listed in footnotes.
- Drop-out within a dose series is evident from the fact that the bars for later doses are generally shorter than those for earlier doses.
- Generally speaking, a higher proportion of children receive the later doses more than two months late compared to the earlier doses. Note that the dark pink portion of the bar for dose 3 of each series is often much longer than the dark pink segment for dose 1 in the same series.
- The length of each segment of each bar is listed in the table below each figure.
- For the SHRUCs Round 3 figures we have changed the convention to show 'Timing Unknown' using a shade of gray instead of pink. The meaning is the same as the very light pink in the TPVICS Round 1 and Round 2 and SHRUCs Round 1 and Round 2 plots: the evidence for

vaccination is either from caregiver recall or from a tick mark or incomplete date on the card. Gray is the new standard color for these plots so we have used that for the newer figures in this report.

Figure 15. Vaccination coverage among children ages 12-23 months, Peshawar District, TPVICS Round 1



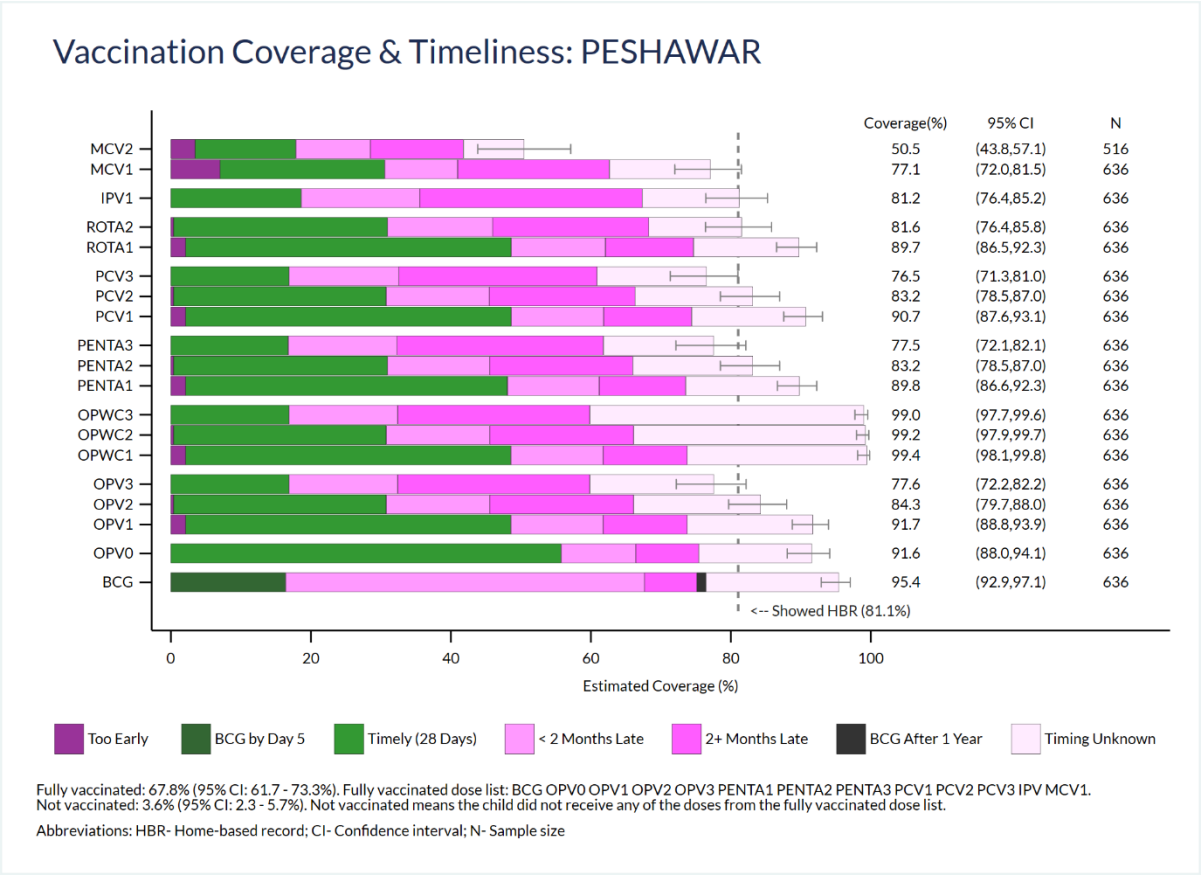
Fully vaccinated: 70.7% (95% CI: 64.2 - 76.4%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 6.7% (95% CI: 4.3 - 10.3%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 23. Vaccination coverage bar segment lengths (%), Peshawar District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	4.0	17.6	12.8	13.1	16.2
MCV1	4.8	27.4	14.4	17.0	21.4
IPV	0.9	16.1	20.4	32.3	20.8
ROTA2	0.5	25.3	20.0	24.6	20.2
ROTA1	1.8	48.5	13.3	10.6	21.9
PCV3	0.3	13.3	17.5	33.4	23.6
PCV2	0.5	25.2	19.8	23.8	22.4
PCV1	1.8	48.0	13.4	10.4	22.8
PENTA3	0.3	13.0	17.6	33.9	23.7
PENTA2	0.5	24.8	19.3	22.4	24.6
PENTA1	1.7	47.4	12.8	10.1	24.4
OPWC3	0.3	13.1	16.9	31.4	37.7
OPWC2	0.5	24.4	18.9	23.1	32.6
OPWC1	1.6	46.2	12.9	10.0	29.1
OPV3	0.3	13.1	16.9	31.4	26.6
OPV2	0.5	24.4	18.9	23.1	25.6
OPV1	1.6	46.2	12.9	10.0	26.8
OPV0	0.0	62.4	6.4	3.7	24.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	23.6	45.1	3.6	0.1	25.8

Figure 16. Vaccination coverage among children ages 12-23 months, Peshawar District, TPVICS Round 2



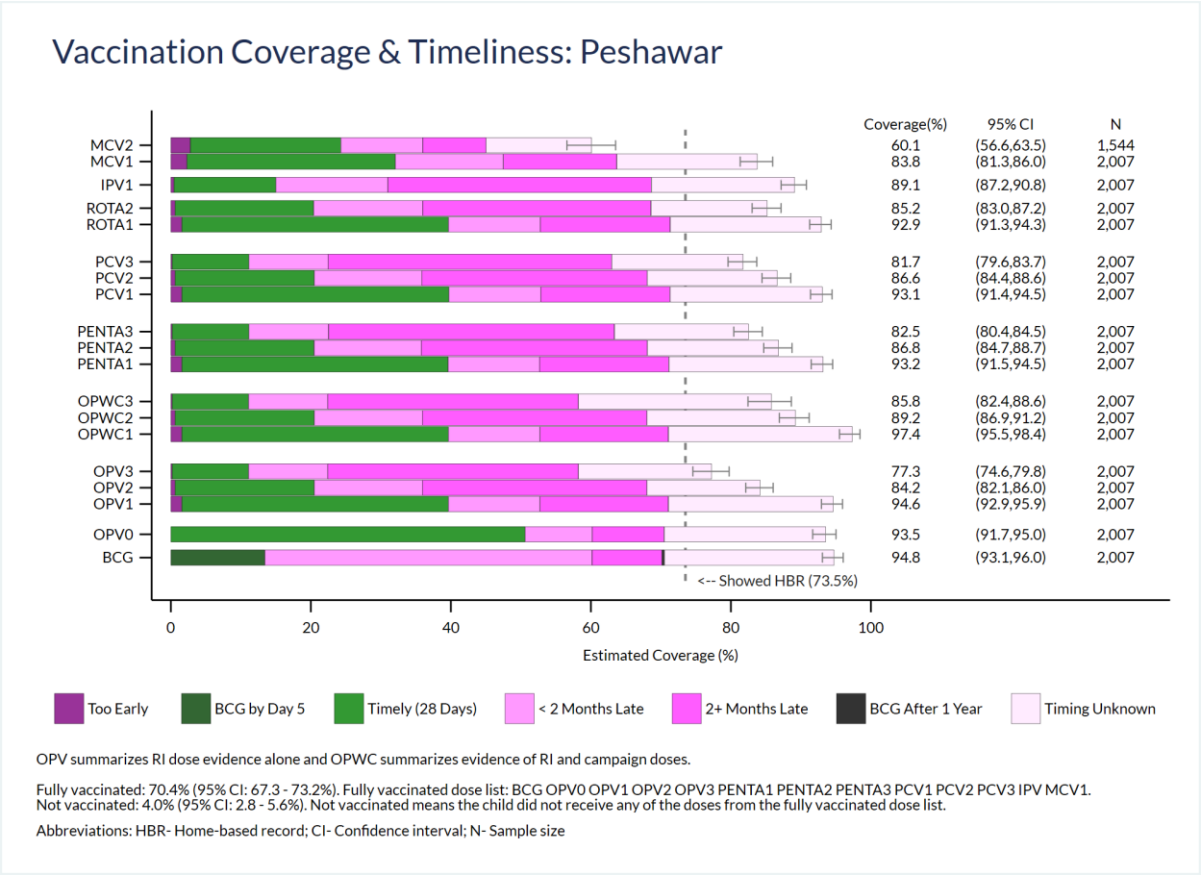
Fully vaccinated: 67.8% (95% CI: 61.7 - 73.3%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 3.6% (95% CI: 2.3 - 5.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 24. Vaccination coverage bar segment lengths (%), Peshawar District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.5	14.4	10.6	13.3	8.7
MCV1	7.0	23.5	10.4	21.7	14.5
IPV	0.0	18.6	16.9	31.8	13.9
ROTA2	0.4	30.6	15.0	22.3	13.3
ROTA1	2.1	46.5	13.5	12.6	15.1
PCV3	0.0	16.9	15.7	28.3	15.6
PCV2	0.4	30.4	14.7	20.8	16.8
PCV1	2.1	46.5	13.2	12.6	16.3
PENTA3	0.0	16.8	15.6	29.5	15.8
PENTA2	0.4	30.6	14.6	20.4	17.2
PENTA1	2.1	46.0	13.1	12.3	16.3
OPWC3	0.0	16.9	15.5	27.4	39.1
OPWC2	0.4	30.4	14.8	20.5	33.1
OPWC1	2.1	46.5	13.2	12.0	25.7
OPV3	0.0	16.9	15.5	27.4	17.7
OPV2	0.4	30.4	14.8	20.5	18.2
OPV1	2.1	46.5	13.2	12.0	18.0
OPV0	0.0	55.8	10.7	9.0	16.1
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	16.4	51.3	7.5	1.3	19.0

Figure 17. Vaccination coverage among children ages 12-23 months, Peshawar District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

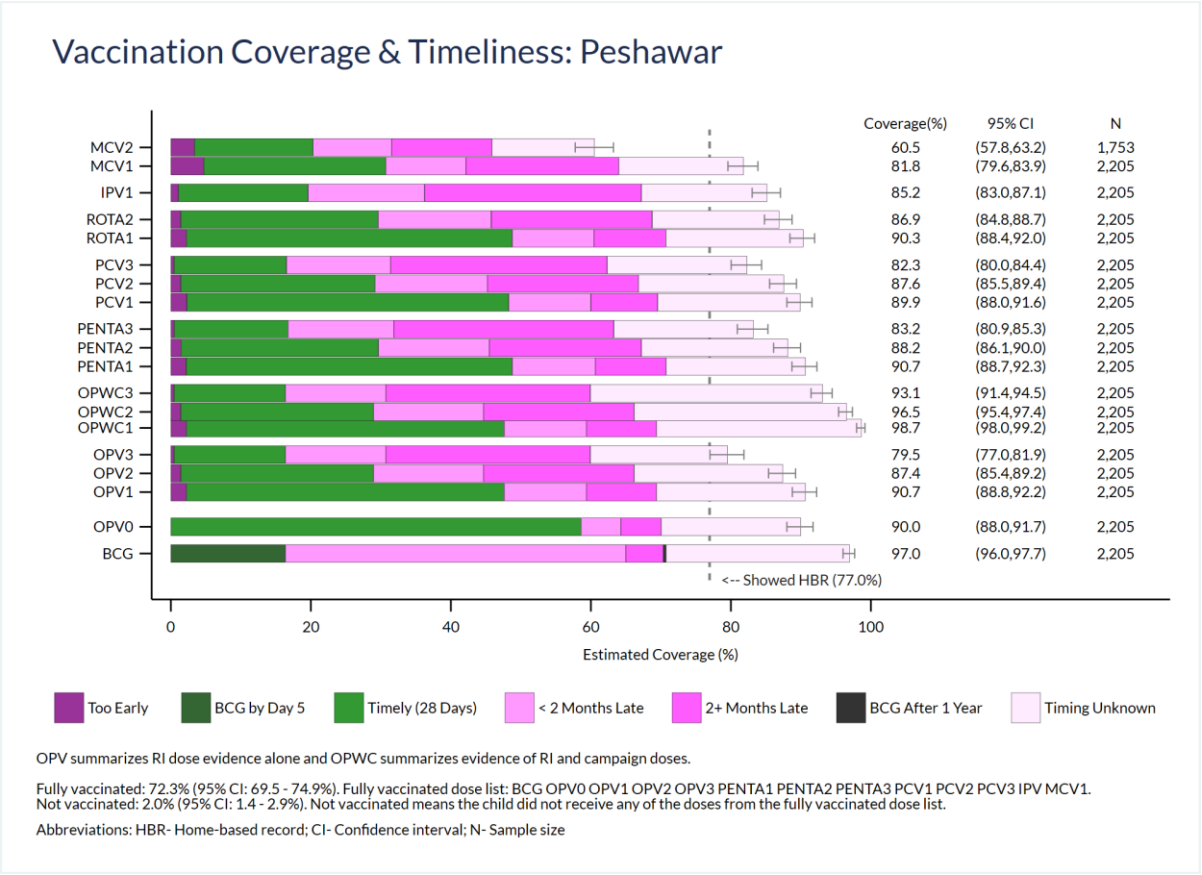
Fully vaccinated: 70.4% (95% CI: 67.3 - 73.2%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 4.0% (95% CI: 2.8 - 5.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 25. Vaccination coverage bar segment lengths (%), Peshawar District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.2	16.8	9.1	7.1	25.0
MCV1	2.3	29.8	15.4	16.2	20.1
IPV	0.4	14.6	16.0	37.7	20.5
ROTA2	0.6	19.8	15.6	32.6	16.6
ROTA1	1.6	38.1	13.1	18.6	21.6
PCV3	0.2	11.0	11.3	40.5	18.8
PCV2	0.6	19.9	15.4	32.2	18.6
PCV1	1.6	38.1	13.1	18.5	21.8
PENTA3	0.2	11.0	11.4	40.8	19.2
PENTA2	0.6	19.8	15.3	32.3	18.8
PENTA1	1.6	38.0	13.1	18.5	22.0
OPWC3	0.2	10.9	11.3	35.8	27.6
OPWC2	0.6	19.9	15.5	32.1	21.2
OPWC1	1.6	38.1	13.1	18.3	26.3
OPV3	0.2	10.9	11.3	35.8	19.0
OPV2	0.6	19.9	15.5	32.1	16.2
OPV1	1.6	38.1	13.1	18.3	23.6
OPV0	0.0	50.6	9.6	10.3	23.1
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	13.4	46.7	10.0	0.4	24.2

Figure 18. Vaccination coverage among children ages 12-23 months, Peshawar District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 72.3% (95% CI: 69.5 - 74.9%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 2.0% (95% CI: 1.4 - 2.9%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 26. Vaccination coverage bar segment lengths (%), Peshawar District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.7	13.5	8.9	11.4	24.1
MCV1	4.7	26.0	11.4	21.9	17.8
IPV	1.1	18.5	16.6	31.0	18.0
ROTA2	1.4	28.2	16.1	23.0	18.1
ROTA1	2.2	46.5	11.7	10.2	19.6
PCV3	0.5	16.1	14.9	30.9	20.0
PCV2	1.4	27.8	16.1	21.6	20.8
PCV1	2.3	46.0	11.7	9.5	20.4
PENTA3	0.5	16.2	15.1	31.4	20.0
PENTA2	1.5	28.2	15.8	21.7	21.0
PENTA1	2.2	46.6	11.9	10.1	19.9
OPWC3	0.5	15.9	14.3	29.2	33.2
OPWC2	1.4	27.5	15.7	21.5	30.3
OPWC1	2.2	45.4	11.7	10.0	29.3
OPV3	0.5	15.9	14.3	29.2	19.6
OPV2	1.4	27.5	15.7	21.5	21.3
OPV1	2.2	45.4	11.7	10.0	21.3
OPV0	0.0	58.6	5.7	5.8	20.0
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	16.4	48.6	5.4	0.4	26.2

Figure 19. Vaccination coverage among children ages 12-23 months, Peshawar District, SHRUCs Round 3

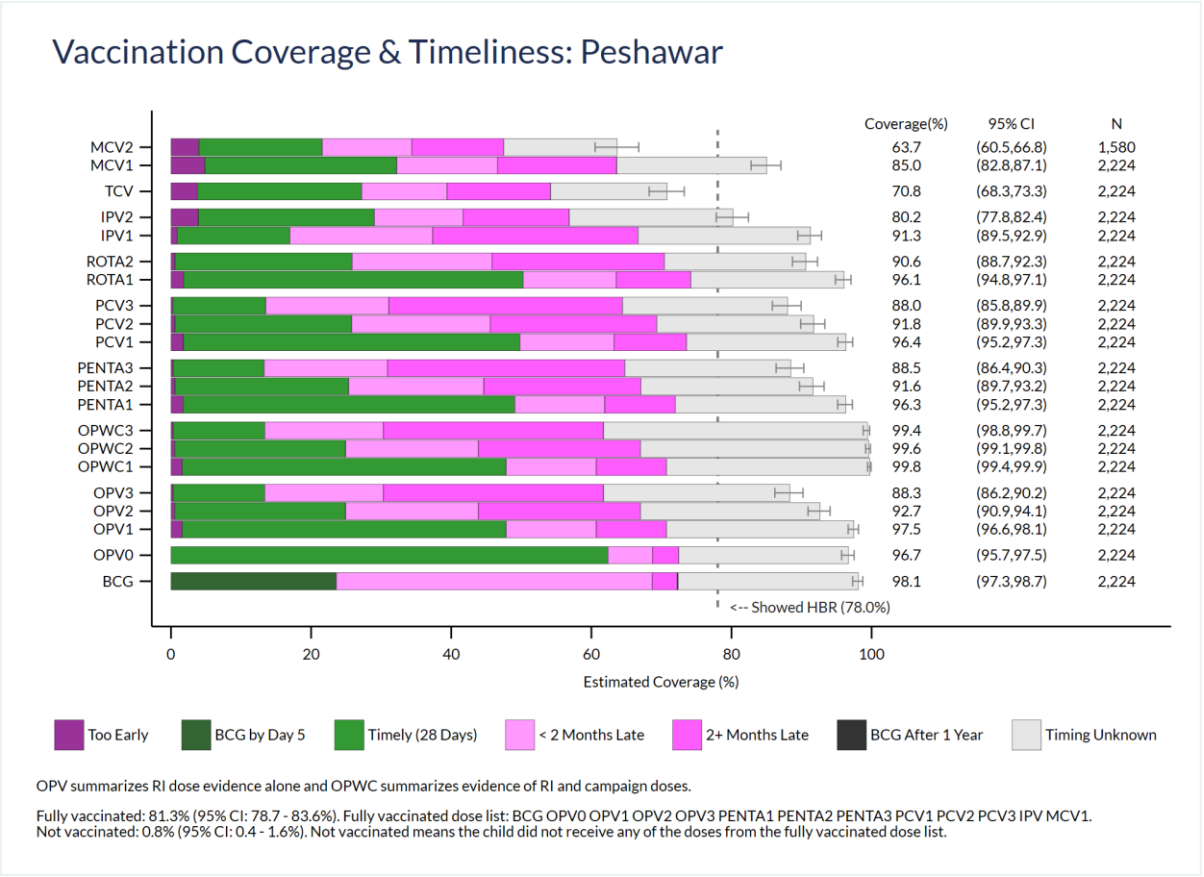


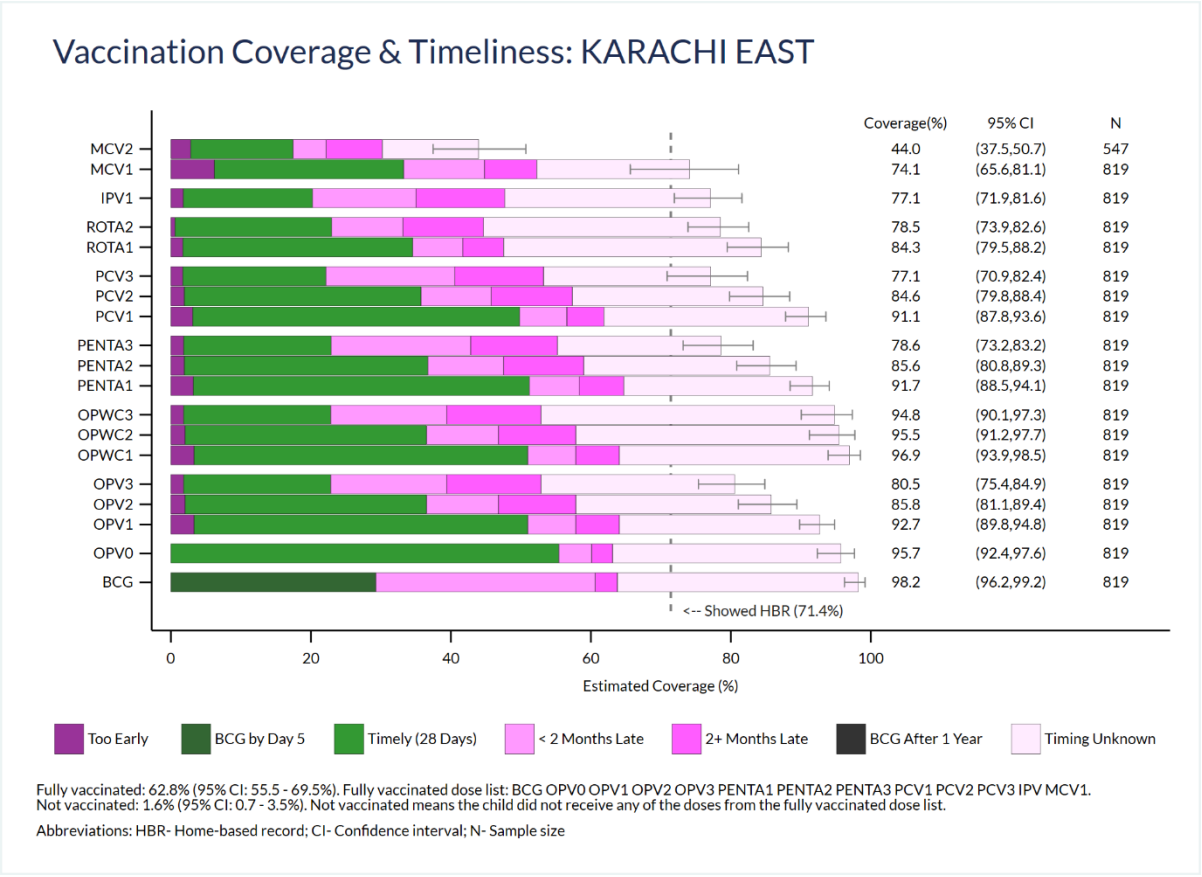
Table 27. Vaccination coverage bar segment lengths (%), Peshawar District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	4.0	17.6	12.8	13.1	16.2
MCV1	4.8	27.4	14.4	17.0	21.4
TCV	3.8	23.4	12.2	14.8	16.6
IPV2	3.9	25.1	12.7	15.1	23.4
IPV1	0.9	16.1	20.4	29.3	24.6
ROTA2	0.5	25.3	20.0	24.6	20.2
ROTA1	1.8	48.5	13.3	10.6	21.9
PCV3	0.3	13.3	17.5	33.4	23.6
PCV2	0.5	25.2	19.8	23.8	22.4
PCV1	1.8	48.0	13.4	10.4	22.8
PENTA3	0.3	13.0	17.6	33.9	23.7
PENTA2	0.5	24.8	19.3	22.4	24.6
PENTA1	1.7	47.4	12.8	10.1	24.4
OPWC3	0.3	13.1	16.9	31.4	37.7
OPWC2	0.5	24.4	18.9	23.1	32.6
OPWC1	1.6	46.2	12.9	10.0	29.1
OPV3	0.3	13.1	16.9	31.4	26.6
OPV2	0.5	24.4	18.9	23.1	25.6
OPV1	1.6	46.2	12.9	10.0	26.8
OPV0	0.0	62.4	6.4	3.7	24.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	23.6	45.1	3.6	0.1	25.8

The Peshawar figures (Figure 1 and Figure 2 and Figure 15 through Figure 19) indicate:

- Like every other SHRUC district in this report, after modest mixed gains and declines from SHRUC Round 1 to Round 2, the Round 3 survey showed statistically significant improvements for nearly every dose, and there was net improvement from Round 1 in 2021 to Round 3 in 2023 for all doses except IPV and MCV. The percent fully vaccinated in SHRUCs improved by 10.7% over that time period. Statistically significant changes are summarized in Table 15.
- In Round 1 TPVICS the coverage for IPV was quite comparable to PENTA3 and PCV3; in Round 1 SHRUCs the IPV coverage was notably higher than PENTA3 and PCV3. In Round 2, IPV coverage was higher than OPV3 and PCV3 and Penta3 in both TPVICS and SHRUCs.
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in every dose series.
- All five surveys show notable portions of each bar indicating doses received more than 28 days late. The later doses in the series have many more children receiving the doses two or more months late compared to the earlier doses in the series.

Figure 20. Vaccination coverage among children ages 12-23 months, Karachi East District, TPVICS Round 1



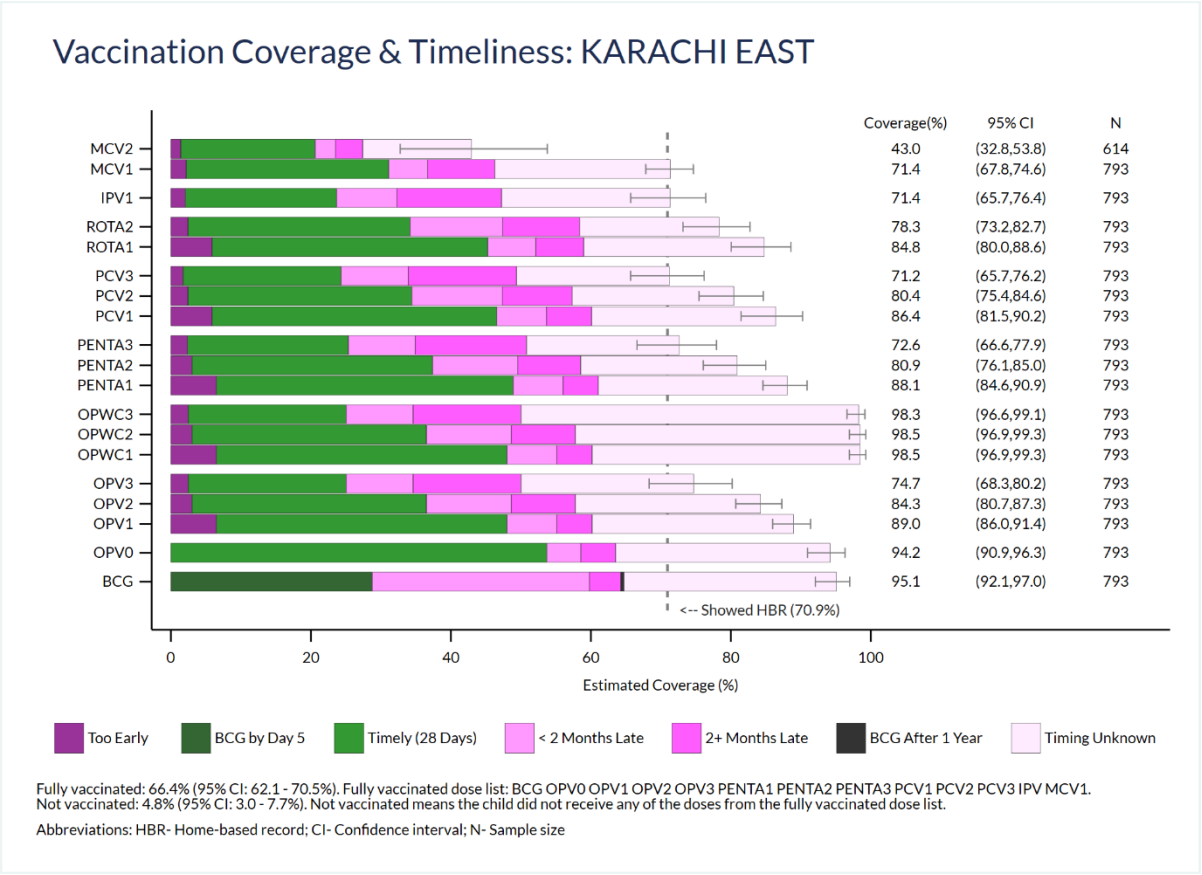
Fully vaccinated: 62.8% (95% CI: 55.5 - 69.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 1.6% (95% CI: 0.7 - 3.5%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 28. Vaccination coverage bar segment lengths (%), Karachi East District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.8	14.6	4.7	8.0	13.8
MCV1	6.2	27.0	11.5	7.5	21.9
IPV	1.8	18.5	14.8	12.7	29.4
ROTA2	0.6	22.4	10.2	11.5	33.9
ROTA1	1.7	32.8	7.1	5.8	36.8
PCV3	1.7	20.4	18.4	12.7	23.9
PCV2	1.9	33.8	10.0	11.6	27.2
PCV1	3.1	46.7	6.7	5.3	29.3
PENTA3	1.8	21.1	19.9	12.4	23.4
PENTA2	1.9	34.8	10.8	11.5	26.6
PENTA1	3.2	48.0	7.1	6.4	27.0
OPWC3	1.8	21.0	16.6	13.5	41.9
OPWC2	2.0	34.5	10.3	11.1	37.6
OPWC1	3.3	47.7	6.9	6.2	32.9
OPV3	1.8	21.0	16.6	13.5	27.7
OPV2	2.0	34.5	10.3	11.1	27.9
OPV1	3.3	47.7	6.9	6.2	28.7
OPV0	0.0	55.4	4.7	3.0	32.6
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	29.3	31.4	3.1	0.0	34.4

Figure 21. Vaccination coverage among children ages 12-23 months, Karachi East District, TPVICS Round 2



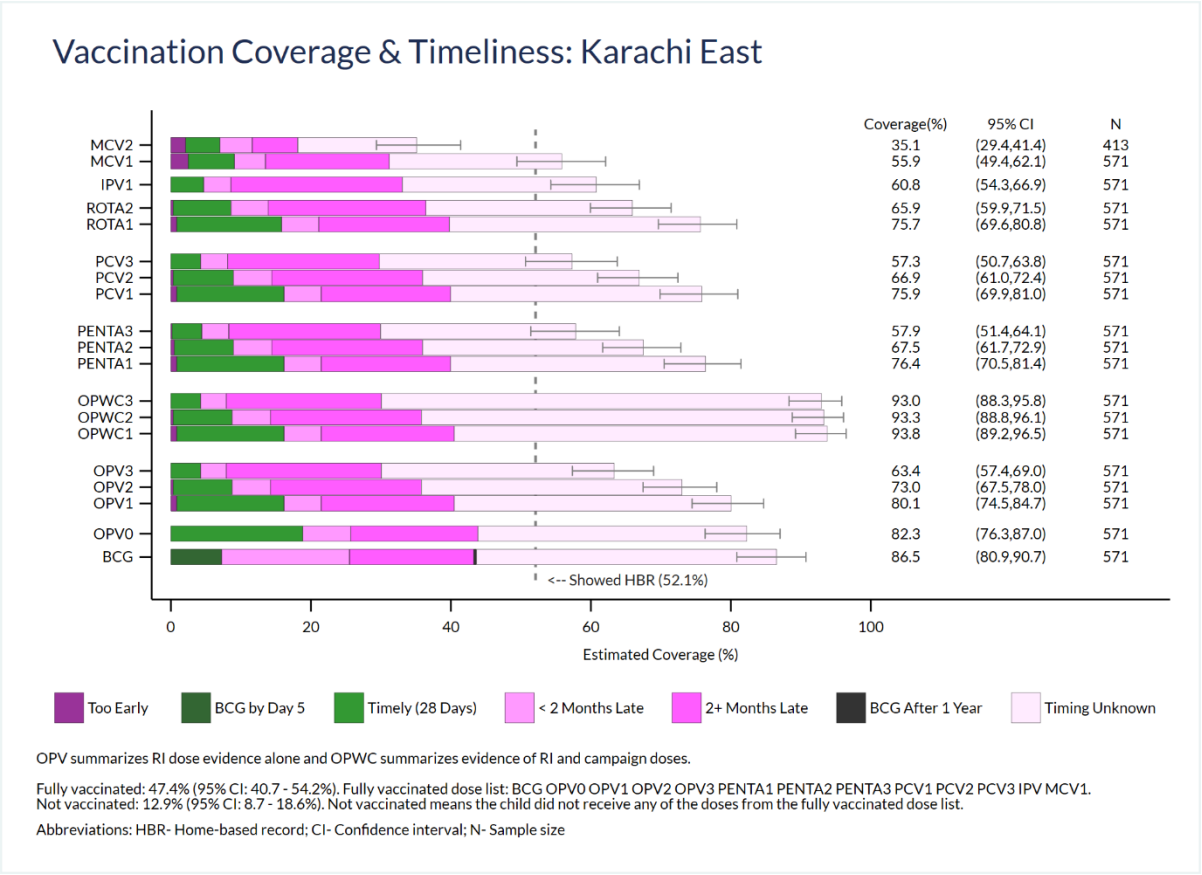
Fully vaccinated: 66.4% (95% CI: 62.1 - 70.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 4.8% (95% CI: 3.0 - 7.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 29. Vaccination coverage bar segment lengths (%), Karachi East District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.4	19.2	2.9	3.9	15.5
MCV1	2.2	28.9	5.6	9.6	25.1
IPV	2.1	21.6	8.6	14.9	24.1
ROTA2	2.5	31.7	13.2	11.0	19.9
ROTA1	5.9	39.4	6.9	6.8	25.8
PCV3	1.7	22.6	9.6	15.5	21.8
PCV2	2.4	32.0	12.9	10.0	23.1
PCV1	5.9	40.7	7.1	6.4	26.3
PENTA3	2.4	23.0	9.6	15.9	21.8
PENTA2	3.0	34.4	12.2	9.0	22.4
PENTA1	6.5	42.4	7.1	5.0	27.0
OPWC3	2.5	22.6	9.5	15.4	48.3
OPWC2	3.0	33.5	12.1	9.1	40.7
OPWC1	6.5	41.5	7.1	5.0	38.3
OPV3	2.5	22.6	9.5	15.4	24.7
OPV2	3.0	33.5	12.1	9.1	26.5
OPV1	6.5	41.5	7.1	5.0	28.8
OPV0	0.0	53.7	4.9	5.0	30.7
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	28.8	31.0	4.5	0.4	30.4

