Expanded Program on Immunization
Government of Pakistan

2022 Supplementary Immunization Coverage Survey in Super High Risk Union Councils of Pakistan (TPVICS-SHRUCs Round 2)

Survey Report

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

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Abbreviations

AKU	Aga Khan University
BCG	Bacille Calmette-Guérin
BMGF	Bill and Melinda Gates Foundation
CAPI	Computer Assisted Personal Interviews
CES	Coverage Evaluation Survey
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
IPV	Inactivated Polio Vaccine
KP	Khyber Pakhtunkhwa
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
PBS	Pakistan Bureau of Statistics
PCV	Pneumococcal Conjugate Vaccine
PENTA	Pentavalent vaccine to protect against: Diphtheria, Pertussis, Tetanus, Haemophilus influenza type b & Hepatitis B
PEOC	Provincial Emergency Operations Center
PSU	Primary Sampling Unit
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
ToT	Training of Trainers
UC	Union Council
VPD	Vaccine-preventable Diseases
VCQI	Vaccination Coverage Quality Indicator
WB	World Bank
WHO	World Health Organization
WPV1	Wild Poliovirus Type 1

Key definitions

Fully Vaccinated: Fully vaccinated is defined as 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, 2022 Supplementary Immunization Coverage Survey in Super High-Risk Union Councils of Pakistan – (TPVICS-SHRUCs Rounds 1 and 2) Survey Report, February 2023[1].

Available at www.biostatglobal.com/downloads/TPVICS_SHRUCS_Survey_2022_Report.pdf

or

https://www.aku.edu/coe-wch/pk/Documents/TPVICS_SHRUCS_Survey_2022_Report.pdf

[1] Note: In this draft yellow highlighting indicates something to check and confirm just before the report is finalized: especially date of report release; table and figure numbers; etc. This will all be removed in the version of the report that is released.

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) 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 2021 and repeated in precisely the same SHRUCs (Round 2) in 2022. 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[2]). 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 was Round 1: July to October 2021 and Round 2: June to August 2022.

In Round 1, 610 clusters, 7,549 households (HHs), and 6,976 children aged 12-23 month and born between September 2018 and January 2019 were enrolled in the survey. Girls comprised 47% and boys comprised 53% of the sample. In Round 2, 612 clusters, 7,930 HHs and 7,846 children (again, 53% boys and 47% girls) born between June 2022 and December 2021 were enrolled.

The survey sample was allocated in a fashion to power for detecting change over the next few years not at the union council level, but 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

[2] 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 were scheduled to receive them.

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 both surveys, 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 and the proportion who were fully vaccinated tended to be lower in the SHRUCs survey than in the TPVICS survey. 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 OPVWC 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. 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. And the portion of respondents who received doses more than two months 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 ten-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 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 percentil 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 to also 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.

1. Background and objectives

The National and Provincial Emergency Operations Centers (NEOC and PEOCs) for polio eradication have identified 40 union councils in the country as Super-High Risk Union Councils (SHRUCs) because they are significant poliovirus reservoirs (1). There are 8 UCs from Sindh, 18 from KP, and 14 UCs from Balochistan. Together, these areas have an estimated population of around 3 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 DLIs under the National Immunization Support. Project (NISP). TPVICS covered all four provinces i.e. Sindh, Punjab, Khyber Pakhtunkhwa (KP), 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 SHRUCs[3]. 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”)[4].

The purpose of this report is to summarize coverage outcomes from the SHRUCs R1 & R2 surveys, comparing those outcomes with outcomes in TPVICS R1 & R2 for the districts and provinces that contain the SHRUCs.

[3] 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.

[4] The TPVICS R2 survey outcomes will be summarized in two forthcoming reports.

2. Survey design and methods

This section describes the survey sampling methods, development of the survey instrument, manuals, and standard operating procedures (SOPs), along with 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.

2.1. Sampling

The team employed a two-stage, stratified cluster, cross-sectional survey. Additional details about the survey and sampling design are provided in Table 1.

Table 1. Summary of survey design

Survey design	Two-stage stratified cluster, cross-sectional survey
Target age group	The primary target group was all children of age 12-23 months. Data were also collected on the convenience sample of younger children aged 6-11 months in the households that had children aged 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)	Samples from all Primary Sampling Units (PSUs) (also known as clusters) were aggregated at the UC level and analysis was conducted on UCs and then on upper administrative levels i.e. District level.
Sampling design and strategy	Maps developed and finalized during the provincial workshops organized by BMGF for the operationalization of Essential Immunization (EI) work plans in SHRUCs were used for demarcation and selection of sample areas and clusters.
Selection of primary sampling units, households, and respondents	A two-stage cluster sampling technique was adopted for the implementation of the SHRUCs surveys. ***Stage I:*** In Round 1, the required number of the PSUs from each SHRUC were selected randomly with necessary identification information and boundary demarcations using the maps developed by BMGF for SHRUCs. In Round 2, in the interest of time, precisely the same PSUs from Round 1 were re-visited and used again. ***Stage II:*** In both Rounds 1 and 2, all households in each selected PSU were visited to screen for the presence of children of age 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 aged 12-23 months, and all children aged 6-11 months in the selected households.

2.1.1 Selection of primary sampling units:

To demarcate and select sample areas/clusters, in Round 1, the survey team used the maps developed and finalized during the 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 from the 39 SHRUCs. In Round 2, the same PSUs were visited again.

2.1.2 Sample size calculation and estimated vaccination coverage

Before Round 1, the sample size estimates were finalized after a series of meetings with key technical stockholders. The WHO 2018 Vaccination Coverage Surveys Reference Manual was also consulted for sample size estimation (4).

The inferential goal is 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 several years hence. The WHO 2018 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. With 90 PSUs per district and a target of at least ten eligible respondents per cluster, the achieved sample size will be over 900 children, so the inferential goal should be achievable even if the observed design effect is 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 of finding at least ten respondents aged 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 aged 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 hold at least one child aged 12-23 months. This listing of eligible households was repeated with a new up-to-date list for Round 2. In each round, 7,956 households (612 x 13 = 7,956) were targeted for visitation by survey interview teams.

Table 2. Number of PSUs per SHRUC by province and district

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

[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.

2.1.3 Round 2 district name changes in Karachi

Table 3 lists the 39 SHRUCs, and which district and province they fall within. There were some changes in Karachi in 2021 and 2022 which caused three SHRUCs to be counted in a different district in this analysis than where they were counted in the Round 1 report. Those changes are noted in

Table 3. List of SHRUCs by province and district

Province	Union Council	District in Round 1 Report	District in This Report
Khyber Pakhtunkhwa	Akhun Abad	Peshawar	Peshawar
	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	UC 4 Gujro	Karachi East	Karachi East
	UC 2 Ittehad Town	Karachi West	Karachi West
	UC 7 Chishti Nagar		
	UC 8 Manghopir		
	UC Islamia Colony		
	UC 5 Songal	Malir	
	UC 1 Muzaffarabad	Korangi	Malir
	UC 2 Muslimabad		
Balochistan	Ashazai 1	Killa Abdullah	Killa Abdullah
	Ashazai 2		
	Mabad 1		
	Mabad 2		
	Sirki Talar		
	Bazarkohna	Pishin	Pishin
	Pishin Town		
	Karbala		
	10B	Quetta	Quetta
	11A		
	11B		
	Baleli A		
	Kharotabad 1		
	Kharotabad 2		

2.2. Survey instrument development

This survey used the same tools developed and employed to implement the primary TPVICS surveys. 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 WHO Vaccination Coverage Cluster Surveys Reference Manual 2018 (4) 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.

The Round 2 questionnaire forms[5] are available in the folder of supplemental materials.

2.3. Survey manuals and standard operating procedures (SOPs)

This survey used the 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. The National EPI Program Manager and Ministry of National Health Services Regulation & Coordination (MoNHSRC), Islamabad issued the support letters to respective provincial authorities for their support and facilitation of supplementary TPVICS activities. Following that each province 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 past. Preference was given to candidates who were locals, were well versed with local languages and culture, had the experience of working in 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

[5] In this draft, green highlighting refers to something that we promise to provide in a folder of supplemental materials. Before the report is released, the green items should be cross-checked with the supplemental folder. The green highlighting will be removed when the report is released.

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 possibly other responses) were recorded correctly in HHs 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 filling of forms. Also, the data collectors were responsible for checking the completed forms and, where required, revisited the households to correct any discrepancies or obtain missing information.

The data entry operator (DEO) was responsible for data entry when data collectors were not able to directly enter the data on handheld devices due to the reluctance of respondents or other issues. In cases where data collectors gathered data on paper-based forms, the DEOs were responsible for data entry on the same day with the support of the corresponding data collector.

For the 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 HH 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 deliverable 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 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.

2.8. Data collection and timeline

Data collection of the SHRUCs survey 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 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 the 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. Field activities, including identifying travel routes to and from field locations, were developed to either circumvent the areas of high COVID risk or minimize encounters with the public and local authorities while in the area. All field staff were trained on the precautionary methods to avoid COVID and necessary personal protective equipment (PPE) such as gloves, masks, and sanitizers were provided to the entire field staff. The timeline for survey implementation is summarized in Table 4**.**

Table 4. Timelines for SHRUCs survey implementation, Rounds 1 & 2

	Round 1		Round 2	
Districts	**Start**	**End**	**Start**	**End**
Peshawar	5 July 2021	24 August 2021	29 June 2022	14 August 2022
Korangi	7 July 2021	20 August 2021		
Karachi West	10 July 2021	3 August 2021	15 July 2022	6 August 2022
Karachi East	25 August 2021	27 August 2021	2 August 2022	16 August 2022
Malir	30 August 2021	31 August 2021	27 June 2022	16 July 2022
Killa Abdullah	20 September 2021	20 October 2021	28 June 2022	20 July 2022
Quetta	13 July 2021	8 September 2021	28 June 2022	25 July 2022
Pishin	10 August 2021	26 August 2021	29 June 2022	26 July 2022

2.9. Data collection monitoring and quality control procedures

A dedicated "TPVICS dashboard" was also developed on the PHP programming language. The PHP version used in this dashboard was 8.1.2. The "*CodeIgniter*" framework was used for backend, and the HTML, CSS, JQUERY, Bootstrap were used for front-end development. The database used in this dashboard was "SQL Server".

TPVICS dashboard provided live information on the progress of data collection activities and offered other features including facility for the survey managers to carry out randomization of the households, access soft copy or print the list of randomized households for each PSU. The access of dashboard was also provided to key partners to check the day-to-day progress of the field activities.

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

- The Super Admin group had all the rights of dashboard, including adding, editing, and deleting. It is mostly for Senior Managers, PI, etc.

- The admin group had also almost all rights. They were mostly DMU staff, and coordinators.
- Supervisors had limited rights only to add or edit the data but not the right to delete the data. They were site staff supervisors.
- 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, they 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 the vaccination cards.

The following steps were ensured 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, the reasons for missing questionnaires were 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, and that field workers did not skip (either intentionally or by mistake) interviews for eligible children, and to tally eligible respondents in each home. 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 home-based records. 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 home-based record. Those discrepancies were handled downstream in the WHO Vaccination Coverage Quality Indicator (VCQI) software, described below.

Every home-based record 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 Survey Reference Manual (4). 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 aged 12-23 months = # of HH found to hold a child 12-23m / # 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 age 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.

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

$$AdjWt2 = AdjWt1x\ \frac{\#\ of\ HHs\ targeted\ for\ data\ collection\ in\ this\ cluster}{\#\ of\ HHs\ from\ which\ data\ were\ collected\ in\ this\ cluster}$$

Because data are 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 would be 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. The number of children aged 12-23 months was assumed to be proportional to the number of children under 5 years of age, so the post-stratified weights were calculated thus:

$$PsWt1 = AdjWt2\ x\ \frac{(Population\ under\ age\ 5\ in\ this\ UC/5)}{Sum\ of\ AdjWt2\ for\ children\ age\ 12\ to\ 23\ months\ in\ this\ UC}$$

The values of PsWt1 may be used to estimate the number of children aged 12-23 months in the UCs and to estimate the number of those children who received the various vaccine doses. The values are less programmatically meaningful for the younger siblings aged 6-11 months in this dataset. Their relative values are meaningful, representing the probability of household selection, but their absolute values do not correspond to anything that should be interpreted as a count of children aged 6-11 months in the UCs.

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

$$PsWt2 = PsWt1\ x\ \frac{Total\ number\ of\ children\ 12-23m}{Sum\ of\ PsWt1\ for\ children\ 12-23m}$$

The values of PsWt2 were used in the analysis of vaccination coverage among children aged 12-23 months. Identical estimated proportions (coverage results) would be obtained if the analysis used PsWt1. A similar set of weights were calculated for children aged 6-11 months.

2.10.3 Data analysis – pre-processing

The survey dataset was designed to provide estimates of key indicators at UC level. 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) (5). VCQI analyses were conducted using Stata version 17 (6). The primary analysis examined coverage for children aged 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 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 for each dose. In several well-defined circumstances, VCQI converts a date to a tick mark before estimating coverage indicators. Dates are converted to a simple yes/no tick marks under these conditions:

- If the date is only partially specified
- If the date is nonsensical (e.g., Feb 30 or Sep 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 are cleaned in that manner, coverage indicators are calculated. Indicators reported here include:

- Card availability - proportion of children for whom a home-based record (HBR or *vaccination card*) was seen.
- Crude coverage – What proportion of children had any evidence of receiving the dose, either via the home-based record (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 is 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?

3. Survey results

Results in this report are aggregated to the district level. Individual outcomes at the UC level are available in a folder of supplemental tables and figures.

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.

3.1.1 Survey target and coverage

The survey covered a total number of 610 clusters from 39 target SHRUCs spreading over eight districts. Seventeen SHRUCs were located in district Peshawar in KP, eight SHRUCs in four districts in Sindh, and fourteen SHRUCs in three districts of Balochistan. In total, interviews were completed at 7,549 HHs in the SHRUCs against the target of 7,956: a 99.3% response rate. The household response rate was 100% in the SHRUCs in districts Killa Abdullah and Quetta in Balochistan and in the SHRUCs in four districts of Sindh. In Peshawar, the response rate was 99.8%, and in Pishin, where two PSUs in strictly commercial districts were dropped, the response rate was 92%. District-wise survey targets, coverage, and number of SHRUCs are summarized in **Table 5** and **Table 6**.

Table 5. 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**	**99.3%**
Peshawar	17	170	170	170	2,210	2,205	2,049	99.8%
Korangi	2	82	82	82	1,066	1,066	1,066	100%
Karachi East	1	45	45	45	585	585	585	100%
Karachi West	4	72	72	72	936	936	935	100%
Malir	1	18	18	18	234	234	234	100%
Killa Abdullah	5	90	90	90	1,170	1,170	1,163	100%
Pishin	3	45	43	43	585	538	466	92%*
Quetta	6	90	90	90	1,170	1,170	1,051	100%

* Two PSUs in Pishin were dropped because they were commercial neighborhoods with no residents.

Table 6. 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**	**7956**	**7949**	**7856**	**99.9%**
Peshawar	17	170	170	170	2210	2210	2201	100.0%
Karachi East	1	45	45	45	585	585	583	100.0%
Karachi West	5	90	90	90	1170	1165	1164	99.6%
Malir	2	82	82	82	1066	1066	1066	100.0%
Killa Abdullah	5	90	90	90	1170	1169	1145	99.9%
Pishin	3	45	45	45	585	584	575	99.8%
Quetta	6	90	90	90	1170	1170	1122	100.0%

3.1.2 Demographic characteristics of survey sample

Table 7 summarizes several demographic aspects of the survey sample.

Table 7. Demographic characteristics of survey samples, TPVICS & SHRUCs Rounds 1 & 2

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	57.3
-TPVICS R2	636	17.6 ± 3.2	49.2	37.1	51.7
- SHRUCs R1	2,007	17.5 ± 3.5	51.3	37.6	52.0
- SHRUCs R2	2,205	17.6 ± 3.3	50.4	38.7	46.8
Sindh - Karachi East - TPVICS R1	819	16.6 ± 3.4	55.3	72.4	77.7
-TPVICS R2	793	17.4 ± 3.3	53.8	62.0	68.5
- SHRUCs R1	571	17.0 ± 3.4	55.2	28.9	27.0
- SHRUCs R2	578	17.8 ± 3.8	48.1	48.6	47.4
Sindh - Karachi West - TPVICS R1	832	17.1 ± 3.3	50.4	57.4	63.5
-TPVICS R2	804	17.5 ± 3.3	51.7	59.0	61.3
- SHRUCs R1	1,150	17.3 ± 3.5	51.9	39.0	48.5
- SHRUCs R2	1,158	18.0 ± 3.7	52.7	48.4	52.5
Sindh - Malir - TPVICS R1	837	16.9 ± 3.6	51.0	55.0	66.2
-TPVICS R2	831	17.8 ± 3.2	49.9	54.7	65.8
- SHRUCs R1	1,036	17.3 ±3.5	54.0	44.4	30.3
- SHRUCs R2	1,054	17.9 ± 3.3	53.1	47.1	52.8
Balochistan - Killa Abdullah -TPVICS R1	729	17.9 ± 2.8	66.5	9.8	9.1
-TPVICS R2	717	17.1 ± 3.3	56.8	32.6	34.0
- SHRUCs R1	896	15.8 ± 2.5	52.0	1.5	1.7
- SHRUCs R2	1,135	16.7 ± 3.1	58.1	0.1	0.1
Balochistan - Pishin - TPVICS R1	745	17.5 ± 2.4	56.6	14.2	37.7
-TPVICS R2	730	16.6 ± 3.4	56.4	6.6	14.8
- SHRUCs R1	420	17.1 ± 3.3	55.0	10.5	20.4
- SHRUCs R2	550	16.7 ± 3.2	53.6	7.5	55.6
Balochistan - Quetta - TPVICS R1	821	17.0 ± 3.1	53.8	25.2	28.5
-TPVICS R2	767	16.9 ± 3.4	52.9	32.7	35.6
- SHRUCs R1	896	16.9 ± 3.2	55.5	11.8	22.1
- SHRUCs R2	1,166	16.8 ± 3.3	54.2	10.7	25.3

3.2. Card availability and vaccination coverage: Contrasting Round 1 vs. Round 2

Figures 1-14 summarize home-based record (or *card*) availability along with vaccination coverage in Round 1 versus Round 2 for the seven SHRUC districts. Each district is represented two pages: one that summarizes outcomes for SHRUCs and one that summarizes outcomes for TPVICS. Data about doses are arranged from bottom-to-top following the order of Pakistan's vaccination schedule. The top of each figure summarizes the proportion of respondents who showed an HBR, who were fully-, partially-, or not-vaccinated. If any outcome changed from Round 1 to Round 2 by a magnitude that was statistically significant[6], then the figure includes a star symbol (★) at the far right and an arrow to indicate whether Round 2 was significantly higher (▲) or lower (▼) than Round 1.

Table 8 summarizes both improvements and declines in coverage between Round 1 and 2 across all seven districts and across TPVICS and SHRUCs surveys. Green bars indicate statistically significant improvements in outcomes and red bars indicate declines. Empty cells represent changes that were not statistically significant. The largest changes from Round 1 to 2 were observed in Killa Abdullah and Pishin with notable declines across many doses. Quetta experienced large improvements in the proportion of children who had evidence of OPVWC (OPV RI with campaign doses counted, too). Significant improvements in card availability were documented in one or both surveys in all districts except Quetta and the evidence in Killa Abdulla was contradictory with the SHRUC survey observing an 18.2% increase and TPVICS a 10.6% decline. The SHRUC survey saw improvements in zero dose outcomes in five districts and a significant decline in Killa Abdullah. More details concerning Round 1 to 2 changes are conveyed graphically in Figures 1-14.

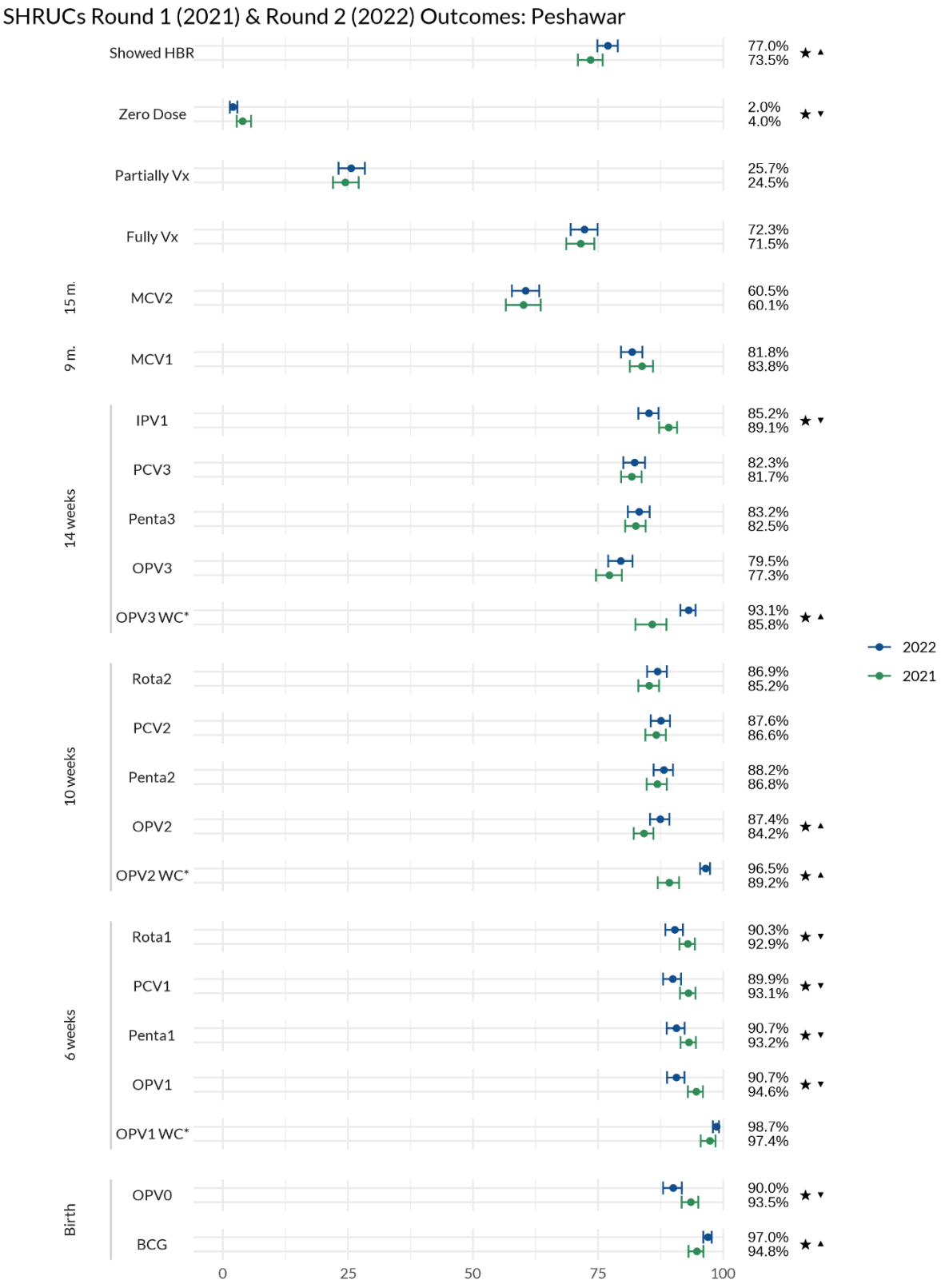
[6] In this context, the phrase *statistically significant* means that the p-value for a 2-sided Rao-Scott survey-adjusted chi-square test was < 0.05.