Figure 22. Vaccination coverage among children ages 12-23 months, Karachi East District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

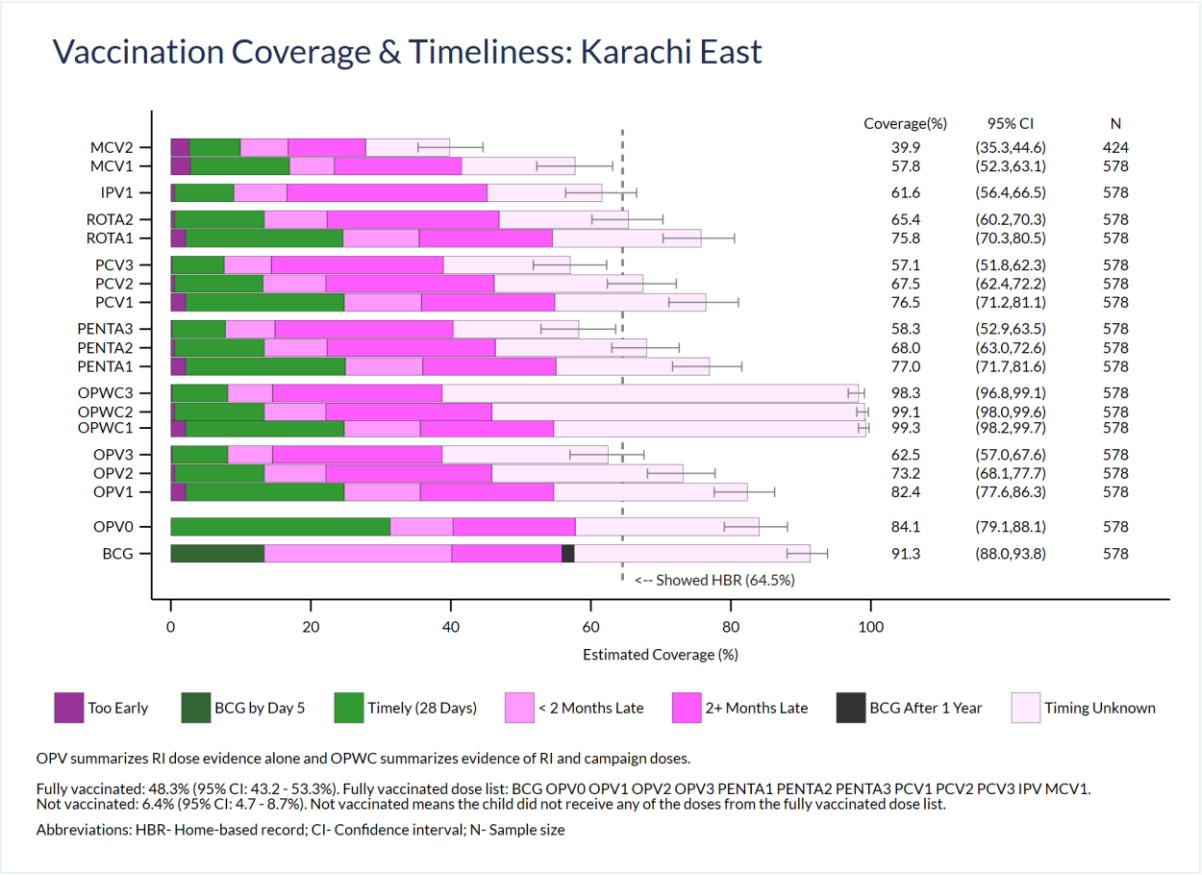
Fully vaccinated: 47.4% (95% CI: 40.7 - 54.2%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 12.9% (95% CI: 8.7 - 18.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 30. Vaccination coverage bar segment lengths (%), Karachi East District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.5	3.5	3.3	4.7	22.0
MCV1	2.5	6.6	4.4	17.7	24.7
IPV	0.0	4.7	3.9	24.5	27.7
ROTA2	0.3	8.3	5.3	22.5	29.5
ROTA1	0.8	15.0	5.3	18.7	35.9
PCV3	0.0	4.2	3.9	21.7	27.6
PCV2	0.3	8.6	5.5	21.5	31.0
PCV1	0.8	15.3	5.3	18.5	35.9
PENTA3	0.2	4.2	3.9	21.7	27.9
PENTA2	0.5	8.4	5.5	21.5	31.6
PENTA1	0.8	15.3	5.3	18.5	36.4
OPWC3	0.0	4.2	3.7	22.2	62.9
OPWC2	0.3	8.4	5.5	21.5	57.5
OPWC1	0.8	15.3	5.3	19.0	53.3
OPV3	0.0	4.2	3.7	22.2	33.3
OPV2	0.3	8.4	5.5	21.5	37.3
OPV1	0.8	15.3	5.3	19.0	39.6
OPV0	0.0	18.9	6.9	18.1	38.4
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	7.3	18.3	17.7	0.4	42.9

Figure 23. Vaccination coverage among children ages 12-23 months, Karachi East District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 48.3% (95% CI: 43.2 - 53.3%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 6.4% (95% CI: 4.7 - 8.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 31. Vaccination coverage bar segment lengths (%), Karachi East District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.9	5.4	5.0	8.1	19.4
MCV1	2.8	14.2	6.4	18.2	16.3
IPV	0.5	8.5	7.6	28.5	16.4
ROTA2	0.5	12.8	9.0	24.6	18.5
ROTA1	2.1	22.5	10.9	19.0	21.3
PCV3	0.2	7.4	6.7	24.6	18.2
PCV2	0.5	12.6	9.0	24.0	21.3
PCV1	2.1	22.7	11.1	19.0	21.6
PENTA3	0.2	7.6	7.1	25.4	18.0
PENTA2	0.5	12.8	9.0	24.0	21.6
PENTA1	2.1	22.8	11.1	19.0	22.0
OPWC3	0.2	8.0	6.4	24.2	59.5
OPWC2	0.5	12.8	8.8	23.7	53.3
OPWC1	2.1	22.7	10.9	19.0	44.6
OPV3	0.2	8.0	6.4	24.2	23.7
OPV2	0.5	12.8	8.8	23.7	27.3
OPV1	2.1	22.7	10.9	19.0	27.7
OPV0	0.0	31.3	9.0	17.5	26.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	13.3	26.8	15.7	1.7	33.7

Figure 24. Vaccination coverage among children ages 12-23 months, Karachi East District, SHRUCs Round 3

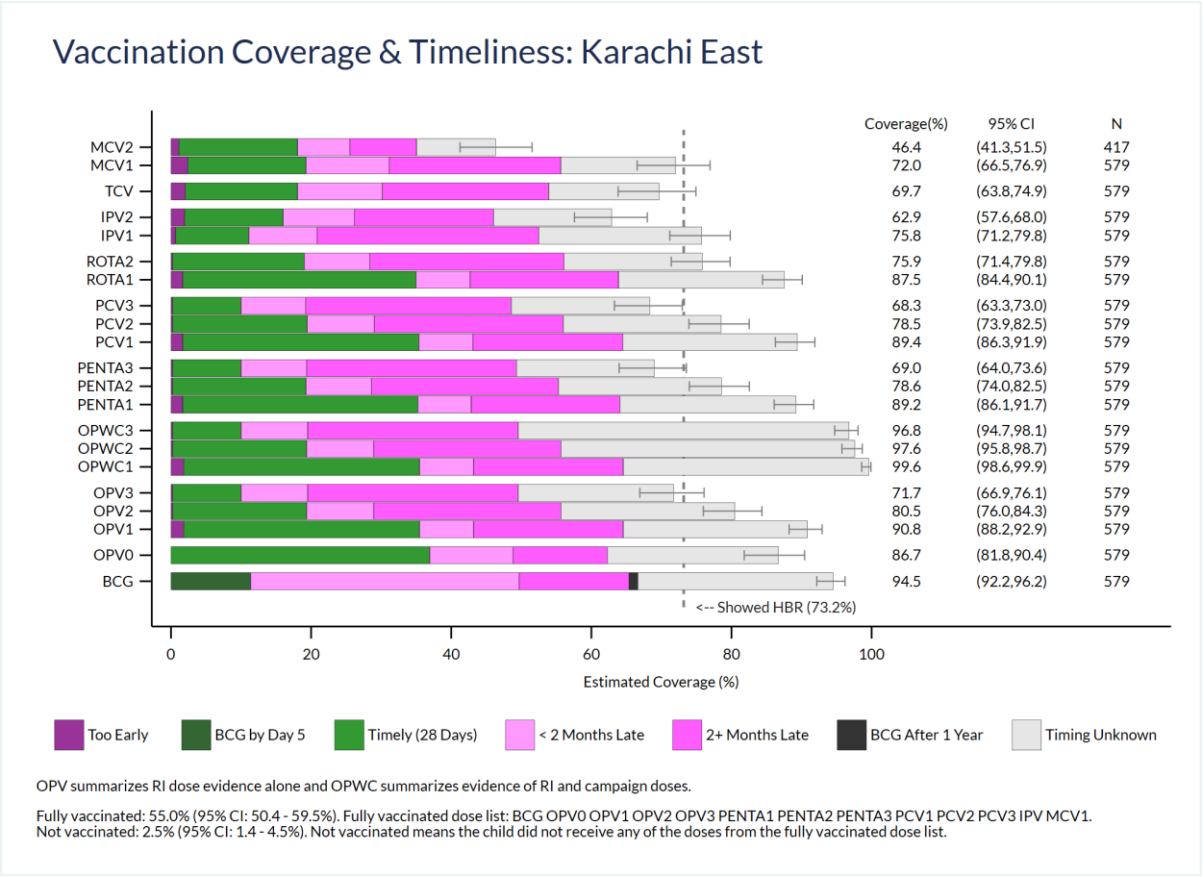


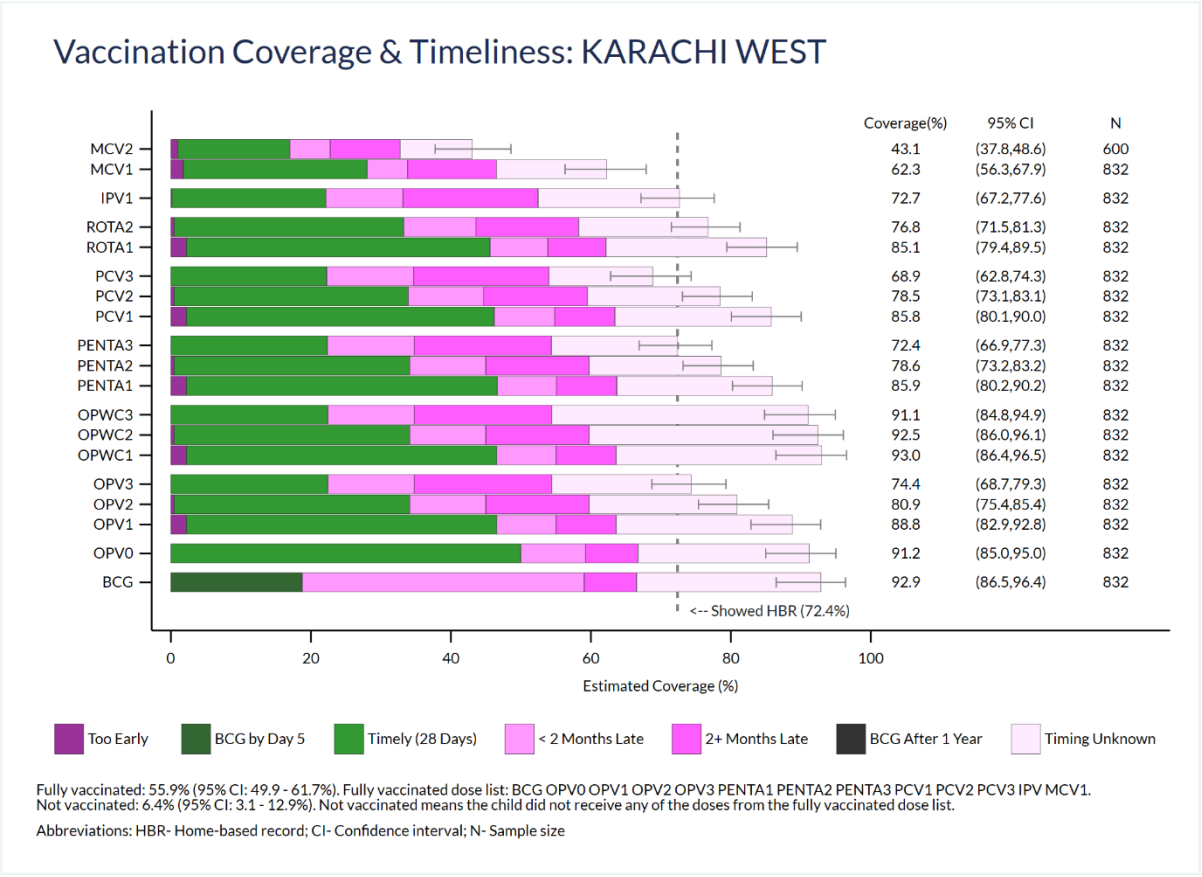
Table 32. Vaccination coverage bar segment lengths (%), Karachi East District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.1	16.9	7.5	9.5	11.3
MCV1	2.4	16.9	11.9	24.5	16.4
TCV	2.0	16.0	12.1	23.7	15.8
IPV2	1.9	14.1	10.2	19.9	16.9
IPV1	0.6	10.5	10.0	33.9	16.7
ROTA2	0.2	18.8	9.3	27.7	19.8
ROTA1	1.7	33.3	7.7	21.2	23.7
PCV3	0.2	9.8	9.2	29.4	19.8
PCV2	0.2	19.2	9.6	27.0	22.6
PCV1	1.7	33.7	7.7	21.4	24.9
PENTA3	0.2	9.8	9.4	29.9	19.6
PENTA2	0.2	19.1	9.4	26.7	23.3
PENTA1	1.7	33.6	7.6	21.2	25.2
OPWC3	0.2	9.8	9.5	30.1	47.2
OPWC2	0.2	19.1	9.6	26.8	41.9
OPWC1	1.8	33.7	7.7	21.4	35.1
OPV3	0.2	9.8	9.5	30.1	22.2
OPV2	0.2	19.1	9.6	26.8	24.8
OPV1	1.8	33.7	7.7	21.4	26.3
OPV0	0.0	36.9	11.9	13.5	24.4
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	11.4	38.3	15.7	1.3	27.9

The Karachi East figures (Figure 3, Figure 4, and Figure 20 through Figure 24) indicate:

- There was little statistically significant change from TPVICS Round 1 to Round 2 or from SHRUCs Round 1 to Round 2, but there was improvement by 10 percentage points or more from SHRUCs Round 2 to Round 3 for nearly every dose. The percentage of zero dose children in Karachi East SHRUCs children dropped by 10.3% from 2021 to 2023 and the percent showing a card improved by 21.1%. Significant changes are tabulated in Table 16.
- Round 1 card availability in the SHRUCs was substantially higher than in TPVICS (71.4% vs. 53.1%). Rounds 2 and 3 of the SHRUCs survey both saw notable increases, reaching 73.2% in 2023.
- In TPVICS Round 1, coverage in the OPV, PENTA, PCV, and ROTA series was nearly the same, but in SHRUCs, coverage for OPV1-3 was somewhat higher than for PENTA1-3 and PCV1-3 and ROTA1-2.
- In Round 1 TPVICS the coverage for IPV was quite comparable to PENTA3 and PCV3; in SHRUCs the IPV coverage was notably higher than PENTA3 and PCV3.
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All five surveys show many children having evidence of receiving doses more than 28 days late. They also show that later doses in the series had many more children receiving the doses two or more months late compred to earlier doses in the series.

Figure 25. Vaccination coverage among children ages 12-23 months, Karachi West District, TPVICS Round 1



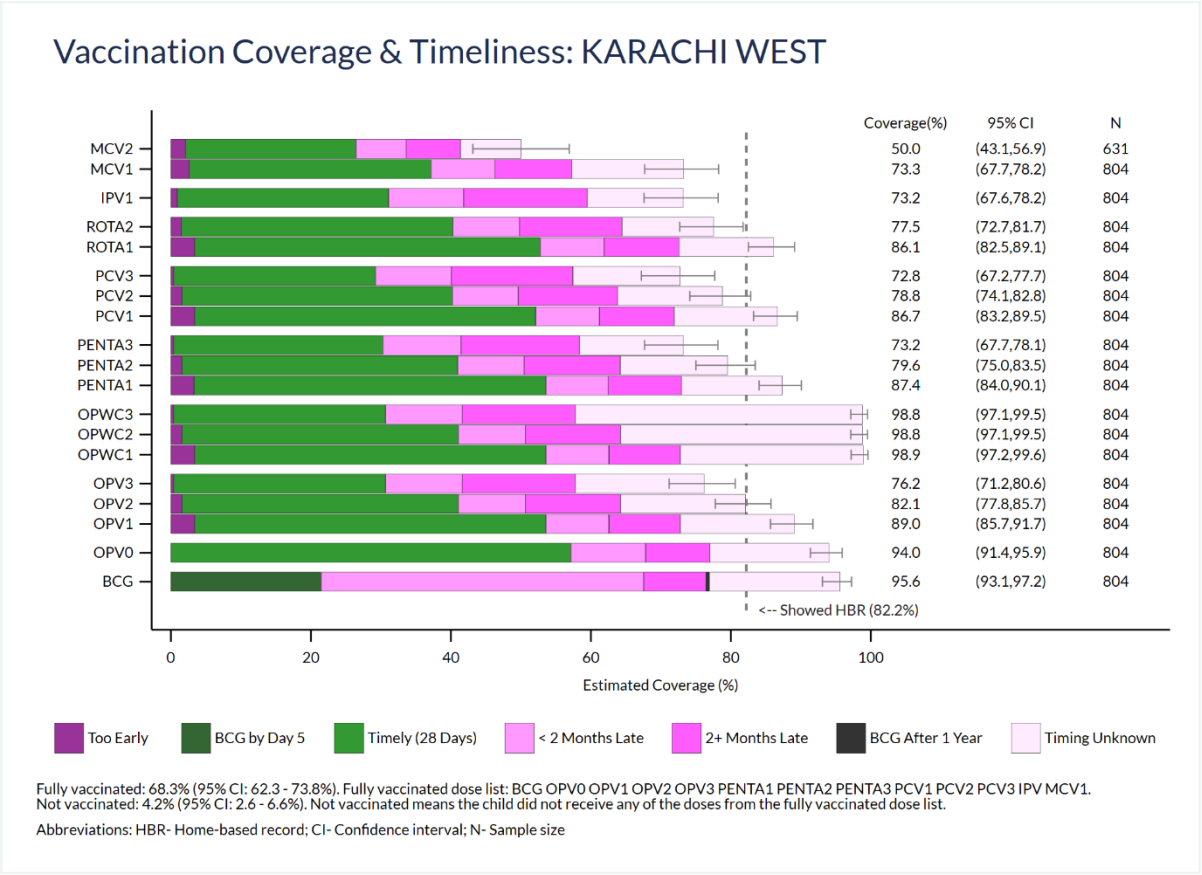
Fully vaccinated: 55.9% (95% CI: 49.9 - 61.7%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 6.4% (95% CI: 3.1 - 12.9%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 33. Vaccination coverage bar segment lengths (%), Karachi West District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.0	16.0	5.8	10.0	10.3
MCV1	1.8	26.3	5.8	12.7	15.8
IPV	0.2	22.0	11.0	19.3	20.3
ROTA2	0.5	32.8	10.3	14.7	18.5
ROTA1	2.2	43.4	8.2	8.3	23.0
PCV3	0.0	22.3	12.4	19.3	14.8
PCV2	0.5	33.4	10.8	14.8	19.0
PCV1	2.2	44.0	8.6	8.6	22.4
PENTA3	0.0	22.4	12.4	19.6	18.0
PENTA2	0.5	33.6	10.8	14.8	18.9
PENTA1	2.2	44.4	8.4	8.6	22.2
OPWC3	0.0	22.5	12.3	19.6	36.7
OPWC2	0.5	33.6	10.8	14.8	32.7
OPWC1	2.2	44.3	8.4	8.6	29.4
OPV3	0.0	22.5	12.3	19.6	20.0
OPV2	0.5	33.6	10.8	14.8	21.1
OPV1	2.2	44.3	8.4	8.6	25.2
OPV0	0.0	50.0	9.3	7.5	24.5
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	18.8	40.3	7.5	0.0	26.4

Figure 26. Vaccination coverage among children ages 12-23 months, Karachi West District, TPVICS Round 2



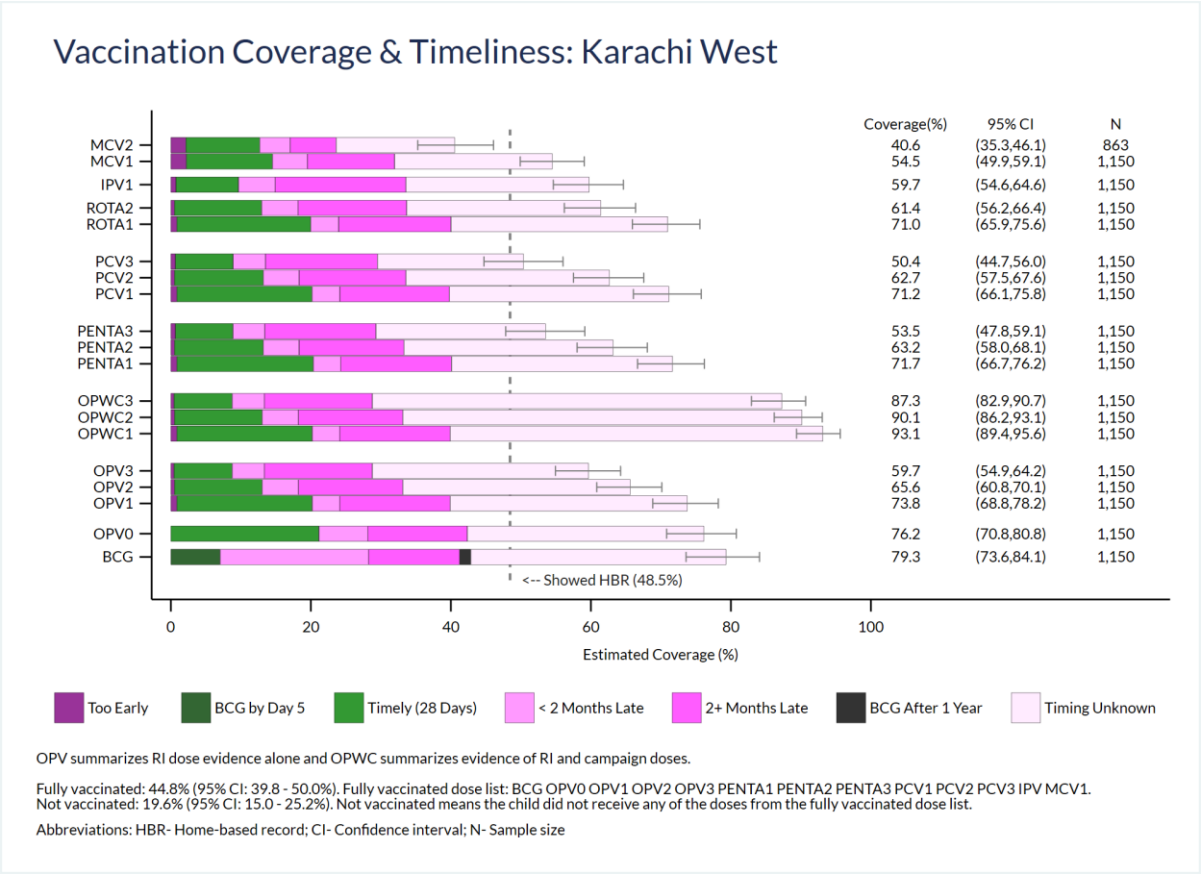
Fully vaccinated: 68.3% (95% CI: 62.3 - 73.8%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 4.2% (95% CI: 2.6 - 6.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 34. Vaccination coverage bar segment lengths (%), Karachi West District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.1	24.4	7.2	7.8	8.7
MCV1	2.6	34.5	9.1	10.9	16.1
IPV	0.9	30.2	10.7	17.6	13.7
ROTA2	1.5	38.8	9.5	14.6	13.1
ROTA1	3.4	49.4	9.1	10.7	13.6
PCV3	0.4	28.8	10.8	17.4	15.3
PCV2	1.6	38.6	9.4	14.2	15.0
PCV1	3.4	48.7	9.1	10.7	14.8
PENTA3	0.4	29.9	11.2	16.9	14.8
PENTA2	1.6	39.4	9.5	13.7	15.4
PENTA1	3.3	50.3	8.9	10.5	14.4
OPWC3	0.4	30.3	10.9	16.1	41.1
OPWC2	1.6	39.5	9.6	13.6	34.6
OPWC1	3.4	50.2	9.0	10.2	26.1
OPV3	0.4	30.3	10.9	16.1	18.5
OPV2	1.6	39.5	9.6	13.6	17.9
OPV1	3.4	50.2	9.0	10.2	16.3
OPV0	0.0	57.1	10.7	9.2	17.0
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	21.5	46.1	8.9	0.5	18.7

Figure 27. Vaccination coverage among children ages 12-23 months, Karachi West District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

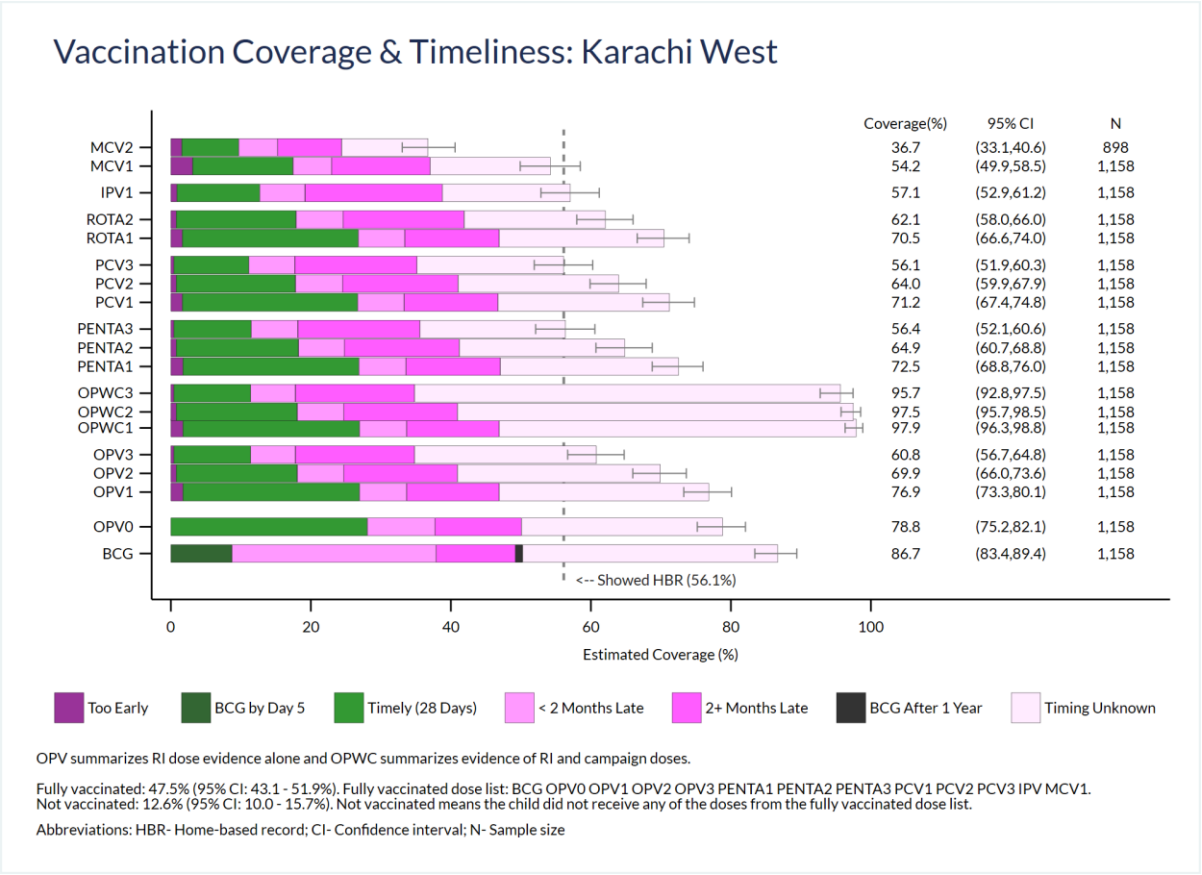
Fully vaccinated: 44.8% (95% CI: 39.8 - 50.0%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 19.6% (95% CI: 15.0 - 25.2%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 35. Vaccination coverage bar segment lengths (%), Karachi West District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.6	7.8	3.2	4.9	23.0
MCV1	2.2	12.3	5.0	12.5	22.6
IPV	0.7	8.9	5.3	18.7	26.2
ROTA2	0.5	12.4	5.2	15.5	27.8
ROTA1	0.9	19.1	4.0	16.0	31.0
PCV3	0.6	8.2	4.6	16.0	20.9
PCV2	0.5	12.7	5.1	15.2	29.1
PCV1	0.9	19.3	4.0	15.7	31.4
PENTA3	0.6	8.2	4.5	15.9	24.2
PENTA2	0.5	12.7	5.1	15.0	29.9
PENTA1	0.9	19.5	3.9	15.8	31.6
OPWC3	0.5	8.3	4.6	15.4	58.5
OPWC2	0.5	12.5	5.2	14.9	57.0
OPWC1	0.9	19.3	3.9	15.8	53.2
OPV3	0.5	8.3	4.6	15.4	30.9
OPV2	0.5	12.5	5.2	14.9	32.5
OPV1	0.9	19.3	3.9	15.8	33.9
OPV0	0.0	21.1	7.0	14.2	33.8
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	7.0	21.2	13.0	1.6	36.5

Figure 28. Vaccination coverage among children ages 12-23 months, Karachi West District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 47.5% (95% CI: 43.1 - 51.9%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 12.6% (95% CI: 10.0 - 15.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 36. Vaccination coverage bar segment lengths (%), Karachi West District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.2	6.3	4.3	7.1	17.8
MCV1	3.1	14.3	5.5	14.1	17.2
IPV	0.9	11.8	6.5	19.6	18.3
ROTA2	0.8	17.1	6.7	17.3	20.2
ROTA1	1.6	25.1	6.6	13.5	23.6
PCV3	0.4	10.7	6.6	17.4	21.0
PCV2	0.8	17.0	6.7	16.5	23.0
PCV1	1.6	25.0	6.6	13.4	24.5
PENTA3	0.4	11.1	6.6	17.4	20.8
PENTA2	0.8	17.4	6.6	16.4	23.7
PENTA1	1.7	25.1	6.7	13.5	25.5
OPWC3	0.4	11.0	6.4	17.0	60.9
OPWC2	0.8	17.3	6.6	16.2	56.6
OPWC1	1.7	25.2	6.7	13.2	51.0
OPV3	0.4	11.0	6.4	17.0	26.0
OPV2	0.8	17.3	6.6	16.2	29.0
OPV1	1.7	25.2	6.7	13.2	30.0
OPV0	0.0	28.1	9.7	12.3	28.8
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	8.7	29.2	11.3	1.0	36.4

Figure 29. Vaccination coverage among children ages 12-23 months, Karachi West District, SHRUCs Round 3

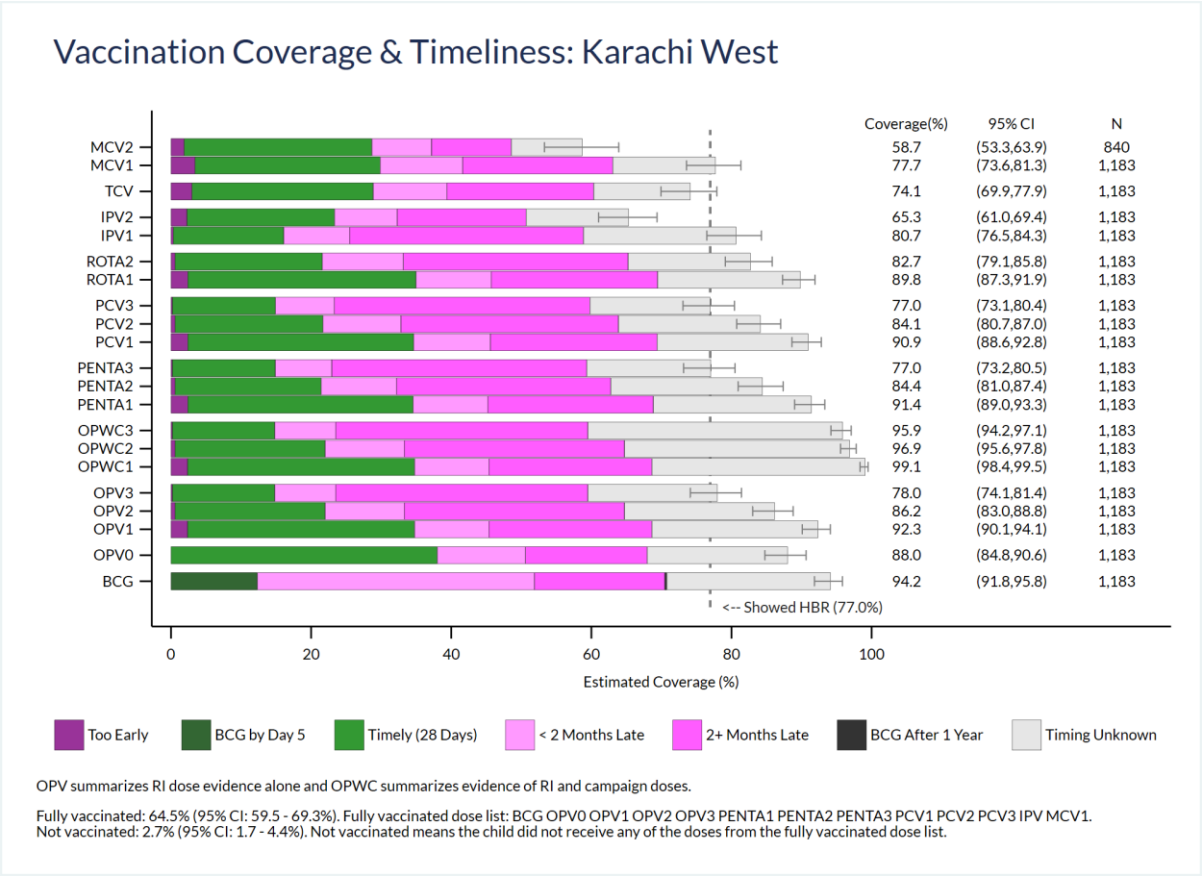


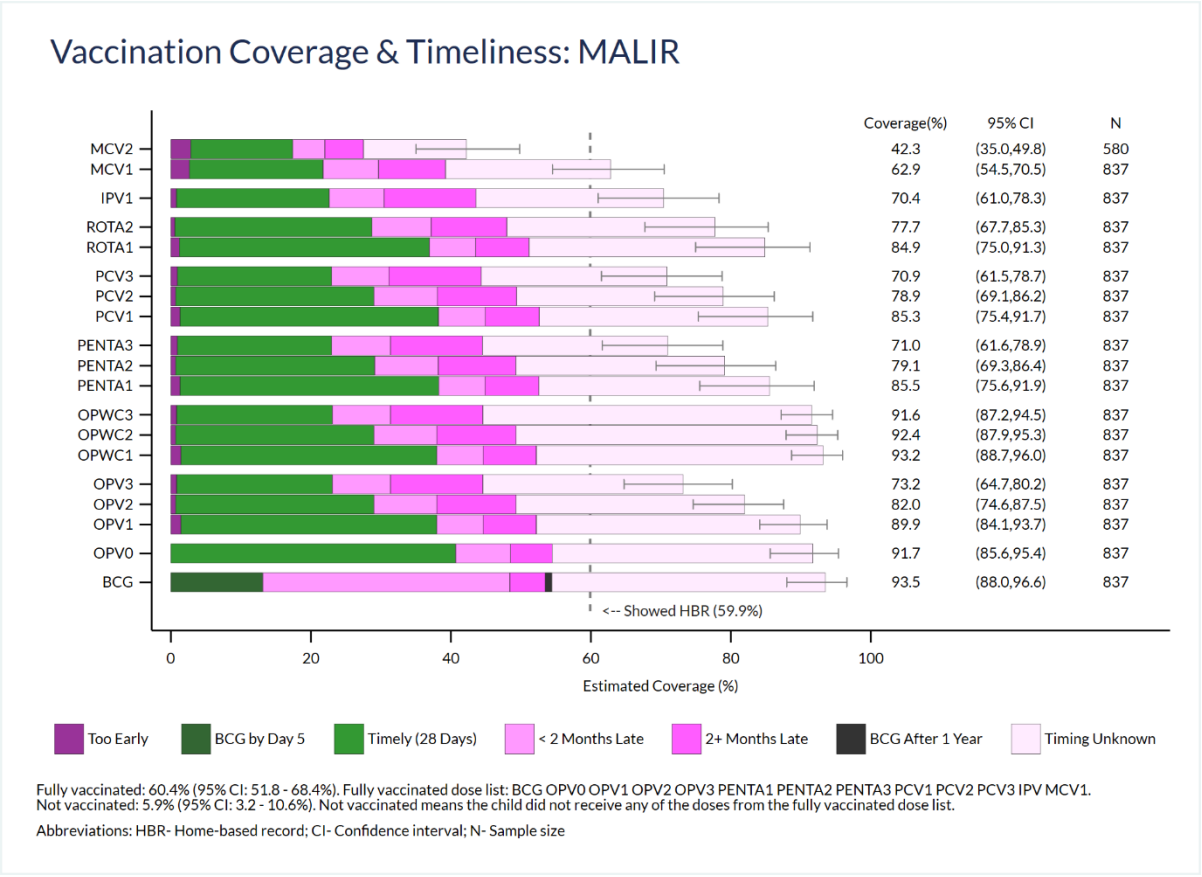
Table 37. Vaccination coverage bar segment lengths (%), Karachi West District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.9	26.8	8.5	11.4	10.1
MCV1	3.4	26.4	11.8	21.4	14.7
TCV	3.0	25.9	10.5	20.9	13.8
IPV2	2.3	21.1	8.9	18.4	14.6
IPV1	0.3	15.7	9.5	35.9	15.6
ROTA2	0.6	21.0	11.6	32.1	17.5
ROTA1	2.4	32.6	10.7	23.7	20.4
PCV3	0.2	14.7	8.4	36.5	17.2
PCV2	0.6	21.1	11.1	31.0	20.3
PCV1	2.4	32.2	10.9	23.8	21.6
PENTA3	0.2	14.7	8.1	36.4	17.7
PENTA2	0.6	20.9	10.7	30.6	21.7
PENTA1	2.4	32.2	10.6	23.6	22.6
OPWC3	0.2	14.6	8.7	36.0	36.4
OPWC2	0.6	21.4	11.3	31.4	32.1
OPWC1	2.4	32.4	10.6	23.3	30.5
OPV3	0.2	14.6	8.7	36.0	18.5
OPV2	0.6	21.4	11.3	31.4	21.4
OPV1	2.4	32.4	10.6	23.3	23.7
OPV0	0.0	38.0	12.6	17.4	20.1
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	12.3	39.5	18.6	0.3	23.4

The Karachi West figures (Figure 5, Figure 6, and Figure 25 through Figure 29) indicate:

- Both TPVICS and SHRUCs showed modest gains from SHRUC Round 1 to Round 2, but the Round 3 survey showed statistically significant improvements of 10 to 20 percentage points for nearly every dose, and there was net improvement from Round 1 in 2021 to Round 3 in 2023 for all doses. The percent fully vaccinated in SHRUCs improved by 19.2% and the percent of zero dose children dropped by 16.9% over that period. Statistically significant changes are summarized in Table 17.
- Round 1 card availability in TPVICS was substantially higher than in SHRUCs (72.4% vs. 48.5%). Card availability increased substantially in the SHRUCs from Round 2 to Round 3, rising to 77.0% in 2023.
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All five surveys show many children having evidence of receiving doses more than 28 days late and show the later doses in the series have many more children receiving the doses two or more months late compared to earlier doses in the series.

Figure 30. Vaccination coverage among children ages 12-23 months, Malir District, TPVICS Round 1



Fully vaccinated: 60.4% (95% CI: 51.8 - 68.4%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 5.9% (95% CI: 3.2 - 10.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 38. Vaccination coverage bar segment lengths (%), Malir District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.8	14.6	4.6	5.5	14.7
MCV1	2.7	19.1	7.9	9.6	23.6
IPV	0.8	21.8	7.8	13.1	26.8
ROTA2	0.6	28.2	8.5	10.8	29.7
ROTA1	1.2	35.7	6.6	7.6	33.7
PCV3	0.9	22.1	8.2	13.2	26.5
PCV2	0.7	28.3	9.1	11.3	29.5
PCV1	1.3	36.9	6.7	7.7	32.7
PENTA3	0.9	22.1	8.4	13.1	26.5
PENTA2	0.7	28.4	9.1	11.1	29.9
PENTA1	1.3	36.9	6.6	7.7	33.0
OPWC3	0.8	22.3	8.3	13.2	47.0
OPWC2	0.7	28.3	9.0	11.3	43.0
OPWC1	1.4	36.5	6.6	7.6	41.0
OPV3	0.8	22.3	8.3	13.2	28.6
OPV2	0.7	28.3	9.0	11.3	32.7
OPV1	1.4	36.5	6.6	7.6	37.7
OPV0	0.0	40.7	7.9	5.9	37.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	13.1	35.3	5.1	0.9	39.1

Figure 31. Vaccination coverage among children ages 12-23 months, Malir District, TPVICS Round 2

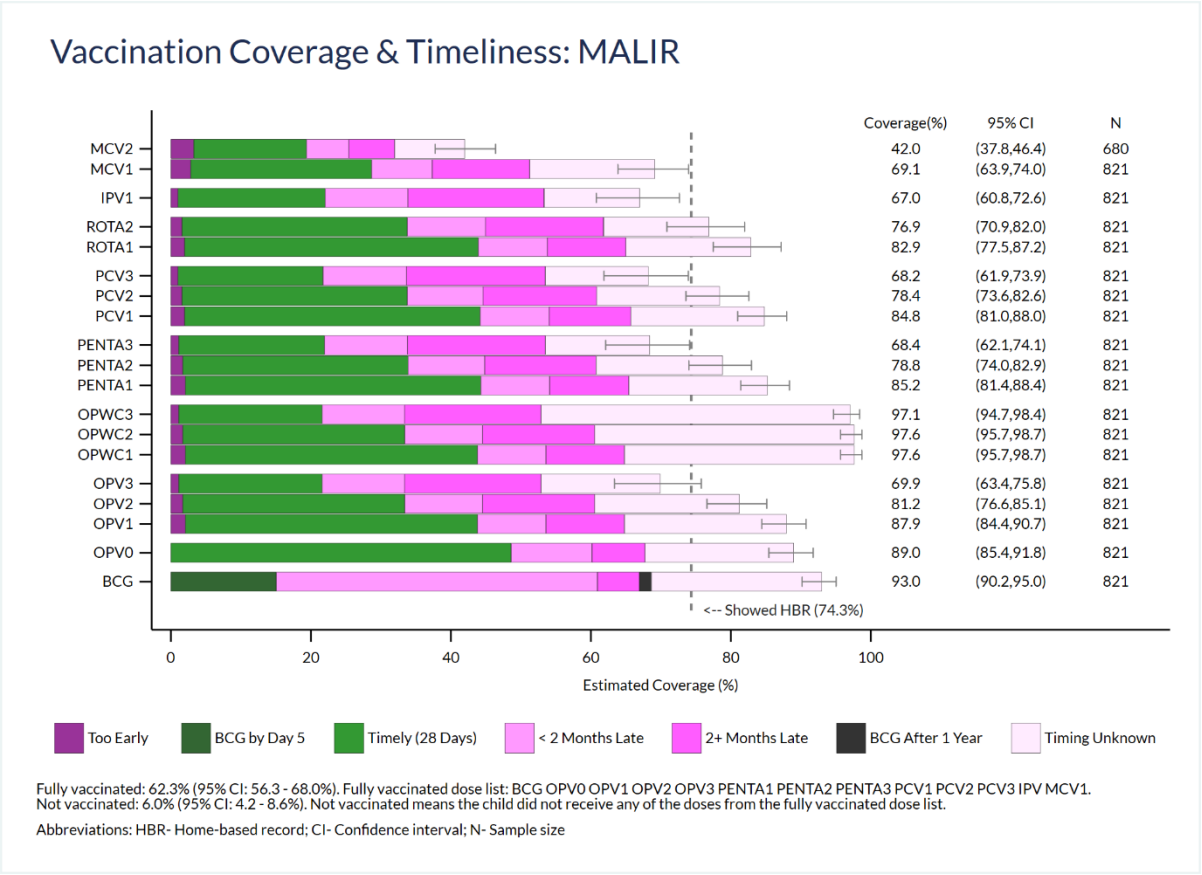
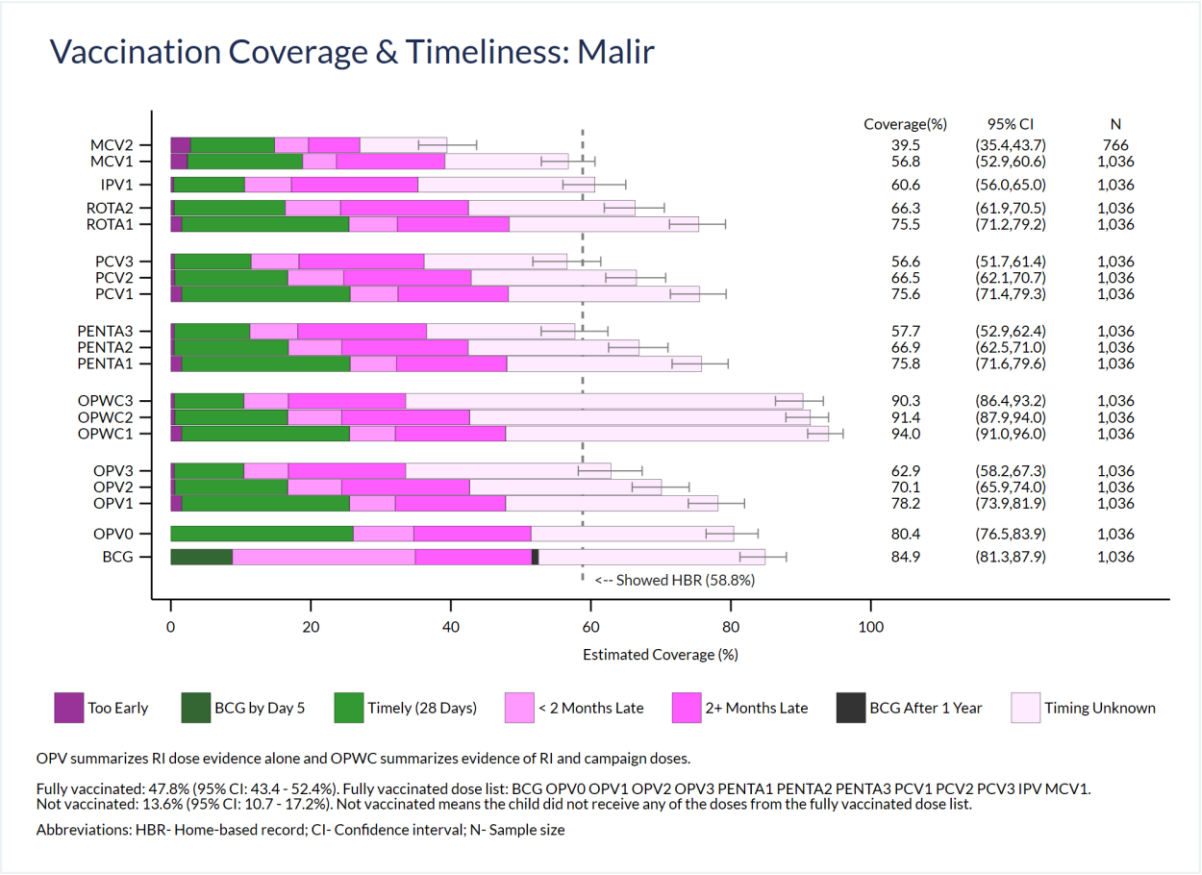


Table 39. Vaccination coverage bar segment lengths (%), Malir District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.3	16.1	6.0	6.5	10.1
MCV1	2.8	25.8	8.7	13.9	17.9
IPV	1.0	21.0	11.8	19.5	13.7
ROTA2	1.6	32.2	11.2	16.9	15.1
ROTA1	2.0	42.0	9.9	11.2	17.9
PCV3	1.0	20.7	11.9	19.8	14.7
PCV2	1.6	32.2	10.8	16.2	17.6
PCV1	2.0	42.2	9.9	11.6	19.1
PENTA3	1.1	20.8	11.8	19.7	14.9
PENTA2	1.7	32.2	10.9	15.9	18.1
PENTA1	2.1	42.2	9.8	11.3	19.8
OPWC3	1.1	20.5	11.8	19.5	44.2
OPWC2	1.7	31.7	11.1	16.0	37.1
OPWC1	2.1	41.7	9.8	11.2	32.8
OPV3	1.1	20.5	11.8	19.5	17.0
OPV2	1.7	31.7	11.1	16.0	20.7
OPV1	2.1	41.7	9.8	11.2	23.1
OPV0	0.0	48.6	11.5	7.6	21.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	15.1	45.9	6.0	1.7	24.4

Figure 32. Vaccination coverage among children ages 12-23 months, Malir District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

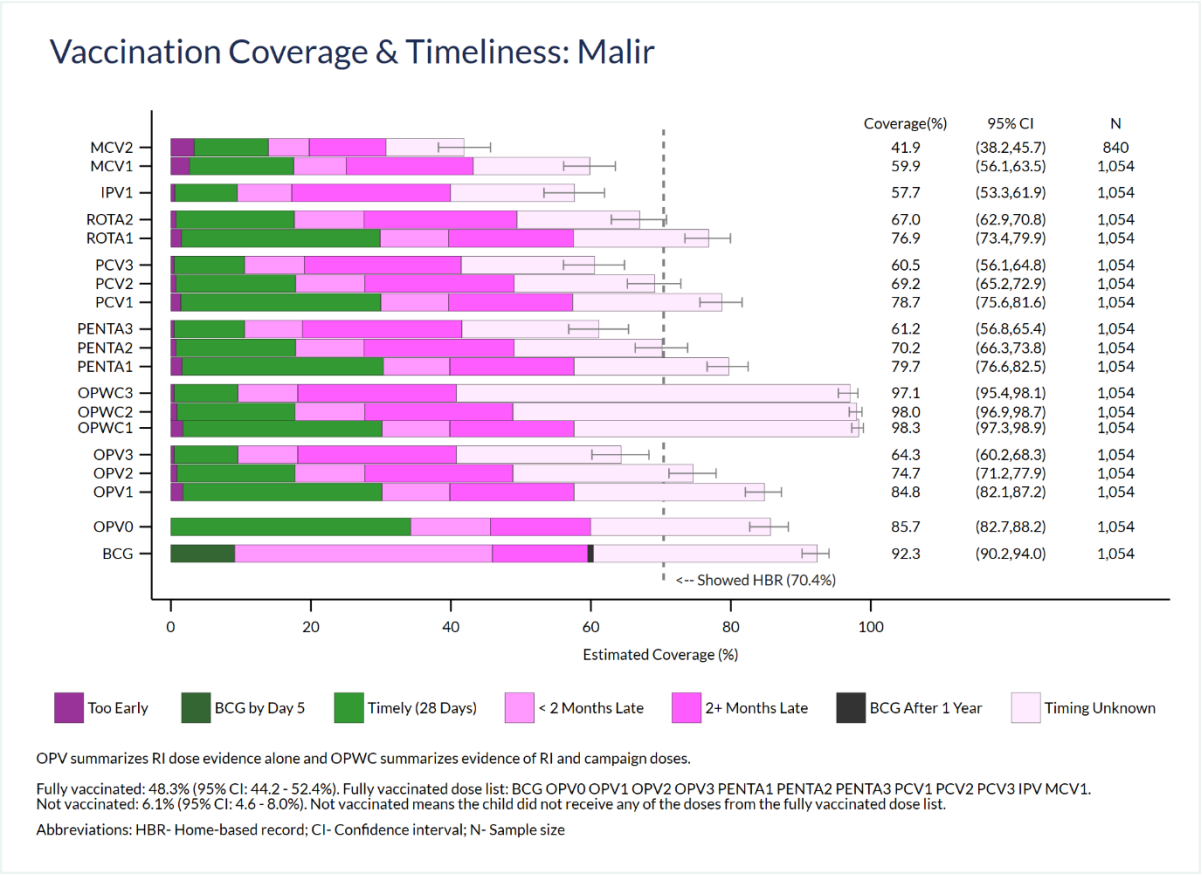
Fully vaccinated: 47.8% (95% CI: 43.4 - 52.4%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 13.6% (95% CI: 10.7 - 17.2%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 40. Vaccination coverage bar segment lengths (%), Malir District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.1	8.9	3.6	5.5	19.4
MCV1	2.4	16.4	4.9	15.5	17.7
IPV	0.4	10.1	6.7	18.1	25.3
ROTA2	0.5	15.8	7.9	18.3	23.8
ROTA1	1.6	23.9	6.9	16.0	27.1
PCV3	0.5	11.0	6.8	17.9	20.5
PCV2	0.6	16.1	8.0	18.2	23.6
PCV1	1.6	24.1	6.8	15.8	27.3
PENTA3	0.5	10.8	6.8	18.4	21.2
PENTA2	0.5	16.3	7.6	18.0	24.4
PENTA1	1.6	24.1	6.6	15.7	27.8
OPWC3	0.5	9.9	6.4	16.8	56.8
OPWC2	0.6	16.1	7.7	18.3	48.7
OPWC1	1.6	24.0	6.5	15.8	46.2
OPV3	0.5	9.9	6.4	16.8	29.3
OPV2	0.6	16.1	7.7	18.3	27.4
OPV1	1.6	24.0	6.5	15.8	30.4
OPV0	0.0	26.1	8.7	16.7	29.0
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	8.8	26.1	16.7	0.9	32.4

Figure 33. Vaccination coverage among children ages 12-23 months, Malir District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 48.3% (95% CI: 44.2 - 52.4%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 6.1% (95% CI: 4.6 - 8.0%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 41. Vaccination coverage bar segment lengths (%), Malir District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.7	8.4	4.6	8.7	17.4
MCV1	2.7	14.9	7.5	18.1	16.7
IPV	0.6	8.9	7.8	22.7	17.7
ROTA2	0.8	16.9	10.0	21.8	17.6
ROTA1	1.5	28.4	9.8	17.8	19.4
PCV3	0.5	10.1	8.5	22.4	19.1
PCV2	0.8	17.1	9.9	21.3	20.1
PCV1	1.4	28.6	9.7	17.7	21.3
PENTA3	0.5	10.1	8.3	22.8	19.6
PENTA2	0.8	17.1	9.8	21.4	21.2
PENTA1	1.6	28.7	9.5	17.7	22.1
OPWC3	0.5	9.1	8.5	22.7	56.3
OPWC2	0.9	16.9	10.0	21.2	49.1
OPWC1	1.7	28.5	9.7	17.7	40.7
OPV3	0.5	9.1	8.5	22.7	23.5
OPV2	0.9	16.9	10.0	21.2	25.8
OPV1	1.7	28.5	9.7	17.7	27.2
OPV0	0.0	34.3	11.4	14.3	25.7
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	9.1	36.8	13.7	0.8	32.0

Figure 34. Vaccination coverage among children ages 12-23 months, Malir District, SHRUCs Round 3

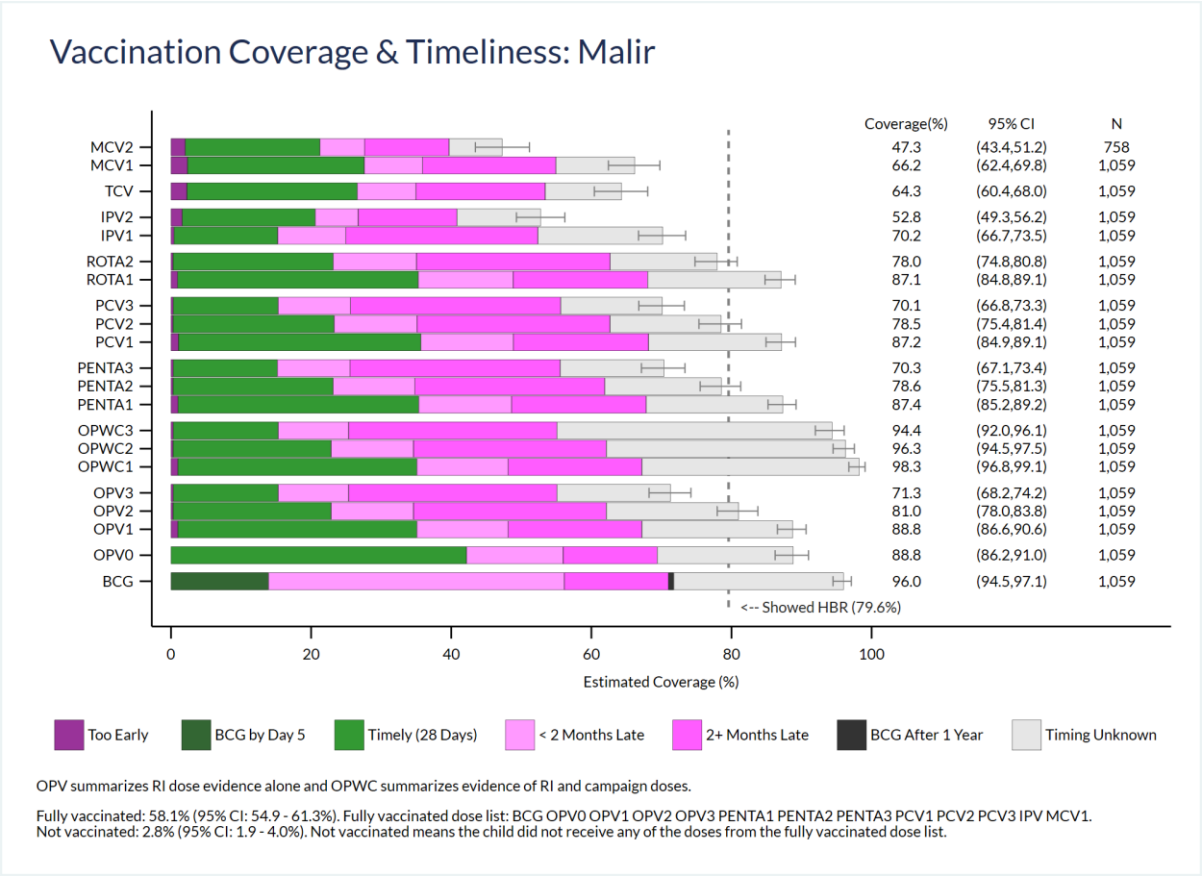


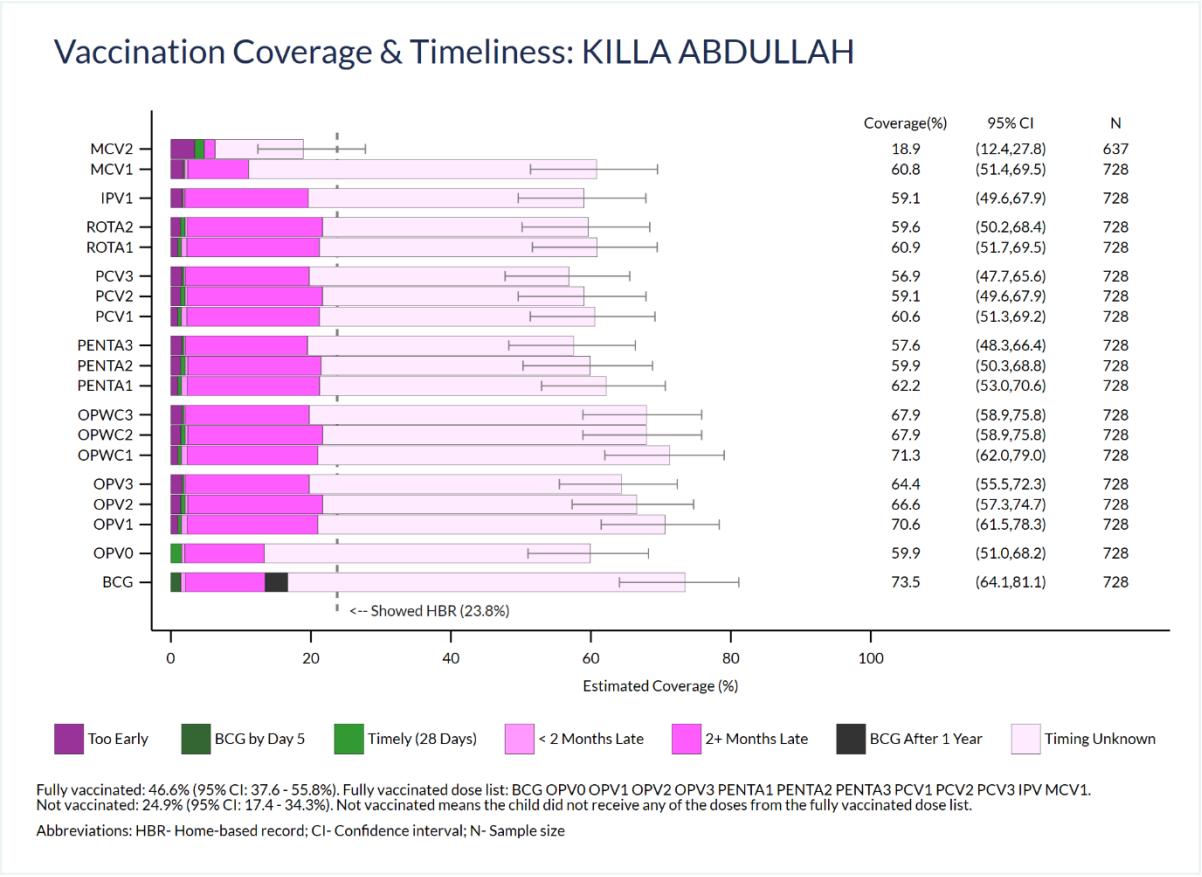
Table 42. Vaccination coverage bar segment lengths (%), Malir District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.0	19.2	6.4	12.1	7.6
MCV1	2.3	25.2	8.3	19.0	11.3
TCV	2.3	24.3	8.4	18.4	10.9
IPV2	1.6	19.0	6.1	14.1	12.0
IPV1	0.4	14.8	9.8	29.3	12.8
ROTA2	0.3	22.9	11.9	27.6	15.3
ROTA1	0.9	34.3	13.5	19.2	19.1
PCV3	0.3	15.0	10.4	30.0	14.5
PCV2	0.3	23.0	11.8	27.5	15.9
PCV1	1.1	34.6	13.2	19.3	19.0
PENTA3	0.3	14.9	10.4	30.0	14.8
PENTA2	0.3	22.9	11.7	27.1	16.7
PENTA1	1.0	34.4	13.3	19.2	19.5
OPWC3	0.3	15.0	10.1	29.7	39.3
OPWC2	0.3	22.6	11.8	27.5	34.2
OPWC1	1.0	34.1	13.0	19.1	31.1
OPV3	0.3	15.0	10.1	29.7	16.2
OPV2	0.3	22.6	11.8	27.5	18.9
OPV1	1.0	34.1	13.0	19.1	21.6
OPV0	0.0	42.2	13.8	13.4	19.4
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	13.9	42.2	14.9	0.7	24.3

The Malir figures (Figure 7, Figure 8, and Figure 30 through Figure 34) indicate:

- Both TPVICS and SHRUCs showed modest gains from SHRUC Round 1 to Round 2, but the Round 3 survey showed statistically significant improvements of up to 11 percentage points for nearly every dose, and there was net improvement from Round 1 in 2021 to Round 3 in 2023 for all doses. The percent fully vaccinated in SHRUCs improved by 9.1% and the percentage of zero dose children dropped by 10.9% over that time period. Statistically significant changes are summarized in Table 18.
- In Round 1, card availability in the SHRUCs was nearly equivalent to that observed in TPVICS (58.8% and 59.9%, respectively). In Round 2, TPVICS card availability went up by 14.4%. By 2023, it had reached 79.6% in the SHRUCs.
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All five surveys show evidence of poor timeliness; more than half of the doses for which timeliness was known were more than 28 days late. The later doses in the series have many more children receiving the doses two or more months late compared to earlier doses in the series.