Table 8. Overview of coverage changes from Round 1 to Round 2, TPVICS and SHRUCs

		Peshawar		Karachi East		Karachi West		Malir		Killa Abdullah		Peshin		Quetta	
		TPVICS	SHRUCs	TPVICS	SHRUCs	TPVICS	SHRUCs	TPVICS	SHRUCs	TPVICS	SHRUCs	TPVICS	SHRUCs	TPVICS	SHRUCs
	Showed HBR	27.9	3.5		12.4	9.8	7.7	14.4	11.6	-10.6	18.2		20.8		
	Zero Dose		-1.9	3.2	-6.5		-7.0		-7.7	-22.8	-12.9				-8.4
	Fully Vx					12.5				-24.7		-27.1	-15.5		-6.4
15 m	MCV2									-12.2	-7.8		-12.8	8.3	-5.7
9 m	MCV1					11.0				-17.0		-29.5			-9.9
14 weeks	IPV1		-3.9							-15.7		-32.6	-11.9		
	PCV3									-13.9	10.9	-26.5	-15.3		
	PENTA3									-14.6	10.2	-30.0	-14.8		
	OPV3									-19.7		-27.7	-15.9		
	OPWC3	11.6	7.3		5.3	7.7	8.4	5.5	6.7		13.4			40.5	8.9
10 weeks	ROTA2									-39.7		-28.9	-10.1		-6.9
	PCV2									-14.3		-31.9	-12.6		
	PENTA2									-15.2		-31.8	-11.5		
	OPV2		3.3							-19.9		-29.5	-10.8		
	OPWC2	9.5	7.3		5.8	6.4	7.4	5.3	6.6		-5.6			39.7	8.9
6 weeks	ROTA1		-2.6							-16.0		-29.0	-7.6		-7.0
	PCV1		-3.1							-14.3	9.3	-28.2			
	PENTA1		-2.5							-15.8		-28.8			
	OPV1		-4.0	-3.7					6.6	-22.3		-27.0			
	OPWC1	6.9			5.5	5.9	4.8	4.5	4.3	12.7	-7.0	28.6		37.8	
Birth	OPV0		-3.5						5.2	-31.7	-11.5	-27.1			
	BCG	4.3	2.2	-3.1			7.4		7.4	-23.3	-22.9				8.6

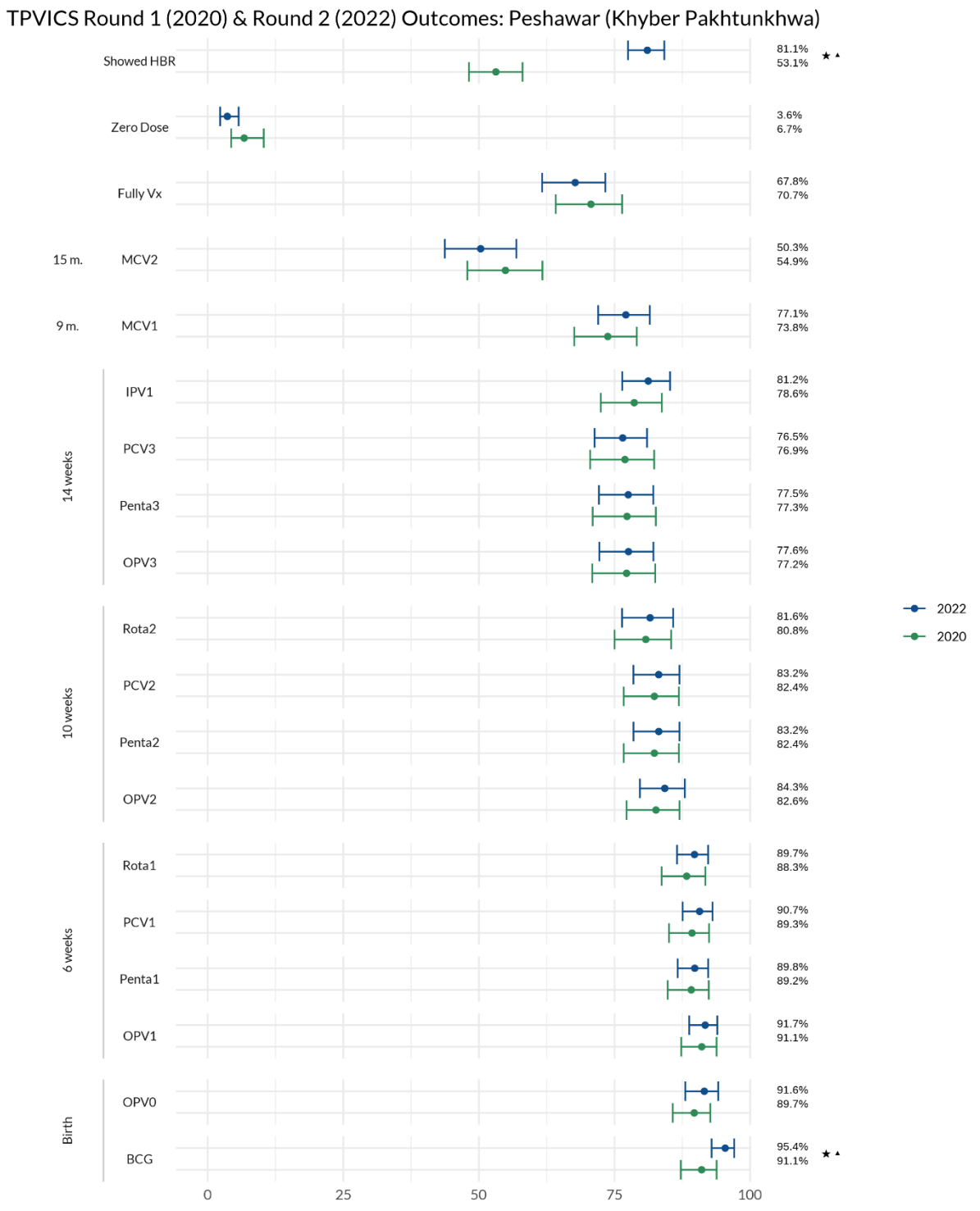
Green bars indicate that R2 outcomes were better than R1. Red bars indicate the opposite.

Data bars are scaled so that if the change in coverage was 50%, half the bar would be filled with color.



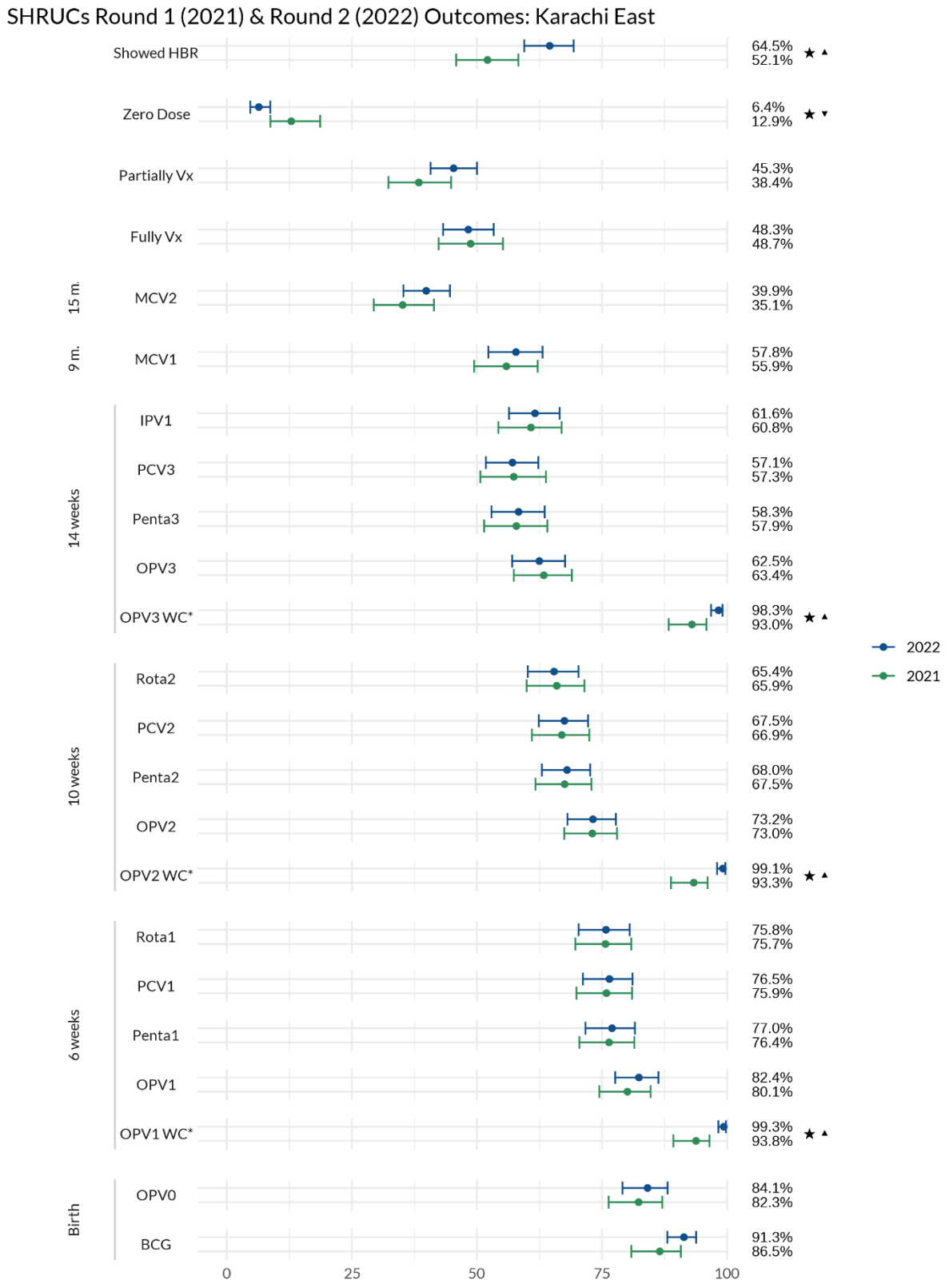
* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the outcome increased or decreased significantly.

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



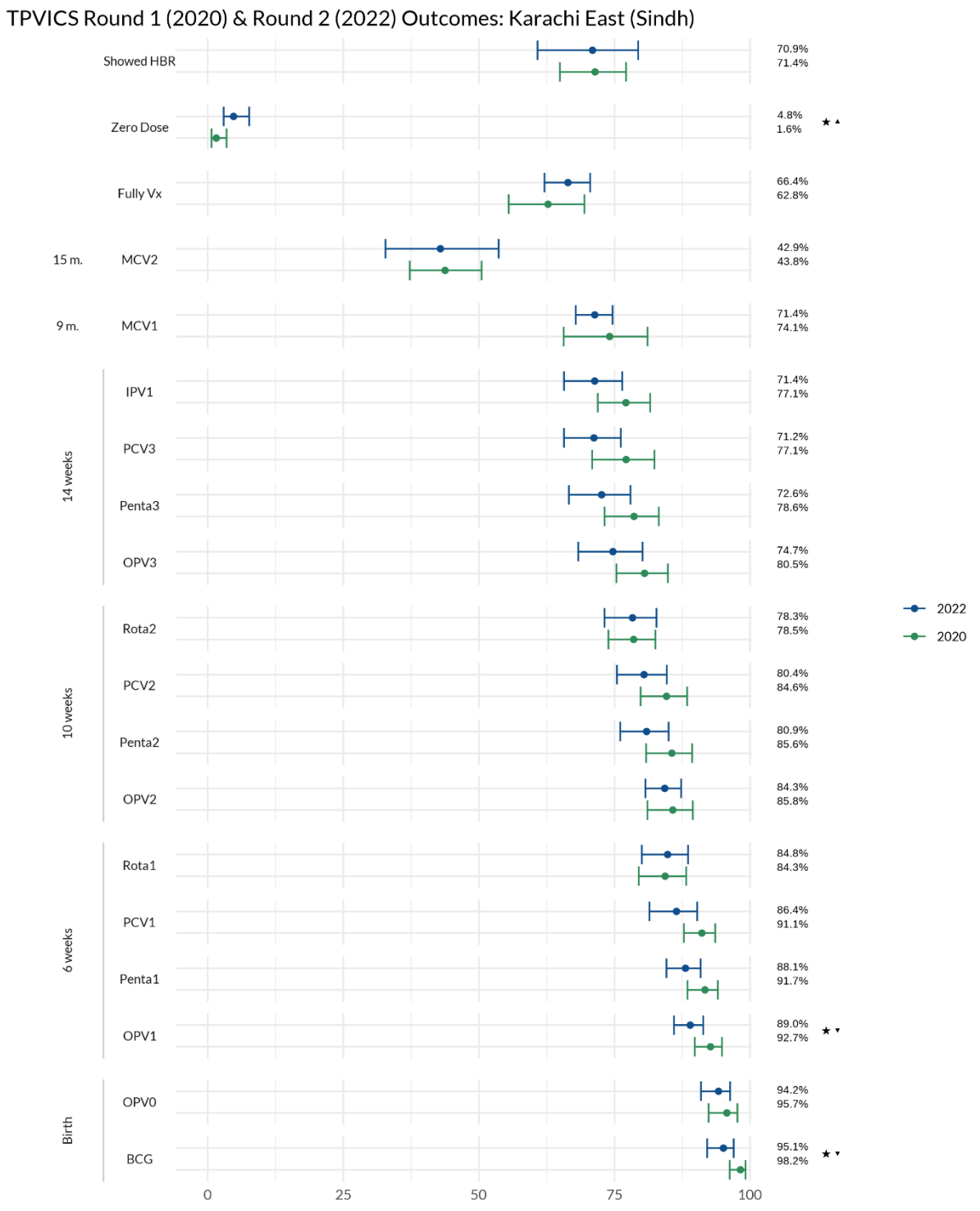
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate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

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



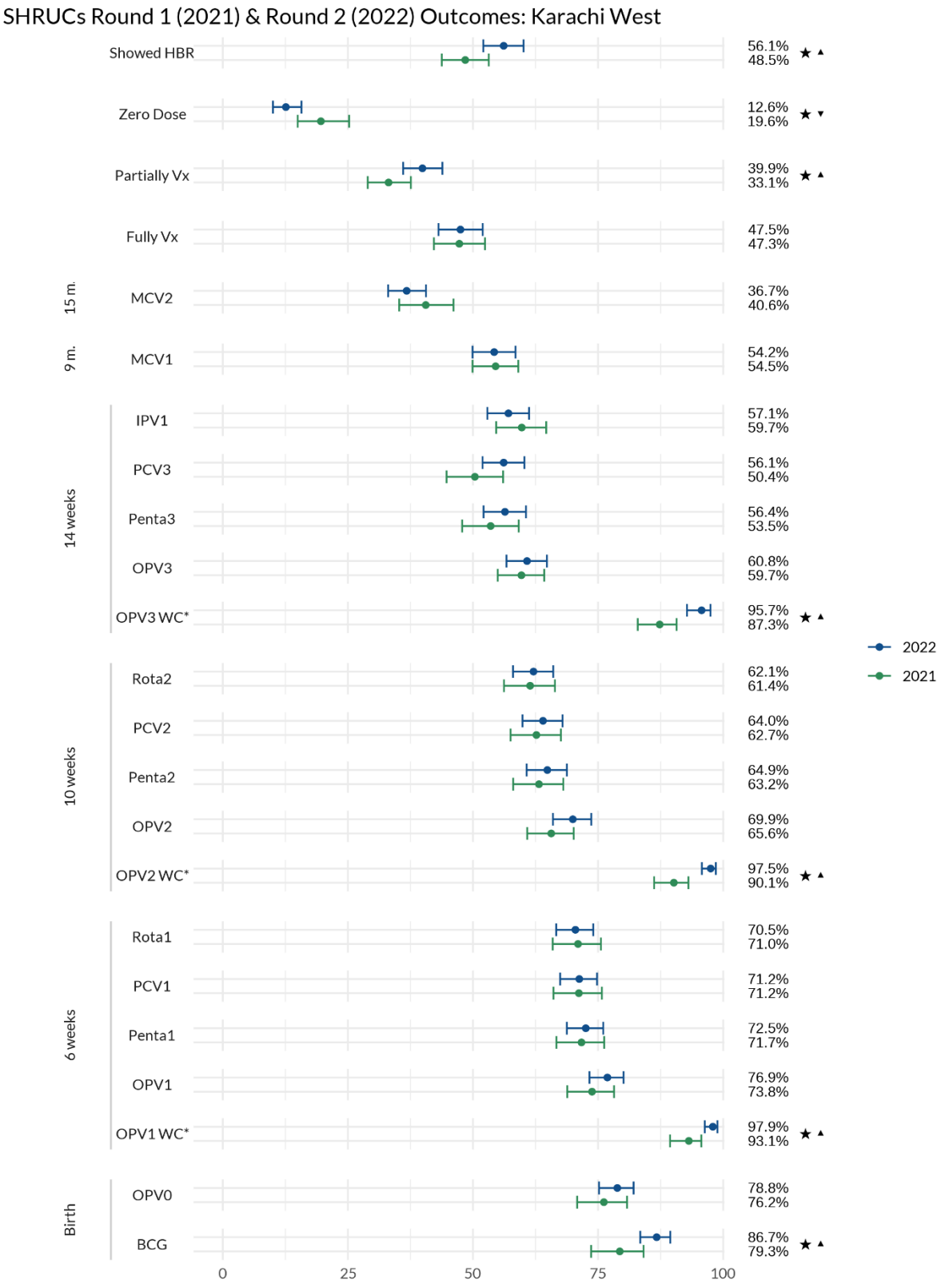
* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the outcome increased or decreased significantly.

Figure 3. SHRUCs Round 1 & Round 2 Outcomes for Karachi East District



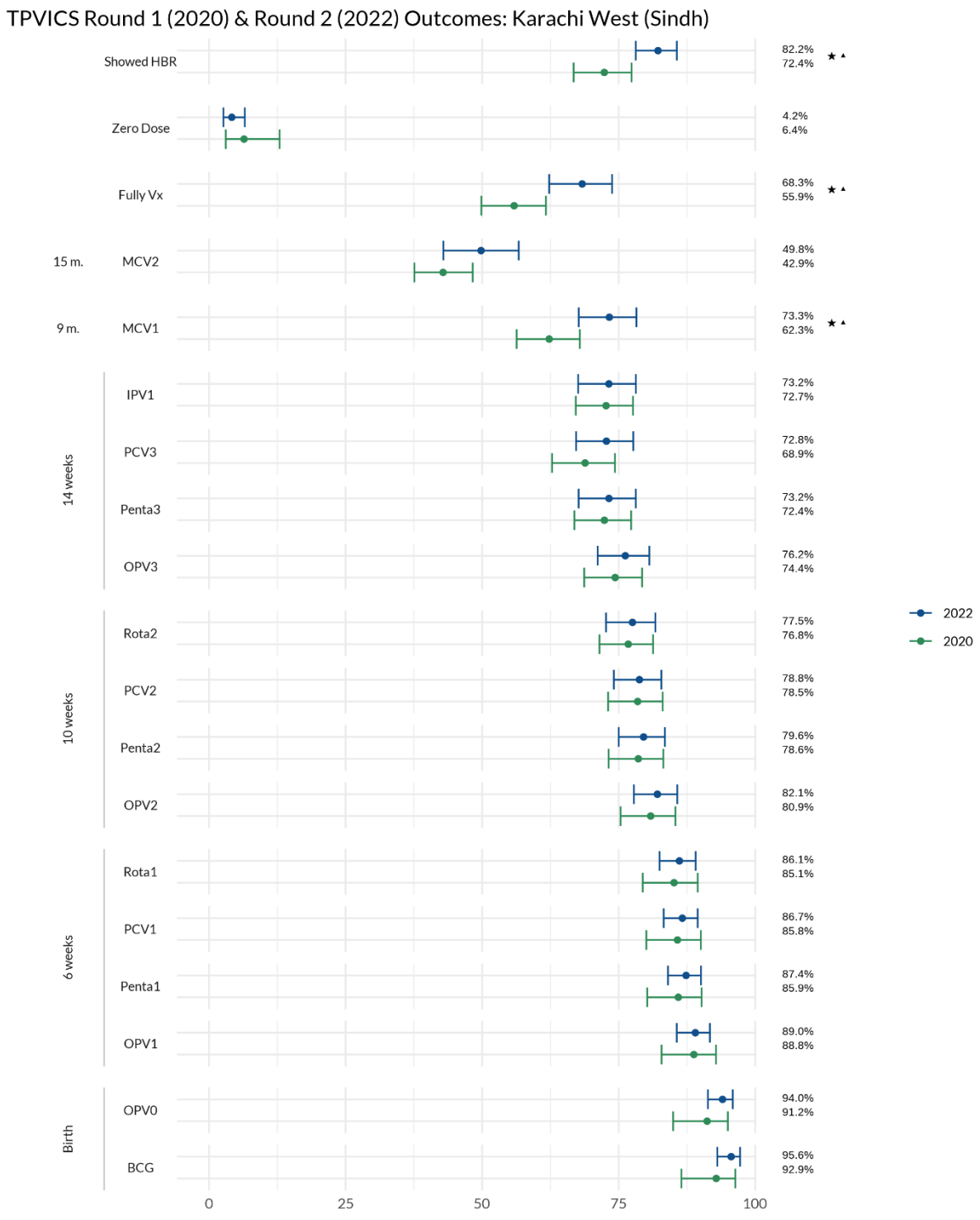
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate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

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



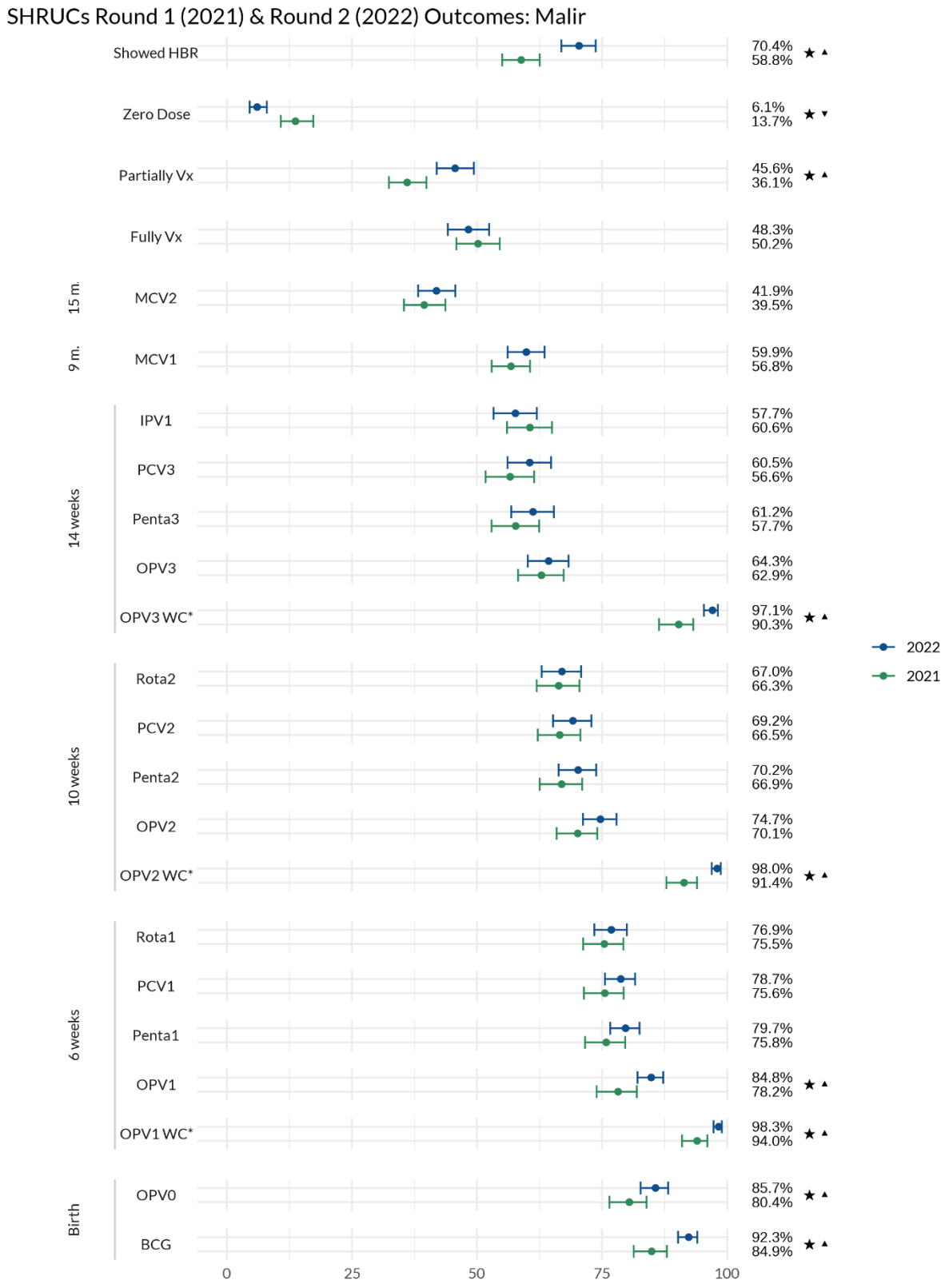
* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the outcome increased or decreased significantly.