Figure 35. Vaccination coverage among children ages 12-23 months, Killa Abdullah District, TPVICS Round 1



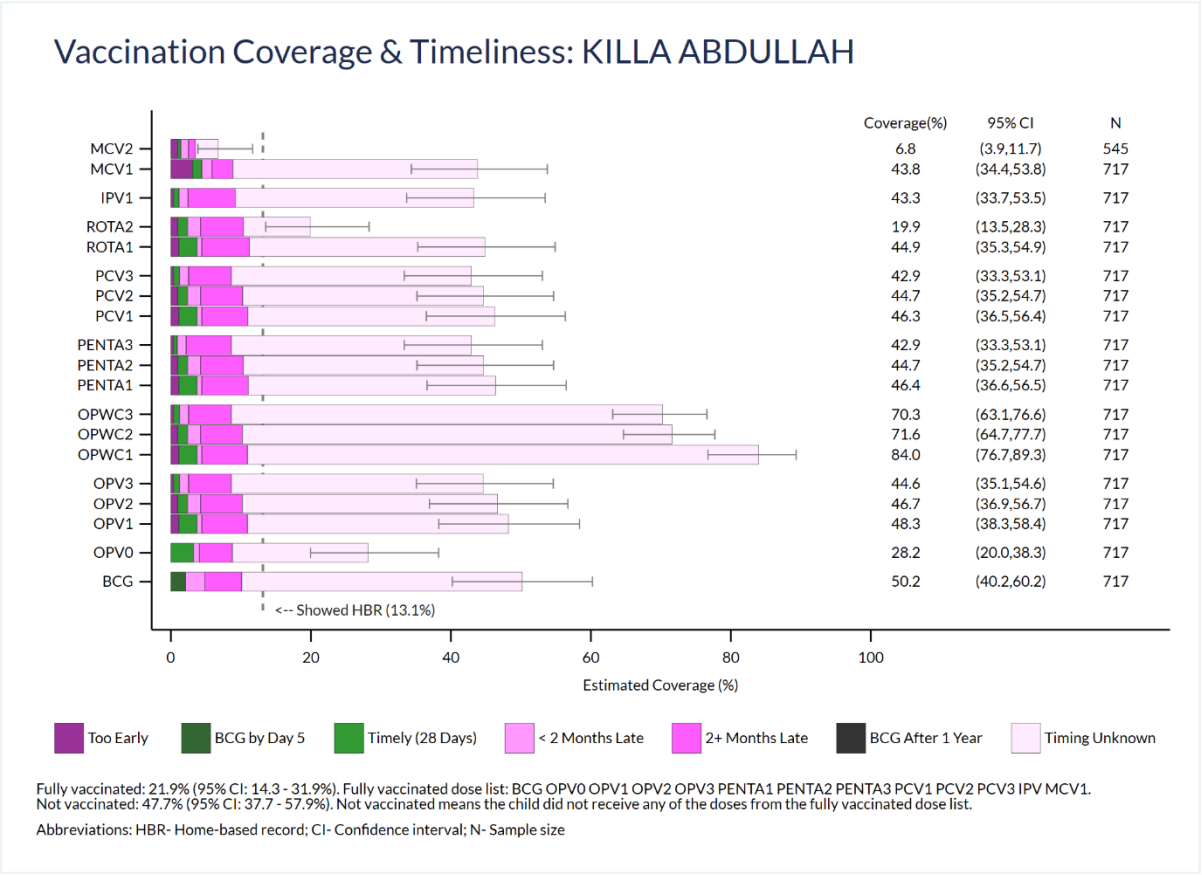
Fully vaccinated: 46.6% (95% CI: 37.6 - 55.8%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 24.9% (95% CI: 17.4 - 34.3%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 43. Vaccination coverage bar segment lengths (%), Killa Abdullah District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.4	1.4	0.0	1.5	12.6
MCV1	1.8	0.2	0.5	8.7	49.7
IPV	1.6	0.1	0.2	17.6	39.4
ROTA2	1.4	0.6	0.4	19.3	38.0
ROTA1	1.0	0.5	0.8	18.9	39.7
PCV3	1.6	0.3	0.2	17.6	37.1
PCV2	1.4	0.6	0.4	19.3	37.4
PCV1	1.0	0.5	0.8	18.9	39.4
PENTA3	1.6	0.3	0.2	17.4	38.1
PENTA2	1.4	0.7	0.4	19.0	38.5
PENTA1	1.0	0.5	0.8	18.9	41.0
OPWC3	1.6	0.3	0.2	17.7	48.2
OPWC2	1.4	0.6	0.4	19.3	46.2
OPWC1	1.0	0.5	0.8	18.7	50.3
OPV3	1.6	0.3	0.2	17.7	44.6
OPV2	1.4	0.6	0.4	19.3	44.9
OPV1	1.0	0.5	0.8	18.7	49.6
OPV0	0.0	1.6	0.4	11.4	46.6
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	1.4	0.7	11.3	3.2	56.8

Figure 36. Vaccination coverage among children ages 12-23 months, Killa Abdullah District, TPVICS Round 2



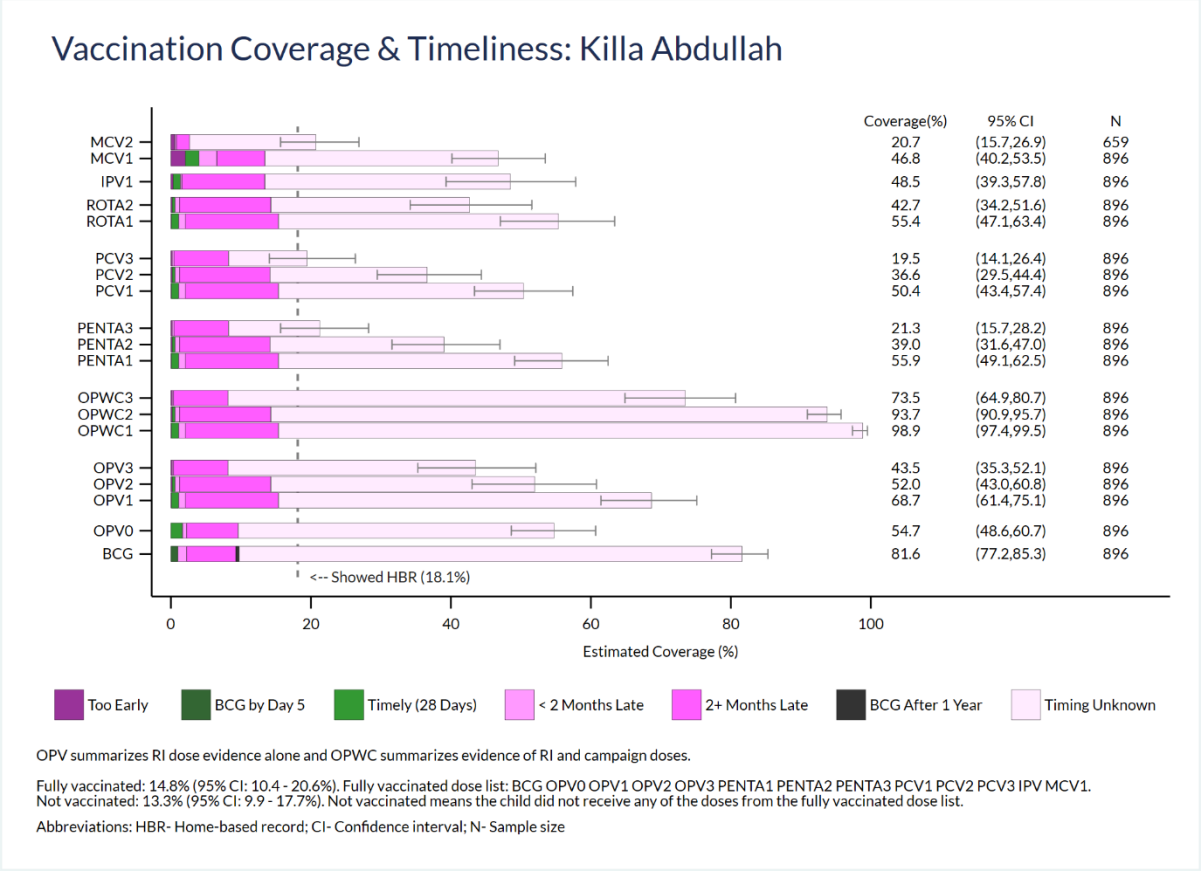
Fully vaccinated: 21.9% (95% CI: 14.3 - 31.9%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 47.7% (95% CI: 37.7 - 57.9%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 44. Vaccination coverage bar segment lengths (%), Killa Abdullah District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.0	0.4	1.1	1.0	3.3
MCV1	3.1	1.3	1.4	3.0	35.0
IPV	0.4	0.8	1.3	6.7	34.1
ROTA2	1.0	1.4	1.8	6.1	9.6
ROTA1	1.1	2.6	0.7	6.8	33.7
PCV3	0.4	0.9	1.3	6.1	34.3
PCV2	1.0	1.4	1.8	6.0	34.5
PCV1	1.1	2.6	0.7	6.6	35.3
PENTA3	0.4	0.6	1.3	6.4	34.3
PENTA2	1.0	1.4	1.8	6.1	34.4
PENTA1	1.1	2.6	0.7	6.6	35.3
OPWC3	0.4	0.9	1.3	6.1	61.7
OPWC2	1.0	1.4	1.8	6.0	61.4
OPWC1	1.1	2.6	0.7	6.5	73.1
OPV3	0.4	0.9	1.3	6.1	36.0
OPV2	1.0	1.4	1.8	6.0	36.5
OPV1	1.1	2.6	0.7	6.5	37.3
OPV0	0.0	3.3	0.8	4.7	19.4
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	2.1	2.8	5.2	0.0	40.1

Figure 37. Vaccination coverage among children ages 12-23 months, Killa Abdullah District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

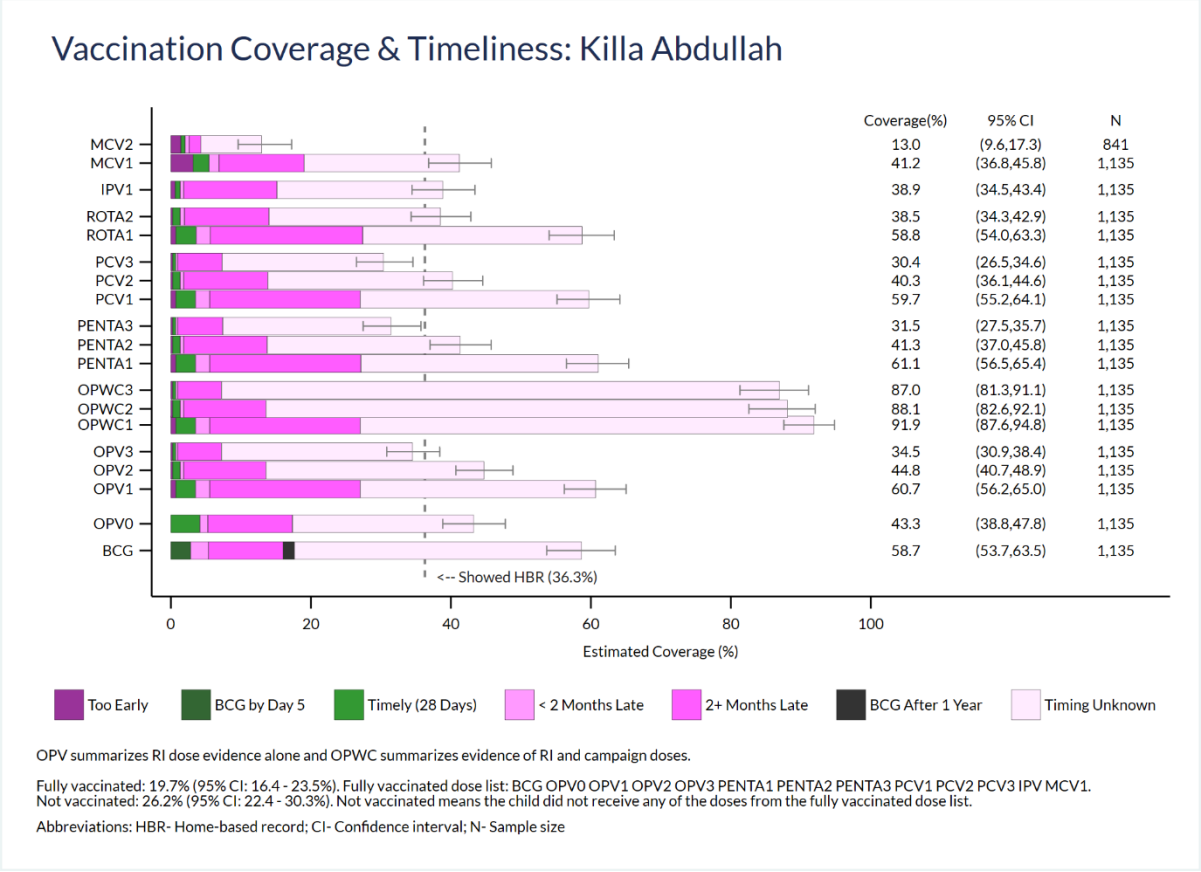
Fully vaccinated: 14.8% (95% CI: 10.4 - 20.6%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 13.3% (95% CI: 9.9 - 17.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 45. Vaccination coverage bar segment lengths (%), Killa Abdullah District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	0.4	0.0	0.2	1.4	18.8
MCV1	2.1	2.0	2.6	6.9	33.3
IPV	0.3	1.0	0.2	11.8	35.1
ROTA2	0.2	0.4	0.6	13.0	28.4
ROTA1	0.1	1.0	0.9	13.3	40.0
PCV3	0.2	0.0	0.3	7.8	11.2
PCV2	0.2	0.4	0.6	12.9	22.4
PCV1	0.1	1.0	0.9	13.3	35.0
PENTA3	0.2	0.0	0.3	7.8	13.0
PENTA2	0.2	0.4	0.6	12.9	24.9
PENTA1	0.1	1.0	0.9	13.3	40.5
OPWC3	0.2	0.0	0.2	7.8	65.4
OPWC2	0.2	0.4	0.6	13.0	79.5
OPWC1	0.1	1.0	0.9	13.3	83.5
OPV3	0.2	0.0	0.2	7.8	35.4
OPV2	0.2	0.4	0.6	13.0	37.7
OPV1	0.1	1.0	0.9	13.3	53.3
OPV0	0.0	1.7	0.6	7.4	45.1
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	1.0	1.2	7.1	0.4	71.9

Figure 38. Vaccination coverage among children ages 12-23 months, Killa Abdullah District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 19.7% (95% CI: 16.4 - 23.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 26.2% (95% CI: 22.4 - 30.3%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 46. Vaccination coverage bar segment lengths (%), Killa Abdullah District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.1	0.4	0.4	1.2	9.8
MCV1	3.2	2.3	1.4	12.2	22.2
IPV	0.6	0.7	0.5	13.3	23.7
ROTA2	0.3	1.1	0.6	12.1	24.5
ROTA1	0.7	2.9	2.0	21.8	31.4
PCV3	0.3	0.4	0.3	6.3	23.1
PCV2	0.3	1.1	0.5	12.0	26.4
PCV1	0.7	2.8	2.0	21.5	32.7
PENTA3	0.3	0.4	0.3	6.4	24.1
PENTA2	0.3	1.1	0.5	11.9	27.6
PENTA1	0.7	2.8	2.0	21.6	33.9
OPWC3	0.3	0.4	0.3	6.3	79.7
OPWC2	0.3	1.1	0.5	11.7	74.5
OPWC1	0.7	2.8	2.0	21.5	64.8
OPV3	0.3	0.4	0.3	6.3	27.3
OPV2	0.3	1.1	0.5	11.7	31.2
OPV1	0.7	2.8	2.0	21.5	33.7
OPV0	0.0	4.1	1.1	12.1	25.9
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	2.8	2.6	10.7	1.6	41.1

Figure 39. Vaccination coverage among children ages 12-23 months, Killa Abdullah District, SHRUCs Round 3

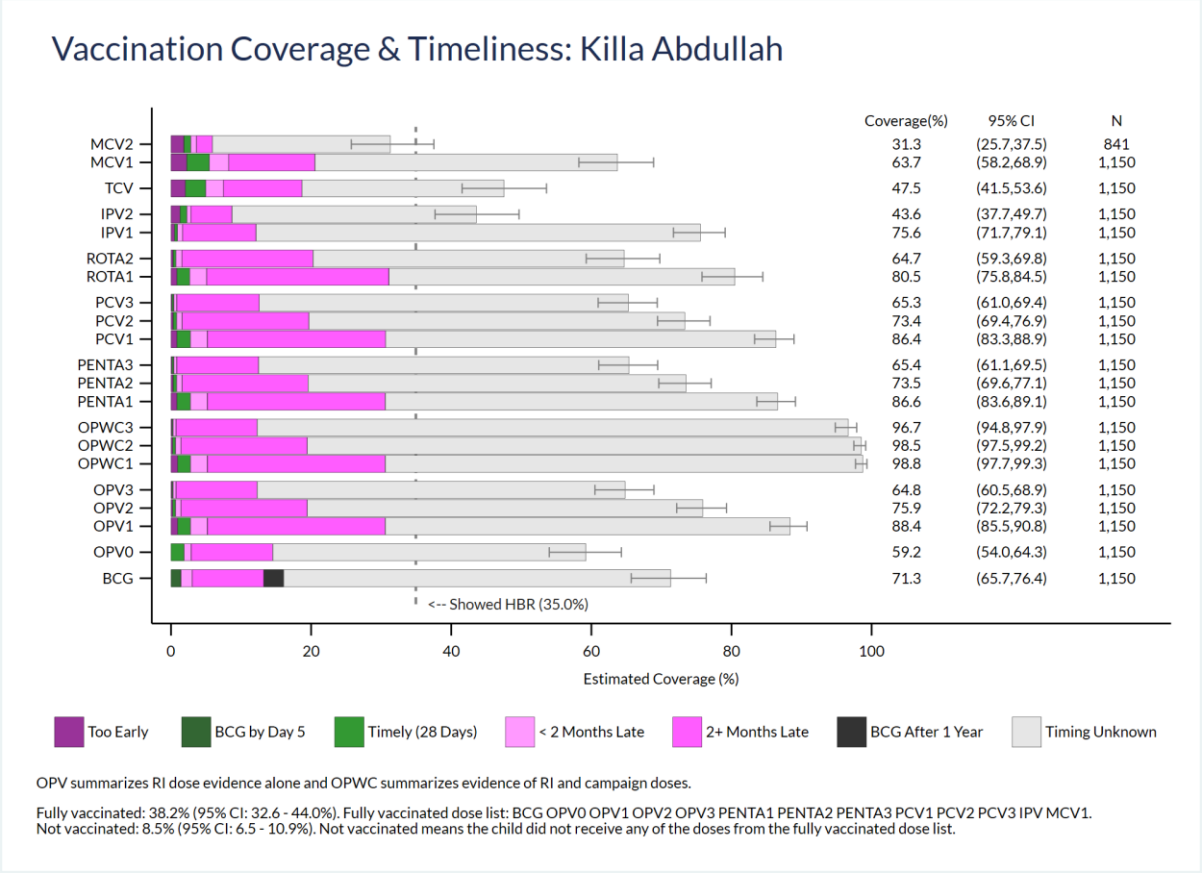


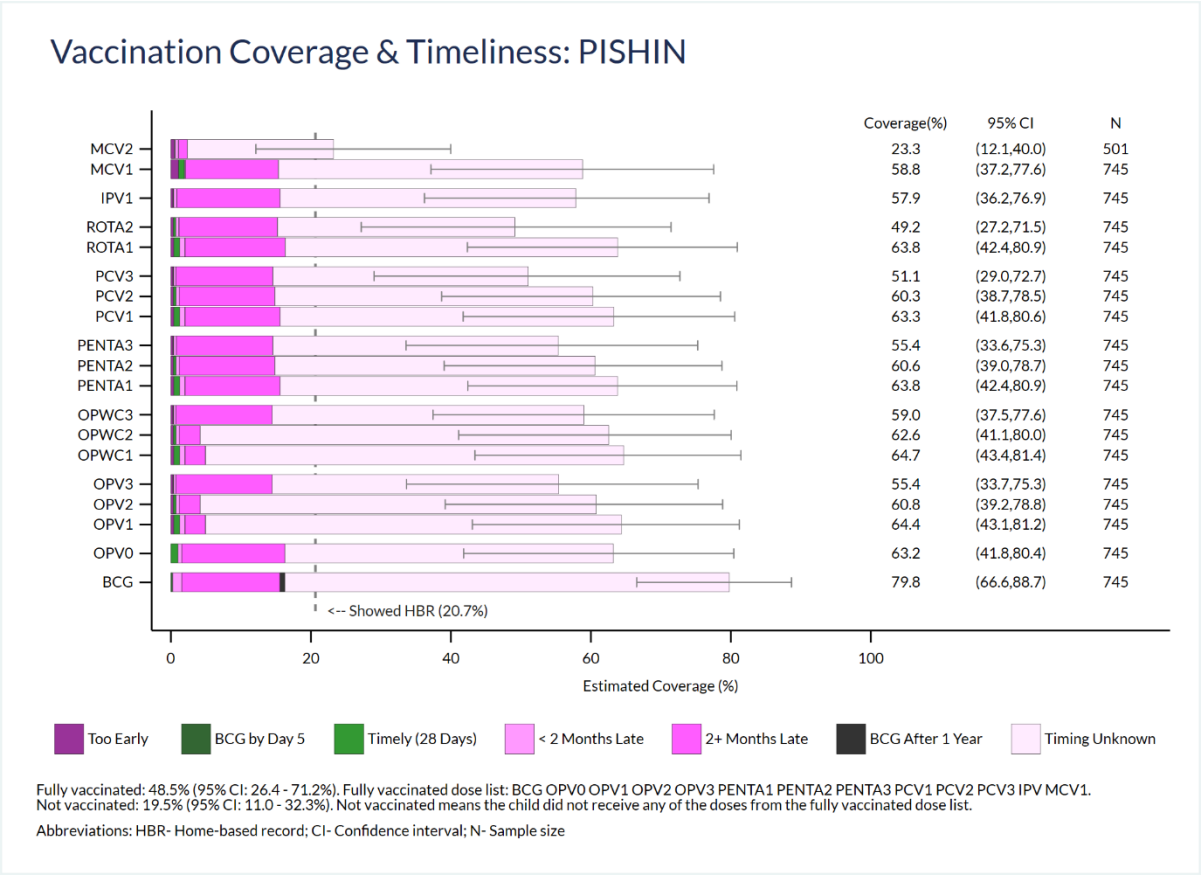
Table 47. Vaccination coverage bar segment lengths (%), Killa Abdullah District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.8	1.0	0.8	2.3	25.4
MCV1	2.2	3.2	2.8	12.3	43.2
TCV	2.1	2.9	2.5	11.2	28.8
IPV2	1.3	1.0	0.6	5.9	34.9
IPV	0.5	0.4	0.8	19.0	52.1
ROTA2	0.3	0.4	0.9	18.7	44.4
ROTA1	0.8	1.8	2.4	26.0	49.4
PCV3	0.1	0.2	0.4	11.8	52.7
PCV2	0.3	0.5	0.8	18.1	53.7
PCV1	0.8	1.9	2.4	25.4	55.7
PENTA3	0.1	0.2	0.4	11.7	52.9
PENTA2	0.3	0.5	0.8	18.0	54.0
PENTA1	0.8	1.9	2.4	25.4	56.0
OPWC3	0.1	0.1	0.4	11.6	84.4
OPWC2	0.2	0.4	0.8	18.0	79.1
OPWC1	0.9	1.8	2.4	25.4	68.2
OPV3	0.1	0.1	0.4	11.6	52.5
OPV2	0.2	0.4	0.8	18.0	56.5
OPV1	0.9	1.8	2.4	25.4	57.8
OPV0	0.0	1.9	1.0	11.6	44.7
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	1.4	1.6	10.2	2.8	55.3

The Killa Abdullah figures (Figure 9, Figure 10 and Figure 35 through Figure 39) indicate:

- Killa Abdullah showed declines of double-digit percentage points for nearly all outcomes from TPVICS Round 1 to Round 2. The SHRUC survey showed a mix of improvements and losses from Round 1 to Round 2 but showed consistent double-digit improvements from Round 1 to Round 3. There was a net improvement from Round 1 in 2021 to Round 3 in 2023 for nearly all doses, with the exception of a 10.3% decline for BCG. The percent fully vaccinated in SHRUCs improved by 23.4% and the percent of zero dose children dropped by 4.8% over that period. Statistically significant changes are summarized in Table 19.
- Card availability was notably lower in the three Balochistan districts than those from KP and Sindh. Card availability was notably lower in Killa Abdullah than the districts described above. Round 1 TPVICS availability was 23.8% and SHRUCs was 18.1%.
- Both TPVICS and SHRUCs found more zero dose children in Round 2 than 1: TPVICS had a 22.8% increase in estimated prevalence of zero dose and SHRUCs had a 12.9% increase.
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All five surveys show poor timeliness. Most doses for which timeliness can be calculated were given two or more months late. Both surveys showed small Round 1 to 2 improvements in the percent of doses given in a timely manner.

Figure 40. Vaccination coverage among children ages 12-23 months, Pishin District, TPVICS Round 1



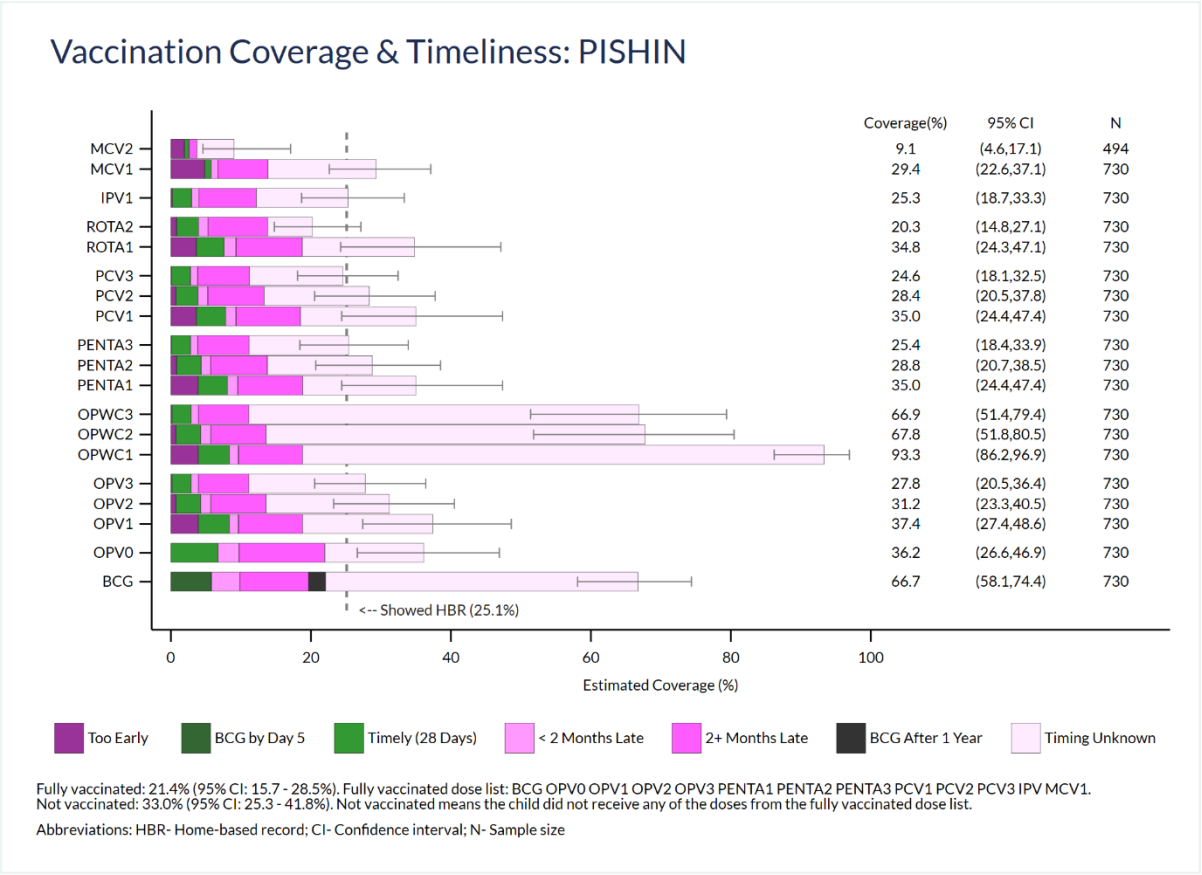
Fully vaccinated: 48.5% (95% CI: 26.4 - 71.2%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 19.5% (95% CI: 11.0 - 32.3%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 48. Vaccination coverage bar segment lengths (%), Pishin District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	0.5	0.1	0.5	1.3	20.9
MCV1	1.1	0.8	0.1	13.3	43.5
IPV	0.3	0.1	0.5	14.8	42.3
ROTA2	0.4	0.3	0.4	14.1	33.9
ROTA1	0.4	0.9	0.7	14.3	47.5
PCV3	0.3	0.1	0.3	13.8	36.5
PCV2	0.4	0.4	0.4	13.6	45.4
PCV1	0.4	0.9	0.7	13.6	47.7
PENTA3	0.3	0.1	0.4	13.8	40.8
PENTA2	0.4	0.4	0.4	13.6	45.8
PENTA1	0.4	0.9	0.7	13.6	48.2
OPWC3	0.3	0.1	0.3	13.7	44.6
OPWC2	0.4	0.4	0.4	3.0	58.4
OPWC1	0.4	0.9	0.7	2.9	59.8
OPV3	0.3	0.1	0.3	13.7	41.0
OPV2	0.4	0.4	0.4	3.0	56.6
OPV1	0.4	0.9	0.7	2.9	59.4
OPV0	0.0	1.0	0.5	14.7	46.9
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	0.3	1.3	14.0	0.7	63.5

Figure 41. Vaccination coverage among children ages 12-23 months, Pishin District, TPVICS Round 2



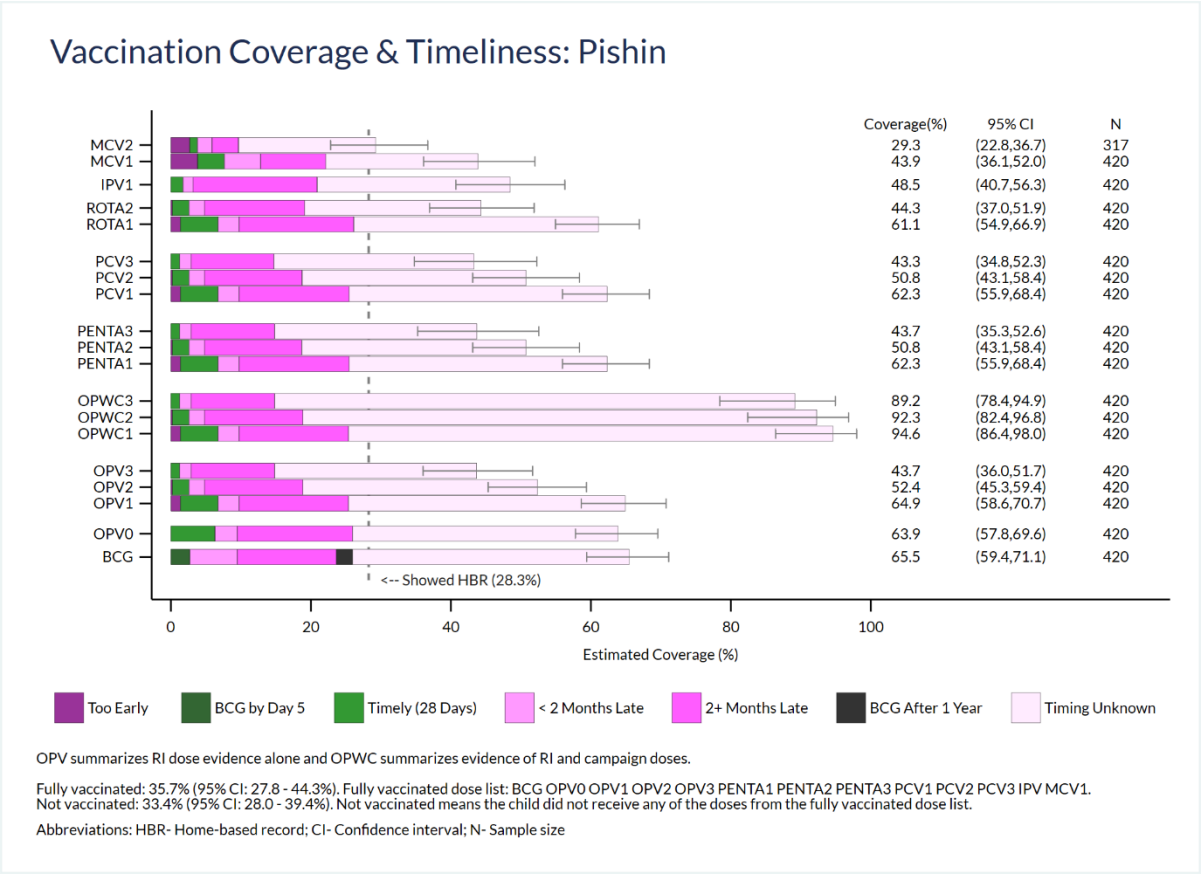
Fully vaccinated: 21.4% (95% CI: 15.7 - 28.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 33.0% (95% CI: 25.3 - 41.8%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 49. Vaccination coverage bar segment lengths (%), Pishin District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.9	0.6	0.1	1.1	5.3
MCV1	4.8	0.9	0.9	7.2	15.5
IPV	0.2	2.7	1.0	8.2	13.1
ROTA2	0.8	3.1	1.4	8.5	6.5
ROTA1	3.6	4.0	1.7	9.5	16.1
PCV3	0.1	2.7	1.0	7.4	13.4
PCV2	0.7	3.1	1.4	8.0	15.0
PCV1	3.6	4.2	1.5	9.2	16.5
PENTA3	0.1	2.7	1.0	7.3	14.2
PENTA2	0.8	3.5	1.4	8.1	15.0
PENTA1	3.9	4.2	1.5	9.3	16.2
OPWC3	0.2	2.7	1.0	7.2	55.7
OPWC2	0.7	3.5	1.5	7.9	54.2
OPWC1	3.9	4.4	1.3	9.2	74.5
OPV3	0.2	2.7	1.0	7.2	16.6
OPV2	0.7	3.5	1.5	7.9	17.6
OPV1	3.9	4.4	1.3	9.2	18.6
OPV0	0.0	6.7	3.0	12.3	14.2
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	5.8	4.1	9.8	2.4	44.6

Figure 42. Vaccination coverage among children ages 12-23 months, Pishin District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

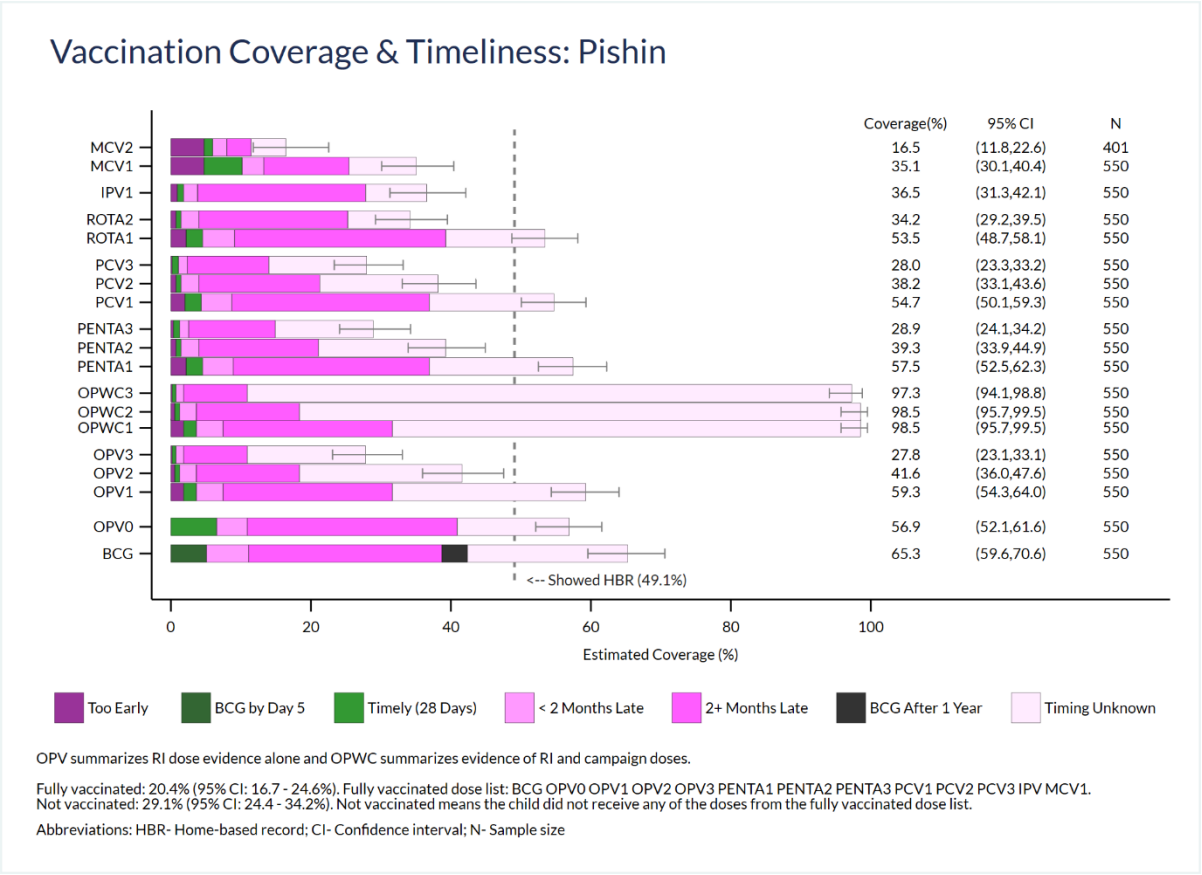
Fully vaccinated: 35.7% (95% CI: 27.8 - 44.3%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 33.4% (95% CI: 28.0 - 39.4%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 50. Vaccination coverage bar segment lengths (%), Pishin District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.1	0.8	1.6	2.9	21.9
MCV1	3.8	3.8	5.2	9.3	21.8
IPV	0.0	1.7	1.4	17.7	27.6
ROTA2	0.2	2.4	2.2	14.3	25.2
ROTA1	1.4	5.4	3.0	16.4	35.0
PCV3	0.0	1.3	1.7	11.8	28.6
PCV2	0.2	2.4	2.2	13.9	32.0
PCV1	1.4	5.4	3.0	15.7	36.9
PENTA3	0.0	1.3	1.7	11.9	28.9
PENTA2	0.2	2.4	2.2	13.9	32.1
PENTA1	1.4	5.4	3.0	15.7	36.9
OPWC3	0.0	1.3	1.7	11.9	74.4
OPWC2	0.2	2.4	2.2	14.0	73.4
OPWC1	1.4	5.4	3.0	15.6	69.2
OPV3	0.0	1.3	1.7	11.9	28.9
OPV2	0.2	2.4	2.2	14.0	33.5
OPV1	1.4	5.4	3.0	15.6	39.6
OPV0	0.0	6.3	3.2	16.5	37.9
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	2.7	6.8	14.2	2.3	39.5