Figure 5. SHRUCs Round 1 & Round 2 Outcomes for Karachi West District



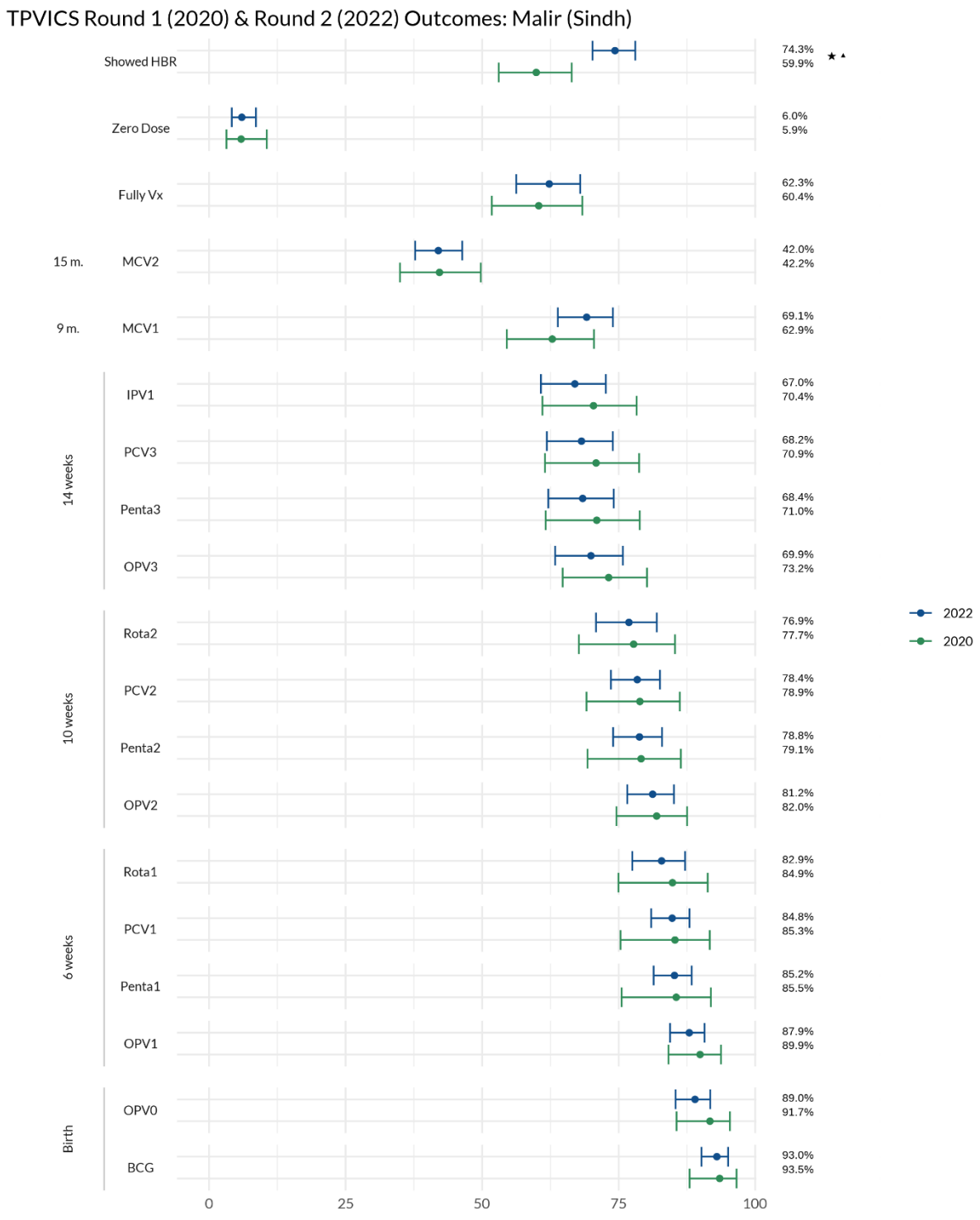
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate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

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



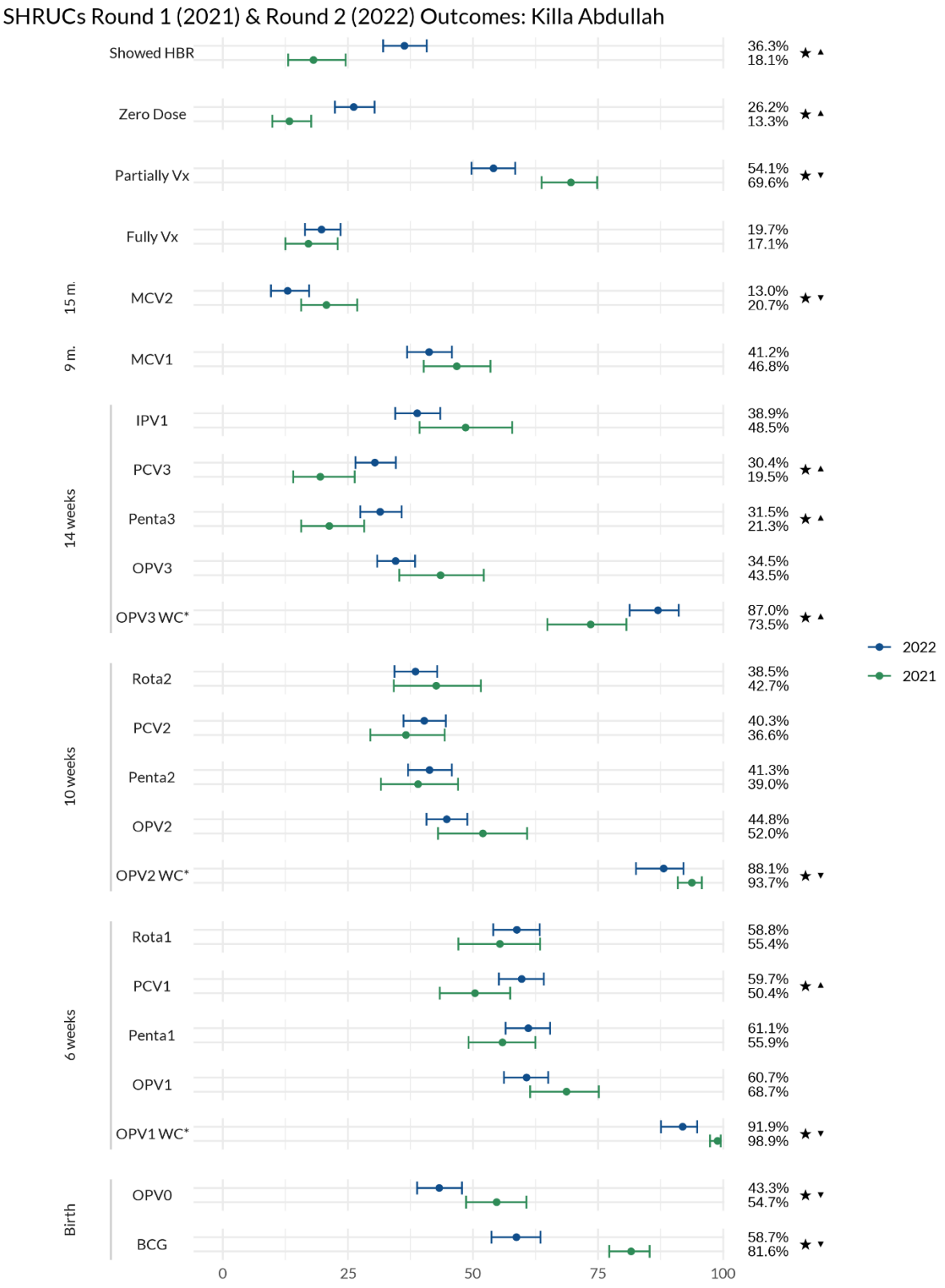
* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the outcome increased or decreased significantly.

Figure 7. SHRUCs Round 1 & Round 2 Outcomes for Malir District



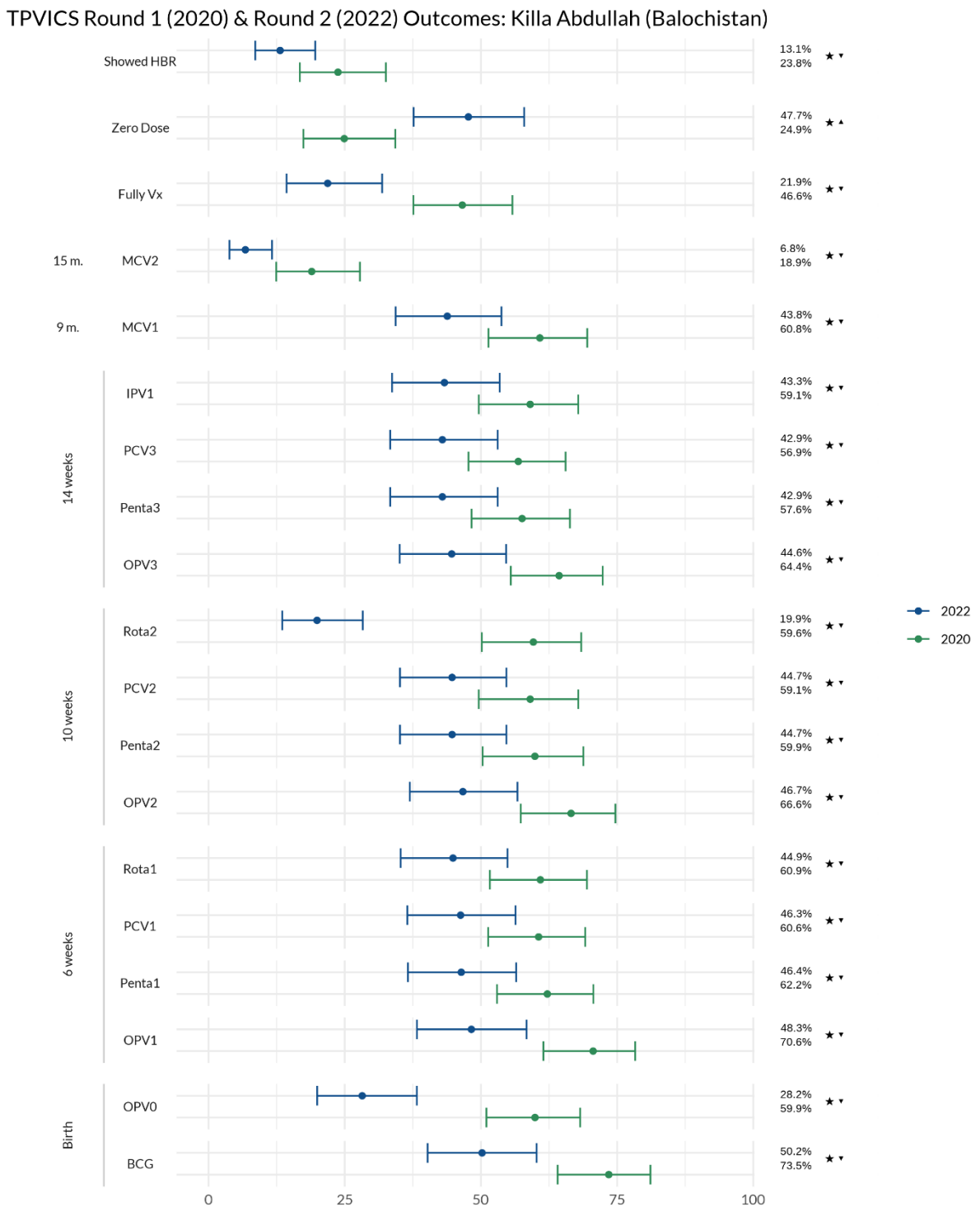
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate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

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



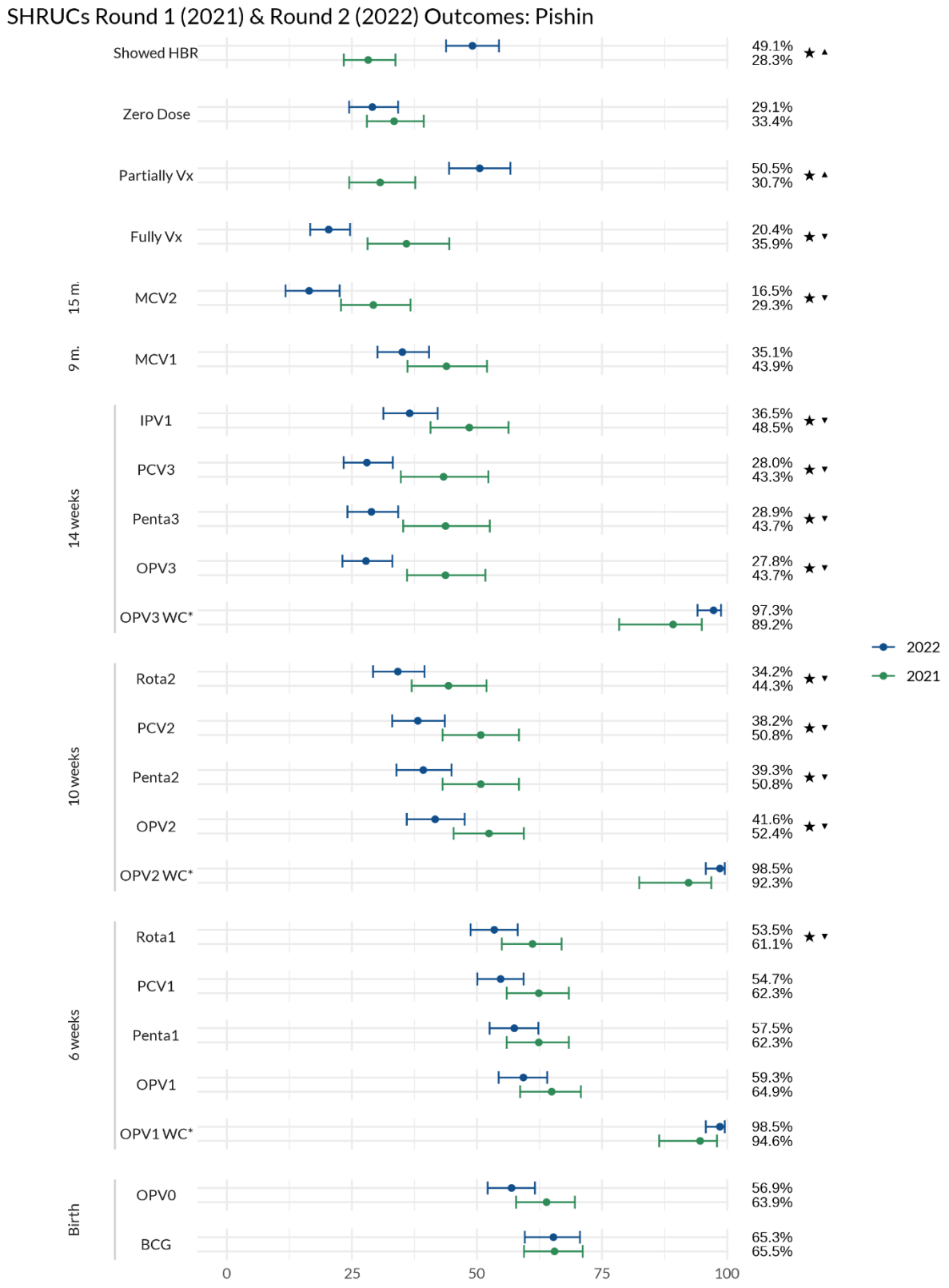
* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the outcome increased or decreased significantly.

Figure 9. SHRUCs Round 1 & Round 2 Outcomes for Killa Abdullah District



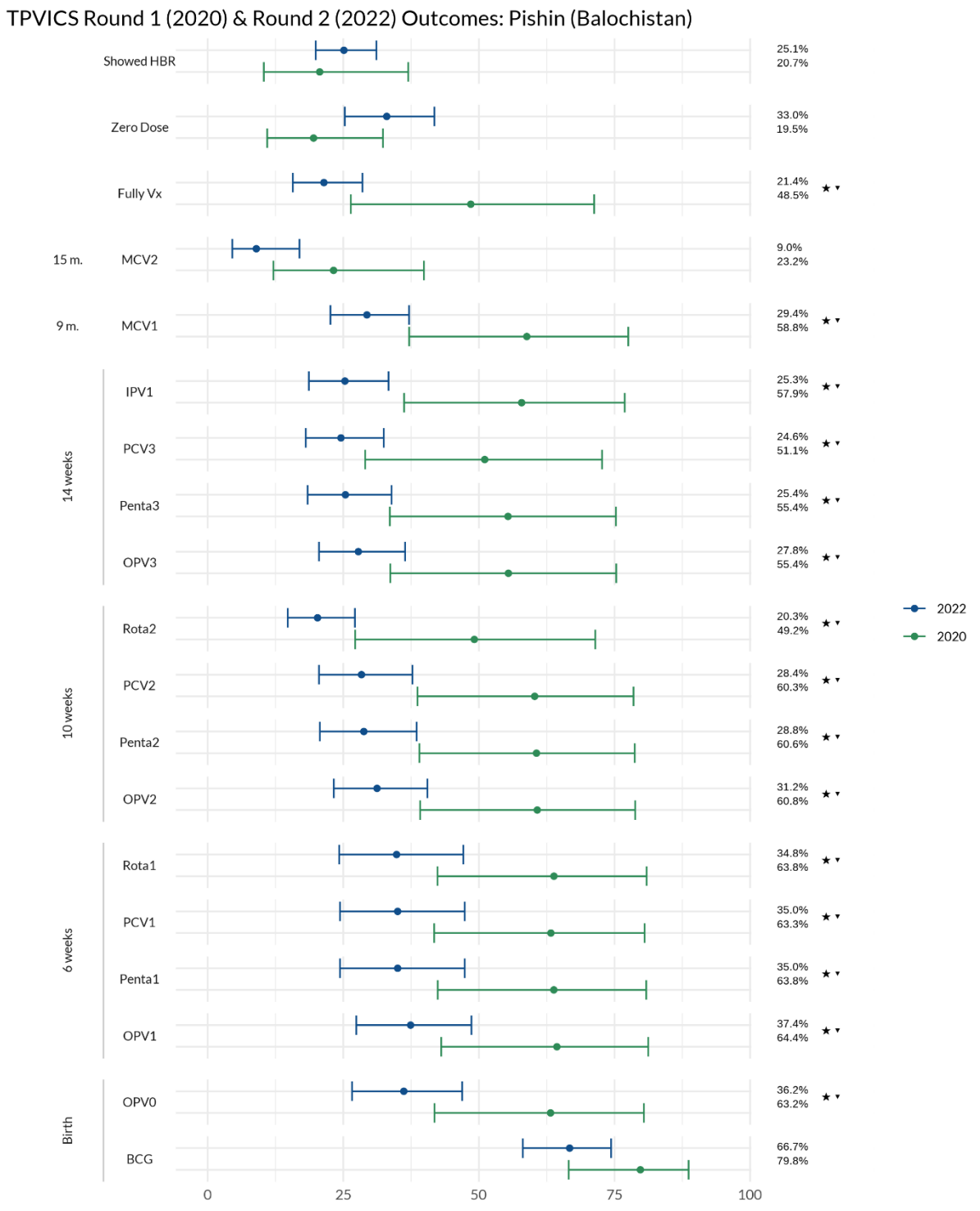
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate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

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



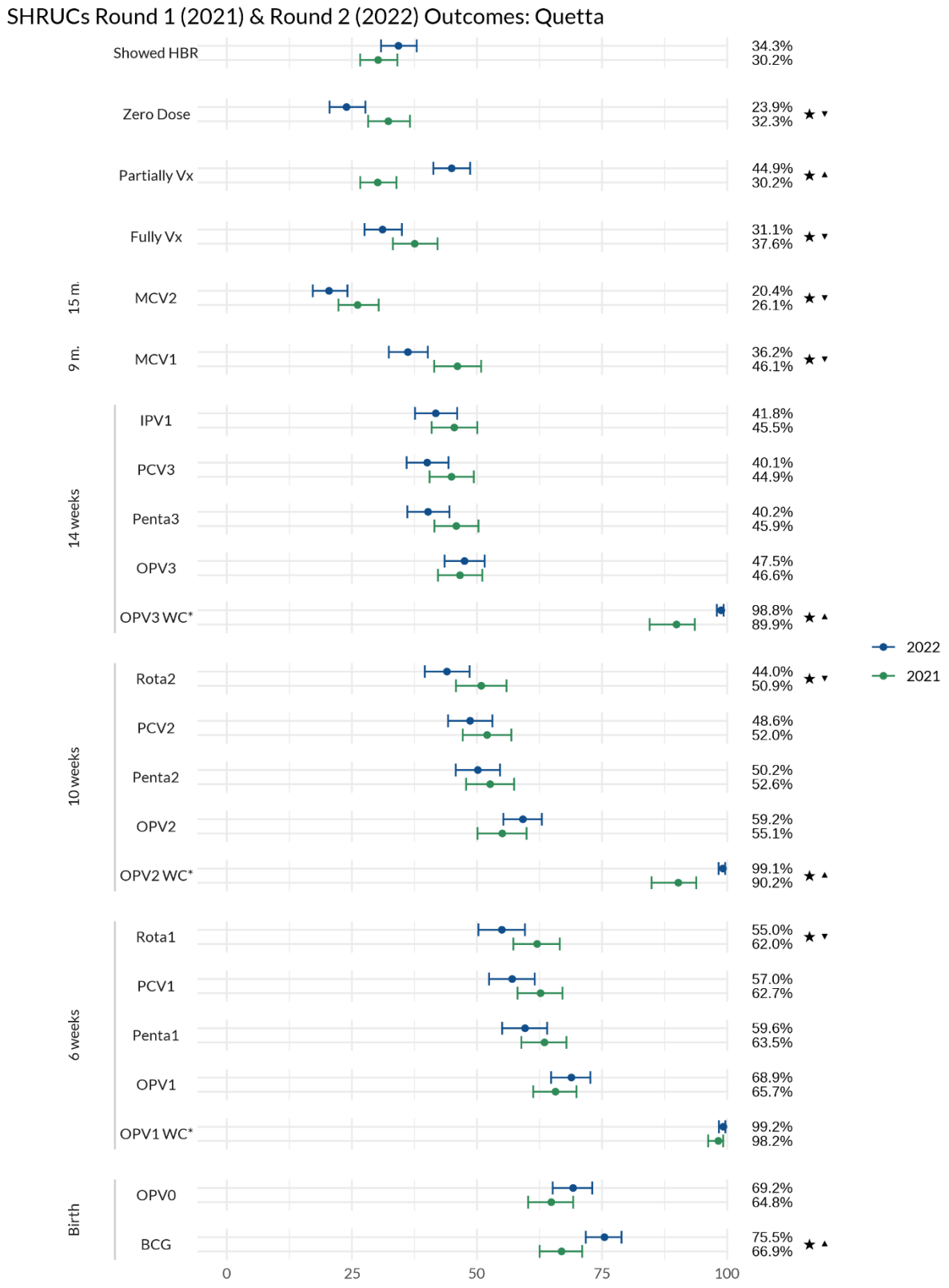
* WC = with campaigns. OPV WC coverage calculations include Polio campaign doses.
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the outcome increased or decreased significantly.

Figure 11. SHRUCs Round 1 & Round 2 Outcomes for Pishin District



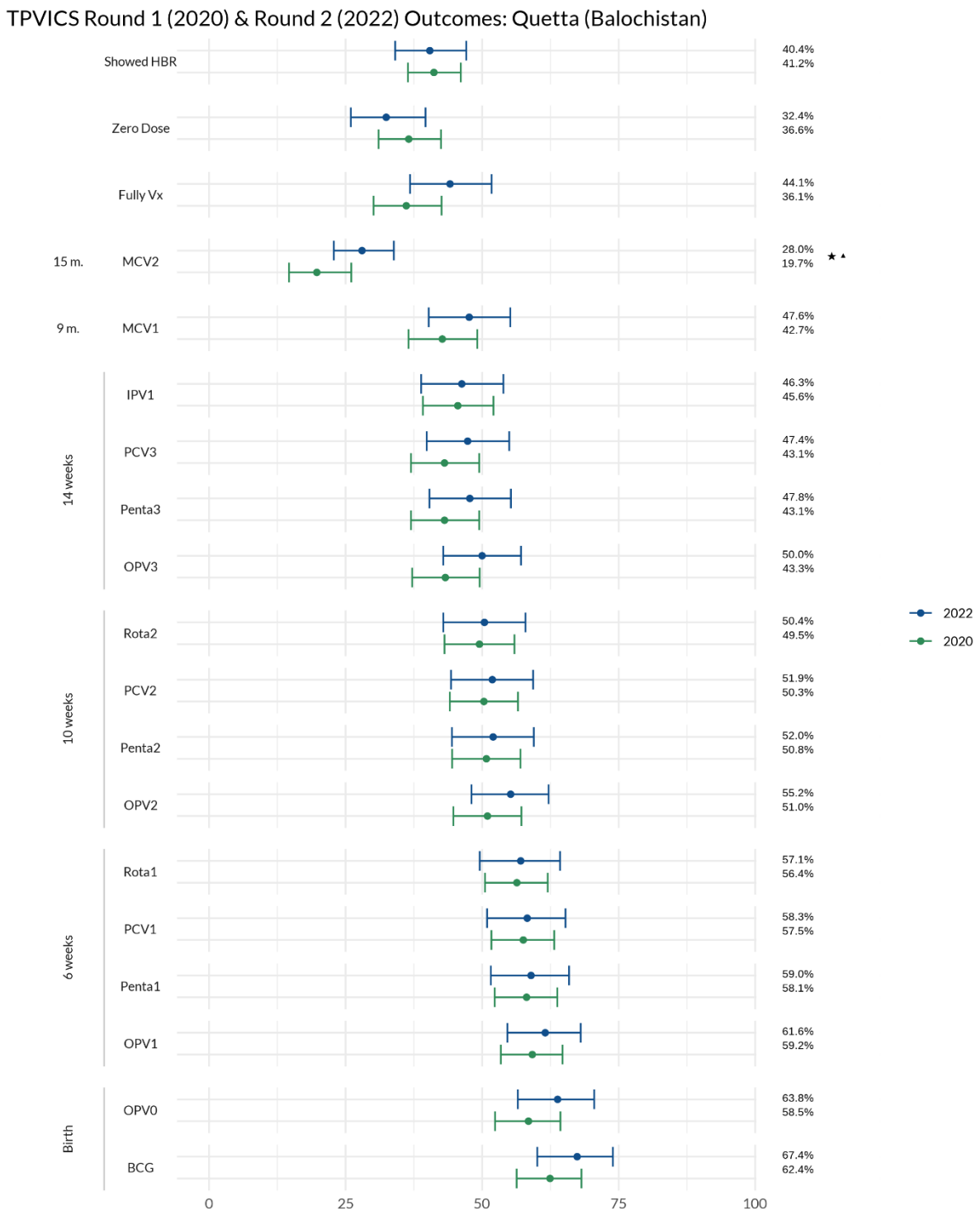
Fully vaccinated dose list: BCG, OPV0, OPV1-3, Penta1-3, PCV1-3, IPV1, MCV1.
Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.
Stars indicate statistically significant differences ($p<0.05$). Arrows beside stars indicate whether the Round 2 estimate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

Figure 12. TPVICS Round 1 & Round 2 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.
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 outcome increased or decreased significantly.

Figure 13. SHRUCs 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.

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

3.2. Vaccination home-based record (card) availability

3.2.1 Reasons for never receiving a vaccination card

Reasons for never having received a vaccination card are summarized in Table 9. 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 of the children never visited a health facility to obtain a vaccination card for their children.

Table 9. Reasons for never having received a vaccination card, by district, TPVICS & SHRUCs

	Never received a card (%)	Why not?						N
		Dont think it is important (%)	Never visited a facility (%)	Card was not available with the health provider (%)	The vaccinator / facility did not provide the card (%)	Not aware of such cards (%)	Other (%)	
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	8.9	2.4	2.7	3.0	0.3	0.0	0.5	2,007
- SHRUCs R2	5.3	1.1	0.3	0.2	0.0	0.1	3.7	2,205
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
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
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
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
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	424
- SHRUCs R2	40.3	8.7	24.0	2.3	3.8	1.1	0.4	551
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

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.

3.3. Vaccination coverage and timeliness

The pages of this section summarize district level vaccination coverage among children aged 12-23 months for rounds 1 and 2 of the TPVICS and SHRUCs 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 a home-based record (HBR) is indicated in the figure. The saturated colors starting at the left side of the bar summarize the timeliness with which the doses were administered. Timeliness is 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 to be 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 2 months late than 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.

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

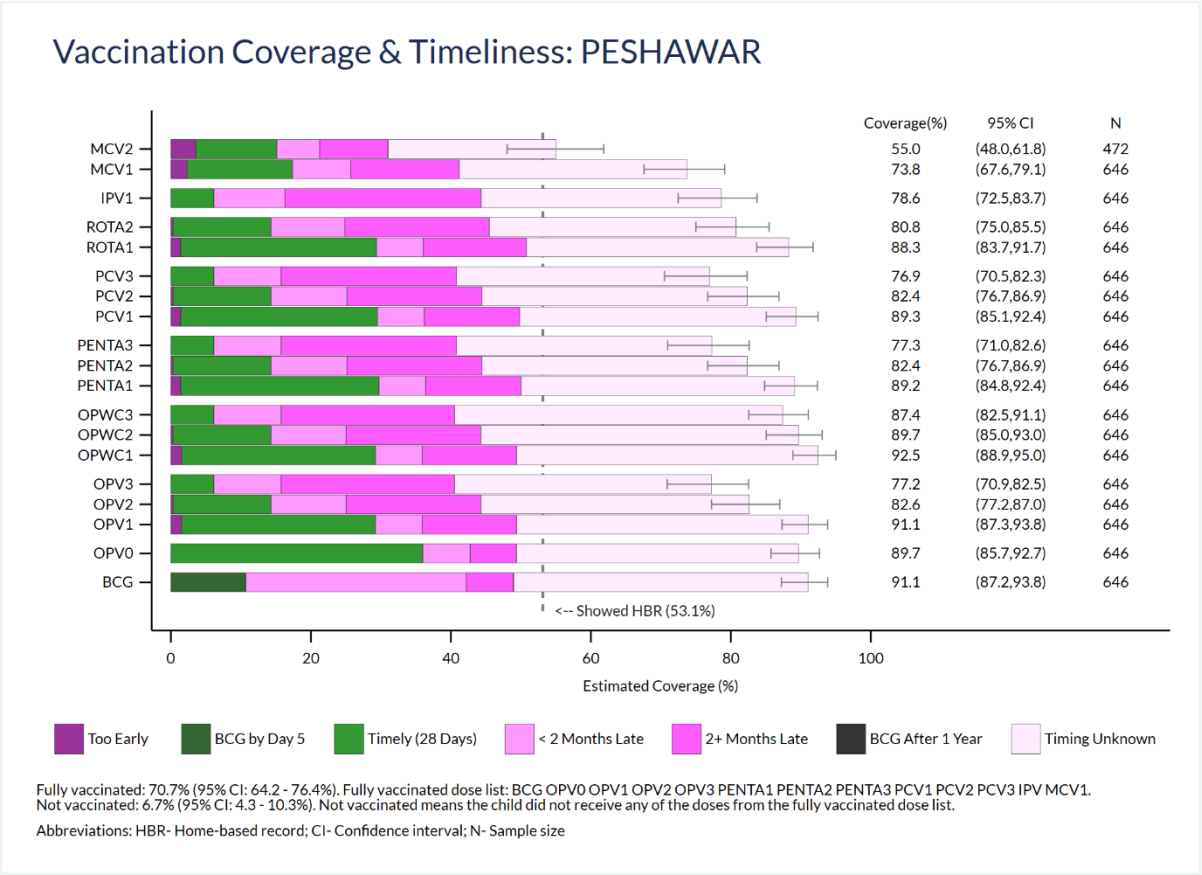
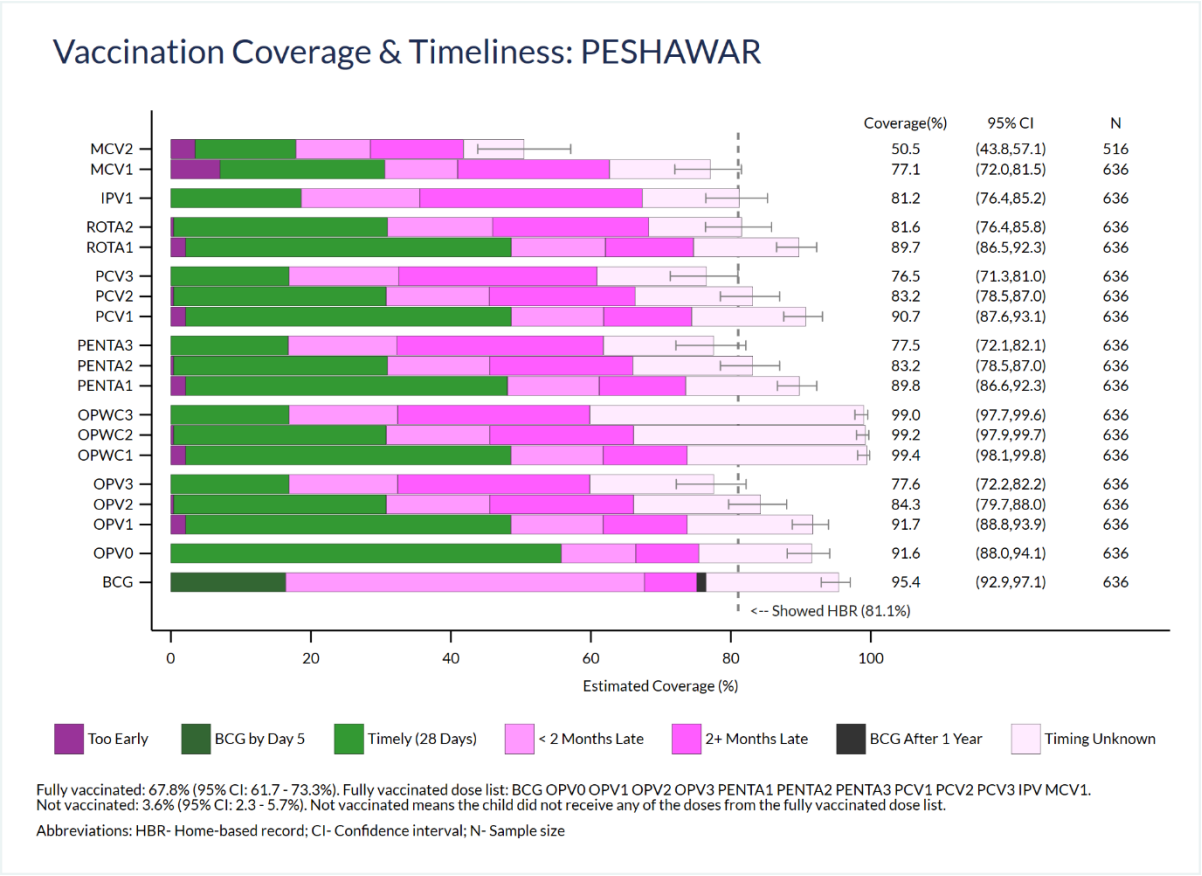


Table 10. Vaccination coverage bar segment lengths (%), Peshawar District, TPVICS Round 1

Vaccines	Too Early	Timely (28 days)	< 2 Months Late	2+ Months Late	Timing unknown
MCV2	3.5	11.6	6.1	9.8	24.0
MCV1	2.3	15.0	8.3	15.5	32.6
IPV	0.0	6.1	10.2	28.0	34.3
ROTA2	0.3	14.0	10.5	20.6	35.3
ROTA1	1.4	28.0	6.7	14.7	37.5
PCV3	0.0	6.1	9.6	25.1	36.1
PCV2	0.3	14.0	10.9	19.2	37.9
PCV1	1.4	28.1	6.7	13.6	39.5
PENTA3	0.0	6.1	9.6	25.1	36.5
PENTA2	0.3	14.0	10.9	19.2	37.9
PENTA1	1.4	28.3	6.7	13.6	39.1
OPWC3	0.0	6.1	9.6	24.8	46.9
OPWC2	0.3	14.0	10.7	19.2	45.4
OPWC1	1.6	27.7	6.7	13.5	43.1
OPV3	0.0	6.1	9.6	24.8	36.7
OPV2	0.3	14.0	10.7	19.2	38.4
OPV1	1.6	27.7	6.7	13.5	41.7
OPV0	0.0	36.0	6.8	6.6	40.3
	BCG by day 5	**< 2 Months Late**	**2+ Months Late**	**After 1 Year (BCG only)**	**Timing unknown**
BCG	10.7	31.5	6.7	0.1	42.1

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



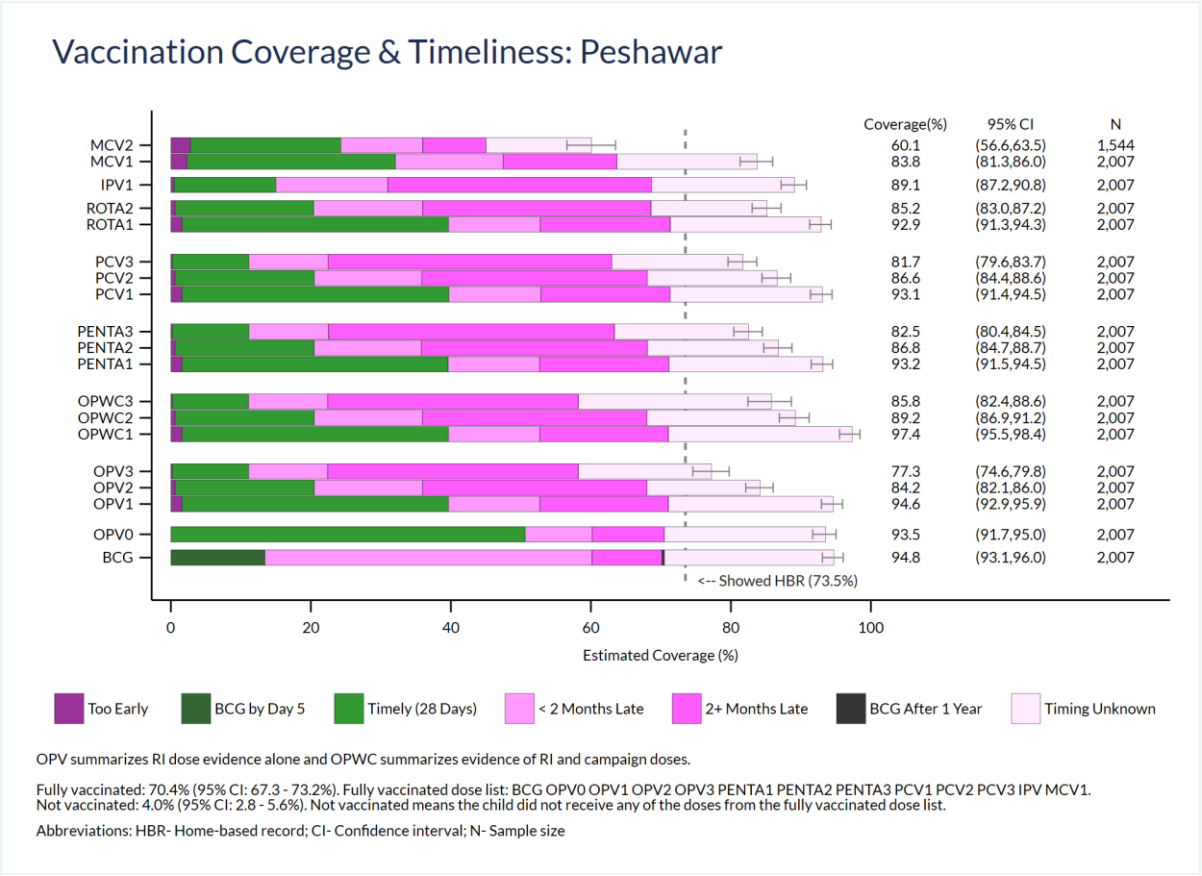
Fully vaccinated: 67.8% (95% CI: 61.7 - 73.3%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 3.6% (95% CI: 2.3 - 5.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 11. 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 aged 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 12. 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 aged 12-23 months, Peshawar District, SHRUCs Round 2

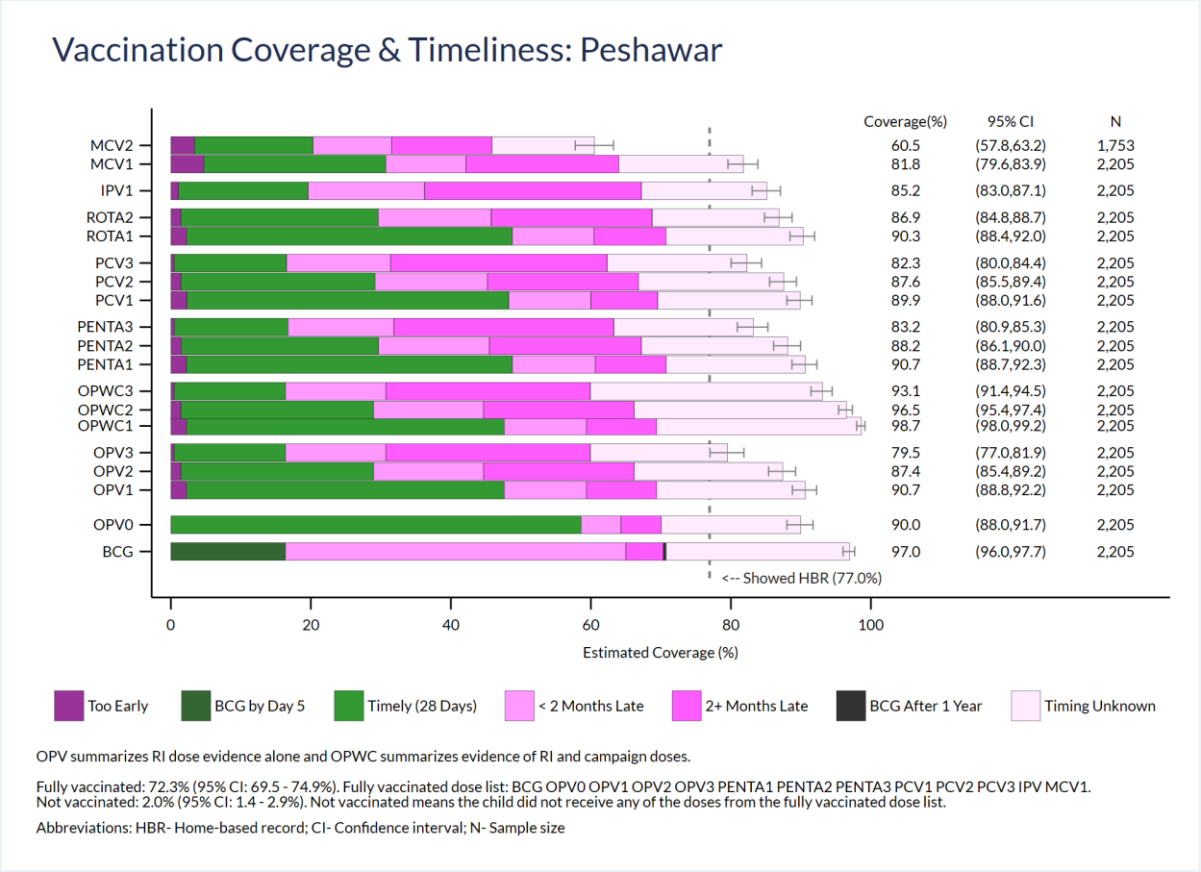


Table 13. Vaccination coverage bar segment lengths (%), Peshawar District, SHRUCs Round 2

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

The Peshawar figures (**Figure 1**, **Figure 2**, **Figure 15**, **Figure 16**, **Figure 17**, and **Figure 18**) indicate:

- In Round 1, card availability in the SHRUCs was substantially higher than in TPVICS (71.5% vs. 53.1%). In Round 2, the TPVICS availability increased to 81.1% and SHRUCs to 77.0%.
- TPVICS Round 2 showed statistically significant improvements over Round 1 for BCG and the three OPVWC doses but not for OPV. SHRUCs coverage was a mix. The six-week doses (except for OPVWC1) and IPV1 showed significant decreases. OPV2 and OPVWC2 showed significant increases as did OPVWC3.
- In the TPVICS survey, coverage in the OPV, PENTA, PCV & ROTA series were nearly the same, but in SHRUCs, coverage for OPV1-3 were 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 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 four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in every dose series.
- All four surveys show notable portions of each bar showing doses received more than 28 days late. The later doses in the series have many more children receiving the doses 2+ months late than the earlier doses in the series.