Figure 43. Vaccination coverage among children ages 12-23 months, Pishin District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 20.4% (95% CI: 16.7 - 24.6%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 29.1% (95% CI: 24.4 - 34.2%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 51. Vaccination coverage bar segment lengths (%), Pishin District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.5	0.9	1.5	2.5	8.1
MCV1	4.7	5.5	3.1	12.2	9.6
IPV	0.9	0.9	2.0	24.0	8.7
ROTA2	0.7	0.7	2.5	21.3	8.9
ROTA1	2.2	2.4	4.5	30.2	14.2
PCV3	0.2	0.9	1.3	11.6	14.0
PCV2	0.7	0.7	2.5	17.3	16.9
PCV1	2.0	2.4	4.4	28.2	17.8
PENTA3	0.4	0.9	1.3	12.4	14.0
PENTA2	0.7	0.7	2.5	17.1	18.2
PENTA1	2.2	2.4	4.4	28.0	20.5
OPWC3	0.2	0.5	1.1	9.1	86.4
OPWC2	0.5	0.7	2.4	14.7	80.2
OPWC1	1.8	1.8	3.8	24.2	66.9
OPV3	0.2	0.5	1.1	9.1	16.9
OPV2	0.5	0.7	2.4	14.7	23.3
OPV1	1.8	1.8	3.8	24.2	27.6
OPV0	0.0	6.5	4.4	30.0	16.0
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	5.1	6.0	27.6	3.6	22.9

Figure 44. Vaccination coverage among children ages 12-23 months, Pishin District, SHRUCs Round 3

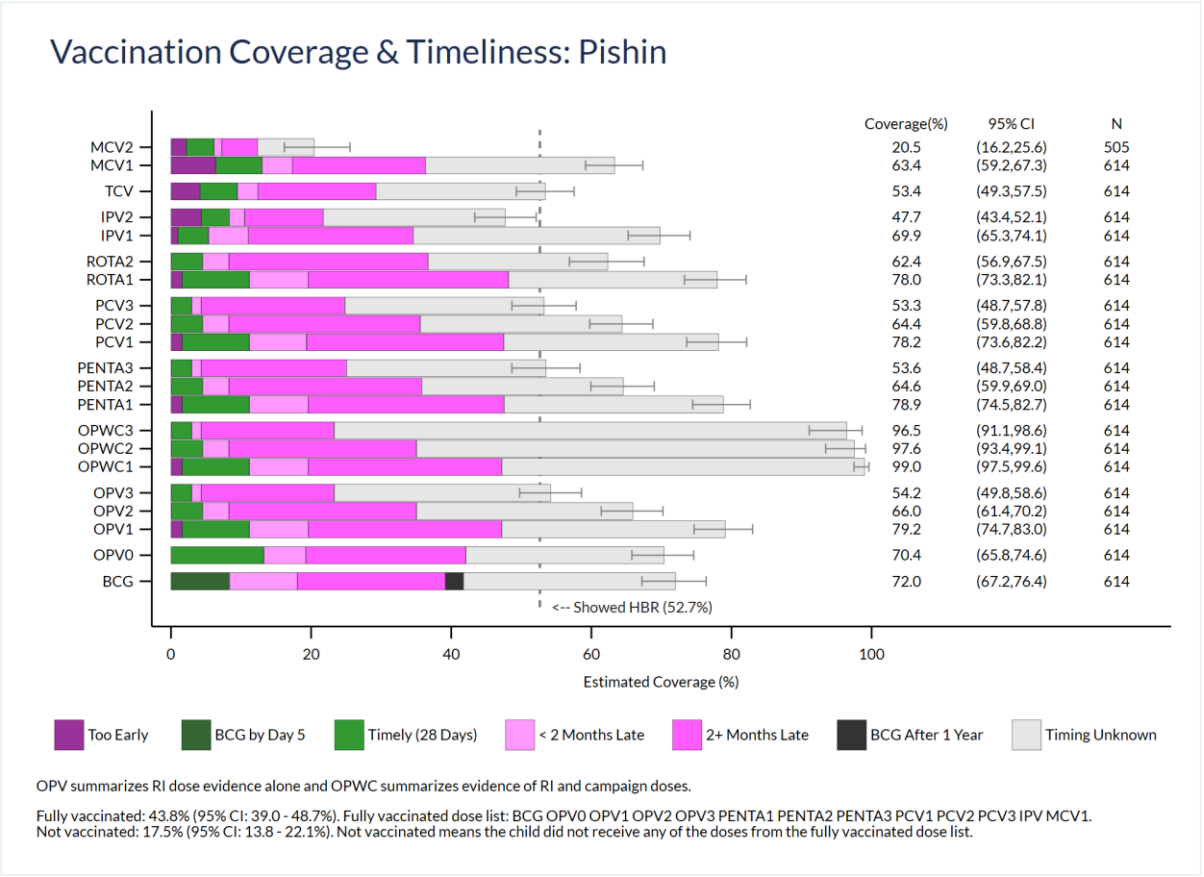


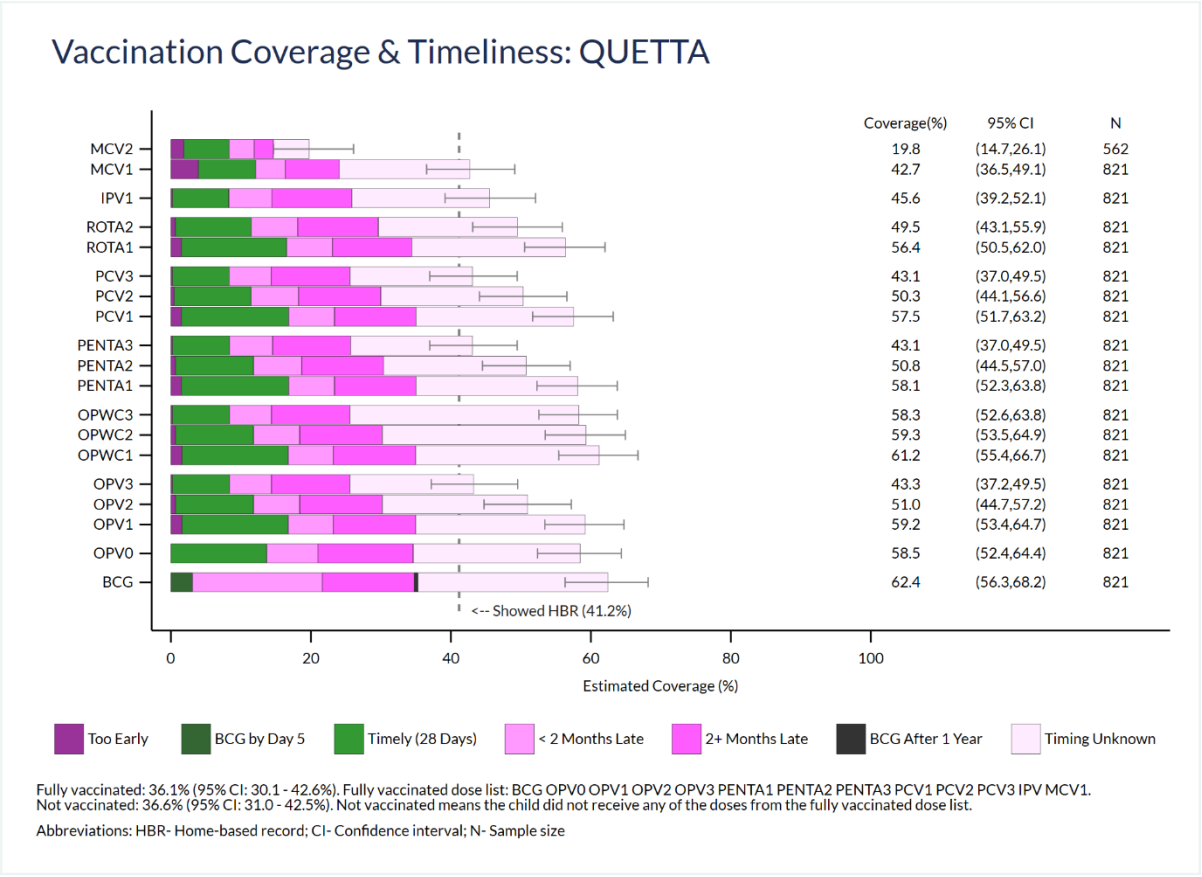
Table 52. Vaccination coverage bar segment lengths (%), Pishin District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.2	4.0	1.1	5.1	8.1
MCV1	6.4	6.6	4.3	19.0	27.0
TCV	4.1	5.3	3.0	16.8	24.2
IPV2	4.4	4.0	2.2	11.2	26.0
IPV1	1.0	4.4	5.7	27.4	26.7
ROTA2	0.1	4.5	3.7	28.4	25.7
ROTA1	1.6	9.6	8.4	28.6	29.9
PCV3	0.1	2.9	1.4	20.5	28.5
PCV2	0.1	4.5	3.7	27.3	28.9
PCV1	1.6	9.6	8.1	28.2	30.7
PENTA3	0.1	2.9	1.4	20.7	28.5
PENTA2	0.1	4.5	3.7	27.5	28.8
PENTA1	1.6	9.6	8.4	28.0	31.3
OPWC3	0.1	2.9	1.4	19.0	73.2
OPWC2	0.1	4.5	3.7	26.8	62.5
OPWC1	1.6	9.6	8.4	27.6	51.8
OPV3	0.1	2.9	1.4	19.0	30.9
OPV2	0.1	4.5	3.7	26.8	30.9
OPV1	1.6	9.6	8.4	27.6	31.9
OPV0	0.0	13.3	6.0	22.8	28.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	8.3	9.7	21.1	2.6	30.3

The Pishin figures (Figure 11, Figure 12 and Figure 40 through Figure 44) indicate:

- Pishin showed declines of double-digit percentage points for nearly all outcomes from TPVICS Round 1 to 2. Idiosyncratically, OPWC1 increased by 28.6% while OPC2 and 3 did not change by significant degree. The SHRUC survey also observed consistent declines across most doses from Round 1 to Round 2 but showed consistent double-digit improvements from Round 1 to 3. There was a net improvement from Round 1 in 2021 to Round 3 in 2023 for nearly all doses, with the exception of a 8.8% decline for MCV2. Unlike the districts described above, the percent fully vaccinated in SHRUCs did not improve by a significant degree from 2021 to 2023 but the percent of zero dose children dropped by 15.9% over that time period. Statistically significant changes are summarized in Table 20.
- Round 1 card availability in the SHRUCs was higher than in TPVICS (28.3% vs. 20.7%). Round 2 TPVICS availability did not change by a statistically significant degree, but SHRUCs availability increased by 20.8% to 49.1%
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All five surveys show that for most doses, most children for whom timeliness was known received most doses two or more months late.

Figure 45. Vaccination coverage among children ages 12-23 months, Quetta District, TPVICS Round 1



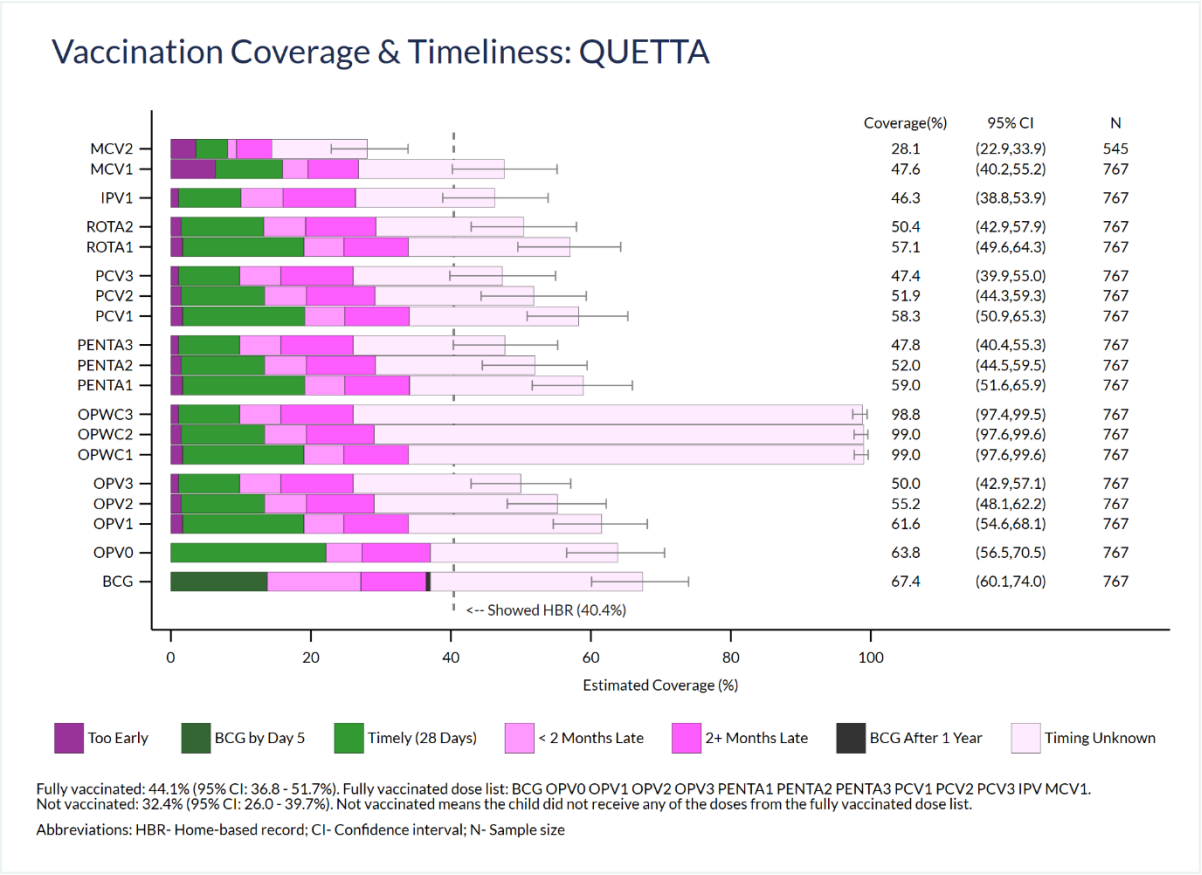
Fully vaccinated: 36.1% (95% CI: 30.1 - 42.6%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 36.6% (95% CI: 31.0 - 42.5%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 53. Vaccination coverage bar segment lengths (%), Quetta District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.9	6.4	3.6	2.7	5.1
MCV1	3.9	8.2	4.2	7.7	18.7
IPV	0.2	8.0	6.1	11.4	19.7
ROTA2	0.6	10.9	6.6	11.5	19.9
ROTA1	1.5	15.1	6.5	11.3	22.0
PCV3	0.2	8.1	6.0	11.3	17.5
PCV2	0.5	11.0	6.8	11.8	20.3
PCV1	1.5	15.3	6.5	11.7	22.5
PENTA3	0.2	8.1	6.1	11.1	17.4
PENTA2	0.7	11.1	6.9	11.7	20.4
PENTA1	1.5	15.3	6.5	11.7	23.1
OPWC3	0.2	8.1	6.0	11.2	32.7
OPWC2	0.7	11.1	6.6	11.8	29.1
OPWC1	1.6	15.2	6.5	11.8	26.3
OPV3	0.2	8.1	6.0	11.2	17.7
OPV2	0.7	11.1	6.6	11.8	20.8
OPV1	1.6	15.2	6.5	11.8	24.2
OPV0	0.0	13.7	7.3	13.6	23.9
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	3.1	18.5	13.2	0.5	27.1

Figure 46. Vaccination coverage among children ages 12-23 months, Quetta District, TPVICS Round 2



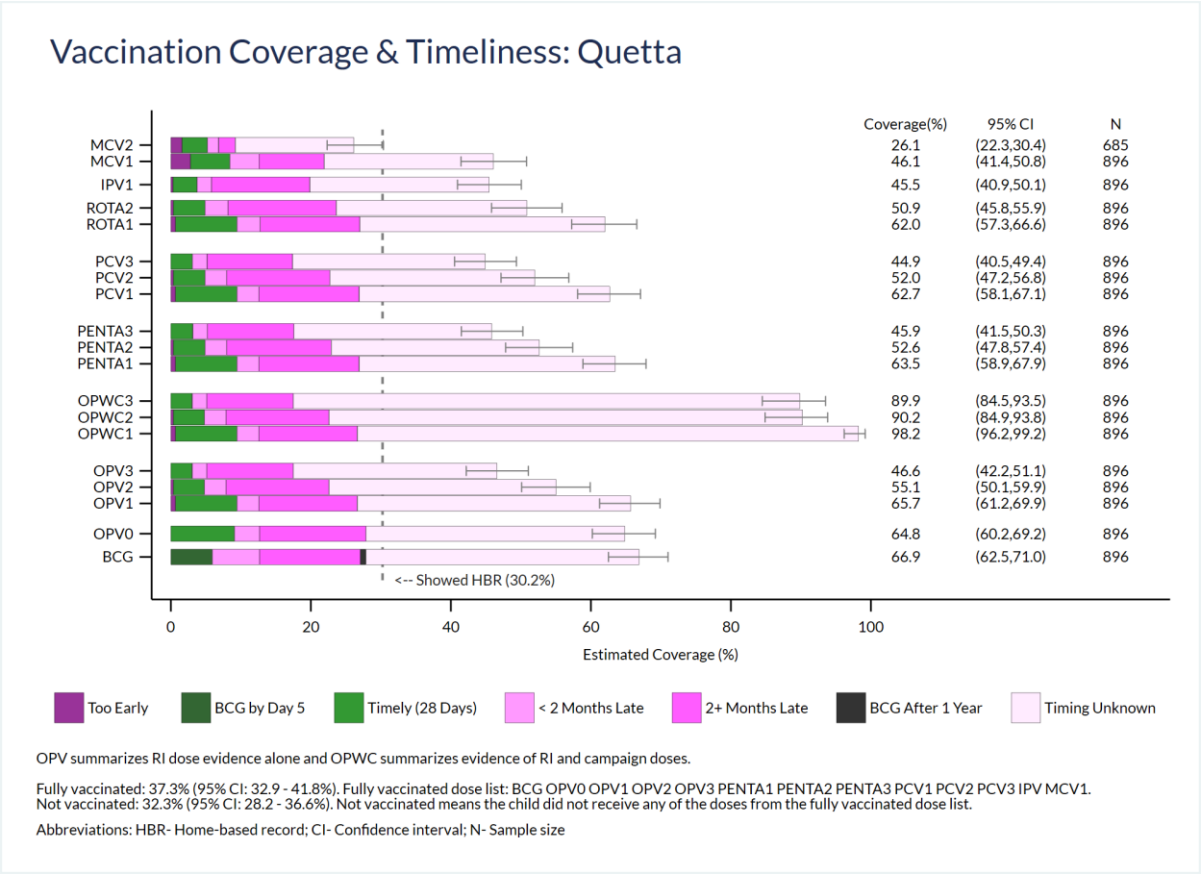
Fully vaccinated: 44.1% (95% CI: 36.8 - 51.7%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 32.4% (95% CI: 26.0 - 39.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 54. Vaccination coverage bar segment lengths (%), Quetta District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.6	4.5	1.3	5.0	13.7
MCV1	6.4	9.6	3.6	7.2	20.8
IPV	1.1	8.9	6.0	10.4	19.9
ROTA2	1.5	11.8	6.0	10.0	21.1
ROTA1	1.7	17.3	5.7	9.2	23.1
PCV3	1.1	8.7	5.9	10.4	21.3
PCV2	1.5	11.9	6.0	9.8	22.7
PCV1	1.7	17.5	5.7	9.2	24.2
PENTA3	1.1	8.7	5.9	10.4	21.7
PENTA2	1.5	11.9	6.0	9.8	22.8
PENTA1	1.7	17.5	5.7	9.3	24.9
OPWC3	1.1	8.7	5.9	10.4	72.8
OPWC2	1.5	11.9	6.0	9.7	69.9
OPWC1	1.7	17.3	5.7	9.3	65.1
OPV3	1.1	8.7	5.9	10.4	24.0
OPV2	1.5	11.9	6.0	9.7	26.2
OPV1	1.7	17.3	5.7	9.3	27.6
OPV0	0.0	22.2	5.1	9.8	26.8
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	13.8	13.4	9.3	0.6	30.3

Figure 47. Vaccination coverage among children ages 12-23 months, Quetta District, SHRUCs Round 1



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

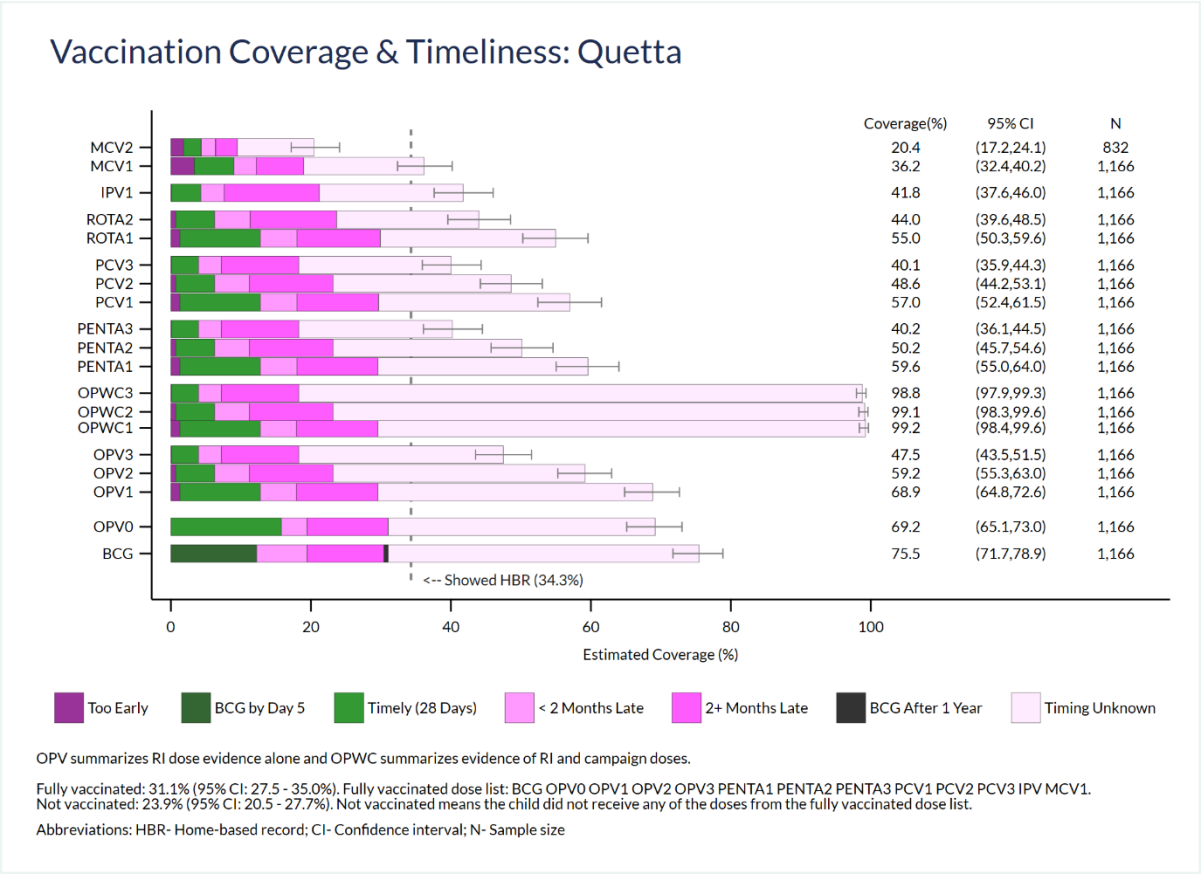
Fully vaccinated: 37.3% (95% CI: 32.9 - 41.8%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 32.3% (95% CI: 28.2 - 36.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 55. Vaccination coverage bar segment lengths (%), Quetta District, SHRUCs Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.2	2.8	1.2	1.8	19.1
MCV1	2.8	5.6	4.2	9.3	24.2
IPV	0.3	3.4	2.1	14.0	25.6
ROTA2	0.4	4.5	3.3	15.5	27.2
ROTA1	0.7	8.8	3.3	14.2	35.0
PCV3	0.0	3.1	2.1	12.2	27.5
PCV2	0.4	4.5	3.1	14.7	29.3
PCV1	0.7	8.8	3.2	14.3	35.8
PENTA3	0.0	3.1	2.1	12.3	28.3
PENTA2	0.4	4.5	3.1	14.9	29.7
PENTA1	0.7	8.8	3.2	14.3	36.6
OPWC3	0.0	3.0	2.1	12.3	72.4
OPWC2	0.4	4.4	3.1	14.7	67.6
OPWC1	0.7	8.8	3.2	14.0	71.6
OPV3	0.0	3.0	2.1	12.3	29.1
OPV2	0.4	4.4	3.1	14.7	32.5
OPV1	0.7	8.8	3.2	14.0	39.1
OPV0	0.0	9.1	3.6	15.2	37.0
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	5.9	6.8	14.4	0.8	39.0

Figure 48. Vaccination coverage among children ages 12-23 months, Quetta District, SHRUCs Round 2



OPV summarizes RI dose evidence alone and OPWC summarizes evidence of RI and campaign doses.

Fully vaccinated: 31.1% (95% CI: 27.5 - 35.0%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 23.9% (95% CI: 20.5 - 27.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 56. Vaccination coverage bar segment lengths (%), Quetta District, SHRUCs Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	1.3	1.8	1.5	2.2	13.7
MCV1	3.3	5.7	3.2	6.8	17.2
IPV	0.1	4.2	3.3	13.6	20.6
ROTA2	0.7	5.6	5.1	12.3	20.3
ROTA1	1.3	11.5	5.2	11.9	25.0
PCV3	0.1	3.9	3.3	11.1	21.8
PCV2	0.7	5.6	5.0	11.9	25.5
PCV1	1.3	11.5	5.2	11.7	27.4
PENTA3	0.1	3.9	3.3	11.1	22.0
PENTA2	0.7	5.6	5.0	11.9	27.0
PENTA1	1.3	11.5	5.2	11.6	30.0
OPWC3	0.1	3.9	3.3	11.1	80.5
OPWC2	0.7	5.6	5.0	11.9	76.0
OPWC1	1.3	11.5	5.1	11.7	69.6
OPV3	0.1	3.9	3.3	11.1	29.2
OPV2	0.7	5.6	5.0	11.9	36.0
OPV1	1.3	11.5	5.1	11.7	39.3
OPV0	0.0	15.8	3.7	11.6	38.2
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	12.3	7.2	11.0	0.6	44.4

Figure 49. Vaccination coverage among children ages 12-23 months, Quetta District, SHRUCs Round 3

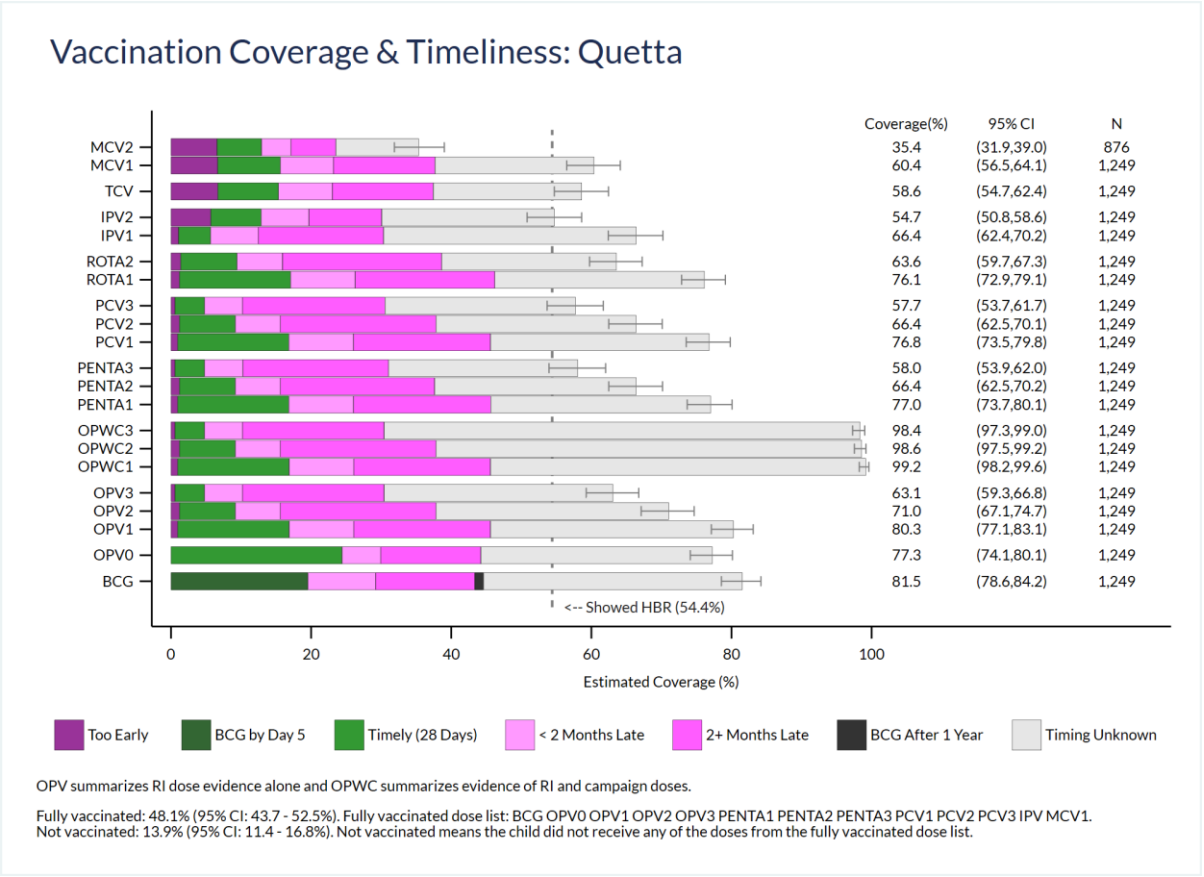


Table 57. Vaccination coverage bar segment lengths (%), Quetta District, SHRUCs Round 3

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	6.6	6.3	4.2	6.4	11.8
MCV1	6.7	8.9	7.6	14.5	22.7
TCV	6.7	8.6	7.7	14.4	21.2
IPV2	5.7	7.2	6.8	10.4	24.7
IPV1	1.1	4.6	6.9	24.4	25.9
ROTA2	1.4	8.0	6.5	22.7	25.0
ROTA1	1.2	15.9	9.2	19.9	29.9
PCV3	0.6	4.2	5.4	20.3	27.2
PCV2	1.2	8.0	6.4	22.2	28.6
PCV1	1.0	15.9	9.2	19.6	31.2
PENTA3	0.6	4.2	5.5	20.8	27.0
PENTA2	1.2	8.0	6.4	22.0	28.8
PENTA1	1.0	15.9	9.2	19.6	31.4
OPWC3	0.6	4.2	5.4	20.2	68.0
OPWC2	1.2	8.0	6.4	22.2	60.8
OPWC1	1.0	15.9	9.2	19.5	53.6
OPV3	0.6	4.2	5.4	20.2	32.7
OPV2	1.2	8.0	6.4	22.2	33.2
OPV1	1.0	15.9	9.2	19.5	34.7
OPV0	0.0	24.4	5.5	14.3	33.1
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	19.5	9.7	14.2	1.3	36.9

The Quetta figures (Figure 13, Figure 14 and Figure 45 through Figure 49) indicate:

- The Quetta district did not see the large Round 1 to 2 declines in coverage that were evident in both TPVICS and SHRUCs in Killa Abdullah and Pishin. It showed tremendous improvement in OPV coverage when including campaign doses (OPWC) from TPVICS Round 1 to Round 2. The SHRUC survey observed a mix of modest improvements and declines from Round 1 to Round 2 but showed consistent double-digit improvements from Round 1 to Round 3. There was a net improvement from Round 1 in 2021 to Round 3 in 2023 for all doses. The percent fully vaccinated in SHRUCs improve by a 10.7% from 2021 to 2023 and the percent of zero dose children dropped by 18.4% over that period. Statistically significant changes are summarized in Table 21**Table 19**.
- All five surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All five surveys show more than half of the doses for which timeliness was known being more than 28 days late. Many children received doses two or more months late.

Figure 50. Vaccination coverage among children ages 12-23 months, Lahore District, TPVICS Round 1

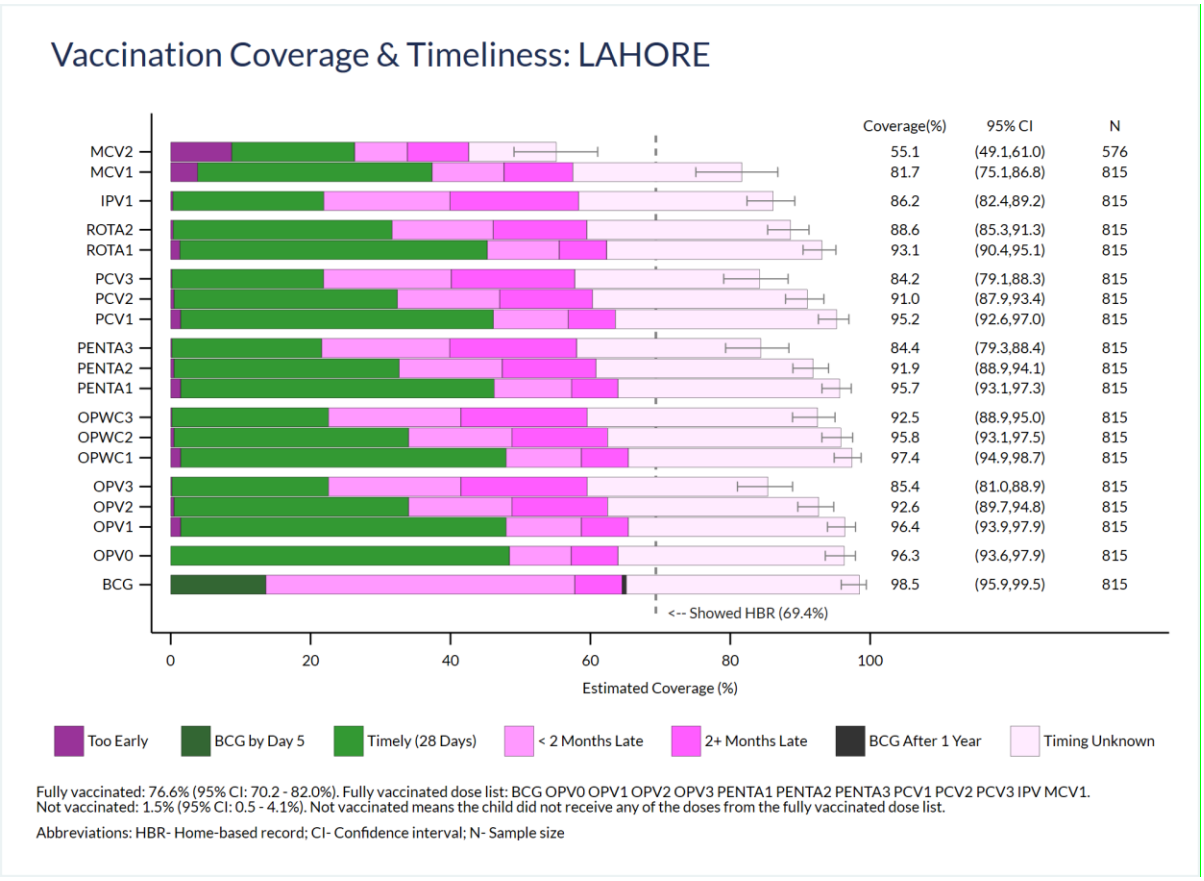
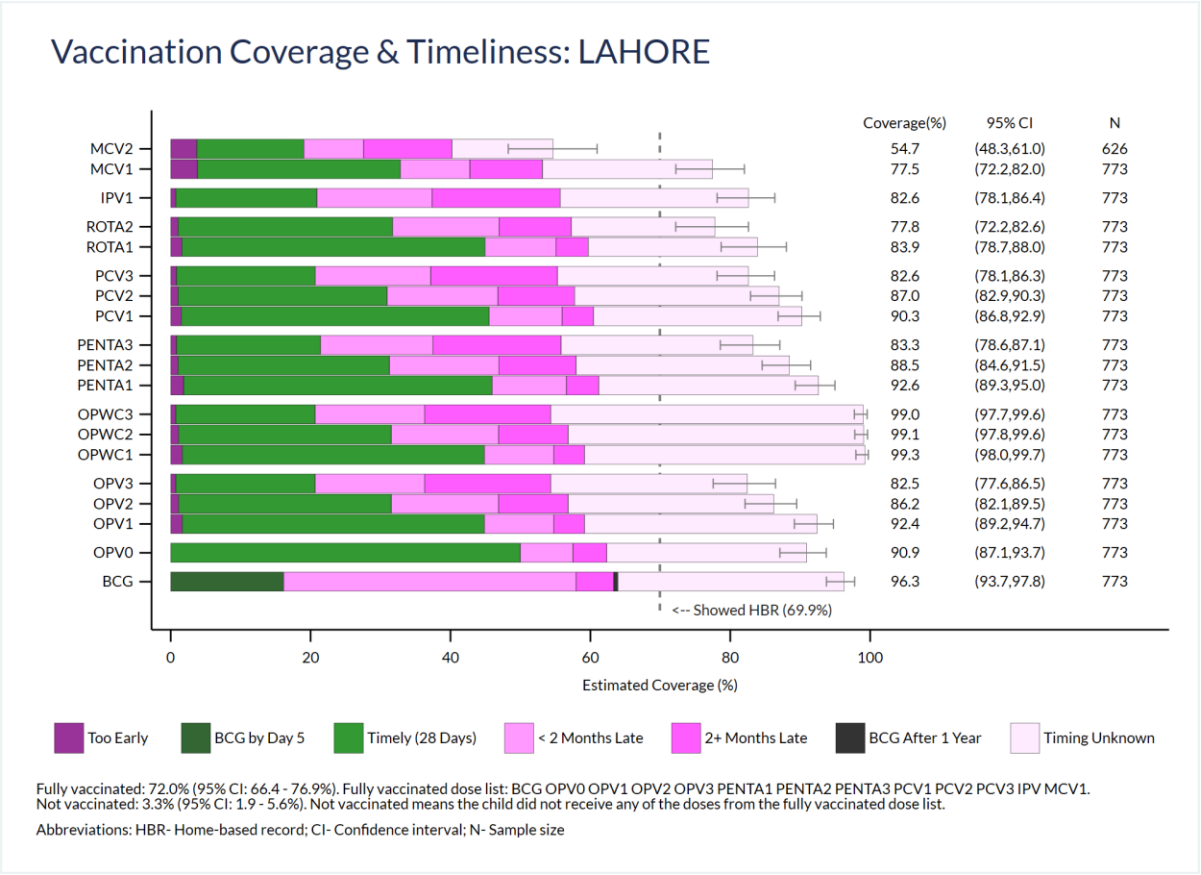


Table 58. Vaccination coverage bar segment lengths (%), Lahore District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	8.7	17.6	7.5	8.8	12.5
MCV1	3.8	33.5	10.3	9.8	24.2
IPV	0.3	21.6	18.1	18.4	27.8
ROTA2	0.4	31.3	14.5	13.4	29.2
ROTA1	1.3	43.9	10.3	6.8	30.8
PCV3	0.2	21.7	18.3	17.7	26.4
PCV2	0.5	32.0	14.6	13.3	30.7
PCV1	1.4	44.7	10.7	6.7	31.7
PENTA3	0.2	21.4	18.3	18.2	26.3
PENTA2	0.5	32.2	14.7	13.4	31.1
PENTA1	1.4	44.8	11.1	6.6	31.7
OPWC3	0.2	22.4	18.9	18.1	33.0
OPWC2	0.5	33.5	14.8	13.7	33.4
OPWC1	1.4	46.5	10.7	6.7	32.0
OPV3	0.2	22.4	18.9	18.1	25.9
OPV2	0.5	33.5	14.8	13.7	30.2
OPV1	1.4	46.5	10.7	6.7	31.0
OPV0	0.0	48.4	8.8	6.7	32.4
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	13.6	44.2	6.8	0.6	33.4

Figure 51. Vaccination coverage among children ages 12-23 months, Lahore District, TPVICS Round 2



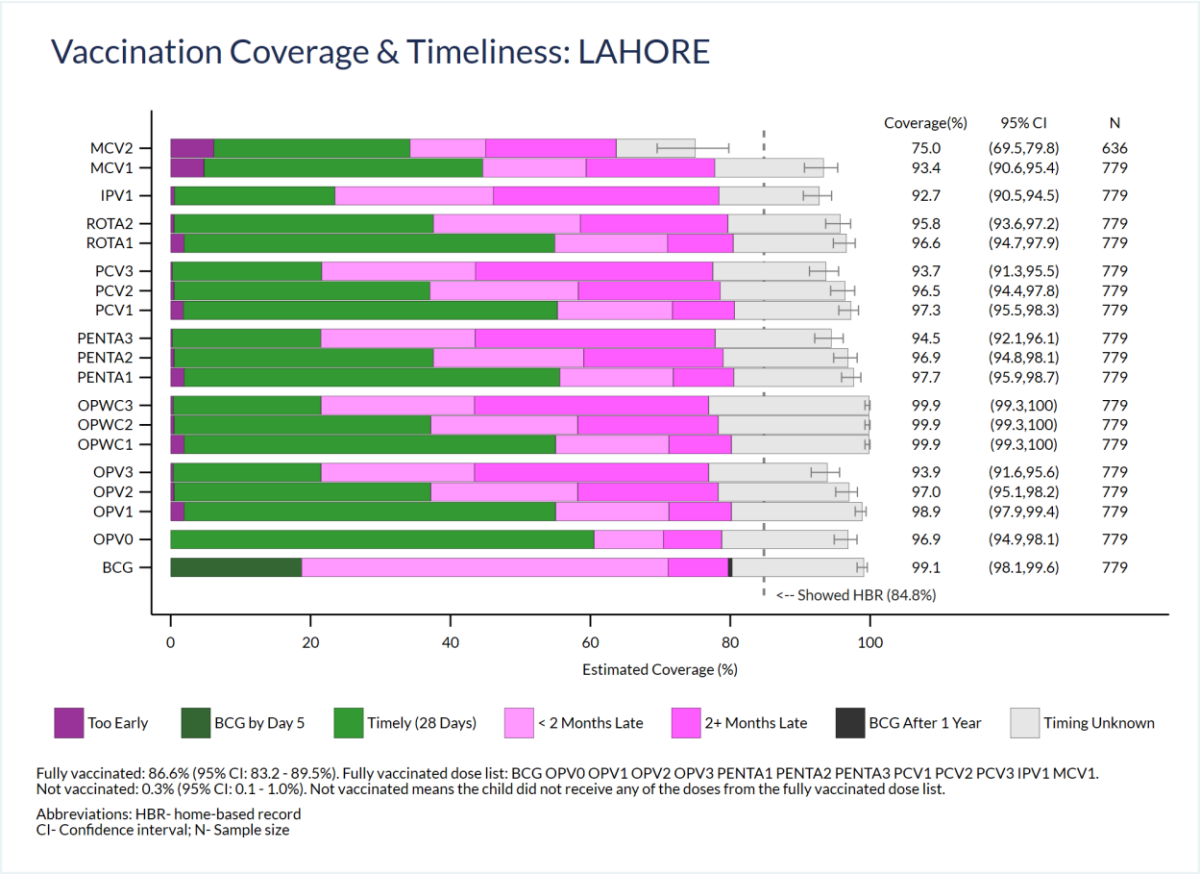
Fully vaccinated: 72.0% (95% CI: 66.4 - 76.9%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 3.3% (95% CI: 1.9 - 5.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- Home-based record; CI- Confidence interval; N- Sample size

Table 59. Vaccination coverage bar segment lengths (%), Lahore District, TPVICS Round 2

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.7	15.3	8.6	12.6	14.5
MCV1	3.8	29.0	9.9	10.4	24.4
IPV	0.7	20.1	16.5	18.3	27.0
ROTA2	1.0	30.7	15.2	10.3	20.6
ROTA1	1.6	43.3	10.1	4.6	24.2
PCV3	0.8	19.8	16.5	18.1	27.3
PCV2	1.0	29.9	15.8	11.0	29.3
PCV1	1.5	44.0	10.4	4.5	29.9
PENTA3	0.8	20.6	16.1	18.3	27.5
PENTA2	1.0	30.2	15.7	11.0	30.5
PENTA1	1.8	44.1	10.6	4.6	31.4
OPWC3	0.7	19.9	15.7	18.0	44.7
OPWC2	1.1	30.4	15.3	10.0	42.3
OPWC1	1.7	43.2	9.9	4.4	40.1
OPV3	0.7	19.9	15.7	18.0	28.1
OPV2	1.1	30.4	15.3	10.0	29.4
OPV1	1.7	43.2	9.9	4.4	33.2
OPV0	0.0	50.0	7.5	4.8	28.6
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	16.1	41.8	5.4	0.6	32.3

Figure 52. Vaccination coverage among children ages 12-23 months, Lahore District, LICS 2023



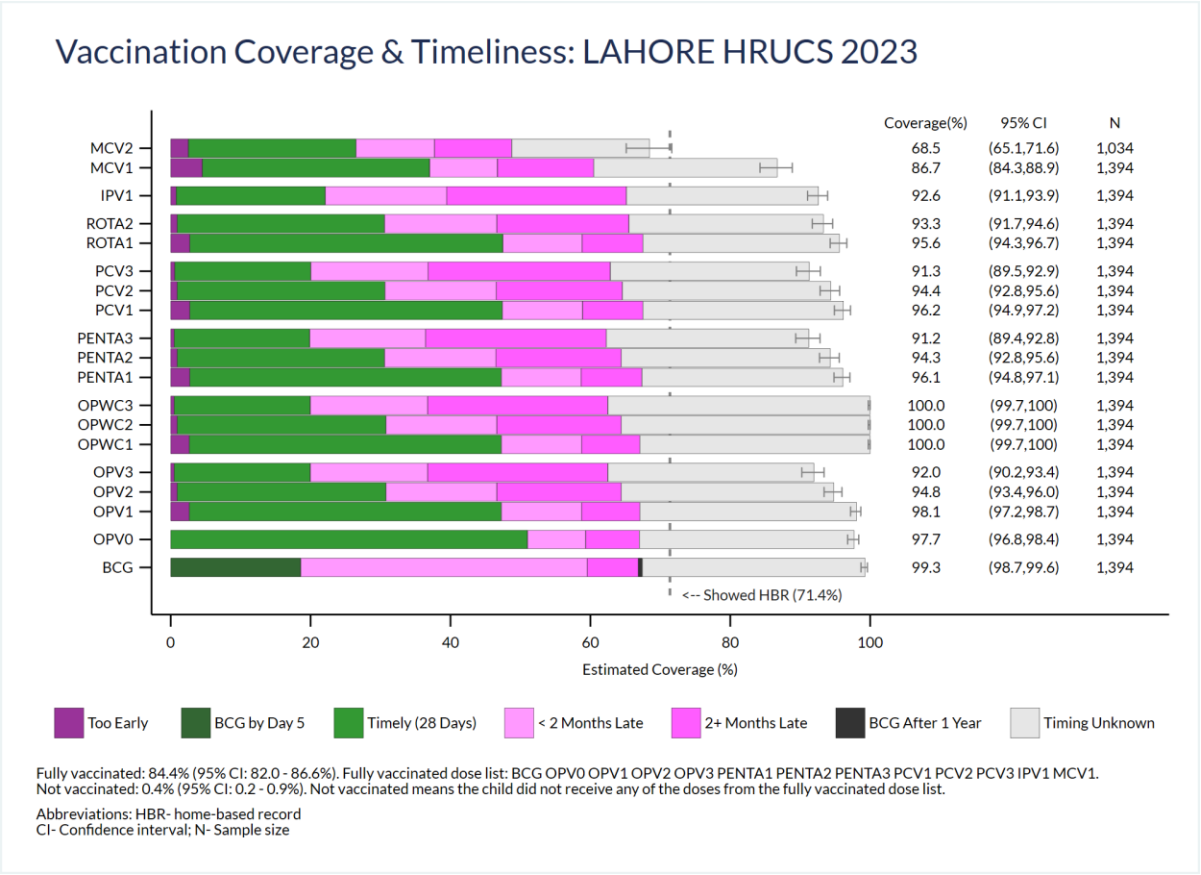
Fully vaccinated: 86.6% (95% CI: 83.2 - 89.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV1 MCV1.
Not vaccinated: 0.3% (95% CI: 0.1 - 1.0%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- home-based record
CI- Confidence interval; N- Sample size

Table 60. Vaccination coverage bar segment lengths (%), Lahore District, LICS 2023

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	6.2	28.1	10.8	18.7	11.3
MCV1	4.8	39.9	14.8	18.4	15.6
IPV	0.5	23.0	22.6	32.2	14.3
ROTA2	0.5	37.1	21.0	21.1	16.1
ROTA1	1.9	53.0	16.1	9.4	16.2
PCV3	0.2	21.3	22.0	33.9	16.2
PCV2	0.5	36.6	21.2	20.3	17.9
PCV1	1.8	53.5	16.4	8.9	16.6
PENTA3	0.2	21.2	22.1	34.3	16.6
PENTA2	0.5	37.1	21.5	19.9	17.9
PENTA1	1.9	53.7	16.2	8.6	17.2
OPWC3	0.4	21.1	21.9	33.5	23.0
OPWC2	0.5	36.7	21.0	20.1	21.6
OPWC1	1.9	53.1	16.2	8.9	19.7
OPV3	0.4	21.1	21.9	33.5	17.0
OPV2	0.5	36.7	21.0	20.1	18.7
OPV1	1.9	53.1	16.2	8.9	18.7
OPV0	0.0	60.5	9.9	8.4	18.1
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	18.7	52.4	8.6	0.5	18.9

Figure 53. Vaccination coverage among children ages 12-23 months, Lahore District, LHRUCS 2023



Fully vaccinated: 84.4% (95% CI: 82.0 - 86.6%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV1 MCV1.
Not vaccinated: 0.4% (95% CI: 0.2 - 0.9%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

Abbreviations: HBR- home-based record
CI- Confidence interval; N- Sample size

Table 61. Vaccination coverage bar segment lengths (%), Lahore District, LHRUCS 2023

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	2.5	24.0	11.2	11.0	19.7
MCV1	4.5	32.5	9.7	13.8	26.3
IPV	0.8	21.3	17.4	25.7	27.5
ROTA2	0.9	29.6	16.1	18.9	27.8
ROTA1	2.7	44.8	11.3	8.7	28.1
PCV3	0.6	19.4	16.8	26.0	28.5
PCV2	0.9	29.7	15.9	18.0	29.8
PCV1	2.7	44.7	11.5	8.6	28.7
PENTA3	0.5	19.4	16.6	25.8	29.0
PENTA2	0.9	29.6	15.9	17.9	29.9
PENTA1	2.7	44.5	11.4	8.7	28.8
OPWC3	0.5	19.4	16.8	25.8	37.5
OPWC2	0.9	29.8	15.9	17.8	35.6
OPWC1	2.7	44.6	11.5	8.3	32.9
OPV3	0.5	19.4	16.8	25.8	29.5
OPV2	0.9	29.8	15.9	17.8	30.4
OPV1	2.7	44.6	11.5	8.3	31.0
OPV0	0.0	51.0	8.3	7.7	30.7
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	18.6	41.0	7.3	0.6	31.9

The Lahore figures (Figure 50 through Figure 53) indicate:

- Coverage for all doses except OPWC1-3 declined from TPVCIS Round 1 to Round 2 and the percent of children who were fully vaccinated dropped by 4.6%. The district made an excellent turnaround between TPVICS Round 2 and the 2023 LICS survey with most doses seeing double-digit improvements over the course of a single year, and the percent fully vaccinated improved by 14.6%. In the LICS 2023 survey, all doses (except MCV2) had coverage above 93%. Between 2020 and 2023, the percent fully vaccinated improved by a net of 10%.
- Performance in the LHRUCS 2023 survey was nearly the same as in LICS 2023 with slightly lower coverage estimates, especially for MCV1 and 2 (both were 6.7% lower than for LICS). Card availability in the LHRUCS survey was 13.4% lower than in the LICS survey. All doses except MCV1 and 2 in the LHRUCS 2023 survey had estimated coverage over 90%.
- OPVWC1-3 had estimated coverage of 99.9% in LICS 2023 and 100.0% in LHRUCS 2023.
- All four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All four surveys show a substantial portion of children received doses two or more months late. The later the dose appears in the schedule, the higher the likelihood the dose was received very late.

3.6. Drop-out between vaccination visits

Drop-out between vaccination visits is a constant feature of routine vaccination. The survey team observed this pattern in the target districts (Table 62). Drop-out may be calculated using this formula[4]:

$$Drop\text{–}out = 100\%\ x\ \frac{(Coverage\ of\ earlier\ dose - Coverage\ of\ later\ dose)}{Coverage\ of\ earlier\ dose}$$

A drop-out rate greater than 10% is considered a 'high drop-out' by WHO as a global vaccination practice, and a high drop-out rate is indicative of systemic problems in the health system for addressing vaccination coverage.

Table 62 indicates that drop-out was higher than 10% for most dose series in most districts in most surveys summarized in this report. Drop-out was especially high in Balochistan in the SHRUCs survey for most dose pairs. The estimates for MCV1 to MCV2 drop-out are notably high in Balochistan.

Throughout the report, in tables that show both TPVICS and SHRUCs results, those from TPVICS are summarized using blue data bars and those from SHRUCs surveys use orange.

[4] In earlier TPVICS and SHRUCs survey reports, we shared an unweighted estimate of drop-out. In 2023 we updated VCQI with an option to calculate drop-out according to the commonly used formula listed here which can be described as a *weighted* estimate of drop-out. This report uses the more commonly expected weighted indicator.

Table 62. Drop-out rates between dose pairs in target districts

	PENTA1-PENTA3 Dropout (%)	OPV1-OPV3 Dropout (%)	PCV1-PCV3 Dropout (%)	ROTA1-ROTA2 Dropout (%)	MCV1-MCV2 Dropout (%)	BCG-MCV1 Dropout (%)	PENTA1-MCV1 Dropout (%)
KP - Peshawar - TPVICS R1	13.3	15.2	13.8	8.5	26.5	20.1	17.7
-TPVICS R2	13.7	15.4	15.6	9.1	35.8	19.7	15.2
- SHRUCs R1	11.2	17.8	11.9	8	30	12	10
- SHRUCs R2	9.2	14.8	9.5	4.3	28	17.1	11.7
- SHRUCs R3	8.2	9.4	8.7	5.7	26.4	13.6	11.9
Sindh - Karachi East - TPVICS R1	14.3	13.1	16.6	6.9	42.8	24.5	20.7
-TPVICS R2	17.5	16	17.6	7.6	42.3	24.9	21.2
- SHRUCs R1	24.4	21	24.6	12.9	41.4	35.6	28.8
- SHRUCs R2	24.1	23.8	25	13.7	33	38	27.3
- SHRUCs R3	22.7	21	23.6	13.4	39.7	26	21.4
Sindh - Karachi West - TPVICS R1	15.8	16.4	19.8	9.8	37.2	33.1	27.7
-TPVICS R2	16.2	14.4	16	10	34.6	23.5	16.7
- SHRUCs R1	25.3	19.1	29.2	13.5	31.2	32.1	25.2
- SHRUCs R2	22.9	21.7	21.5	13.4	36.4	39.3	28.7
- SHRUCs R3	15.7	15.5	15.4	7.9	26.6	19.8	16.5
Sindh - Malir - TPVICS R1	17.1	18.7	17.1	8.4	37.3	31.9	26.1
-TPVICS R2	19.7	20.5	19.6	7.2	40.2	26.4	20.3
- SHRUCs R1	23.9	19.6	25	12.1	33	34.1	27.5
- SHRUCs R2	23.3	24	23.1	12.9	31.2	36.5	29
- SHRUCs R3	19.5	19.7	19.6	10.5	31.8	31.5	25.5
Balochistan - Killa Abdullah - TPVICS R1	7.5	8.8	6.2	2.1	69	19	5.7
-TPVICS R2	7.5	7.5	7.2	55.6	84.2	15.9	5.9
- SHRUCs R1	61.9	36.7	61.3	23	57.3	48.3	35.1
- SHRUCs R2	48.8	42.9	49.6	35.4	70.8	45	37.7
- SHRUCs R3	24.5	26.7	24.4	19.6	52.8	23.7	27.5
Balochistan - Pishin - TPVICS R1	13.2	13.9	19.3	23	53	27.1	11.3
-TPVICS R2	27.5	25.7	29.8	41.8	74.5	56.4	20.7
- SHRUCs R1	29.9	32.7	30.5	27.5	39.3	33.8	30.2
- SHRUCs R2	48.9	52.5	48.2	35.9	62.8	50.4	41
- SHRUCs R3	32.1	31.5	31.9	20.1	66.8	21.5	20.6
Balochistan - Quetta - TPVICS R1	25.8	26.9	25.1	12.2	55.9	32.4	26.8
-TPVICS R2	19	18.8	18.7	11.6	43.5	29.3	20
- SHRUCs R1	27.8	29.1	28.4	18	46.8	32.1	27.9
- SHRUCs R2	33.8	33.3	31.8	20.4	47.7	52	39.6
- SHRUCs R3	24.7	21.4	24.8	16.5	43.4	29.6	22.1
Punjab - Lahore - TPVICS R1	11.8	11.4	11.6	4.8	33.4	17.1	15.1
- TPVICS R2	10.1	10.8	8.5	7.2	32.4	19.6	16.3
- LICS 2023	3.3	5	3.6	0.9	19.8	6.1	4.5
- LHRUCS 2023	5.1	6.2	5.1	2.4	23.5	12.7	10.2

Denominator is all children who received the earlier dose and were old enough to have received the later dose.

Colored bars are scaled so that if 100% of children dropped out, the entire cell would be filled with color.

Sample sizes are listed for each cell in the supplementary annex with VCQI tables. All sample sizes are > 149.

3.7. Dose intervals

The EPI schedule calls for doses in series due at 6, 10, and 14 weeks to be separated by at least 28 days. If the interval is shorter than 28 days, then the later dose has a smaller chance of triggering a biological immune response and is not considered to be a valid dose. If the interval is too long, then the child spends unnecessary time under-vaccinated and at risk for disease. For children with dose dates recorded on HBRs, it is possible to calculate the length of the dose interval in days and report the proportion of intervals that were too short (< 28 days), timely (28-55 days), or too long (56+ days).

In the surveys summarized in this report, all four vaccine series yielded similar patterns, shown in Table 63, Table 64, Table 65, and Table 66. A small number of intervals were shorter than 28 days. Most were between 28 and 55 days and considered to be timely. Between one-fifth and one-half of the intervals were 56 days or longer, leaving children under-protected for a prolonged period.

Pishin district consistently had the longest intra-dose intervals with the highest proportion of children experiencing intervals of 56+ days. In Karachi East and Karachi West and Quetta, the SHRUCs surveys had consistently more children with intervals 56+ days than the corresponding TPVICS surveys.

Note: The estimates in the interval tables are unweighted, following the VCQI convention that estimates where all children are in the denominator are weighted and estimates with a subset of children in the denominator are not weighted. Table 67 lists the median and 75th percentile for intra-dose intervals (in days). The median values are quite consistent across TPVICS and SHRUCs, with Killa Abdullah and Pishin showing the largest values. For the 75% percentile, the SHRUCs surveys tend to have somewhat larger values than TPVICS, indicating that the worst performance there is notably worse than in the remainder of the district. Some children in the SHRUCs experience extended intervals. For example, in Killa Abdullah, the 75th percentile went from 2.4 months to 4.0 between Round 1 and Round 2 while in Pishin the 75th percentile improved somewhat, from 4.3-4.5 months down to 3.9-4.1 months, from Round 1 to Round 2 but were longer (4.4-4.7 months) in Round 3. Again, the scheduled interval is one month, so in Pishin, the 75% percentile figures indicate that one quarter of the children in the SHRUCs sample who received the later doses in dose pairs experienced intervals at least four times as long as they should.

Table 63. Penta dose interval categories among children ages 12-23 months, by district

	Too Short (%) < 28 days	Timely (%) 28-56 days	Too Long (%) > 56 days
KP - Peshawar - TPVICS R1 (N = 550)	1.5	63.0	35.5
-TPVICS R2 (N = 772)	2.6	68.0	29.4
- SHRUCs R1 (N = 2621)	1.1	64.1	34.8
- SHRUCs R2 (N = 2777)	2.1	65.6	32.3
- SHRUCs R3 (N = 2873)	1.3	66.4	32.3
Sindh - Karachi East - TPVICS R1 (N = 892)	2.7	78.7	18.6
-TPVICS R2 (N = 753)	2.9	78.2	18.9
- SHRUCs R1 (N = 355)	2.8	59.4	37.8
- SHRUCs R2 (N = 478)	2.1	62.1	35.8
- SHRUCs R3 (N = 600)	1.8	56.7	41.5
Sindh - Karachi West - TPVICS R1 (N = 913)	2.8	74.4	22.8
-TPVICS R2 (N = 924)	3.5	76.9	19.6
- SHRUCs R1 (N = 795)	3.4	67.7	28.9
- SHRUCs R2 (N = 854)	3	68.3	28.7
- SHRUCs R3 (N = 1409)	2.8	64.3	32.9
Sindh - Malir - TPVICS R1 (N = 769)	1.4	80.1	18.5
-TPVICS R2 (N = 947)	2.5	74.9	22.6
- SHRUCs R1 (N = 775)	4	72.5	23.5
- SHRUCs R2 (N = 929)	3.7	62.1	34.2
- SHRUCs R3 (N = 1193)	2.8	66.7	30.5
Balochistan - Killa Abdullah - TPVICS R1 (N = 260)	7.3	65.7	27.0
-TPVICS R2 (N = 106)	3.8	47.2	49.0
- SHRUCs R1 (N = 157)	1.3	53.5	45.2
- SHRUCs R2 (N = 210)	5.7	49.0	45.3
- SHRUCs R3 (N = 361)	2.2	44.9	52.9
Balochistan - Pishin - TPVICS R1 (N = 144)	2.8	55.5	41.7
-TPVICS R2 (N = 208)	5.3	41.3	53.4
- SHRUCs R1 (N = 139)	4.3	44.6	51.1
- SHRUCs R2 (N = 177)	5.6	31.1	63.3
- SHRUCs R3 (N = 371)	2.2	37.2	60.6
Balochistan - Quetta - TPVICS R1 (N = 459)	1.7	75.0	23.3
-TPVICS R2 (N = 392)	2.6	74.4	23.0
- SHRUCs R1 (N = 352)	2	65.9	32.1
- SHRUCs R2 (N = 471)	1.7	64.5	33.8
- SHRUCs R3 (N = 826)	1.8	62.0	36.2
Punjab - Lahore - TPVICS R1 (N = 918)	1.4	78.8	19.8
- TPVICS R2 (N = 790)	2	80.0	18.0
- LICS 2023 (N = 1179)	1.6	74.4	24.0
- LHRUCS 2023 (N = 1733)	1.4	75.3	23.3

N is the number of Dose 1 to Dose 2 intervals plus the number of Dose 2 to Dose 3 intervals for which respondents had vaccination dates. Some respondents will have contributed data for no intervals, some for one interval, and some for two intervals.

Table 64. OPV dose interval categories among children ages 12-23 months, by district

	Too Short (%) < 28 days	Timely (%) 28-56 days	Too Long (%) > 56 days
KP - Peshawar - TPVICS R1 (N = 546)	1.5	62.8	35.7
-TPVICS R2 (N = 757)	2.4	69.6	28.0
- SHRUCs R1 (N = 2,553)	1.1	64.4	34.5
- SHRUCs R2 (N = 2,659)	2.1	66.0	31.9
- SHRUCs R3 (N = 2,801)	1.3	66.7	32.0
Sindh - Karachi East - TPVICS R1 (N = 874)	2.6	79.1	18.3
-TPVICS R2 (N = 748)	3.3	77.6	19.1
- SHRUCs R1 (N = 356)	2	60.1	37.9
- SHRUCs R2 (N = 467)	2.6	61.6	35.8
- SHRUCs R3 (N = 605)	1.7	57.0	41.3
Sindh - Karachi West - TPVICS R1 (N = 914)	2.7	74.3	23.0
-TPVICS R2 (N = 928)	3.6	76.8	19.6
- SHRUCs R1 (N = 790)	3.2	68.3	28.5
- SHRUCs R2 (N = 844)	3.3	68.2	28.5
- SHRUCs R3 (N = 1,428)	3.1	64.1	32.8
Sindh - Malir - TPVICS R1 (N = 769)	1.3	79.6	19.1
-TPVICS R2 (N = 941)	2.6	74.8	22.6
- SHRUCs R1 (N = 749)	4.3	70.7	25.0
- SHRUCs R2 (N = 918)	3.8	60.4	35.8
- SHRUCs R3 (N = 1,189)	2.9	66.0	31.1
Balochistan - Killa Abdullah - TPVICS R1 (N = 261)	7.7	64.7	27.6
-TPVICS R2 (N = 103)	2.9	48.6	48.5
- SHRUCs R1 (N = 157)	1.3	53.5	45.2
- SHRUCs R2 (N = 208)	5.3	50.0	44.7
- SHRUCs R3 (N = 359)	2.2	45.1	52.7
Balochistan - Pishin - TPVICS R1 (N = 140)	2.9	56.4	40.7
-TPVICS R2 (N = 202)	5.4	40.7	53.9
- SHRUCs R1 (N = 140)	4.3	45.0	50.7
- SHRUCs R2 (N = 148)	5.4	31.8	62.8
- SHRUCs R3 (N = 356)	2	36.5	61.5
Balochistan - Quetta - TPVICS R1 (N = 459)	1.7	74.8	23.5
-TPVICS R2 (N = 390)	2.6	74.6	22.8
- SHRUCs R1 (N = 349)	2	65.6	32.4
- SHRUCs R2 (N = 471)	1.7	64.5	33.8
- SHRUCs R3 (N = 821)	1.8	62.4	35.8
Punjab - Lahore - TPVICS R1 (N = 960)	1.6	78.6	19.8
- TPVICS R2 (N = 761)	1.7	81.0	17.3
- LICS 2023 (N = 1,168)	1.6	74.4	24.0
- LHRUCS 2023 (N = 1,735)	1.4	75.3	23.3

N is the number of Dose 1 to Dose 2 intervals plus the number of Dose 2 to Dose 3 intervals for which respondents had vaccination dates. Some respondents will have contributed data for no intervals, some for one interval, and some for two intervals.