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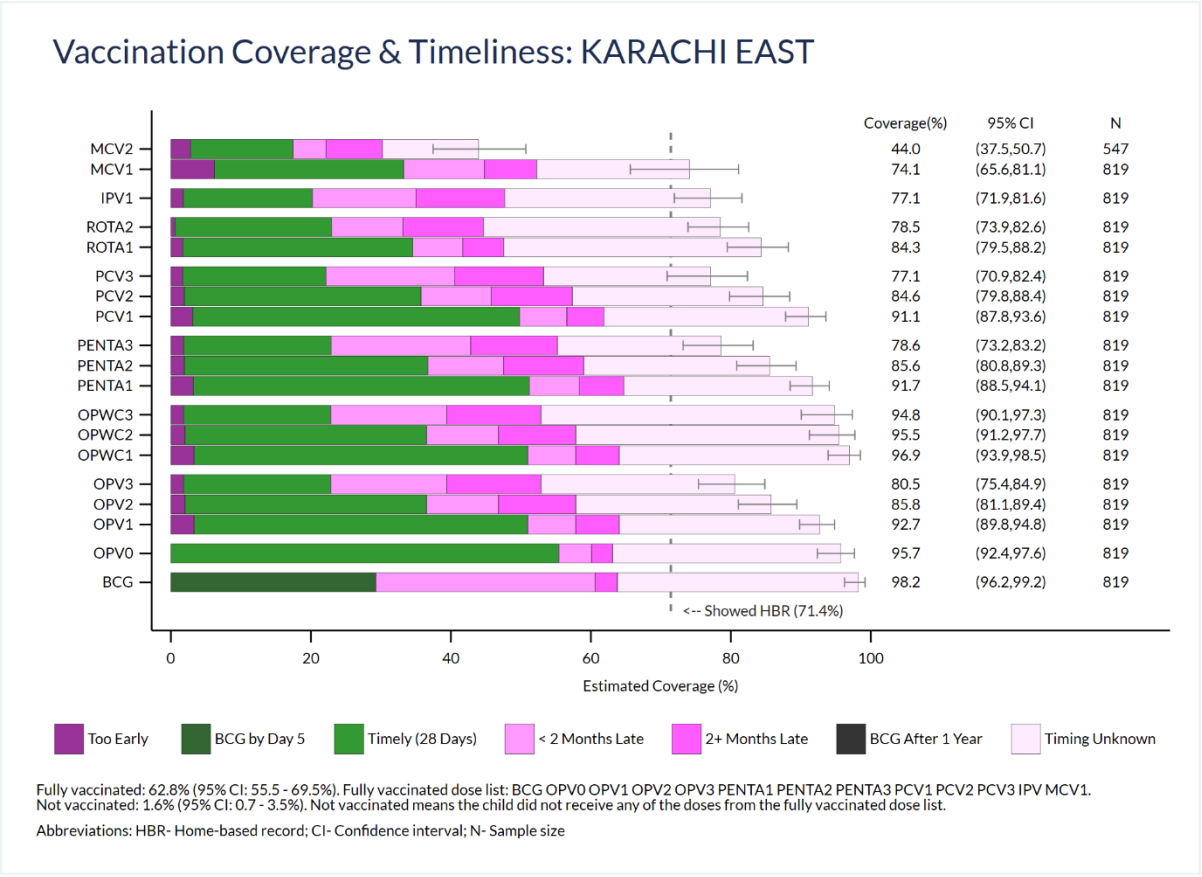
Figure 19. Vaccination coverage among children aged 12-23 months, Karachi East District, TPVICS Round 1



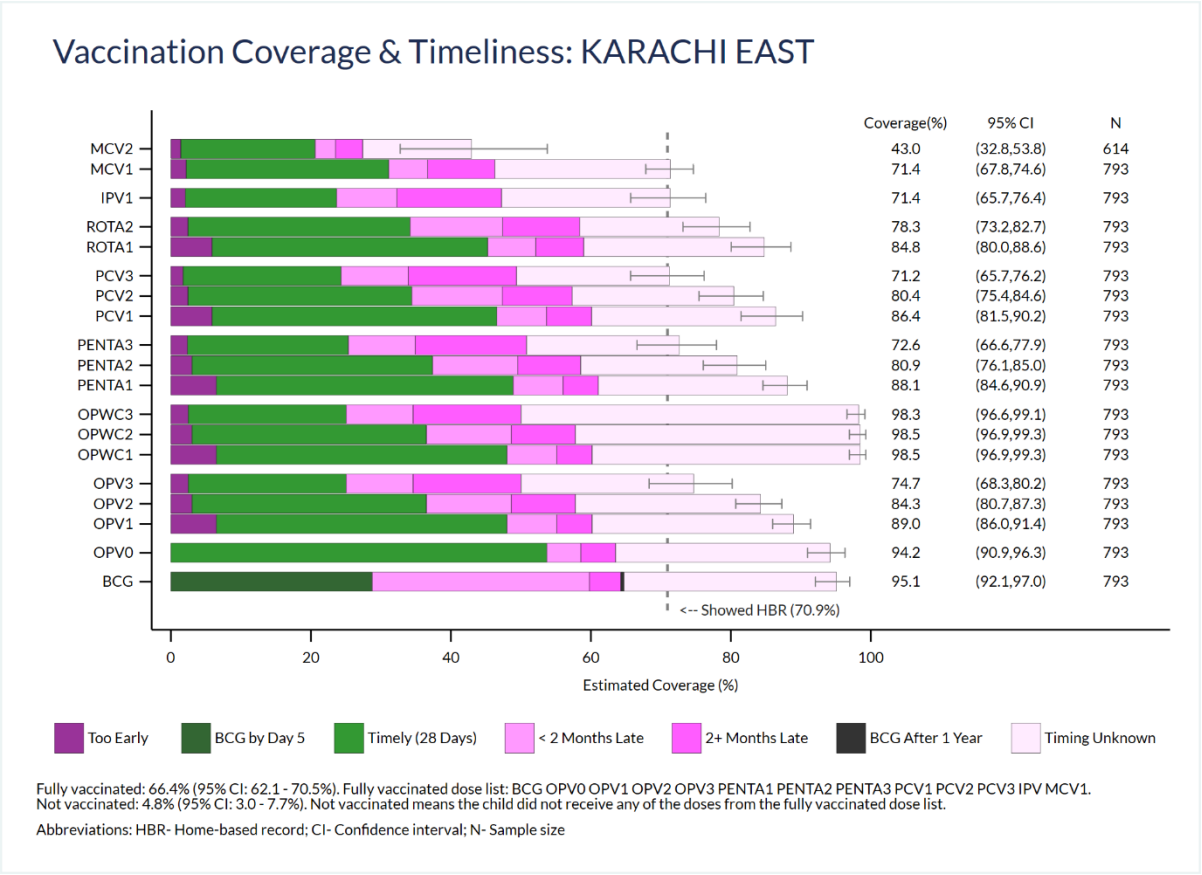
Fully vaccinated: 62.8% (95% CI: 55.5 - 69.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 1.6% (95% CI: 0.7 - 3.5%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 14. 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 20. Vaccination coverage among children aged 12-23 months, Karachi East District, TPVICS Round 2



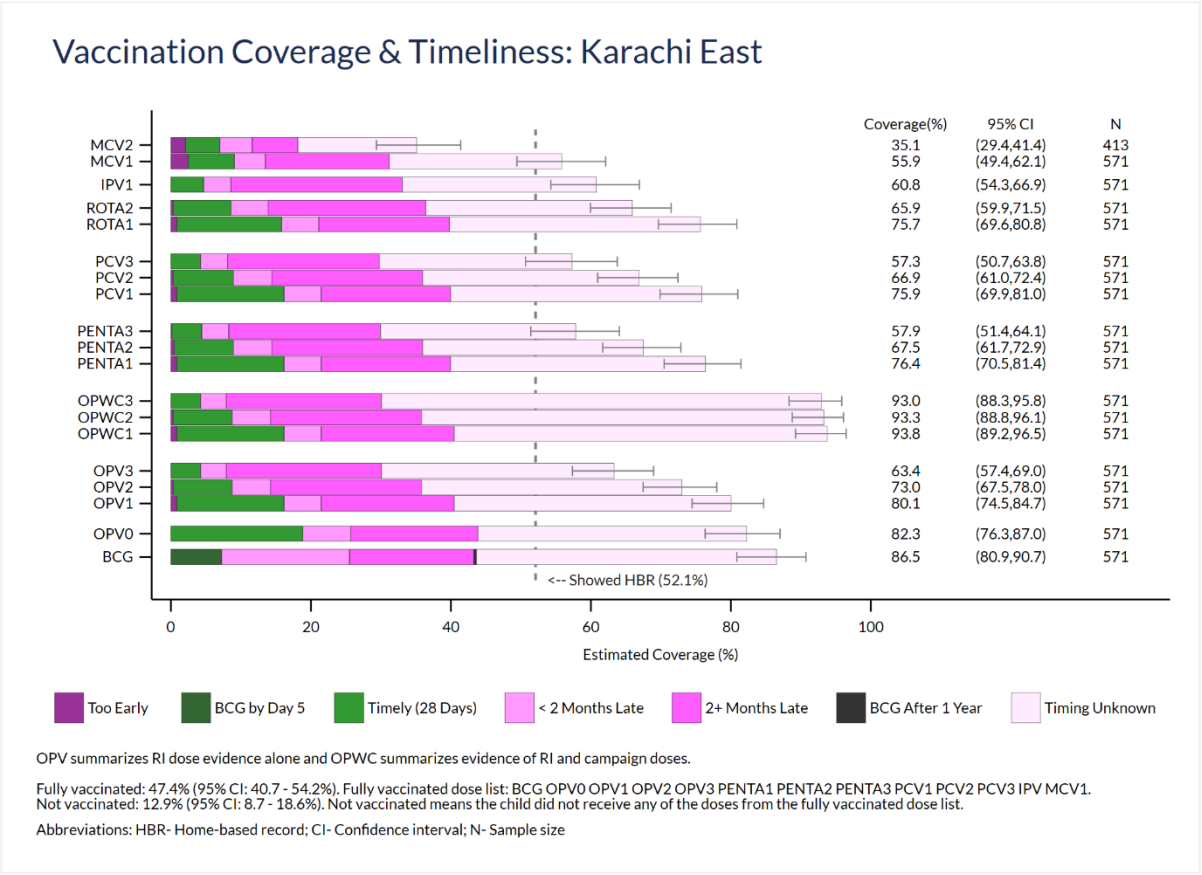
Fully vaccinated: 66.4% (95% CI: 62.1 - 70.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 4.8% (95% CI: 3.0 - 7.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 15. 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 21. Vaccination coverage among children aged 12-23 months, Karachi East District, SHRUCs Round 1



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

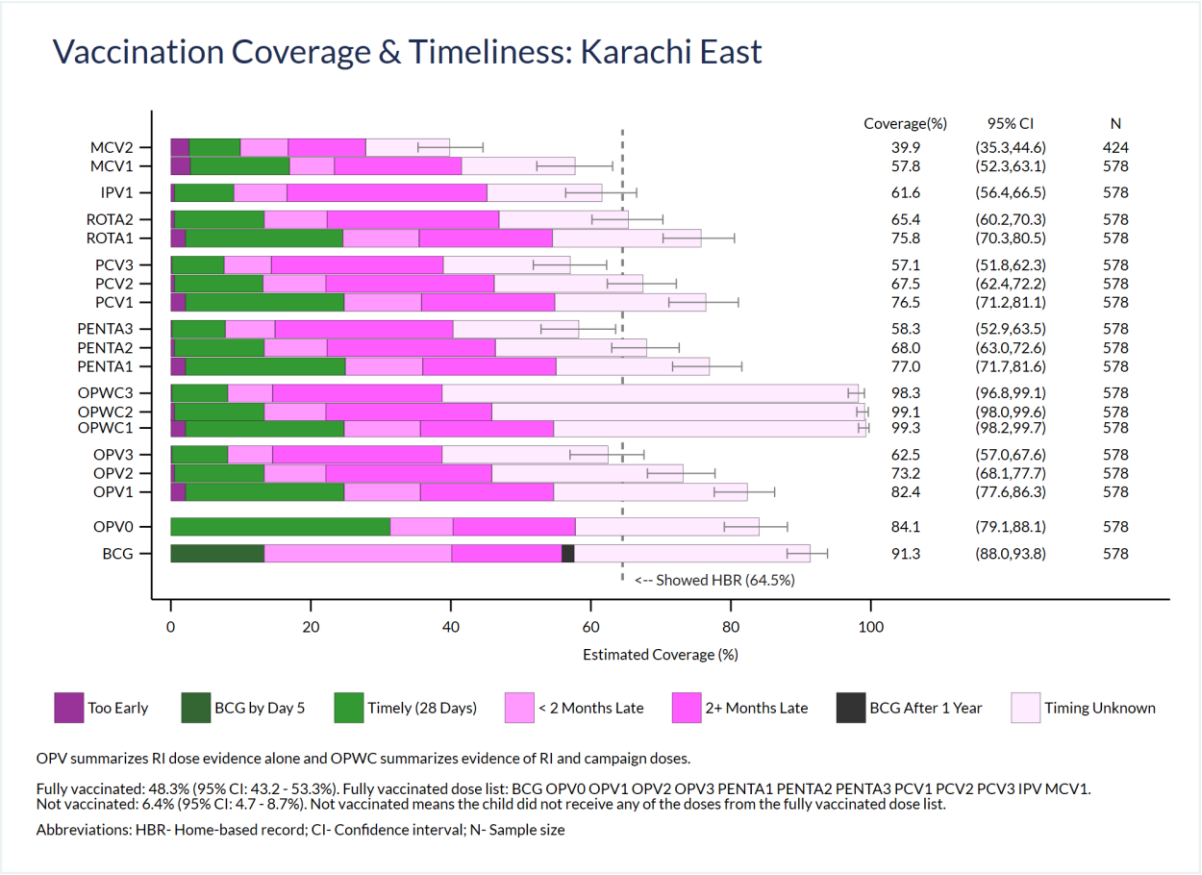
Fully vaccinated: 47.4% (95% CI: 40.7 - 54.2%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 12.9% (95% CI: 8.7 - 18.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 16. 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 22. Vaccination coverage among children aged 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 17. 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

The Karachi East figures (**Figure 3**, **Figure 4**, **Figure 19**, **Figure 20**, **Figure 21**, and **Figure 22**) indicate:

- Round 1 card availability in the SHRUCs was substantially higher than in TPVICS (71.5% vs. 53.1%) and Round 2 saw an increase in availability in the SHRUCs but not in TPVICS.
- Round 1 coverage in the SHRUCs was higher for every dose than coverage estimated across the district in TPVICS.
- Coverage changed very little from Round 1 to 2 in TPVICS, with small (3-4%) statistically significant declines in zero dose, OPV1, and BCG. The SHRUCs coverage improved significantly for OPVWC1-3, for card availability (increased 12.4%), and for zero-dose (dropped 6.5%).
- In the TPVICS Round 1, coverage in the OPV, PENTA, PCV & ROTA series were nearly the same, but in SHRUCs, coverage for OPV1-3 were 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 four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All four 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 2+ months late than the earlier doses in the series.

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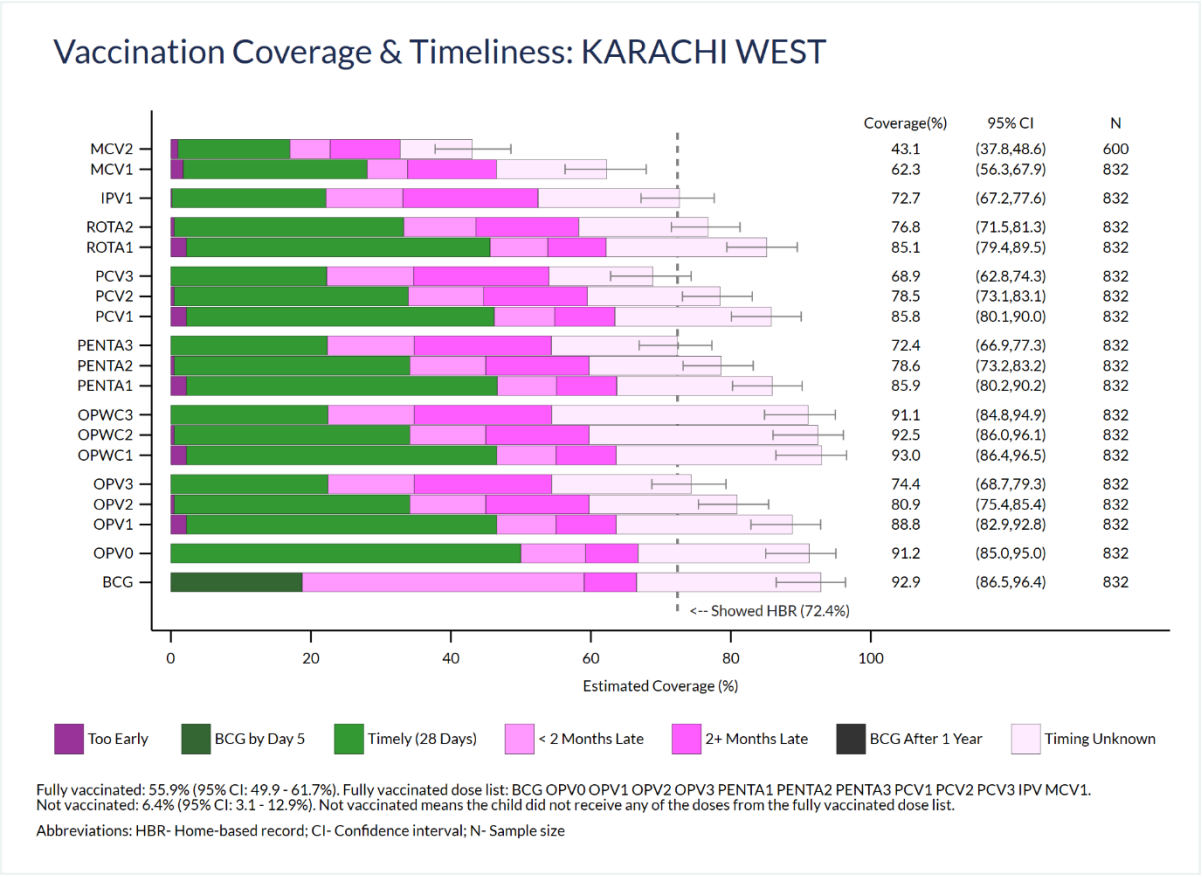
Figure 23. Vaccination coverage among children aged 12-23 months, Karachi West District, TPVICS Round 1



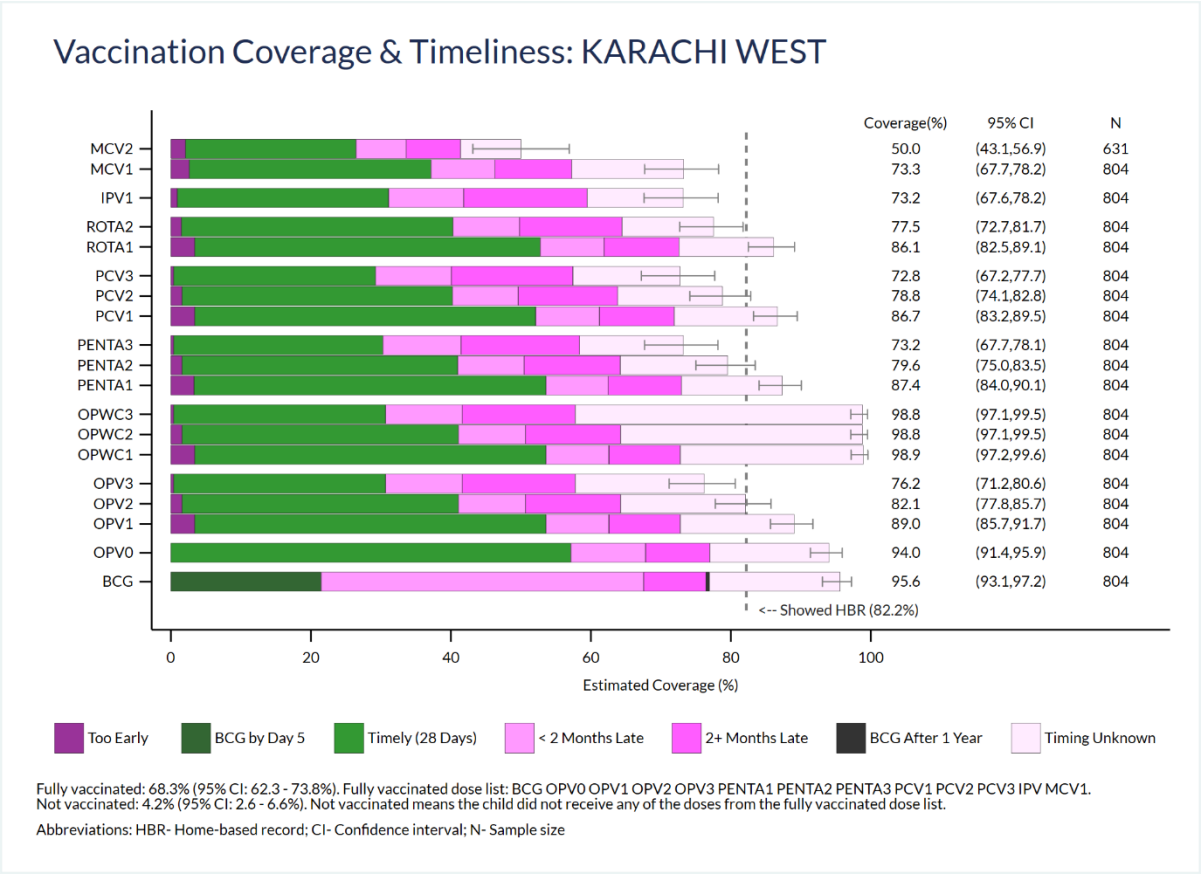
Fully vaccinated: 55.9% (95% CI: 49.9 - 61.7%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 6.4% (95% CI: 3.1 - 12.9%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 18. 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 24. Vaccination coverage among children aged 12-23 months, Karachi West District, TPVICS Round 2



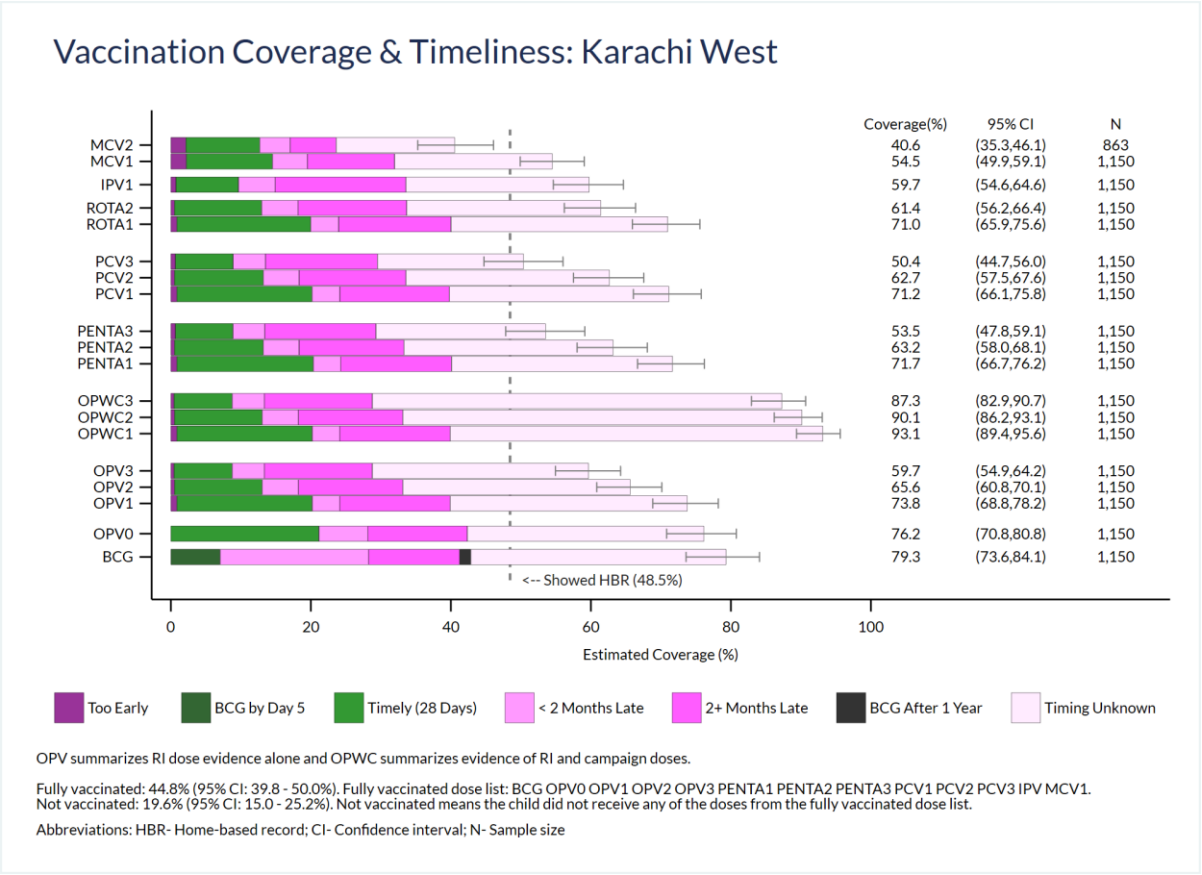
Fully vaccinated: 68.3% (95% CI: 62.3 - 73.8%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 4.2% (95% CI: 2.6 - 6.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 19. 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 25. Vaccination coverage among children aged 12-23 months, Karachi West District, SHRUCs Round 1



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

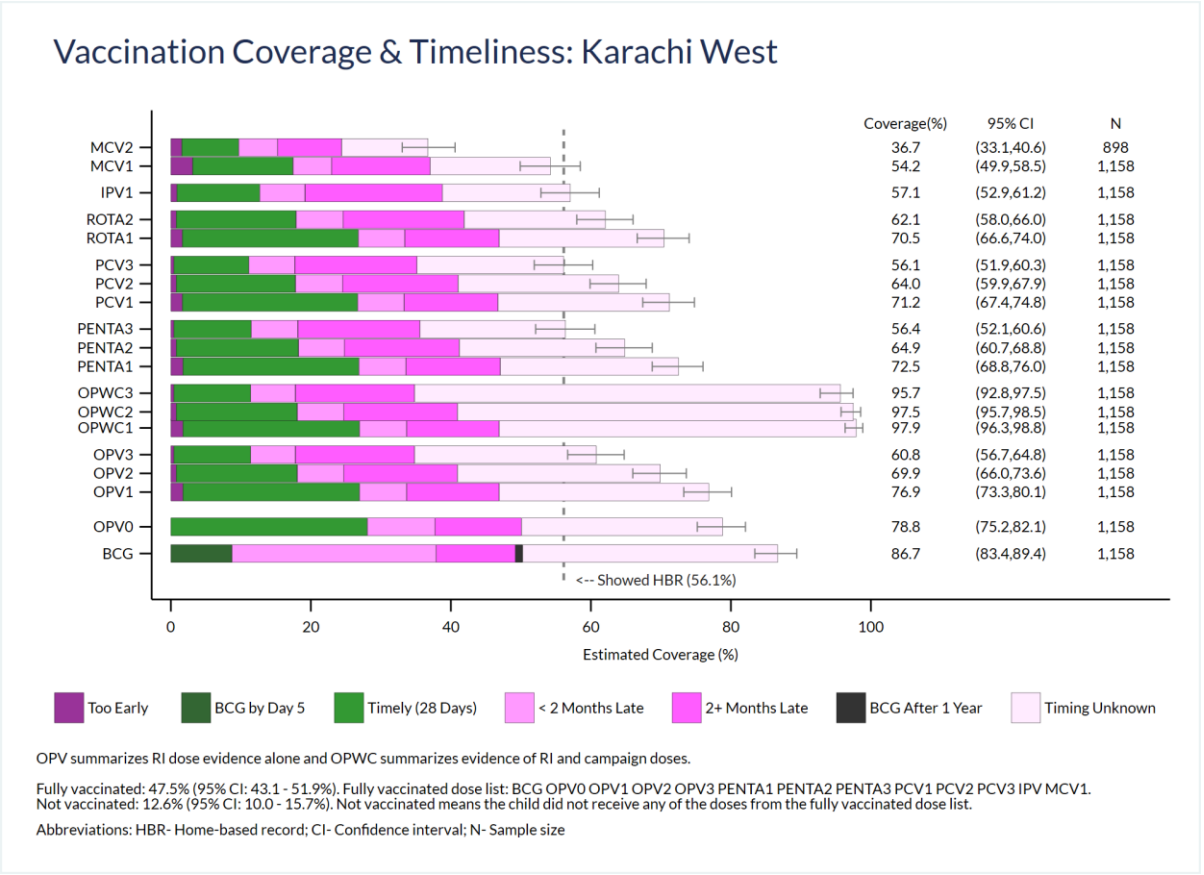
Fully vaccinated: 44.8% (95% CI: 39.8 - 50.0%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 19.6% (95% CI: 15.0 - 25.2%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 20. 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 26. Vaccination coverage among children aged 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 21. 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

The Karachi West figures (**Figure 5**, **Figure 6**, **Figure 23**, **Figure 24**, **Figure 25**, and **Figure 26**) indicate:

- Round 1 card availability in the SHRUCs was substantially higher than in TPVICS (71.5% vs. 53.1%). For Round 2, both surveys had significant increases: 9.8% in TPVICS and 7.7% in SHRUCs.
- Round 1 coverage in the SHRUCs was higher for every dose than coverage estimated across the district in TPVICS.
- All of the statistically significant Round 1 to Round 2 changes in TPVICS and SHRUCs were improvements. Both surveys showed 4 to 9% improvements in OPVWC1-3. In the SHRUCs survey there was also a 7.4% improvement in BCG coverage and a 7% improvement (reduction) in zero dose.
- In Round 1, the TPVICS survey coverage for the OPV, PENTA, PCV & ROTA series were nearly the same, but in SHRUCs, coverage for OPV1-3 were somewhat higher than for PENTA1-3 and PCV1-3 and ROTA1-2.
- 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 large portion of which timeliness is known being more than 28 days late. The later doses in the series have many more children receiving the doses 2+ months late than the earlier doses in the series.

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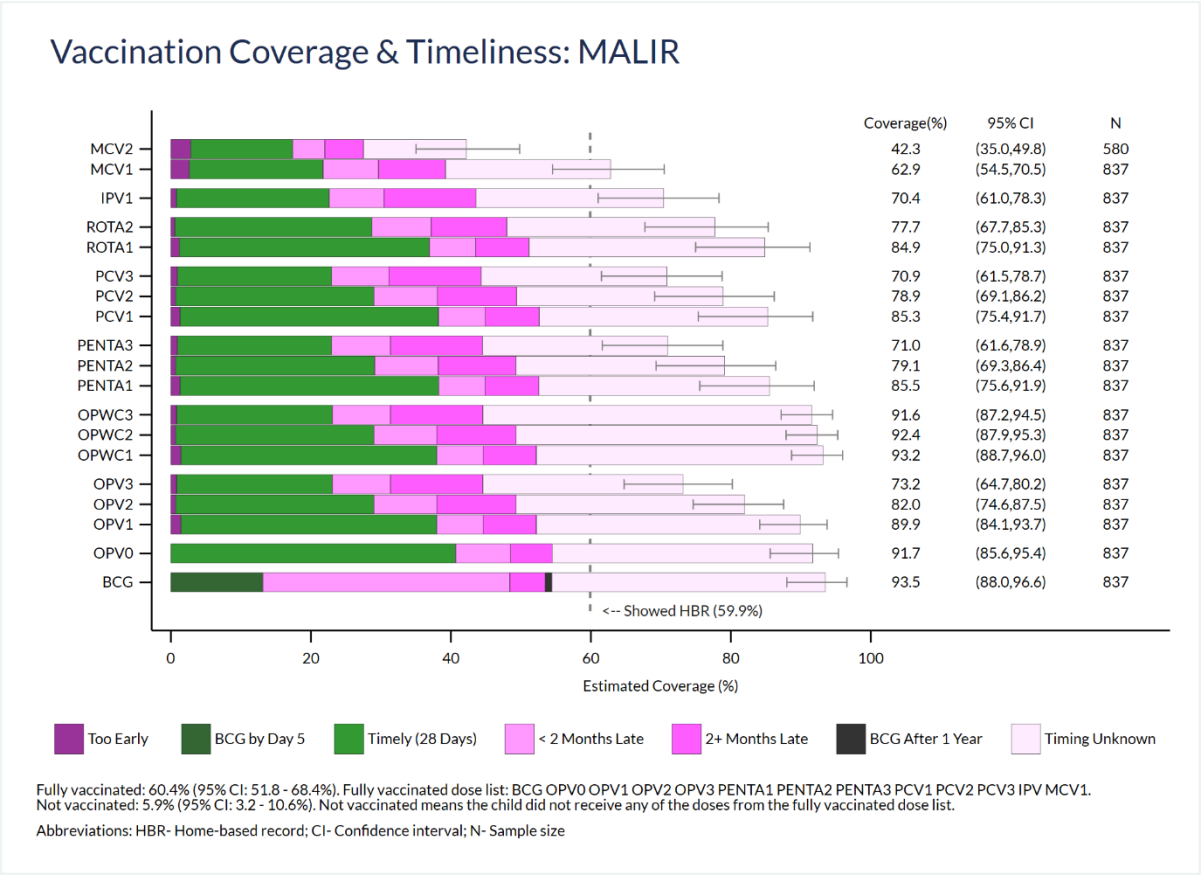
Figure 27. Vaccination coverage among children aged 12-23 months, Malir District, TPVICS Round 1



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 22. 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 28. Vaccination coverage among children aged 12-23 months, Malir District, TPVICS Round 2

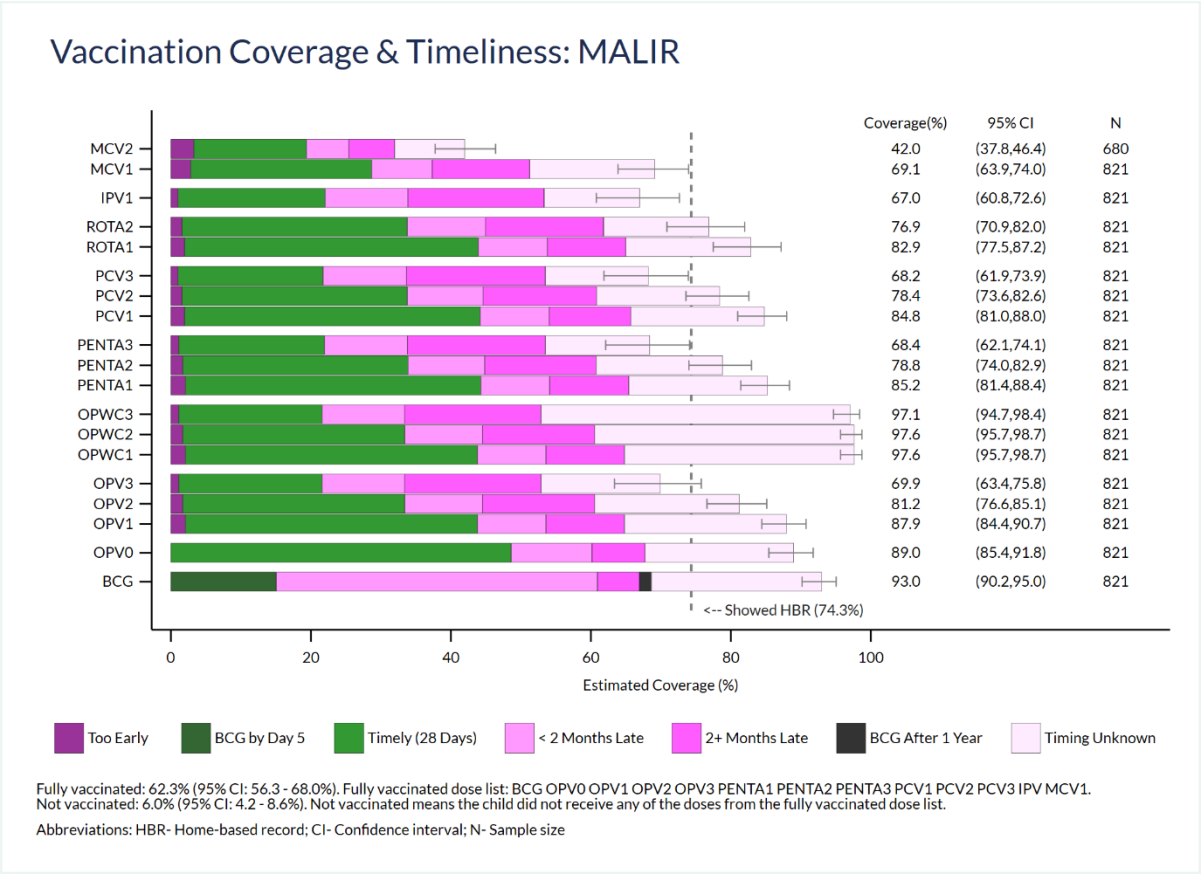
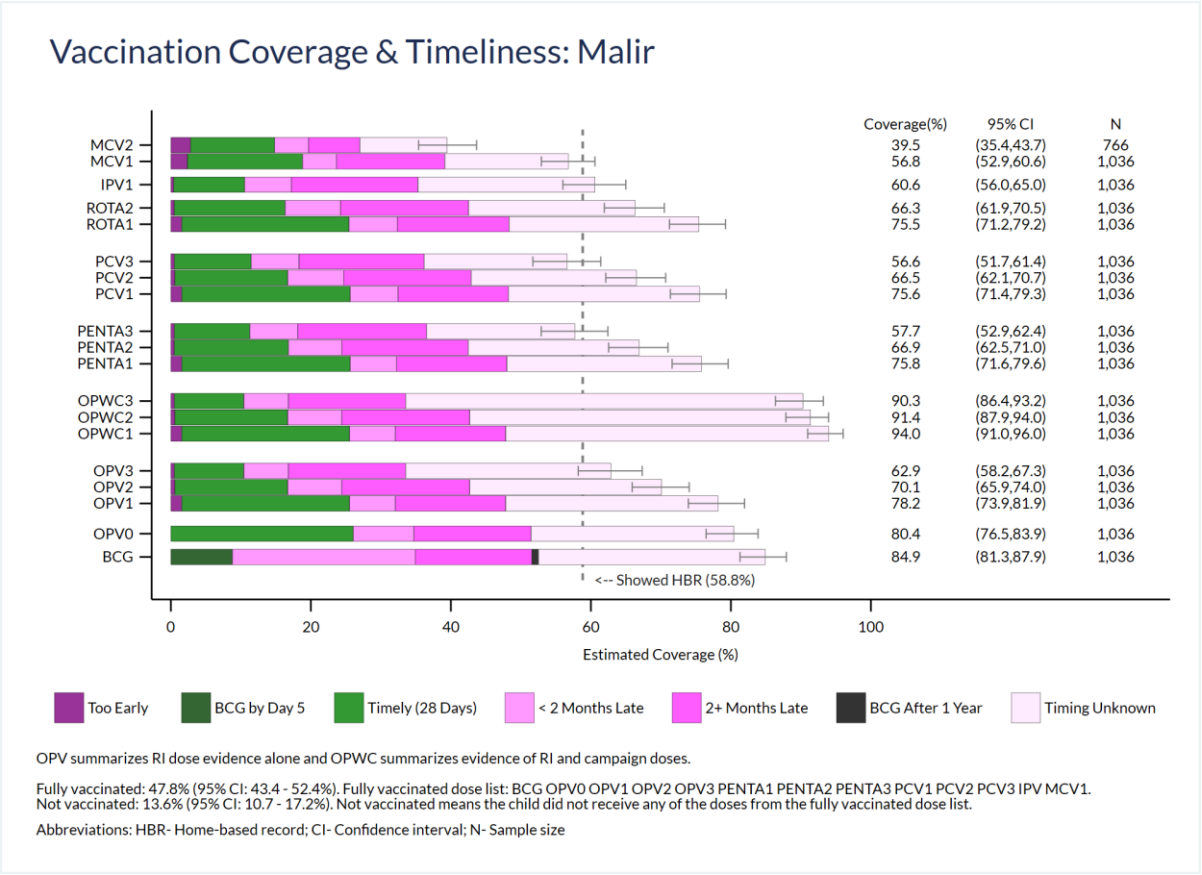


Table 23. Vaccination coverage bar segment lengths (%), Malir District, TPVICS Round 2

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 29. Vaccination coverage among children aged 12-23 months, Malir District, SHRUCs Round 1



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

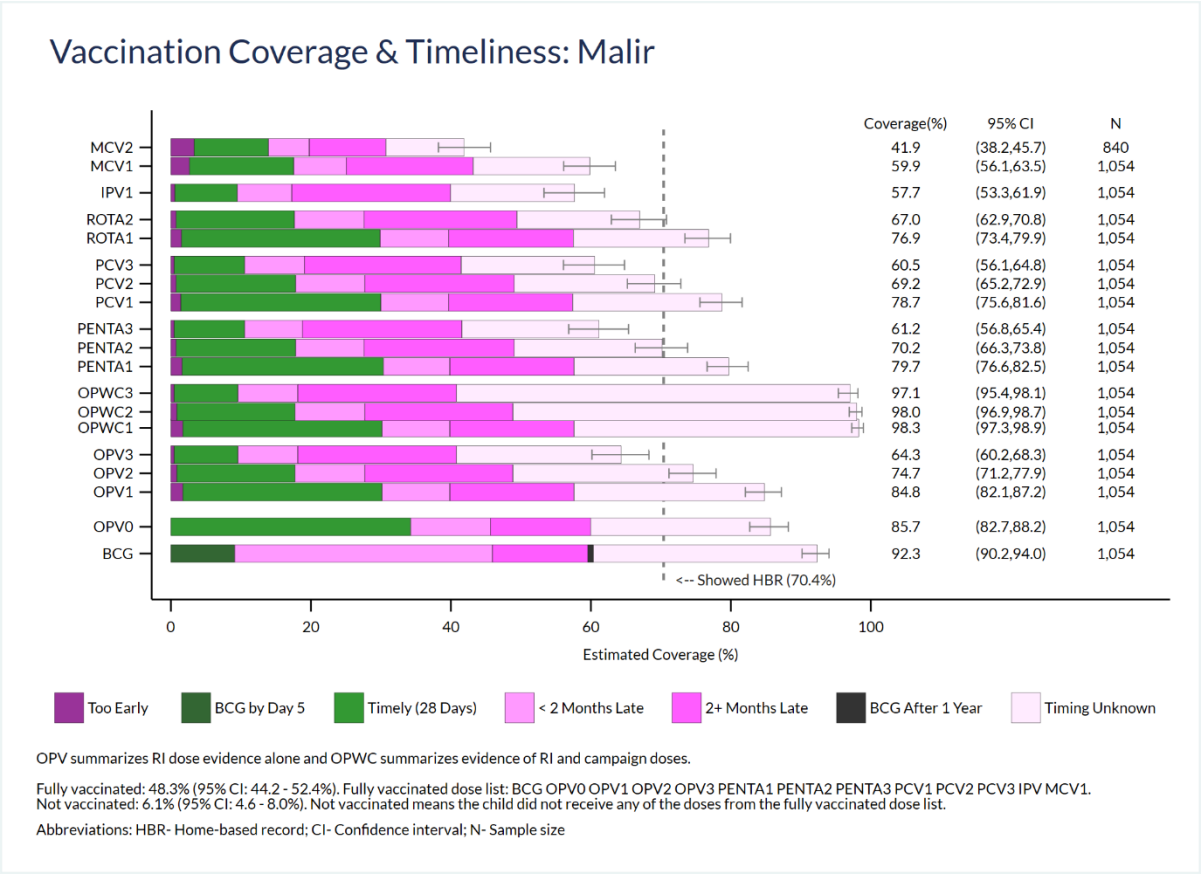
Fully vaccinated: 47.8% (95% CI: 43.4 - 52.4%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 13.6% (95% CI: 10.7 - 17.2%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 24. 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 30. Vaccination coverage among children aged 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 25. 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

The Malir figures (**Figure 7**, **Figure 8**, **Figure 27**, **Figure 28**, **Figure 29**, and **Figure 30**) indicate:

- In Round 1, card availability in the SHRUCs was substantially higher than in TPVICS (71.5% vs. 53.1%). Both surveys had statistically significant double-digit increases from Round 1 to 2: TPVICS card availability went up by 14.4% and SHRUCs went up by 11.6%.
- In Round 1, coverage in the SHRUCs was higher for every dose than coverage estimated across the district in TPVICS.
- All of the statistically significant changes from Round 1 to 2 were improvements. In TPVICS there were 4-6% improvements in OPVWC1-3. In the SHRUCs survey there were 4-8% improvements in BCG, OPV0, OPVWC1-3, OPV1 and zero dose.
- In the Round 1 TPVICS survey, coverage in the OPV, PENTA, PCV & ROTA series were nearly the same, but in SHRUCs, coverage for OPV1-3 were somewhat higher than for PENTA1-3 and PCV1-3 and ROTA1-2.
- All four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All four surveys show poor timeliness with more than half of the doses for which timeliness is known being more than 28 days late. The later doses in the series have many more children receiving the doses 2+ months late than the earlier doses in the series.