Table 65. PCV dose interval categories among children ages 12-23 months, by district

	Too Short (%) < 28 days	Timely (%) 28-56 days	Too Long (%) > 56 days
KP - Peshawar - TPVICS R1 (N = 550)	1.5	62.9	35.6
-TPVICS R2 (N = 767)	2.6	68.6	28.8
- SHRUCs R1 (N = 2,617)	1.2	63.9	34.9
- SHRUCs R2 (N = 2,742)	2	65.8	32.2
- SHRUCs R3 (N = 2,940)	1.2	66.4	32.4
Sindh - Karachi East - TPVICS R1 (N = 862)	2.8	78.9	18.3
-TPVICS R2 (N = 742)	3.2	77.1	19.7
- SHRUCs R1 (N = 354)	2.8	59.1	38.1
- SHRUCs R2 (N = 469)	2.1	61.6	36.3
- SHRUCs R3 (N = 604)	1.8	57.0	41.2
Sindh - Karachi West - TPVICS R1 (N = 907)	2.9	74.6	22.5
-TPVICS R2 (N = 916)	3.5	76.3	20.2
- SHRUCs R1 (N = 805)	3.1	68.2	28.7
- SHRUCs R2 (N = 849)	3.1	68.1	28.8
- SHRUCs R3 (N = 1,431)	2.9	64.4	32.7
Sindh - Malir - TPVICS R1 (N = 769)	1.6	79.6	18.8
-TPVICS R2 (N = 942)	2.3	74.9	22.8
- SHRUCs R1 (N = 778)	4.2	72.4	23.4
- SHRUCs R2 (N = 927)	3.7	62.7	33.6
- SHRUCs R3 (N = 1,210)	2.9	66.6	30.5
Balochistan - Killa Abdullah - TPVICS R1 (N = 260)	7.7	65.0	27.3
-TPVICS R2 (N = 104)	2.9	49.0	48.1
- SHRUCs R1 (N = 157)	1.3	53.5	45.2
- SHRUCs R2 (N = 209)	5.7	48.8	45.5
- SHRUCs R3 (N = 365)	2.2	44.9	52.9
Balochistan - Pishin - TPVICS R1 (N = 144)	2.8	55.5	41.7
-TPVICS R2 (N = 202)	5	41.0	54.0
- SHRUCs R1 (N = 138)	4.3	43.5	52.2
- SHRUCs R2 (N = 175)	5.1	32.6	62.3
- SHRUCs R3 (N = 370)	2.2	37.0	60.8
Balochistan - Quetta - TPVICS R1 (N = 459)	1.3	75.0	23.7
-TPVICS R2 (N = 390)	2.6	74.6	22.8
- SHRUCs R1 (N = 350)	2.3	65.7	32.0
- SHRUCs R2 (N = 471)	1.7	64.5	33.8
- SHRUCs R3 (N = 823)	1.7	62.2	36.1
Punjab - Lahore - TPVICS R1 (N = 906)	1.5	78.8	19.7
- TPVICS R2 (N = 777)	2.1	80.3	17.6
- LICS 2023 (N = 1,173)	1.7	74.6	23.7
- LHRUCS 2023 (N = 1,741)	1.5	75.2	23.3

N is the number of Dose 1 to Dose 2 intervals plus the number of Dose 2 to Dose 3 intervals for which respondents had vaccination dates. Some respondents will have contributed data for no intervals, some for one interval, and some for two intervals.

Table 66. Rota dose interval categories among children ages 12-23 months, by district

	Too Short (%) < 28 days	Timely (%) 28-56 days	Too Long (%) > 56 days
KP - Peshawar - TPVICS R1 (N = 292)	1	62.0	37.0
-TPVICS R2 (N = 417)	2.2	70.0	27.8
- SHRUCs R1 (N = 1361)	0.7	65.1	34.2
- SHRUCs R2 (N = 1466)	1.9	66.9	31.2
- SHRUCs R3 (N = 1539)	1.2	66.9	31.9
Sindh - Karachi East - TPVICS R1 (N = 416)	2.6	80.1	17.3
-TPVICS R2 (N = 390)	3.1	79.5	17.4
- SHRUCs R1 (N = 195)	2.6	55.9	41.5
- SHRUCs R2 (N = 261)	1.5	61.3	37.2
- SHRUCs R3 (N = 325)	2.8	57.8	39.4
Sindh - Karachi West - TPVICS R1 (N = 456)	3.1	76.5	20.4
-TPVICS R2 (N = 492)	3.7	77.2	19.1
- SHRUCs R1 (N = 434)	2.8	69.1	28.1
- SHRUCs R2 (N = 466)	3.4	68.9	27.7
- SHRUCs R3 (N = 756)	2.8	63.6	33.6
Sindh - Malir - TPVICS R1 (N = 389)	0.5	81.5	18.0
-TPVICS R2 (N = 511)	3.1	76.2	20.7
- SHRUCs R1 (N = 414)	4.6	69.8	25.6
- SHRUCs R2 (N = 507)	3.9	63.2	32.9
- SHRUCs R3 (N = 641)	2.5	64.4	33.1
Balochistan - Killa Abdullah - TPVICS R1 (N = 135)	4.4	62.3	33.3
-TPVICS R2 (N = 58)	3.4	51.8	44.8
- SHRUCs R1 (N = 101)	2	49.5	48.5
- SHRUCs R2 (N = 140)	3.6	47.8	48.6
- SHRUCs R3 (N = 228)	2.2	42.5	55.3
Balochistan - Pishin - TPVICS R1 (N = 80)	3.8	58.7	37.5
-TPVICS R2 (N = 126)	5.6	40.4	54.0
- SHRUCs R1 (N = 81)	2.5	43.2	54.3
- SHRUCs R2 (N = 125)	4.8	30.4	64.8
- SHRUCs R3 (N = 225)	2.2	36.0	61.8
Balochistan - Quetta - TPVICS R1 (N = 246)	1.6	72.4	26.0
-TPVICS R2 (N = 208)	4.3	71.2	24.5
- SHRUCs R1 (N = 204)	2.5	67.6	29.9
- SHRUCs R2 (N = 273)	1.5	62.2	36.3
- SHRUCs R3 (N = 457)	2.2	60.2	37.6
Punjab - Lahore - TPVICS R1 (N = 462)	0.4	80.3	19.3
- TPVICS R2 (N = 398)	1.8	80.9	17.3
- LICS 2023 (N = 607)	0.8	79.9	19.3
- LHRUCS 2023 (N = 903)	1.2	74.4	24.4

N is the number of Dose 1 to Dose 2 intervals plus the number of Dose 2 to Dose 3 intervals for which respondents had vaccination dates. Some respondents will have contributed data for no intervals, some for one interval, and some for two intervals.

Table 67. Intra-dose interval median (50th percentile) and 75th percentiles

	Median (Months)				75th Percentile (Months)				Number of Intervals			
	Penta	OPV	PCV	Rota	Penta	OPV	PCV	Rota	Penta	OPV	PCV	Rota
KP - Peshawar - TPVICS R1	1.6	1.6	1.6	1.6	2.6	2.6	2.6	2.6	550	546	550	292
-TPVICS R2	1.4	1.4	1.4	1.4	2.3	2.2	2.3	2.2	772	757	767	417
- SHRUCs R1	1.5	1.5	1.5	1.5	2.6	2.6	2.6	2.5	2,621	2,553	2,617	1,361
- SHRUCs R2	1.5	1.5	1.5	1.5	2.3	2.3	2.3	2.3	2,777	2,659	2,742	1,466
- SHRUCs R3	1.5	1.5	1.5	1.5	2.3	2.3	2.3	2.3	2,873	2,801	2,940	1,539
Sindh - Karachi East - TPVICS R1	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.8	892	874	862	416
-TPVICS R2	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.8	753	748	742	390
- SHRUCs R1	1.5	1.6	1.5	1.6	2.8	2.8	2.7	3.0	355	356	354	195
- SHRUCs R2	1.5	1.5	1.5	1.6	2.6	2.6	2.7	3.0	478	467	469	261
- SHRUCs R3	1.6	1.6	1.6	1.6	3.0	3.0	3.0	3.0	600	605	604	325
Sindh - Karachi West - TPVICS R1	1.3	1.3	1.3	1.3	1.9	1.9	1.9	1.8	913	914	907	456
-TPVICS R2	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.7	924	928	916	492
- SHRUCs R1	1.3	1.3	1.3	1.3	2.3	2.3	2.3	2.4	795	790	805	434
- SHRUCs R2	1.4	1.4	1.4	1.4	2.2	2.2	2.2	2.1	854	844	849	466
- SHRUCs R3	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	1,409	1,428	1,431	756
Sindh - Malir - TPVICS R1	1.3	1.3	1.3	1.3	1.7	1.8	1.7	1.6	769	769	769	389
-TPVICS R2	1.3	1.3	1.3	1.3	1.9	1.9	1.9	1.8	947	941	942	511
- SHRUCs R1	1.3	1.3	1.3	1.3	2.0	2.0	2.0	2.1	775	749	778	414
- SHRUCs R2	1.5	1.5	1.4	1.4	2.7	2.8	2.6	2.7	929	918	927	507
- SHRUCs R3	1.4	1.4	1.4	1.4	2.3	2.3	2.3	2.4	1,193	1,189	1,210	641
Balochistan - Killa Abdullah - TPVICS R1	1.2	1.2	1.2	1.3	2.2	2.2	2.2	2.6	260	261	260	135
-TPVICS R2	1.9	1.9	1.9	1.8	2.6	2.6	2.5	2.4	106	103	104	58
- SHRUCs R1	1.7	1.7	1.7	1.9	2.4	2.4	2.4	2.5	157	157	157	101
- SHRUCs R2	1.8	1.8	1.8	1.9	4.0	4.0	4.0	4.0	210	208	209	140
- SHRUCs R3	2.1	2.1	2.1	2.2	3.4	3.4	3.4	4.0	361	359	365	228
Balochistan - Pishin - TPVICS R1	1.5	1.5	1.5	1.5	3.3	3.2	3.3	3.2	144	140	144	80
-TPVICS R2	2.1	2.1	2.1	2.2	3.3	3.3	3.3	3.3	208	202	202	126
- SHRUCs R1	2.0	2.0	2.1	2.1	4.3	4.3	4.3	4.5	139	140	138	81
- SHRUCs R2	2.4	2.4	2.4	2.4	3.9	4.0	3.9	4.1	177	148	175	125
- SHRUCs R3	2.5	2.5	2.4	2.5	4.5	4.6	4.4	4.7	371	356	370	225
Balochistan - Quetta - TPVICS R1	1.3	1.3	1.3	1.3	2.0	2.0	2.0	2.1	459	459	459	246
-TPVICS R2	1.3	1.3	1.3	1.4	1.9	1.9	1.9	2.0	392	390	390	208
- SHRUCs R1	1.5	1.5	1.4	1.4	2.5	2.5	2.5	2.3	352	349	350	204
- SHRUCs R2	1.5	1.5	1.5	1.5	2.6	2.6	2.6	2.6	471	471	471	273
- SHRUCs R3	1.5	1.5	1.5	1.5	2.5	2.5	2.6	2.7	826	821	823	457
Punjab - Lahore - TPVICS R1	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.8	918	960	906	462
- TPVICS R2	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.8	790	761	777	398
- LICS 2023	1.4	1.3	1.3	1.3	2.0	2.0	2.0	1.8	1,179	1,168	1,173	607
- LHRUCS 2023	1.3	1.3	1.3	1.3	2.0	1.9	1.9	2.0	1,733	1,735	1,741	903

Shaded cells are scaled so that if the quantity in the table cell were 6 months, the cell would be entirely filled with color.

The target interval for Penta, OPV, PCV, and Rota is one (1) month.

3.8. Missed opportunities for simultaneous vaccination

A missed opportunity for vaccination (MOV) occurs when a child has contact with the health system but does not receive all the vaccinations they were eligible for during that visit. A missed opportunity for simultaneous vaccination (MOSV) is a type of MOV that occurs when a child has a health centre visit at which they receive one or more vaccinations, but do not receive all the vaccine doses for which they were eligible. The dates of vaccination visits recorded on an HBR can be used to identify MOSVs and summarize their frequency.

This section summarizes 1) the proportion of vaccination visits at which a MOSV occurred, in aggregate and for each individual dose (Table 68), 2) the proportion of children who experienced one or more MOSVs (Table 69), and 3) whether those missed opportunities were corrected at later health centre visits or had not been corrected by the time of the survey (Table 70).

When a child has their first health system contact after becoming eligible for a vaccine dose, that child may (a) receive the dose at the first eligible opportunity during that visit or (b) experience a missed opportunity to be vaccinated. For children who had a MOSV, we say that the missed opportunity is *corrected* if the dose is administered at a later date, and *uncorrected* if the child has still not received the dose at the time of the survey. When examining corrected MOSVs we can also consider the time to correction: the number of days that elapsed between the initial missed opportunity and the visit at which the dose was administered.

At least four notable findings are evident in the tables. First, MOSVs for IPV were extremely common in all districts in all surveys. Second, MOSVs for the doses due at 6-weeks were more common than for those due at 10- or 14-weeks. Third, MOSVs for MCV1 were also surprisingly common. Finally, in Killa Abdullah, there are a surprisingly large number of MOSVs for BCG and most of those had not been corrected by the time of the survey.

Table 71 summarizes the time to correction for IPV, reporting both the median (50th percentile) and the 90th percentile, in months. In most rows of the table, the median time to correction indicates that half of the IPV MOSVs were corrected in under three months and half took longer. The 90th percentiles indicate that in many rows at least 10% of MOSV corrections took longer than six months.

Table 68. Percent of visits with MOSVS: children were eligible for the dose and did not receive it

	BCG	OPV0	OPV1	OPV2	OPV3	PENTA1	PENTA2	PENTA3	PCV1	PCV2	PCV3	ROTA1	ROTA2	IPV1	MCV1	MCV2	Any Dose
KP - Peshawar - TPVICS R1	8.7	0.5	7.5	0.7	1.2	7.4	0.7	1.2	7.1	1.1	1.5	7.3	1.0	51.1	15.5	0.0	24.1
-TPVICS R2	8.0	1.5	7.0	3.0	5.7	8.6	1.5	4.6	6.4	2.0	8.6	9.2	1.5	40.7	13.2	2.0	19.5
- SHRUCs R1	10.1	0.1	5.1	0.7	8.5	5.6	0.8	2.7	5.1	0.7	3.7	5.4	0.9	35.7	10.3	0.4	17.1
- SHRUCs R2	11.2	1.6	8.0	3.8	11.1	6.1	1.7	3.9	7.8	1.9	5.3	7.2	4.9	38.3	13.2	1.5	20.1
- SHRUCs R3	6.0	0.4	4.4	1.9	2.0	4.3	1.2	2.1	3.9	0.9	4.4	4.7	4.0	37.1	10.4	0.5	15.7
Sindh - Karachi East - TPVICS R1	1.5	0.9	8.7	2.2	2.5	7.8	2.4	2.7	12.5	2.0	2.8	22.0	4.6	47.0	9.9	0.0	20.3
-TPVICS R2	6.2	1.0	14.4	4.4	3.9	12.5	2.6	4.9	16.3	2.9	3.9	21.3	3.9	44.1	15.8	0.7	20.0
- SHRUCs R1	7.9	0.0	27.8	7.0	5.7	28.6	6.6	8.1	28.6	6.6	5.2	30.3	11.8	62.7	37.0	8.7	42.4
- SHRUCs R2	14.2	0.0	23.0	8.4	11.2	21.9	8.7	9.3	23.0	8.0	13.1	24.8	12.1	56.0	30.7	4.0	35.8
- SHRUCs R3	23.5	2.8	21.0	9.5	14.3	21.4	10.4	14.9	21.1	9.8	17.4	22.8	12.7	54.2	24.3	5.3	36.9
Sindh - Karachi West - TPVICS R1	2.4	1.0	11.9	2.6	1.7	11.2	2.8	1.7	12.1	2.2	1.7	16.6	5.4	43.6	12.2	0.0	18.7
-TPVICS R2	4.4	0.6	14.3	1.9	7.4	14.7	1.9	6.4	18.3	1.9	6.4	19.3	5.9	43.8	11.1	0.5	19.4
- SHRUCs R1	8.2	0.9	24.0	4.7	6.1	23.6	4.7	6.6	24.1	4.0	6.7	25.2	5.9	51.5	29.4	1.3	28.8
- SHRUCs R2	9.9	0.4	21.6	5.6	8.8	21.5	4.1	8.4	23.2	4.4	9.4	23.6	6.1	53.5	27.6	3.4	29.7
- SHRUCs R3	19.8	1.2	22.0	5.9	10.4	22.0	6.0	9.3	22.3	5.9	9.0	23.1	7.6	55.3	23.1	1.1	32.5
Sindh - Malir - TPVICS R1	5.3	1.1	10.5	1.3	2.0	10.2	1.3	2.5	10.2	1.0	2.5	12.1	1.8	42.8	16.1	0.0	17.6
-TPVICS R2	8.1	0.3	12.2	0.6	5.2	12.1	0.4	4.3	12.7	0.4	4.5	13.4	0.6	49.8	20.2	1.7	21.4
- SHRUCs R1	8.8	0.5	25.0	6.2	8.7	25.3	5.8	5.1	25.9	5.7	4.6	26.6	7.6	60.8	33.2	0.0	32.6
- SHRUCs R2	16.6	0.4	24.3	4.8	13.8	24.2	4.7	6.8	25.2	5.0	6.1	27.0	8.0	64.9	31.8	0.0	37.4
- SHRUCs R3	11.9	1.3	20.7	2.7	8.0	20.4	3.2	5.8	20.7	2.5	5.8	21.0	6.2	58.4	27.9	1.4	32.3
Balochistan - Killa Abdullah - TPVICS R1	49.0	12.5	14.5	1.6	6.5	14.9	0.8	6.4	15.0	0.8	6.5	16.2	0.8	69.4	58.1	0.0	69.7
-TPVICS R2	45.1	28.6	20.2	5.5	9.1	20.7	6.9	11.1	20.0	5.4	9.1	21.3	6.9	70.2	41.8	12.5	65.4
- SHRUCs R1	64.5	0.0	9.8	1.0	14.5	9.8	1.0	14.5	9.8	1.0	14.5	10.4	2.0	49.3	27.7	0.0	60.8
- SHRUCs R2	61.8	4.7	16.0	7.4	17.1	15.9	7.3	19.5	16.0	7.3	22.1	16.3	9.0	66.4	43.4	14.3	71.7
- SHRUCs R3	72.2	19.2	12.8	4.1	9.6	11.6	4.1	8.9	11.6	4.1	9.4	12.3	6.4	62.9	42.5	24.2	75.5
Balochistan - Pishin - TPVICS R1	9.3	0.0	17.1	2.0	4.4	17.8	2.0	2.2	17.8	2.0	6.2	14.3	1.8	60.3	29.3	0.0	44.7
-TPVICS R2	13.6	0.0	14.7	4.3	2.7	16.3	5.9	3.8	15.9	5.2	1.3	16.3	7.3	67.9	41.3	6.7	49.7
- SHRUCs R1	5.1	5.6	12.0	1.3	13.8	11.1	2.6	13.8	11.1	3.8	14.1	10.8	3.7	56.3	25.5	15.4	40.6
- SHRUCs R2	21.8	3.3	30.2	10.2	27.3	22.7	8.5	18.7	24.1	8.3	22.1	26.4	5.6	64.6	44.1	4.5	58.6
- SHRUCs R3	34.1	0.0	9.1	4.1	17.5	9.7	4.1	11.1	9.4	3.6	10.6	9.3	3.9	47.0	26.2	21.7	41.1
Balochistan - Quetta - TPVICS R1	7.1	1.5	20.2	3.7	5.0	19.9	4.9	5.0	20.3	4.5	5.4	23.8	3.4	60.5	23.4	1.9	33.7
-TPVICS R2	3.6	0.0	10.4	2.0	4.4	10.3	2.0	3.3	10.4	2.0	2.8	11.4	5.8	52.9	16.3	0.0	25.2
- SHRUCs R1	7.8	1.5	11.4	3.5	4.5	11.3	3.5	4.5	11.3	3.0	7.0	12.9	4.8	60.0	18.8	8.3	35.8
- SHRUCs R2	5.0	0.0	8.3	0.8	7.2	8.1	0.8	7.2	8.1	0.8	7.2	8.2	2.2	55.6	20.2	3.4	29.7
- SHRUCs R3	25.3	1.1	5.4	1.6	9.4	5.4	1.8	6.4	5.4	1.8	8.2	5.8	3.3	51.2	19.4	3.3	31.6
Punjab - Lahore - TPVICS R1	6.4	2.6	6.3	1.4	3.7	6.0	0.8	4.3	6.9	0.9	4.6	15.4	5.4	41.2	6.2	0.0	17.8
- TPVICS R2	8.3	1.4	5.2	1.6	5.7	4.2	1.3	4.4	5.7	0.8	7.1	13.0	3.7	39.6	8.1	1.1	17.2
- LICS 2023	13.0	1.1	6.6	4.3	5.2	5.1	2.5	3.8	6.7	2.5	5.0	9.7	2.3	39.8	7.2	0.3	18.3
- LHRUCS 2023	10.2	0.5	5.4	1.5	3.3	5.6	1.4	3.5	5.5	1.5	3.3	6.5	2.0	33.1	9.0	0.7	14.4

Note: Early doses are accepted in this analysis; all doses are considered valid doses.

Note: The denominators differ for different doses because it is the number of visits where a child was eligible for the dose. There are fewer visits eligible for later doses than earlier ones.

Note: The denominators for each column are available in supplementary tables.

Note: The denominator for 'Any Dose' is the largest denominator in the table. It is possible for the % listed under individual doses to be higher than the % for 'Any Dose' because of denominator differences.

Shaded cells are scaled such that if 100% of visits involved an MOSV, the cell would be entirely filled with color.

Table 69. Percent of children who experienced an MOSV

	BCG	OPV0	OPV1	OPV2	OPV3	PENTA1	PENTA2	PENTA3	PCV1	PCV2	PCV3	ROTA1	ROTA2	IPV1	MCV1	MCV2	Any Dose
KP - Peshawar - TPVICS R1	4.9	0.6	7.7	0.7	0.8	7.5	0.7	0.8	7.6	1.1	1.2	7.8	1.0	67.8	14.1	0.0	66.9
-TPVICS R2	5.7	1.5	6.8	1.3	3.7	7.4	1.5	3.3	6.8	1.3	4.4	7.9	1.5	46.8	11.0	2.0	52.1
- SHRUCs R1	6.1	0.1	5.3	0.7	4.8	5.9	0.8	2.2	5.4	0.8	2.6	5.4	0.8	44.5	9.5	0.4	54.0
- SHRUCs R2	5.2	1.6	5.8	2.3	6.8	5.5	1.3	2.9	6.0	1.4	3.6	5.8	2.8	44.8	12.4	1.5	53.7
- SHRUCs R3	4.0	0.4	4.3	1.3	1.5	4.2	1.0	1.7	4.0	0.9	3.1	4.4	2.2	47.7	9.7	0.5	52.2
Sindh - Karachi East - TPVICS R1	0.4	0.6	7.5	2.3	2.5	7.8	2.4	2.2	9.4	2.1	2.3	15.4	3.0	50.4	9.0	0.0	49.2
-TPVICS R2	2.9	1.0	14.2	2.9	4.0	13.7	1.6	4.8	14.9	2.4	4.0	17.7	3.2	49.1	12.8	0.7	45.8
- SHRUCs R1	6.0	0.0	34.3	6.8	5.9	34.0	6.4	7.9	34.0	6.4	5.3	35.0	10.3	74.8	36.2	9.1	76.1
- SHRUCs R2	10.1	0.0	25.2	8.1	8.6	24.8	8.4	7.5	25.8	7.7	10.4	26.4	10.4	65.7	28.5	4.1	70.6
- SHRUCs R3	17.6	2.8	22.8	9.1	13.0	23.1	9.8	13.4	23.0	9.4	14.6	23.5	10.8	62.7	22.7	5.3	74.6
Sindh - Karachi West - TPVICS R1	2.1	1.0	12.5	2.4	1.7	12.3	2.6	1.7	13.1	2.2	1.7	14.2	4.0	49.2	11.5	0.0	47.0
-TPVICS R2	3.6	0.6	15.2	1.7	5.7	15.6	1.7	4.8	16.4	1.9	5.5	16.9	3.8	45.8	10.4	0.5	45.4
- SHRUCs R1	5.8	0.9	28.0	4.4	4.9	27.6	4.4	5.5	27.9	3.8	5.6	29.0	5.4	56.8	25.7	1.3	62.7
- SHRUCs R2	7.0	0.4	24.0	4.3	7.6	24.2	3.6	7.5	24.7	3.8	8.0	24.6	5.0	60.0	24.0	2.7	63.0
- SHRUCs R3	12.1	1.2	24.7	4.9	9.3	24.9	5.1	8.4	24.9	5.0	8.3	25.1	5.8	63.0	21.1	1.1	69.8
Sindh - Malir - TPVICS R1	2.8	1.2	10.9	1.0	1.7	10.8	1.0	2.3	10.8	0.8	2.3	11.9	1.6	45.6	13.2	0.0	45.3
-TPVICS R2	4.2	0.3	13.1	0.6	4.0	13.0	0.4	3.0	13.4	0.4	3.3	13.7	0.6	52.7	16.6	1.2	52.3
- SHRUCs R1	7.0	0.5	30.1	6.0	8.4	30.6	5.3	4.7	31.4	5.5	4.1	31.4	6.7	68.2	28.1	0.0	66.6
- SHRUCs R2	11.1	0.4	27.4	4.5	13.2	27.3	4.6	6.1	28.0	4.7	5.3	28.8	6.0	75.6	30.9	0.0	73.8
- SHRUCs R3	8.3	1.3	22.9	2.6	6.5	22.8	2.8	4.8	22.9	2.4	4.7	23.3	4.3	68.5	24.4	1.5	68.6
Balochistan - Killa Abdullah - TPVICS R1	25.9	12.5	16.0	1.7	4.9	16.5	0.8	4.8	16.7	0.8	4.9	18.1	0.8	94.4	61.7	0.0	87.5
-TPVICS R2	28.9	28.6	24.7	3.7	9.3	25.3	5.4	11.6	24.3	3.6	9.3	25.0	7.0	85.5	37.9	12.5	94.4
- SHRUCs R1	45.7	0.0	9.8	1.0	12.1	9.8	1.0	12.1	9.8	1.0	12.1	10.5	2.0	50.4	28.4	0.0	76.4
- SHRUCs R2	53.2	4.7	16.0	7.5	15.1	15.9	7.4	17.8	16.0	7.4	19.4	16.8	9.2	73.3	43.0	14.3	83.9
- SHRUCs R3	64.1	19.2	12.6	4.1	7.9	12.3	4.2	7.9	12.3	4.1	7.8	12.6	6.1	74.0	41.5	26.7	89.7
Balochistan - Pishin - TPVICS R1	9.7	0.0	18.3	2.0	4.7	19.4	2.0	2.2	19.4	2.0	6.7	16.2	1.8	71.2	23.4	0.0	71.2
-TPVICS R2	7.9	0.0	16.4	4.5	2.8	18.4	5.4	3.9	17.9	5.4	1.4	17.6	7.6	84.2	39.3	7.1	73.1
- SHRUCs R1	5.3	5.9	13.5	1.3	13.1	12.4	2.6	13.1	12.4	3.9	13.3	12.0	3.8	67.6	25.3	12.5	70.0
- SHRUCs R2	17.2	3.3	30.4	8.6	21.4	25.7	8.7	17.9	26.8	8.6	19.7	27.1	5.7	75.5	41.2	4.5	81.7
- SHRUCs R3	28.1	0.0	9.6	3.8	14.7	10.2	3.7	10.1	9.9	3.2	9.5	9.8	3.6	50.5	25.5	21.4	70.5
Balochistan - Quetta - TPVICS R1	4.3	1.5	24.8	3.8	5.0	23.9	5.0	5.1	24.6	4.2	4.5	26.3	3.4	71.5	20.9	1.9	69.9
-TPVICS R2	2.5	0.0	10.9	1.5	3.4	10.9	1.5	3.4	10.9	1.5	2.8	12.1	4.0	61.8	14.4	0.0	56.8
- SHRUCs R1	5.8	1.5	12.6	3.6	4.6	12.4	3.6	4.5	12.4	3.1	5.3	12.7	4.9	71.2	15.3	4.3	67.3
- SHRUCs R2	4.3	0.0	9.0	0.8	5.9	8.7	0.8	5.9	8.7	0.8	5.9	8.8	2.2	68.6	19.8	3.4	62.5
- SHRUCs R3	15.1	1.1	5.6	1.4	7.4	5.6	1.6	4.9	5.6	1.6	6.8	5.9	2.7	63.1	16.3	2.2	62.9
Punjab - Lahore - TPVICS R1	5.9	2.7	6.0	1.4	3.3	6.1	0.8	3.5	6.2	0.9	3.8	9.0	3.0	49.3	5.2	0.0	51.5
- TPVICS R2	5.1	1.4	5.0	1.1	3.0	4.4	1.3	2.6	6.0	0.8	3.7	7.9	2.0	46.0	6.9	0.6	46.7
- LICS 2023	6.0	1.1	5.4	1.9	3.4	5.1	1.4	2.9	5.7	1.5	3.2	6.2	1.5	46.3	6.5	0.3	52.4
- LHRUCS 2023	7.5	0.5	5.3	1.5	2.7	5.5	1.4	2.9	5.5	1.4	2.6	5.7	1.9	39.9	7.5	0.7	47.3

Note: Early doses are accepted in this analysis; all doses are considered valid doses.

Shaded cells are scaled such that if 100% of children experienced an MOSV, the cell would be entirely filled with color.

The denominators change from column to column. The denominator is the number of children who had at least one visit where they were eligible to receive the dose.

The denominators are available in tables in the supplements.

The denominator for 'Any Dose' is the largest denominator of all. It is the number of children who had a card that documented the date of at least one visit when the child was eligible for at least one dose.

Table 70. Percent of children whose MOSVs had been corrected by the time of the survey

	All MOSVs were corrected (%)	Had MOSV for any dose (N)
KP - Peshawar - TPVICS R1	75.9	228
-TPVICS R2	68.6	264
- SHRUCs R1	83.8	784
- SHRUCs R2	67.3	906
- SHRUCs R3	82.4	896
Sindh - Karachi East - TPVICS R1	60.8	273
-TPVICS R2	65.0	243
- SHRUCs R1	59.4	217
- SHRUCs R2	56.0	259
- SHRUCs R3	56.3	318
Sindh - Karachi West - TPVICS R1	66.0	285
-TPVICS R2	63.4	295
- SHRUCs R1	65.4	367
- SHRUCs R2	54.5	404
- SHRUCs R3	68.9	639
Sindh - Malir - TPVICS R1	66.7	228
-TPVICS R2	59.0	322
- SHRUCs R1	60.3	401
- SHRUCs R2	48.9	536
- SHRUCs R3	59.1	572
Balochistan - Killa Abdullah - TPVICS R1	62.7	126
-TPVICS R2	36.5	85
- SHRUCs R1	28.0	107
- SHRUCs R2	12.1	338
- SHRUCs R3	24.9	358
Balochistan - Pishin - TPVICS R1	64.9	57
-TPVICS R2	42.1	171
- SHRUCs R1	64.3	84
- SHRUCs R2	35.6	219
- SHRUCs R3	42.7	234
Balochistan - Quetta - TPVICS R1	55.5	218
-TPVICS R2	61.3	163
- SHRUCs R1	60.2	181
- SHRUCs R2	55.1	245
- SHRUCs R3	55.3	412
Punjab - Lahore - TPVICS R1	79.7	286
- TPVICS R2	70.3	246
- LICS 2023	80.5	344
- LHRUCS 2023	86.1	467

A corrected MOSV means that the respondent had received a valid dose by the time of the survey.

Shaded cells are scaled such that if 100% of children with MOSVs had all their MOSVs corrected, the cell would be entirely filled with color.