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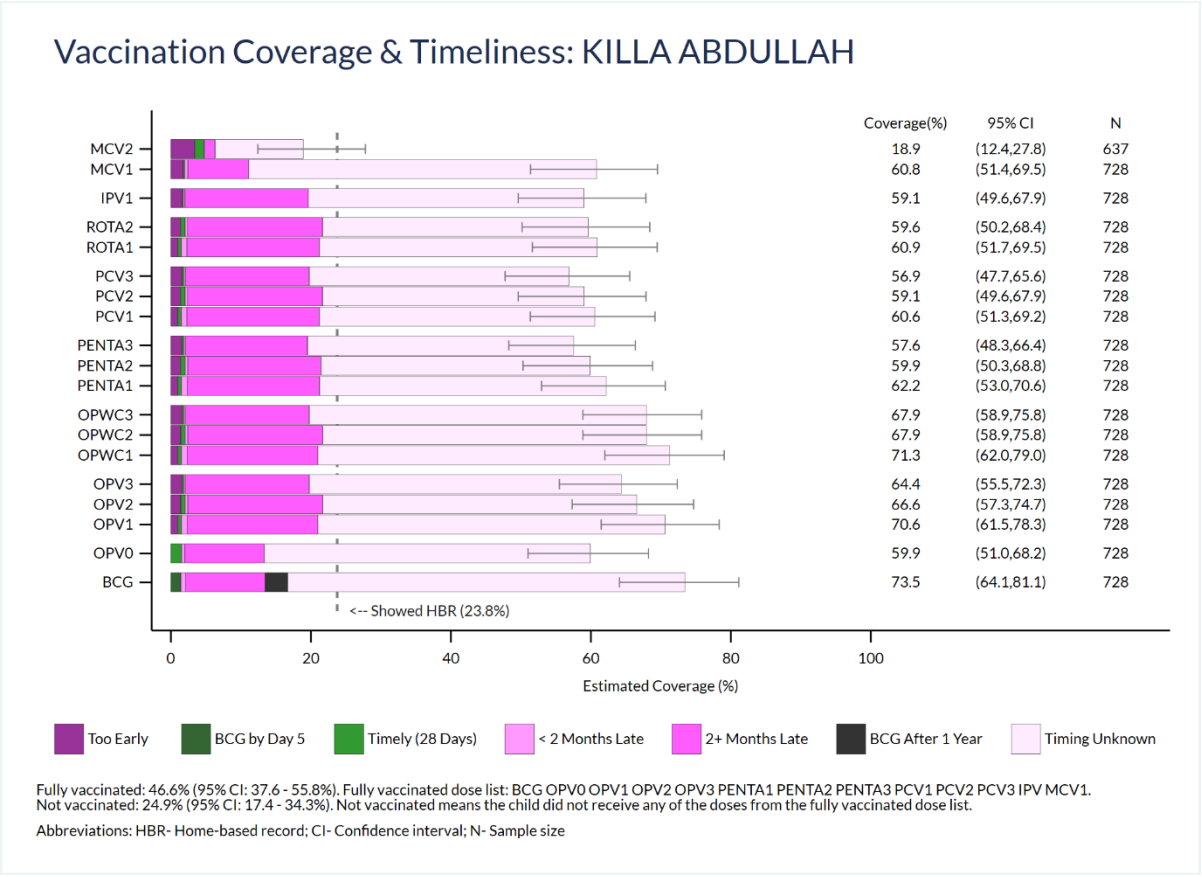
Figure 31. Vaccination coverage among children aged 12-23 months, Killa Abdullah District, TPVICS Round 1



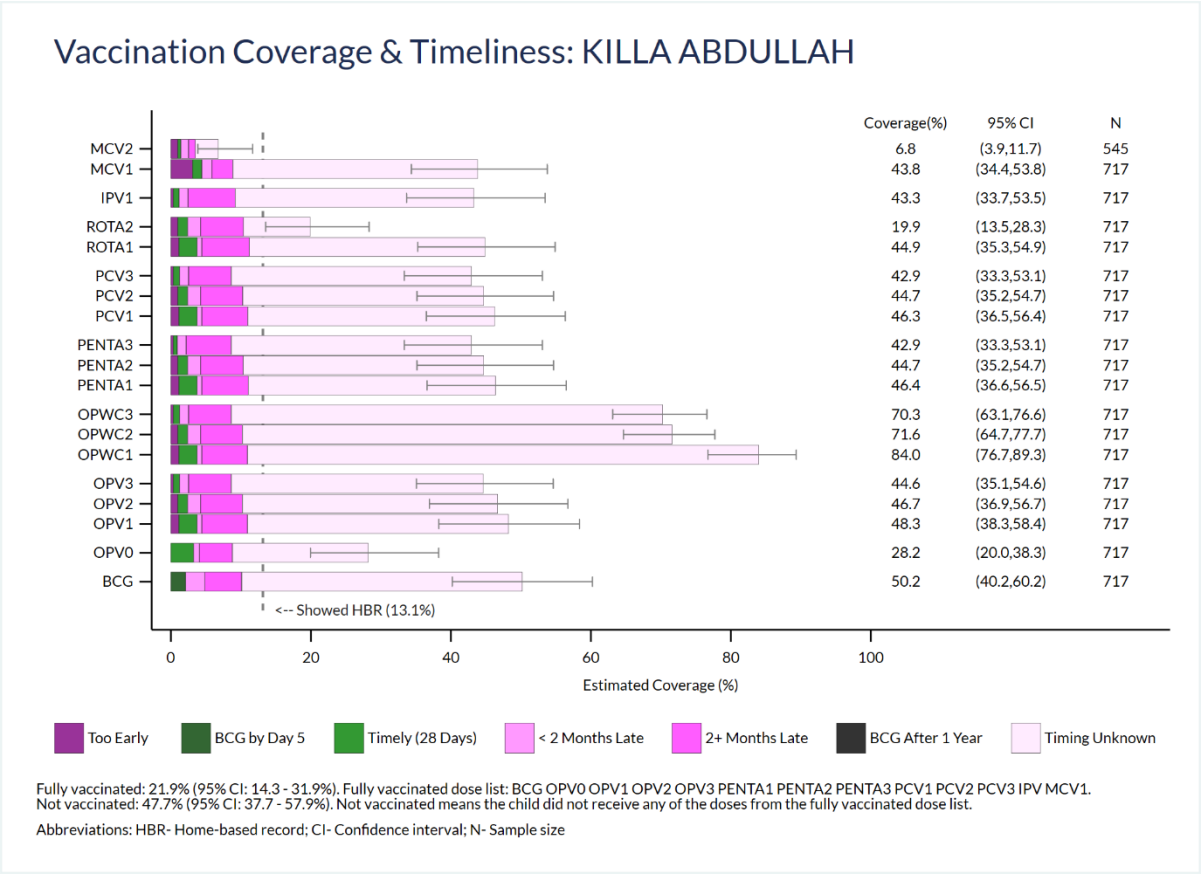
Fully vaccinated: 46.6% (95% CI: 37.6 - 55.8%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 24.9% (95% CI: 17.4 - 34.3%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 26. 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 32. Vaccination coverage among children aged 12-23 months, Killa Abdullah District, TPVICS Round 2



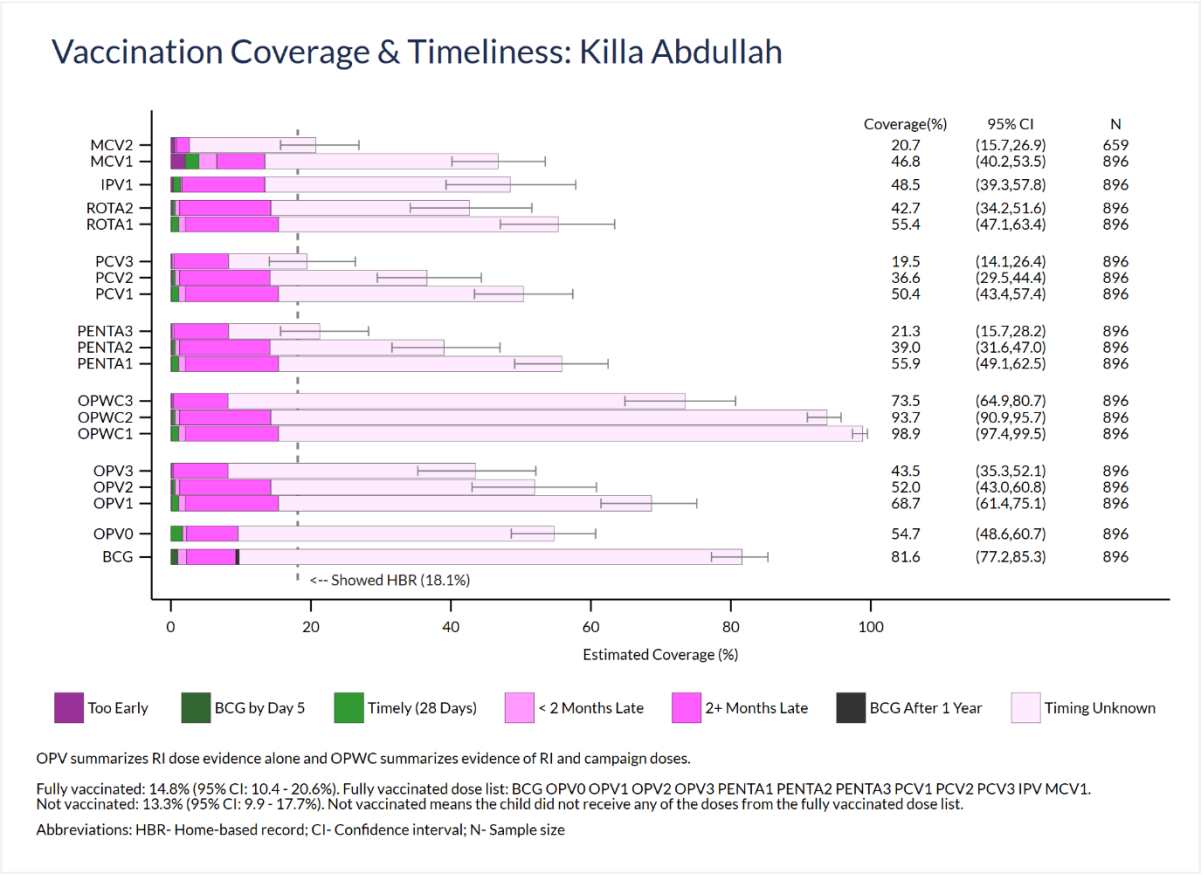
Fully vaccinated: 21.9% (95% CI: 14.3 - 31.9%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 47.7% (95% CI: 37.7 - 57.9%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 27. 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 33. Vaccination coverage among children aged 12-23 months, Killa Abdullah District, SHRUCs Round 1



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

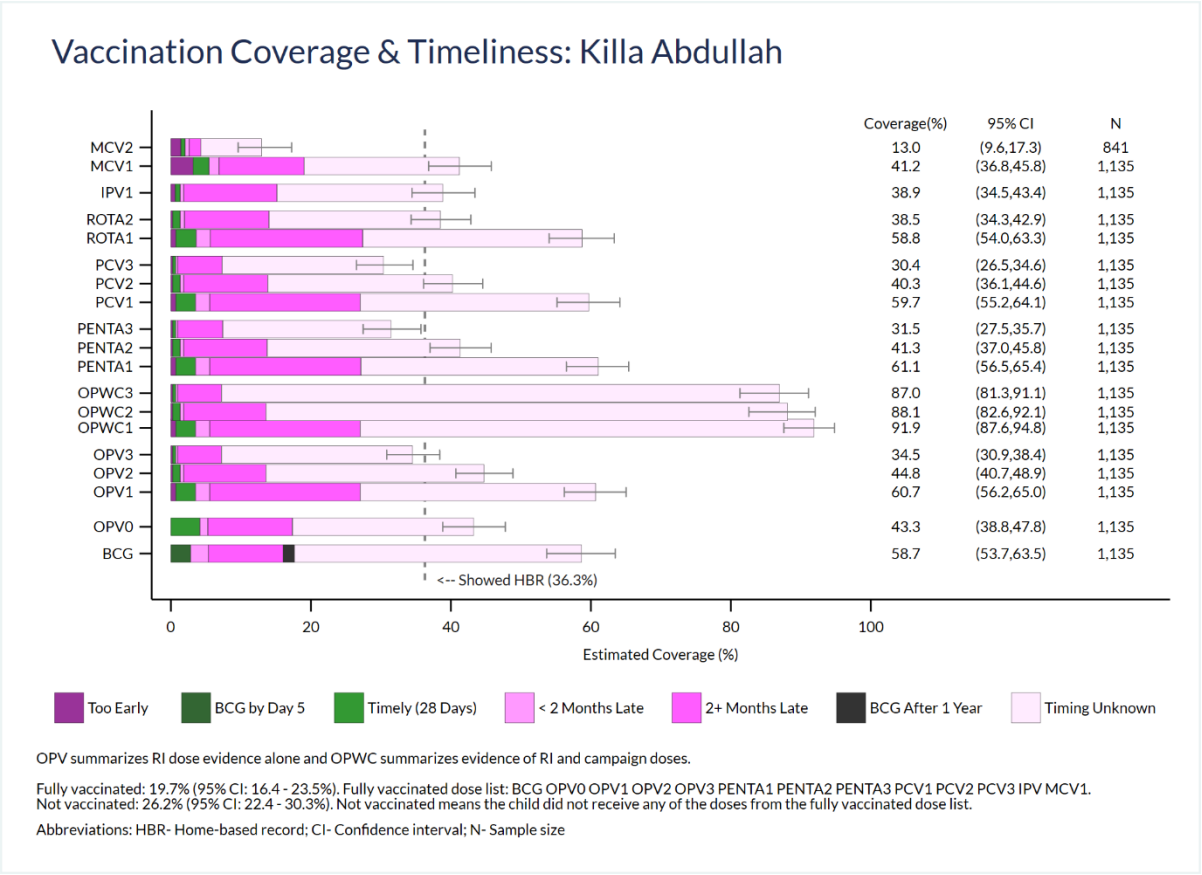
Fully vaccinated: 14.8% (95% CI: 10.4 - 20.6%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 13.3% (95% CI: 9.9 - 17.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 28. 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 34. Vaccination coverage among children aged 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 29. 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

The Killa Abdullah figures (**Figure 9**, **Figure 10**, **Figure 31**, **Figure 32**, **Figure 33**, and **Figure 34**) indicate:

- 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 we have described above. Round 1 TPVICS availability was 23.8% and SHRUCs was 18.1%. Round 2 TPVICS coverage dropped by a statistically significant degree to 13.1%. Round 2 SHRUCs availability doubled by a statistically significant amount to 36.3%.
- Round 1 coverage in the SHRUCs was higher for every dose than coverage estimated across the district in TPVICS.
- The TPVICS survey showed statistically significantly poorer Round 2 coverage than Round 1 for all dose series except OPVWC. The drops in coverage were between 12% (MCV2) and 40% (ROTA2).
- SHRUCs changes from Round 1 to 2 were a mix of improvements and declines. BCG and OPV coverage dropped by 22.9 and 11.5% respectively. OPVWC1 and 2 dropped while OPVWC3 increased by 13.4% Penta3 and PCV3 increased by 10-11%.
- Both TPVICS and SHRUCs found more zero dose children in Round 2 than 1: TPVICS had a 23% increase in estimated prevalence of zero dose and SHRUCs had 12.9% increase.
- All four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All four surveys show poor timeliness with most doses for which timeliness can be calculated given 2+ months late. Both surveys showed small Round 1 to 2 improvements in the % of doses given in a timely manner.

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Figure 35. Vaccination coverage among children aged 12-23 months, Pishin District, TPVICS Round 1

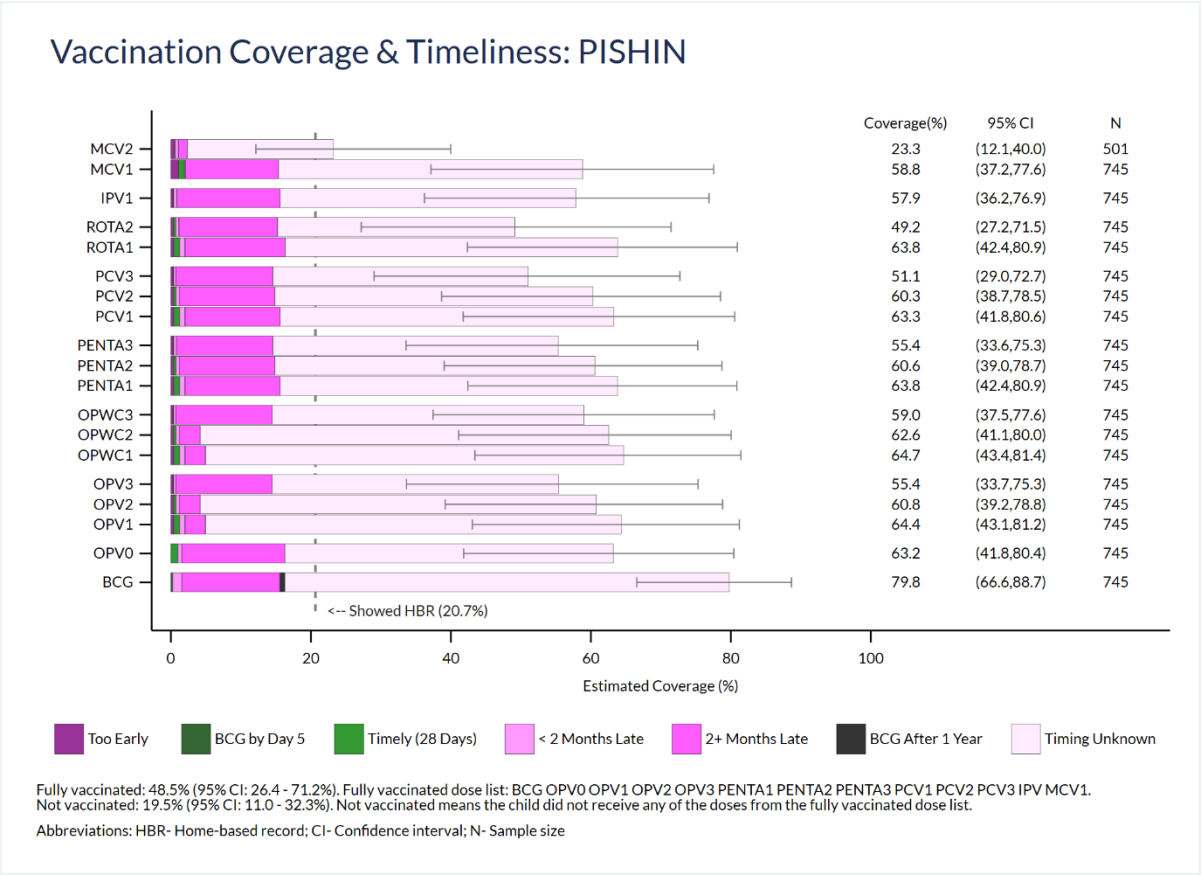
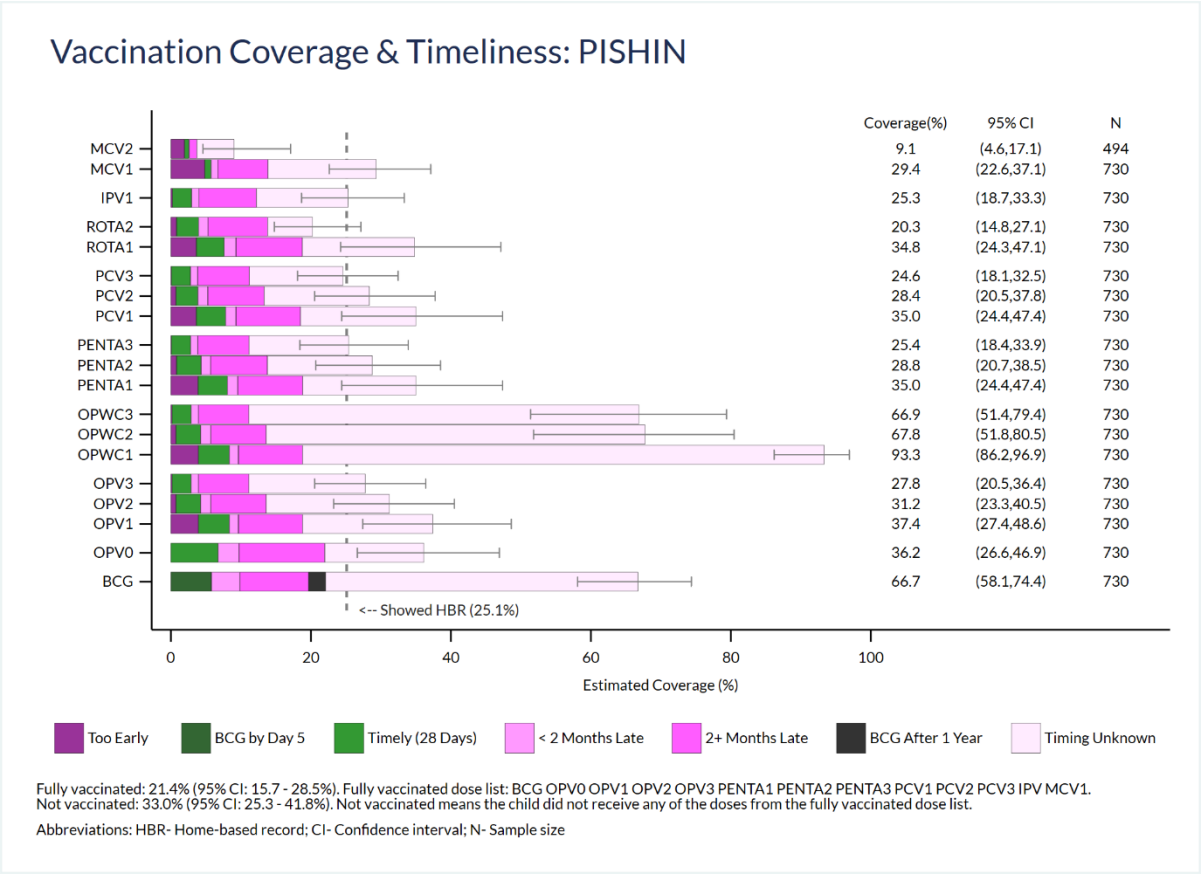


Table 30. Vaccination coverage bar segment lengths (%), Pishin District, TPVICS Round 1

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 36. Vaccination coverage among children aged 12-23 months, Pishin District, TPVICS Round 2



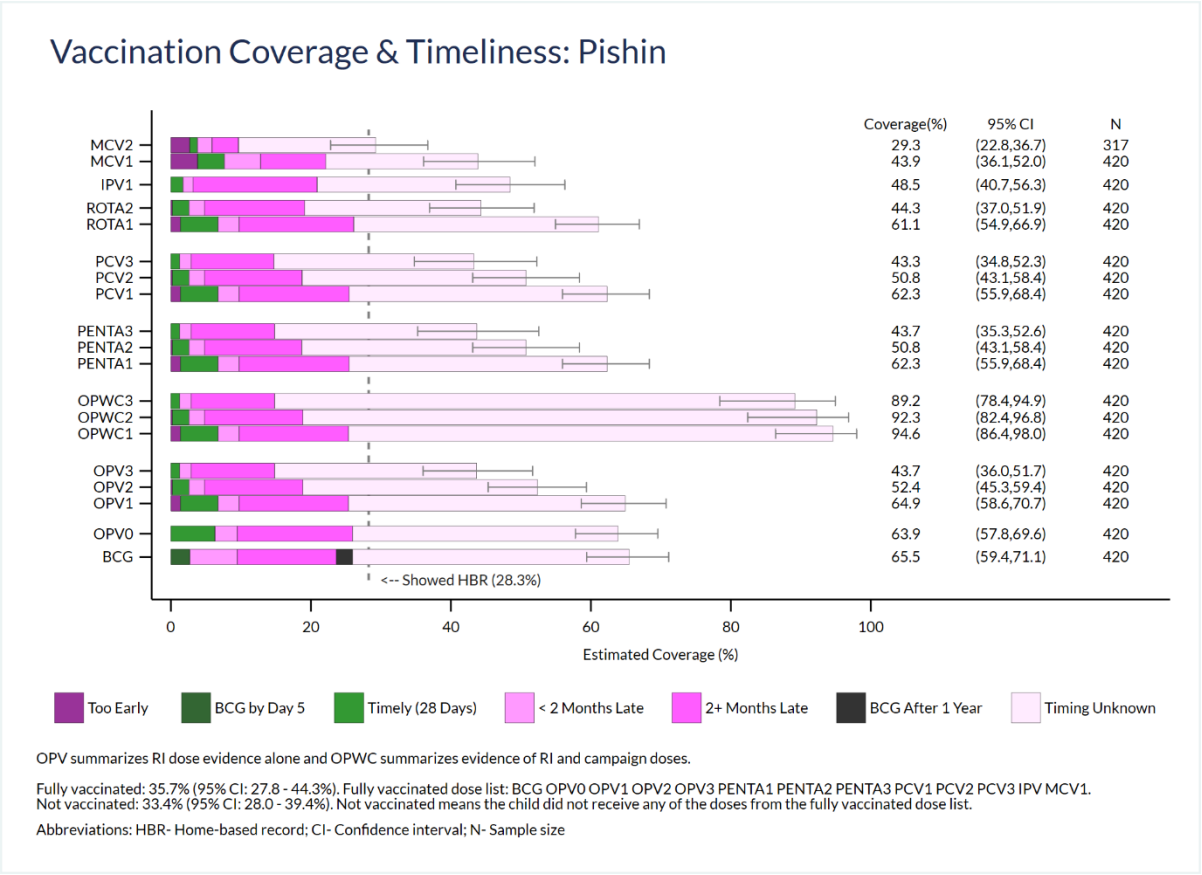
Fully vaccinated: 21.4% (95% CI: 15.7 - 28.5%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 33.0% (95% CI: 25.3 - 41.8%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 31. 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 37. Vaccination coverage among children aged 12-23 months, Pishin District, SHRUCs Round 1