Table 71. MOSVs for IPV1 Details, TPVICS and SHRUCs, Rounds 1 & 2

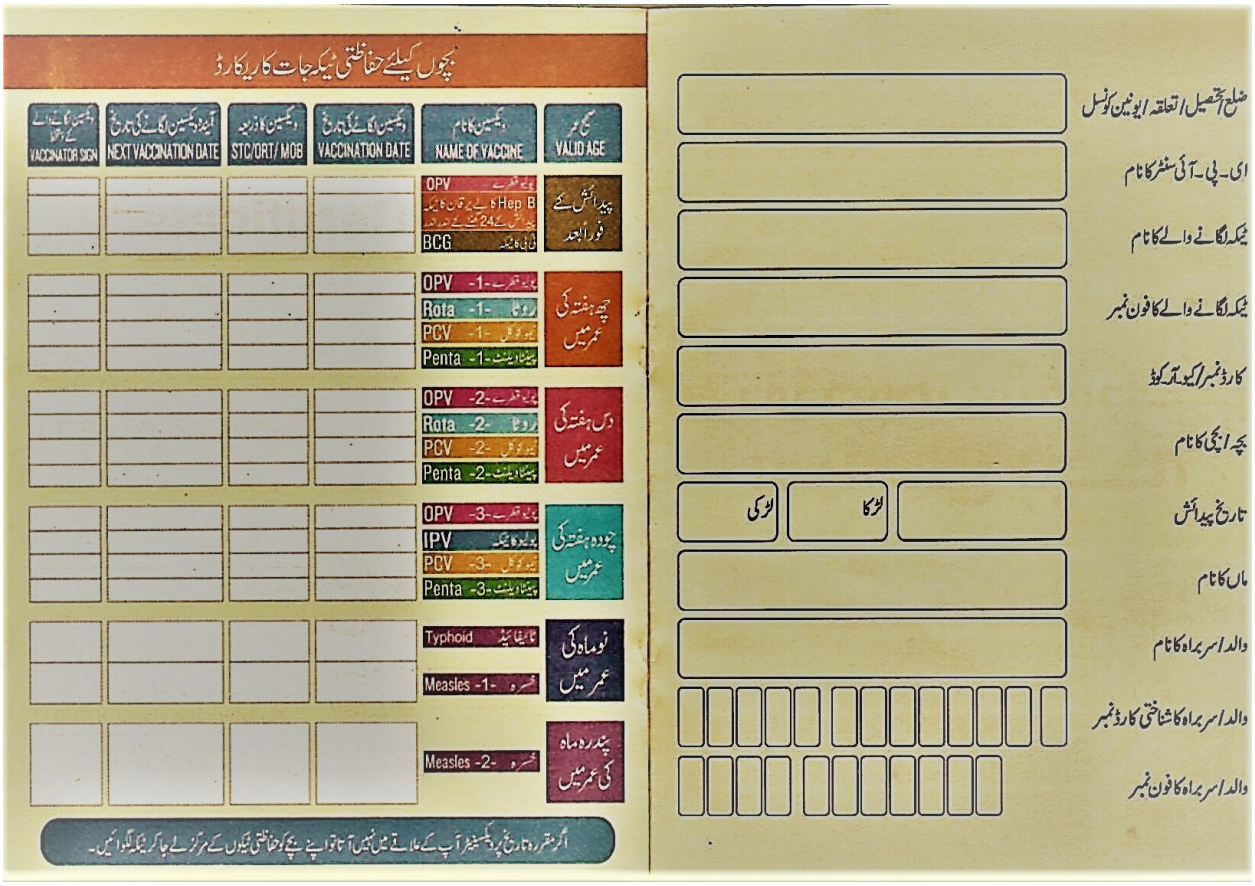
	Number of Respondents (N)			Experienced MOSV for IPV1 (%)			Percentile (Months)	
	Had visits eligible for IPV1 (N)	Had MOV for IPV1 (N)	Had Corrected MOSV for IPV1 (N)	No MOSV (%)	Uncorrected MOSV (%)	Corrected MOSV (%)	50th	90th
KP - Peshawar - TPVICS R1	323	219	180	32.2	17.8	82.2	2.4	7.8
-TPVICS R2	457	214	177	53.2	17.3	82.7	2.1	8.3
- SHRUCs R1	1,386	617	593	55.5	3.9	96.1	2.1	5.9
- SHRUCs R2	1,554	696	600	55.2	13.8	86.2	2.2	6.9
- SHRUCs R3	1,586	756	694	52.3	8.2	91.8	2.0	5.5
Sindh - Karachi East - TPVICS R1	458	231	151	49.6	34.6	65.4	1.5	4.9
-TPVICS R2	407	200	140	50.9	30.0	70.0	1.9	7.0
- SHRUCs R1	242	181	125	25.2	30.9	69.1	3.6	8.3
- SHRUCs R2	324	213	147	34.3	31.0	69.0	2.9	8.8
- SHRUCs R3	391	245	175	37.3	28.6	71.4	3.3	9.6
Sindh - Karachi West - TPVICS R1	500	246	183	50.8	25.6	74.4	2.3	6.3
-TPVICS R2	526	241	161	54.2	33.2	66.8	2.0	6.6
- SHRUCs R1	519	295	216	43.2	26.8	73.2	2.4	7.5
- SHRUCs R2	562	337	214	40.0	36.5	63.5	2.4	7.1
- SHRUCs R3	854	538	423	37.0	21.4	78.6	3.0	8.1
Sindh - Malir - TPVICS R1	430	196	137	54.4	30.1	69.9	2.1	6.5
-TPVICS R2	550	290	183	47.3	36.9	63.1	2.2	6.0
- SHRUCs R1	481	328	205	31.8	37.5	62.5	2.3	8.9
- SHRUCs R2	626	473	262	24.4	44.6	55.4	2.4	8.1
- SHRUCs R3	730	500	338	31.5	32.4	67.6	2.5	7.8
Balochistan - Killa Abdullah - TPVICS R1	125	118	105	5.6	11.0	89.0	3.4	6.0
-TPVICS R2	83	71	41	14.5	42.3	57.7	3.8	8.5
- SHRUCs R1	131	66	39	49.6	40.9	59.1	2.5	5.4
- SHRUCs R2	329	241	77	26.7	68.0	32.0	3.3	6.6
- SHRUCs R3	339	251	149	26.0	40.6	59.4	3.5	7.7
Balochistan - Pishin - TPVICS R1	73	52	39	28.8	25.0	75.0	3.7	11.2
-TPVICS R2	190	160	80	15.8	50.0	50.0	3.2	8.5
- SHRUCs R1	108	73	52	32.4	28.8	71.2	4.2	9.0
- SHRUCs R2	237	179	90	24.5	49.7	50.3	3.6	8.8
- SHRUCs R3	299	151	91	49.5	39.7	60.3	3.0	11.9
Balochistan - Quetta - TPVICS R1	291	208	123	28.5	40.9	59.1	2.2	5.9
-TPVICS R2	246	152	95	38.2	37.5	62.5	2.5	6.8
- SHRUCs R1	236	168	110	28.8	34.5	65.5	2.8	7.4
- SHRUCs R2	331	227	142	31.4	37.4	62.6	2.8	7.7
- SHRUCs R3	544	343	239	36.9	30.3	69.7	2.3	7.1
Punjab - Lahore - TPVICS R1	501	247	210	50.7	15.0	85.0	1.6	4.4
- TPVICS R2	448	206	169	54.0	18.0	82.0	1.6	4.9
- LICS 2023	637	295	261	53.7	11.5	88.5	1.9	5.5
- LHRUCS 2023	927	370	340	60.1	8.1	91.9	1.9	5.1

Green and red and yellow cells are scaled so that if 100% of eligible children fell within the cell, the entire cell would be colored.

Blue and orange and yellow cells are scaled so that if the percentile were 12 months, the entire cell would be colored.

In Pakistan, children are eligible to receive IPV once they are 14 weeks old, and it is standard practice to administer IPV at the same time as the third dose of Penta, OPV, and PCV, which are also due at 14 weeks. Figure 54 shows IPV listed with the other 14-week doses on an HBR.

Figure 54. Sample of home-based record being used in Pakistan



The convention of bundling IPV with the other doses due at 14-weeks can lead to missed opportunities to vaccinate for IPV; for instance, consider a child who receives their *second* doses of Penta, OPV, and PCV late – when they are 15 weeks old. The child is eligible to receive IPV at that same visit, but if the practice of administering IPV with the third doses is followed, then the child will experience a MOSV for IPV and will spend additional weeks or months unprotected by that vaccination. The IPV MOSVs in this dataset occurred usually because children were coming in for their 10-week doses at an age over 14 weeks and in some cases because they were coming for their 6-week doses at an age over 14 weeks. Table 71 indicates that in many cases one-third of the IPV1 MOSVs had not been corrected by the time of the survey, meaning that those children were still under protected against polio. This problem is pervasive across the entire country and was also elucidated in the TPVICS Round 2 report (12).

3.9. Reasons for not vaccinating children

Interviewers were asked to assess each child's vaccination history based on the HBR and the caregiver's responses and to decide whether the child was fully vaccinated. If they perceived the child to have missed one or more eligible doses, the interviewers asked why the child was not fully vaccinated and recorded all the reasons that the caregiver mentioned. Table 72 indicates that the primary reasons reported for not vaccinating children were related to rumors, lack of faith in immunization, and fear of side effects of vaccines. Across all SHRUCs districts, the reason "Child ill, not brought" was given more frequently in SHRUCs Round 3 than in Rounds 1 or 2.

Table 72. Reasons children are not fully vaccinated (%), by district, TPVICS & SHRUCs

	Place of immunization too far (%)	Time of immunization not convenient (%)	Mother too busy (%)	Family problem including mother ill (%)	Child ill, not brought (%)	Child ill, brought but not vaccinated (%)	Long wait (%)	Rumors (%)	No faith in immunization (%)	Fear of side reaction (%)	Time or Place of immunization not Known (%)	Took child but no vaccine available (%)	Took child but no vaccinator (%)	Took child facility closed (%)	Child was sick (%)	Took child but not vaccination day (%)	Other (%)	Don't Know (%)	N
KP - Peshawar - TPVICS R1	2.3	0.0	6.8	6.8	4.5	4.5	4.5	40.9	38.6	2.3	2.3	0.0	0.0	0.0	2.3	0.0	6.8	0.0	44
-TPVICS R2	15.6	0.0	12.5	3.1	3.1	0.0	0.0	12.5	18.8	37.5	0.0	0.0	0.0	0.0	6.2	3.1	9.4	0.0	32
- SHRUCs R1	0.0	0.0	3.6	3.6	12.5	0.0	0.0	33.9	39.3	21.4	0.0	1.8	0.0	0.0	8.9	0.0	3.6	1.8	56
- SHRUCs R2	32.7	0.0	4.1	2.0	0.0	0.0	0.0	6.1	4.1	67.3	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	49
- SHRUCs R3	0.0	0.0	14.3	21.4	28.6	7.1	7.1	57.1	71.4	71.4	7.1	0.0	0.0	0.0	0.0	7.1	0.0	0.0	14
Sindh - Karachi East - TPVICS R1	9.1	4.5	0.0	0.0	18.2	9.1	4.5	13.6	31.8	27.3	13.6	0.0	4.5	4.5	9.1	0.0	4.5	0.0	22
-TPVICS R2	8.8	1.8	7.0	1.8	1.8	0.0	1.8	15.8	19.3	35.1	5.3	0.0	0.0	1.8	19.3	0.0	17.5	0.0	57
- SHRUCs R1	6.5	5.2	9.1	13.0	18.2	7.8	0.0	35.1	40.3	16.9	0.0	2.6	0.0	0.0	7.8	0.0	0.0	0.0	77
- SHRUCs R2	4.5	11.4	6.8	6.8	4.5	6.8	6.8	15.9	25.0	38.6	0.0	0.0	0.0	2.3	43.2	9.1	0.0	0.0	44
- SHRUCs R3	6.2	0.0	0.0	0.0	43.8	12.5	0.0	37.5	62.5	62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16
Sindh - Karachi West - TPVICS R1	1.9	0.0	3.8	3.8	9.6	0.0	0.0	26.9	57.7	23.1	23.1	1.9	0.0	0.0	3.8	0.0	13.5	0.0	52
-TPVICS R2	2.6	0.0	5.1	2.6	5.1	0.0	2.6	15.4	17.9	43.6	5.1	2.6	0.0	0.0	20.5	0.0	2.6	0.0	39
- SHRUCs R1	8.0	6.0	6.0	3.5	17.1	1.5	0.5	30.7	30.2	27.1	1.5	0.0	1.0	0.0	6.5	0.5	0.0	0.0	199
- SHRUCs R2	13.2	2.5	2.5	7.5	3.1	1.9	1.3	22.0	26.4	30.2	0.0	1.3	0.6	2.5	23.3	3.1	1.9	0.0	159
- SHRUCs R3	7.5	0.0	2.5	20.0	42.5	2.5	0.0	45.0	62.5	45.0	5.0	0.0	2.5	0.0	0.0	0.0	12.5	5.0	40
Sindh - Malir - TPVICS R1	0.0	0.0	0.0	4.8	7.1	2.4	0.0	28.6	45.2	28.6	7.1	0.0	0.0	0.0	16.7	0.0	31.0	0.0	42
-TPVICS R2	6.2	0.0	4.7	1.6	7.8	0.0	0.0	17.2	15.6	29.7	9.4	0.0	1.6	1.6	18.8	0.0	10.9	0.0	64
- SHRUCs R1	3.4	18.6	7.6	6.9	12.4	1.4	0.0	22.8	27.6	29.7	2.1	0.0	0.7	0.0	6.9	0.0	1.4	0.0	145
- SHRUCs R2	17.4	2.9	4.3	1.4	1.4	0.0	0.0	21.7	15.9	40.6	2.9	1.4	1.4	0.0	27.5	1.4	1.4	1.4	69
- SHRUCs R3	6.5	3.2	0.0	6.5	22.6	3.2	0.0	32.3	61.3	32.3	6.5	0.0	0.0	0.0	0.0	0.0	9.7	3.2	31
Balochistan - Killa Abdullah - TPVICS R1	15.9	5.1	19.9	5.1	4.5	0.6	5.1	19.3	6.8	0.0	0.0	0.0	0.6	0.0	2.3	0.6	18.8	0.0	176
-TPVICS R2	4.0	0.8	2.4	3.6	5.2	0.4	0.0	33.2	26.4	11.2	5.2	0.8	4.0	0.0	5.2	0.4	0.4	2.8	250
- SHRUCs R1	1.9	0.0	0.0	0.0	0.0	0.6	4.5	62.4	40.1	20.4	1.3	0.0	0.6	0.0	0.6	0.6	0.0	0.6	157
- SHRUCs R2	7.6	0.3	9.3	4.0	4.0	1.3	3.3	31.2	47.5	15.3	1.0	0.3	0.7	0.3	12.6	0.3	5.6	0.0	301
- SHRUCs R3	5.5	0.0	2.8	0.0	18.3	0.0	1.8	4.6	51.4	10.1	2.8	0.0	1.8	0.9	0.0	0.0	0.9	11.0	109
Balochistan - Pishin - TPVICS R1	10.0	3.0	8.5	8.0	6.5	1.0	2.5	24.0	18.0	34.5	10.5	0.0	1.0	0.0	9.0	0.0	6.0	0.0	200
-TPVICS R2	7.2	0.9	10.5	1.2	3.9	0.0	0.3	4.5	22.6	6.0	2.7	4.8	3.0	1.5	26.8	1.2	10.5	3.0	332
- SHRUCs R1	9.6	1.4	9.6	4.1	10.3	2.7	2.7	7.5	29.5	21.9	7.5	0.0	0.0	0.7	4.1	2.1	6.2	1.4	146
- SHRUCs R2	20.5	1.2	14.0	1.2	1.2	0.0	1.2	64.9	64.9	40.9	2.3	0.6	0.0	0.0	4.7	0.0	0.0	11.7	171
- SHRUCs R3	1.9	0.0	18.3	4.8	24.0	0.0	0.0	25.0	33.7	26.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	104
Balochistan - Quetta - TPVICS R1	9.4	0.6	32.8	4.9	6.5	3.9	3.2	49.4	27.6	24.0	36.0	1.6	0.6	0.3	27.6	1.0	5.8	0.0	308
-TPVICS R2	4.6	0.0	11.8	1.8	3.6	0.7	0.7	5.0	43.6	12.5	5.0	0.0	0.0	0.0	15.4	0.0	0.4	3.9	280
- SHRUCs R1	8.7	1.4	5.9	12.2	12.9	1.7	2.4	12.9	25.8	8.7	5.2	0.0	0.0	0.0	9.1	0.0	0.3	0.7	287
- SHRUCs R2	3.3	0.3	17.4	3.9	3.6	0.0	0.6	4.5	18.9	37.4	0.3	0.0	0.3	0.3	17.1	0.0	0.6	1.2	334
- SHRUCs R3	4.3	1.1	8.0	16.5	30.9	5.9	8.0	17.0	51.1	3.7	1.6	0.0	0.0	0.5	0.0	0.5	0.0	3.2	188
Punjab - Lahore - TPVICS R1	14.3	7.1	28.6	14.3	0.0	0.0	7.1	14.3	21.4	0.0	7.1	0.0	0.0	0.0	0.0	0.0	28.6	0.0	14
- TPVICS R2	13.9	0.0	8.3	0.0	2.8	2.8	0.0	19.4	25.0	8.3	2.8	0.0	0.0	0.0	11.1	0.0	38.9	16.7	36
- LICS 2023	33.3	0.0	0.0	0.0	33.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3
- LHRUCS 2023	0.0	0.0	16.7	0.0	16.7	16.7	0.0	16.7	16.7	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6

Note: This measure is an unweighted summary of proportions from the survey sample.

Respondents could select more than one response to this question.

Denominator (N) is limited to respondents who answered the question.

Colored bars are scaled so that if the percentage were 100%, the entire cell would be colored.

4. Behavioral and Social Drivers of Vaccination (BeSD)

Behavioral and social drivers of vaccination (BeSD) are "people's beliefs, experiences, and their circumstances that affect whether they get vaccinated or not" (13). BeSD are classified in terms of four domains: how people *think and feel* about vaccines, *social processes* that drive or inhibit vaccination, *motivation* (or hesitancy) to seek vaccination, and *practical issues* involved in seeking and receiving vaccination (13, p.2). As part of the Round 3 survey, 7,829 caregivers across the seven SHRUCs responded to the BeSD Childhood Vaccination Survey for Caregivers which is designed to assess the drivers of vaccination for children under age 5.

Caregivers' responses to all 19 questions of the BeSD Childhood Vaccination Survey for Caregivers are provided in Supplement 05. Table 73 summarizes responses to the five priority BeSD childhood vaccination indicator questions and Table 74 summarizes responses from two questions that highlight vaccination challenges.

Note that:

- More than half of respondents (55.2%) reported wanting their child to get all of the vaccines on Pakistan's schedule, though there was substantial variability across SHRUCs, with a high of 87.6% of respondents in Karachi West and only 2.7% in Peshawar.
- More than two-thirds of respondents reported feeling that vaccines are very important for their child's health (71.3%), although there was variability across SHRUCs (i.e., 85.9% of respondents in Karachi West vs. only 20.2% in Killa Abdullah).
- Across all SHRUCS, a high percentage of caregivers reported thinking that most of their close family and friends want them to get their child vaccinated (90.6%) and knew where to go to get their child vaccinated (92.6%).
- Overall, 67.5% of respondents said it was very easy to pay for vaccination, although again there was substantial variation across SHRUCs, ranging from a low of 17.5% in Killah Abdullah to a high of 90.4% in Karachi East.
- 84.0% of respondents reported that it was not difficult to get vaccination services for their child. Among the 1,644 respondents who reported challenges in obtaining vaccination services for their child, the most common reasons were *getting to the clinic is hard* (74.4%) and *the waiting time in the clinic takes too long* (63.9%), although agreement varied across SHRUCs.
- Among the 2,434 respondents who indicated some dissatisfaction with vaccination services, the most common reasons were length of the waiting time (62.7%), staff do not spend enough time with people (41.0%), and vaccine is not always available (38.0%). Again, there was substantial variability across SHRUCS on these measures.

Table 73. Priority Indicators – Behavioral and social drivers (BeSD) of vaccination, by District (SHRUC Round 3 only)

Question number	BesD questions and responses	Total	KP - Peshawar	Sindh - Karachi East	Sindh - Karachi West	Sindh - Malir	Balochistan - Killa Abdullah	Balochistan - Pishin	Balochistan - Quetta
	Number of respondents (unweighted)	7,829	2,138	579	1,165	1,051	1,156	585	1,155
BeSD01‡	Pakistan has a schedule of vaccines for children. Do you want your child to get none of these vaccines, some of these vaccines or all of these vaccines? (%)								
	All	55.2	2.7	86.7	87.6	84.0	29.0	21.8	41.2
	Some	23.7	29.7	11.1	9.5	12.1	66.6	36.7	45.5
	None	21.1	67.5	2.2	2.9	4.0	4.4	41.5	13.3
BeSD02‡	How important do you think vaccines are for your child's health? (%)								
	Very important	71.3	63.7	84.7	85.9	83.9	20.2	50.4	56.1
	Moderately important	20.3	30.3	10.4	8.5	8.0	65.2	28.2	22.5
	A little important	5.2	4.0	2.9	2.4	5.1	10.7	10.4	15.0
	Not at all important	3.2	2.1	2.0	3.1	2.9	3.9	11.1	6.4
BeSD06‡	Do you think most of your close family and friends want you to get your child vaccinated? (%)								
	Yes	90.6	94.3	87.1	89.6	92.4	91.6	88.1	89.6
	No	9.4	5.7	12.9	10.4	7.6	8.4	11.9	10.4
BeSD12‡	Do you know where to go to get your child vaccinated? (%)								
	Yes	92.6	98.2	90.5	89.8	94.3	91.7	87.8	91.1
	No	7.4	1.8	9.5	10.2	5.7	8.3	12.2	8.9
BeSD16‡	How easy is it to pay for vaccination? (When you think about the cost, please consider any payments to the clinic, the cost of getting there, plus the cost of taking time away from work.) (%)								
	Very easy	67.5	56.3	90.4	80.6	77.6	17.5	43.3	49.4
	Moderately easy	17.9	32.1	3.8	4.9	10.5	55.7	37.1	21.0
	A little easy	9.4	9.2	2.8	6.5	7.3	16.2	11.3	25.8
	Not at all easy	5.2	2.4	3.0	8.1	4.6	10.7	8.3	3.9

Figures in each column sum to 100% in each section of the table.

All responses are weighted using the inverse probability of household selection, post-stratified to align with SHRUC populations.

‡Priority BeSD indicator

Color bars are scaled so that if 100% of respondents gave a particular answer, the entire table cell would be colored in.

Table 74. BeSD Vaccination Challenges, by District (SHRUC Round 3 only)

Question number	BesD questions and responses	Total	KP - Peshawar	Sindh - Karachi East	Sindh - Karachi West	Sindh - Malir	Balochistan - Killa Abdullah	Balochistan - Pishin	Balochistan - Quetta
	Number of respondents - BeSD17 only (unweighted)	1,644	567	12	6	27	425	195	412
BeSD17*	What makes it hard to get vaccination services for your child? (%)								
	Getting to the clinic is hard	73.4	70.2	41.7	83.3	22.2	89.9	75.9	63.8
	The clinic open times are inconvenient	27.3	3.7	0.0	33.3	11.1	57.4	43.6	22.6
	The clinic sometimes turns people away	33.7	16.0	0.0	33.3	18.5	28.5	84.6	41.3
	The waiting time in the clinic takes too long	63.9	65.1	16.7	33.3	33.3	61.2	82.1	60.4
	Something else	2.9	4.6	16.7	0.0	29.6	0.0	0.0	2.9
	Number of respondents - BeSD19 only (unweighted) (These are persons sho do not find the vaccination services to be 'very satisfactory'.)	2,434	682	45	100	124	648	325	510
BeSD19**	What is not satisfactory about the vaccination services? (%)								
	Vaccine is not always available	38.0	3.1	2.2	10.0	5.6	84.3	73.8	19.6
	The clinic does not open on time	34.3	4.1	4.4	8.0	6.5	81.3	44.6	22.9
	Waiting times are long	62.7	63.8	13.3	14.0	13.7	84.9	69.2	54.9
	The clinic is not clean	28.3	6.0	2.2	9.0	7.3	48.8	56.9	25.3
	Staff are poorly trained	16.3	5.6	4.4	4.0	5.6	17.4	48.0	14.9
	Staff are not respectful	19.4	16.4	2.2	3.0	4.0	16.8	47.7	16.9
	Staff do not spend enough time with people	41.0	24.6	2.2	5.0	5.6	57.1	60.6	49.0
	Something else	6.2	4.8	33.3	16.0	12.1	5.2	0.6	7.1
	Did not specify	19.5	24.0	60.0	68.0	69.4	1.1	8.0	18.8

*Percentages for BeSD17 may exceed 100% because respondents who gave a response other than "Nothing, it's not hard" could give multiple responses.

**BeSD19 was asked only of respondents who gave a response other than "Very satisfied" to BeSD18. Percentages for BeSD19 may exceed 100% because respondents could give multiple responses.

Unweighted proportions of those who indicated difficulty or dissatisfaction.

Color bars are scaled so that if 100% of respondents gave a particular answer, the entire table cell would be colored in.

5. Discussion

In all seven districts that hold SHRUCs, coverage in those SHRUCs improved dramatically between survey Round 2 in 2022 and Round 3 in 2023. The improvement is evident in odd-numbered figures between Figure 1 and Figure 13 and in Table 15 through Table 21. The proportion of children fully vaccinated increased in six of seven districts between Rounds 2 and 3 and showed a statistically significant net gain from Round 1 to Round 3 in five of seven districts. The proportion of children who are zero dose decreased to a statistically significant degree in all seven SHRUC districts between Rounds 2 and 3 and all had a net significant improvement between Rounds 1 and 3. Similar improvement was observed in Lahore district, which does not hold any SHRUCs but does have seven HRUCs. The coverage improvement occurred between the TPVICS Round 2 in 2022 and the LICS in 2023. Outcomes in the Lahore HRUCS in 2023 were nearly as good as the outcomes in the LICS survey overall. These notable gains in coverage – sometimes double-digit gains in coverage percentage in a single year – are to be soundly applauded!

The proportion of children whose data came from an HBR increased by double-digit percentage points in six of seven SHRUC districts between 2021 and 2023. The exception was Peshawar where the increase was 4.5%. This improvement is also to be lauded, and hopefully built upon for more improvement in coming years. All seven SHRUC districts have room for improvement on the HBR availability metric, which ranged from 35% in Killa Abdullah to 80% in Malir. Lahore made double-digit improvements between TPVICS Round 2 and LICS 2023, with 85% of the LICS children showing HBRs in 2023. In the Lahore HRUCS, card availability was 71%.

Timeliness outcomes documented in Figure 15 - Figure 53 and Table 63 through Table 67 share several features. In KP and Sindh the dose dates from many HBRs were used to calculate timeliness and we see a large portion of doses being delivered more than 28 days late and quite a large portion of doses delivered more than 56 days late. Those late deliveries manifest later in the report in a high incidence and prevalence of MOSVs for IPV and for MCV1 (See Table 68 through Table 71). In Balochistan there were fewer cards available and so there is less information with which to assess timeliness, but for those records where timeliness can be calculated, a large portion of doses were received 56 days or more late. Efforts to improve the timeliness of vaccination would make a positive impact on these outcomes.

Most, but not all, of the MOSVs were corrected by the time of the survey, but the time to correction was measured in multiple months for more than half of the corrections. Between late administration and MOSVs, the children in these surveys spent quite a lot of time under-protected against these vaccine preventable diseases.

Table 62 indicates that drop-out improved to a notable degree in SHRUCs Round 3 compared with earlier rounds but was still higher than 10% for most doses and districts. In the LICS and LHRUCs surveys in Lahore district, drop-out was low for the 6-, 10-, and 14- week doses, but there was about 20% dropout from MCV1 to MCV2. Again, hopefully the recent gains foreshadow even more improvement in these high-risk union councils.

The tables and figures in this report are set up to facilitate comparisons between repeating rounds of both the TPVICS and SHRUCs surveys. There is evidence of effective OPV campaigns in the SHRUCs with OPWC coverage higher than OPV and higher in the SHRUCs than in their surrounding districts. In some of the other indicators, performance in the SHRUCs is not as good as in TPVICS. For example, Table 67 shows that the longer intradose intervals were longer in SHRUCs than in TPVICS.

The SHRUCs surveys have several strengths. The first round followed shortly after the TPVICS Round 1 survey and so was able to leverage the infrastructure of the TPVICS questionnaire, data collection infrastructure, data quality review procedures, and data cleaning procedures. The SHRUCs surveys were able to mobilize quite rapidly after doing the geographic information systems work needed to construct the frame of PSUs in each relevant union council. In households that showed an HBR, clear photographs helped verify the recorded vaccination dates and helped to review and correct dates that were flagged as illogical during data quality checks. The data were weighted using the probability of respondent selection to estimate conclusions representative of all children ages 12-23 months in the SHRUCs and the weights were post-stratified by the SHRUC population, so the combined estimates give appropriate weight to larger and smaller union councils. The closely spaced timing of the TPVICS and SHRUCs surveys yielded an opportunity to compare outcomes in high-risk union councils with the representative results of those districts as a whole, to see which outcomes were better or worse or comparable to the surrounding district. Finally, the implementation of TPVICS and SHRUCs surveys by the same organization using the same teams and same procedures mean that the data are very comparable, having hopefully very little bias, but if present, it is reasonable to assume that any biases present would be similar across surveys and rounds.

The surveys have several limitations. For the resources available, it was not possible to collect a large enough sample to estimate outcomes precisely in each union council, so this report focuses on outcomes aggregated across UCs within each SHRUCs district. Aggregation may mask some interesting differences in outcomes within districts. Documented evidence was only sought from HBRs, not from any neighborhood ladies[5] or vaccination facilities. So if the caregiver did not show the card, the child's vaccination data was based on their memory instead of documented evidence.

[5] Neighborhood ladies are healthcare workers who often keep a copy of the vaccination record for each child in their

References

1. Pakistan Polio Eradication Program. Polio High-Risk Areas. [cited 2024 Jan 2]. Polio High Risk Areas. Available from: https://www.endpolio.com.pk/polioin-pakistan/high-risk-area

2. Soofi SB, Hussain I, Shah MA, Safdar RM, Umer M, Khan A, et al. Third-Party Verification Immunization Coverage Survey (TPVICS) - 2021. Survey Report. Book 1. [Internet]. Aga Khan University; 2021 [cited 2024 Jan 2] p. 107. Available from: https://ecommons.aku.edu/pakistan_coe-wch_survey_report/1

3. Centre of Excellence in Women and Child Health, Biostat Global Consulting. Third-Party Verification Immunization Coverage Survey (TPVICS) Vaccination Coverage Quality Indicators (VCQI) Analyses Survey Report [Internet]. 2022 Feb [cited 2024 Jan 2] p. 126. Available from: http://www.biostatglobal.com/downloads/TPVICS_2020_VCQI_Report.pdf

4. Center of Excellence in Women and Child Health, Aga Khan University, Biostat Global Consulting. Supplementary Immunization Coverage Survey in Super High-Risk Union Councils of Pakistan (TPVICS-SHRUCs) Survey Report [Internet]. 2022 Mar [cited 2024 Jan 2] p. 84. Available from: www.biostatglobal.com/downloads/TPVICS_SHRUCS_Survey_2021_Report.pdf

5. Center of Excellence in Women and Child Health, Aga Khan University, Biostat Global Consulting. 2022 Supplementary Immunization Coverage Survey in Super High-Risk Union Councils of Pakistan (TPVICS-SHRUCs Rounds 1 and 2) Survey Report [Internet]. 2023 Feb [cited 2024 Feb 10] p. 107. Available from: www.biostatglobal.com/downloads/TPVICS_SHRUCS_Survey_2022_Report.pdf

6. Khan A, Hussain I, Rhoda DA, Umer M, Ansari U, Ahmed I, et al. Determinants of immunization in polio super high-risk union councils of Pakistan. Vaccine. 2023 Dec;S0264410X23015025.

7. Biostat Global Consulting, Aga Khan University. SHRUC Survey Round 1 - Folder Holding Supporting Files [Internet]. 2021 [cited 2024 Feb 10]. Available from: https://www.dropbox.com/sh/wkb5nenf8tx1dot/AAAojoSVtR_SWiG7jlDI1WHSa?dl=0

8. Biostat Global Consulting, Aga Khan University. SHRUC Survey Round 2 - Folder Holding Supporting Files [Internet]. 2023 [cited 2024 Feb 10]. Available from: https://www.dropbox.com/sh/87vk6hm38w60t42/AACFJZ4xmJ8IcVv-6dvPXlWJa?dl=0

9. Biostat Global Consulting, Aga Khan University. SHRUC Survey Round 3 - Folder Holding Supporting Files [Internet]. 2024 [cited 2024 Feb 10]. Available from: https://www.dropbox.com/scl/fo/z8w4iszegv4cfreevo63o/h?rlkey=jsd1t1tnwucxc4fziw10tess7&dl=0

10. World Health Organization. Vaccination Coverage Cluster Surveys: Reference Manual [Internet]. Updated March 2021 to correct typographical errors. (WHO/IVB/18.09). License: CC BY-NC-SA 3.0 IGO. Geneva, Switzerland: World Health Organization; 2018 [cited 2024 Jan 2]. Available from: https://apps.who.int/iris/handle/10665/272820

11. Soofi SB, Hussain I, Kazi MA, Khan A, Umer M, Feroz K, et al. Third-Party Verification Immunization Coverage Survey (TPVICS) - 2023. Survey Report. Book 2. [Internet]. Aga Khan

assigned neighborhood. Those records could potentially serve as another source of dose documentation.

University; 2023 [cited 2024 Jan 2] p. 94. Available from: https://ecommons.aku.edu/pakistan_coe-wch_survey_report/2

12. Centre of Excellence in Women and Child Health, Biostat Global Consulting. Third-Party Verification Immunization Coverage Survey (TPVICS) Round 2 Vaccination Coverage Quality Indicators (VCQI) Analyses Survey Report [Internet]. 2023 Apr [cited 2024 Feb 10] p. 149. Available from: http://www.biostatglobal.com/downloads/TPVICS_2022_VCQI_Report.pdf

13. World Health Organization. Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake [Internet]. Geneva: World Health Organization; 2022 [cited 2024 Jan 2]. Available from: https://apps.who.int/iris/handle/10665/354459

14. Biostat Global Consulting. Vaccination Coverage Quality Indicators (VCQI) Resources [Internet]. 2017 [cited 2024 Jan 2]. Available from: http://www.biostatglobal.com/VCQI_resources.html

15. StataCorp. Stata Statistical Software: Release 18. College Station, TX: StataCorp LLC.; 2023.

16. Rhoda DA. VCQI Indicator List with Specifications, Draft Version 2.2 [Internet]. Biostat Global Consulting; 2021 [cited 2021 May 31]. 104 p. Available from: http://www.biostatglobal.com/downloads/VCQI%20Indicator%20List%20with%20Specifications.pdf

17. Rhoda DA, Trimner MK, Albani T. VCQI Interpretation Quick Reference, Draft Version 1.4 [Internet]. Biostat Global Consulting; 2019 [cited 2020 Apr 16]. 28 p. Available from: http://www.biostatglobal.com/downloads/VCQI%20Interpretation%20Quick%20Reference.pdf

18. Rhoda DA, Trimner MK, Prier ML, Clary, Caitlin B. VCQI User's Guide, Draft Version 2.9 [Internet]. Biostat Global Consulting; 2021 [cited 2021 May 26]. 239 p. Available from: http://www.biostatglobal.com/downloads/VCQI%20User's%20Guide.pdf

19. Rao JNK, Scott AJ. Chi-squared tests for analysis of categorical data from complex surveys. Proceedings of the Survey Research Methods Section of the American Statistical Association [Internet]. 1979 [cited 2024 Feb 10]; Available from: http://www.asasrms.org/Proceedings/papers/1979_007.pdf

20. Rao JN, Scott AJ. The analysis of categorical data from complex sample surveys: chi-squared tests for goodness of fit and independence in two-way tables. Journal of the American statistical association. 1981;76(374):221–30.

21. Rao JNK, Scott AJ. On Chi-Squared Tests for Multiway Contingency Tables with Cell Proportions Estimated from Survey Data. Annals of Statistics. 1984 Mar;12(1):46–60.

22. Rao J, Scott A. On simple adjustments to chi-square tests with sample survey data. The annals of statistics. 1987;385–97.

23. Rao JNK, Scott AJ. A Simple Method for the Analysis of Clustered Binary Data. Biometrics. 1992 Jun;48(2):577.

24. Biostat Global Consulting, Aga Khan University. LICS 2023 Survey - Folder Holding Supporting Files [Internet]. 2024 [cited 2024 Feb 12]. Available from: https://www.dropbox.com/scl/fo/430ef5pbqrtyb043p861u/h?rlkey=zepij5v07n0c3uvp8nvgvvf4z&dl=0

25. Biostat Global Consulting, Aga Khan University. LHRUCS 2023 Survey - Folder Holding Supporting Files [Internet]. 2024 [cited 2024 Feb 12]. Available from:

https://www.dropbox.com/scl/fo/liculbscxxldeyko8jfl0/h?rlkey=c7pf0b9p792apzh8pmqeotjl0&dl=0