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

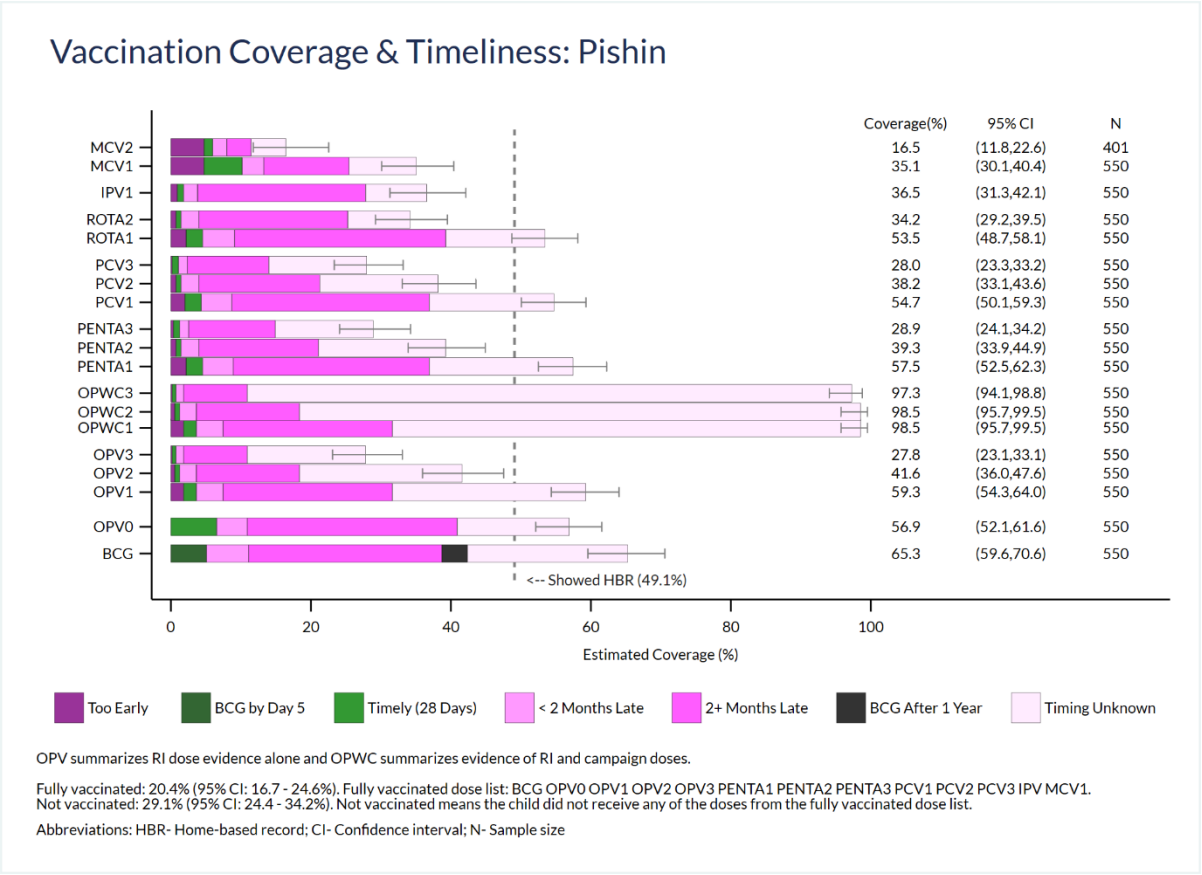
Fully vaccinated: 35.7% (95% CI: 27.8 - 44.3%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 33.4% (95% CI: 28.0 - 39.4%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 32. 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 38. Vaccination coverage among children aged 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 33. 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

The Pishin figures (**Figure 11**, **Figure 12**, **Figure 35**, **Figure 36**, **Figure 37**, and **Figure 38**) indicate:

- 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%
- Round 2 coverage in TPVICS was substantially lower than Round 1, with most doses dropping by 26-33% and the proportion fully vaccinated dropped by 27.1%. Idiosyncratically, OPVWC1 increased by 28.6% while OPVWC2 and 3 did not change by a significant degree.
- Round 2 coverage in SHRUCs surveys also dropped by 10-15% for most doses due at 10- and 14 weeks and the proportion fully vaccinated dropping by an estimated 15.5%.
- All four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All four surveys show for most doses, most of the children for whom timeliness is known being more than 56 days late.

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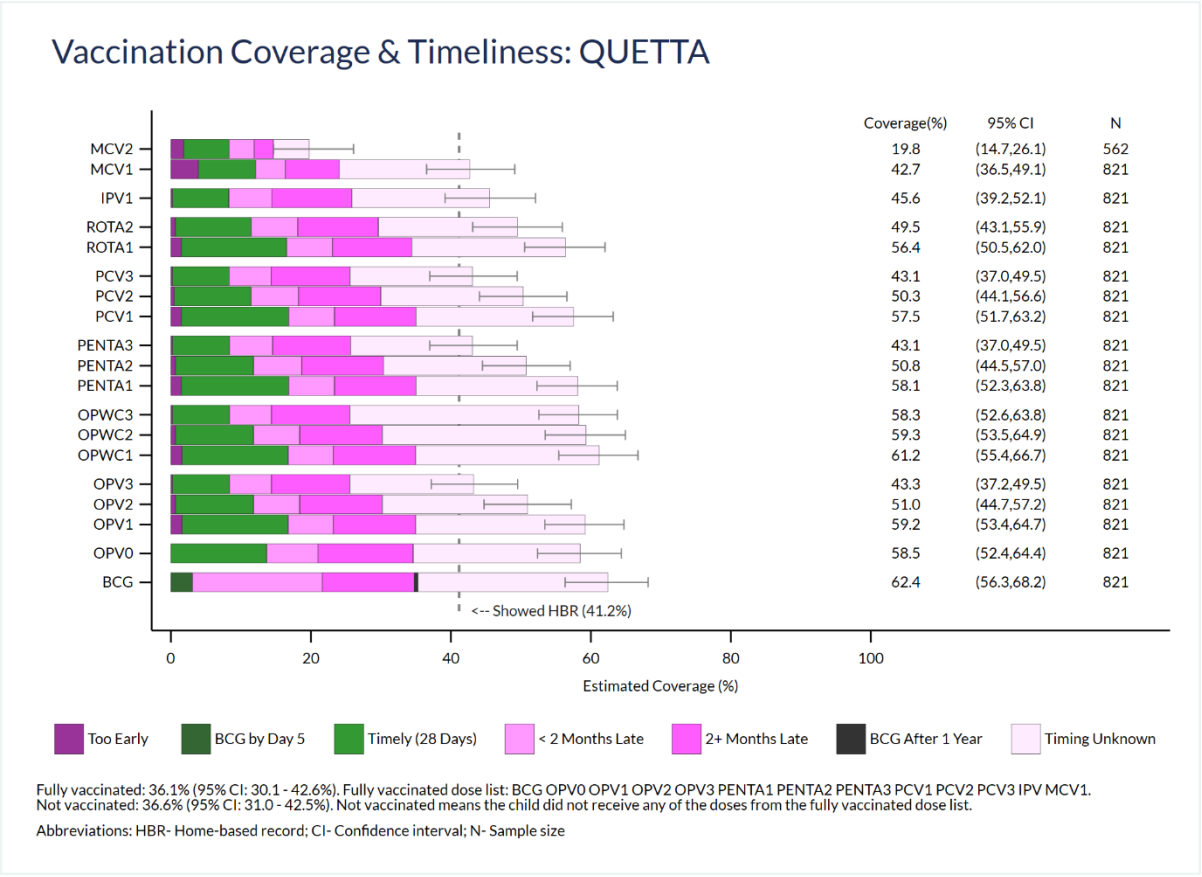
Figure 39. Vaccination coverage among children aged 12-23 months, Quetta District, TPVICS Round 1



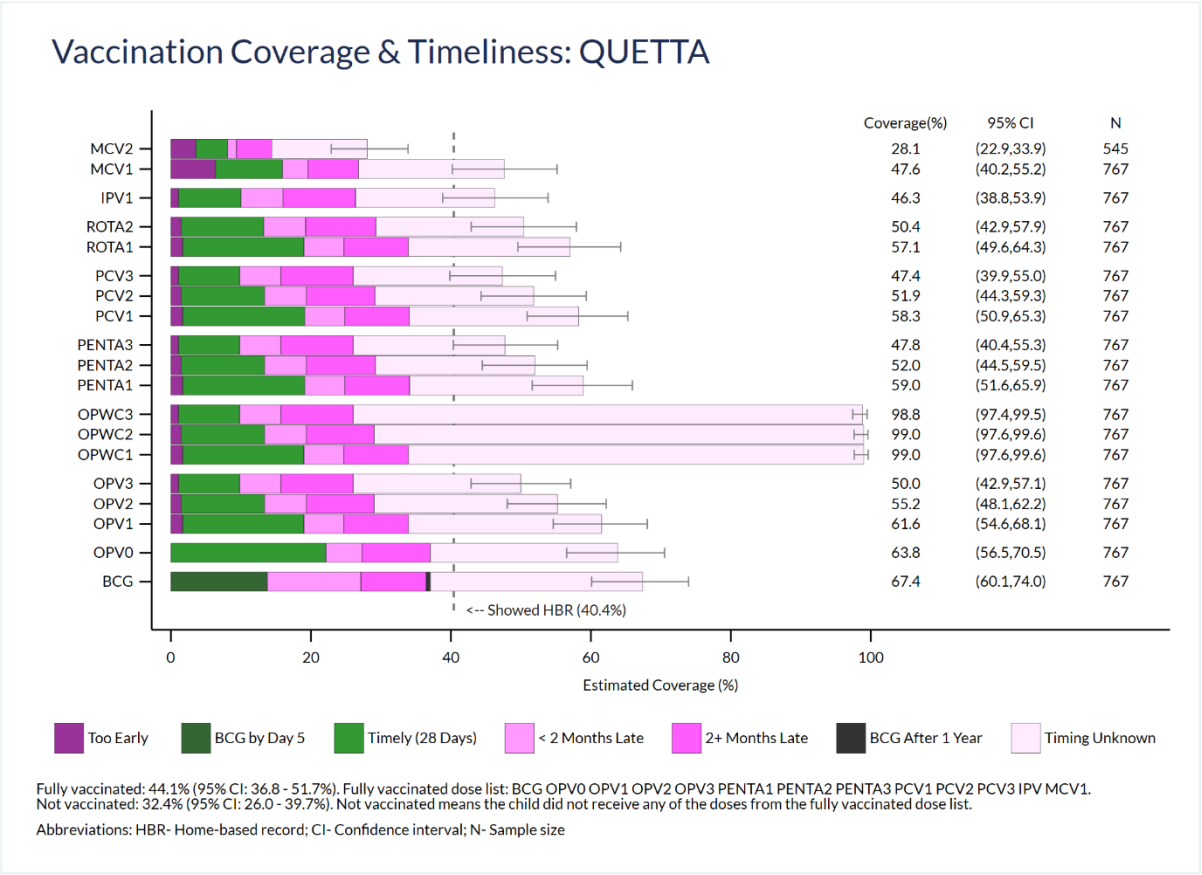
Fully vaccinated: 36.1% (95% CI: 30.1 - 42.6%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 36.6% (95% CI: 31.0 - 42.5%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 34. 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 40. Vaccination coverage among children aged 12-23 months, Quetta District, TPVICS Round 2



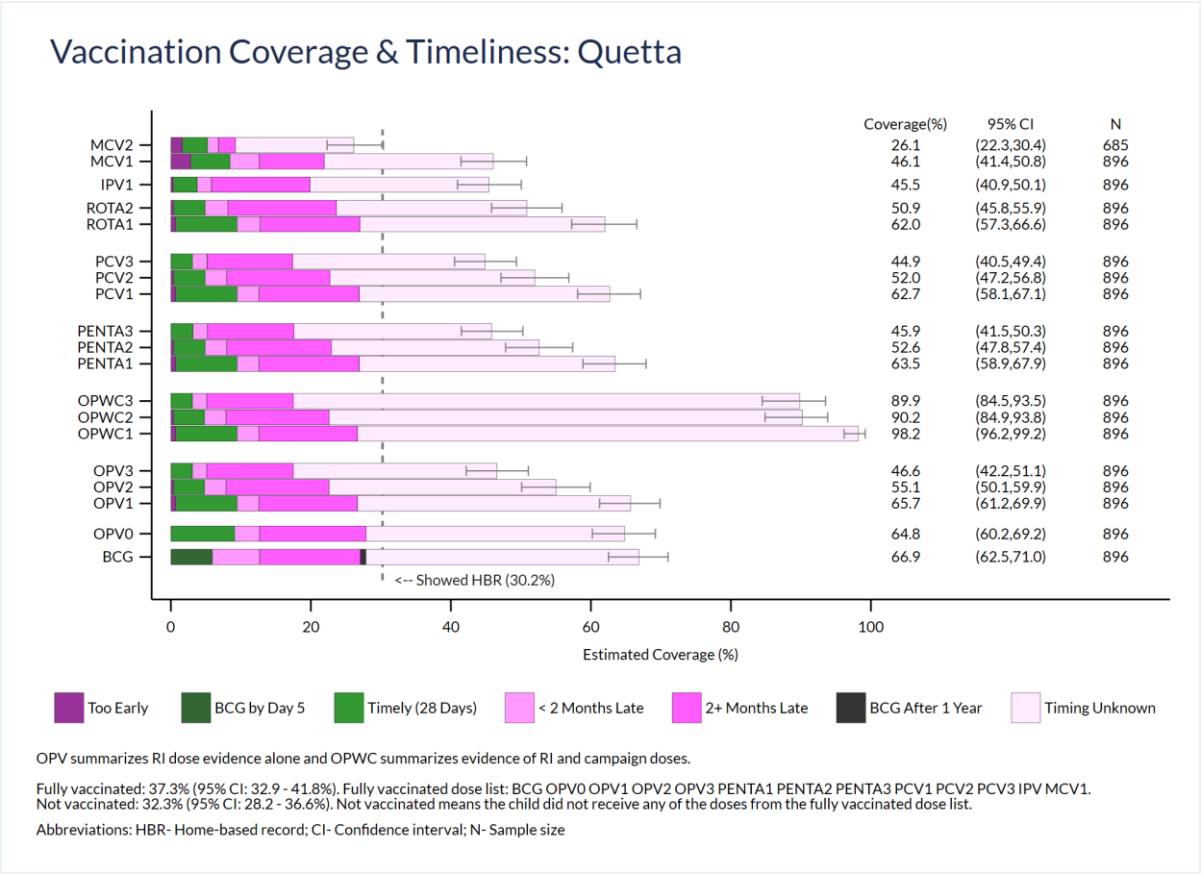
Fully vaccinated: 44.1% (95% CI: 36.8 - 51.7%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 32.4% (95% CI: 26.0 - 39.7%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 35. 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 41. Vaccination coverage among children aged 12-23 months, Quetta District, SHRUCs Round 1



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

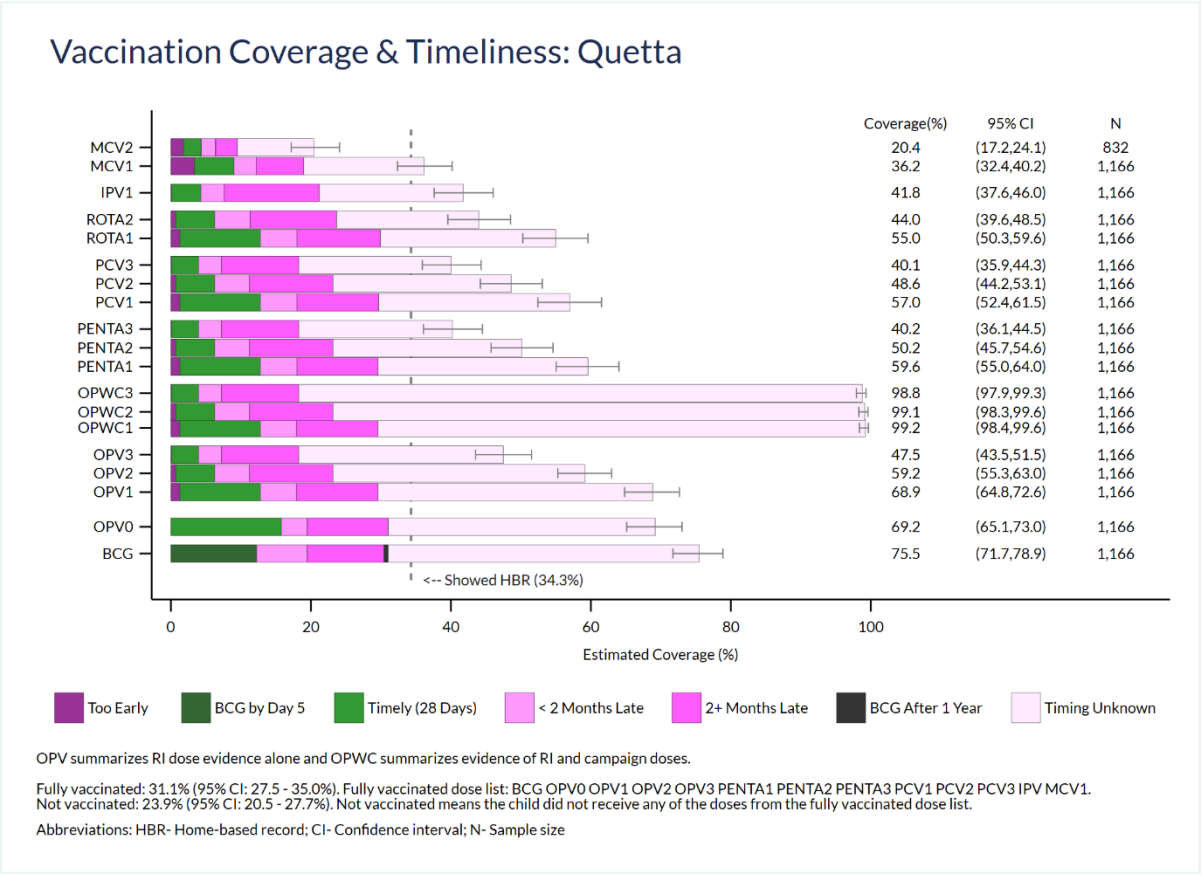
Fully vaccinated: 37.3% (95% CI: 32.9 - 41.8%). Fully vaccinated dose list: BCG OPV0 OPV1 OPV2 OPV3 PENTA1 PENTA2 PENTA3 PCV1 PCV2 PCV3 IPV MCV1.
Not vaccinated: 32.3% (95% CI: 28.2 - 36.6%). Not vaccinated means the child did not receive any of the doses from the fully vaccinated dose list.

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

Table 36. 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 42. Vaccination coverage among children aged 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 37. 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

The Quetta figures (**Figure 13**, **Figure 14**, **Figure 39**, **Figure 40**, **Figure 41**, and **Figure 42**) indicate:

- Card availability for all four surveys fell between 30 and 41%. Neither survey showed Round 2 availability that differed from Round 1 by a statistically significant amount.
- The Quetta district did not see the large declines in coverage that were evident in Killa Abdullah and Pishin. TPVICS coverage improved by about 40% for OPVWC1-3 and by 8.3% for MCV2. The SHRUCs coverage showed a mix of statistically significant improvements and declines. Rota 1 and 2 coverage declined by about 7% while BCG and OPVWC 2 and 3 increased by about 9%. The SHRUCS % who were zero dose declined by about 8%.
- All four surveys show some drop-out from dose 1 to dose 2 and then dose 3 in the series.
- All four surveys show more than half of the doses for which timeliness is known being more than 28 days late and many received doses more than 2+ months late.

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3.5 Drop-out between vaccination visits

Drop-out between vaccination visits is a constant feature of routine vaccination, and the survey team observed the same pattern in the target districts as observed in **Table 38**. 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 38 indicates that drop-out was higher than 10% for most dose series in most districts as measured by both TPVICS and SHRUCs surveys. Drop-out was especially high in Killa Abdullah in the SHRUCs survey for most dose pairs. The estimates for MCV1 to MCV2 drop-out are notably high in Killa Abdullah.

Table 38. Drop-out rates between dose pairs in target districts, TPVICS and SHRUCs, Rounds 1 and 2

	PENTA1-PENTA3 Dropout (%)	OPV1-OPV3 Dropout (%)	OPWC1-OPWC3 Dropout (%)	PCV1-PCV3 Dropout (%)	ROTA1-ROTA2 Dropout (%)	MCV1-MCV2 Dropout (%)	BCG-MCV1 Dropout (%)	PENTA1-MCV1 Dropout (%)
KP - Peshawar - TPVICS R1	13.6	15.5	5.5	14.1	8.3	27.2	20.7	18.2
-TPVICS R2	14.7	16.1	0.6	16.3	9.6	35.4	20.7	15.9
- SHRUCs R1	9.6	15.6	9.0	10.1	8.0	28.2	10.3	8.5
- SHRUCs R2	8.2	12.3	5.7	8.5	3.8	26.7	16.4	10.4
Sindh - Karachi East - TPVICS R1	14.5	12.7	2.8	17.8	8.7	45.4	27.3	22.8
-TPVICS R2	19.9	17.1	0.1	20.3	13.0	40.2	27.5	22.5
- SHRUCs R1	24.7	21.1	0.9	24.8	12.8	41.1	36.1	29.3
- SHRUCs R2	24.3	24.2	1.0	25.3	13.7	32.9	38.3	27.4
Sindh - Karachi West - TPVICS R1	16.8	17.1	2.3	20.8	10.6	39.2	34.4	29.1
-TPVICS R2	18.8	16.7	0.1	18.8	11.4	37.6	26.6	19.1
- SHRUCs R1	22.6	17.6	6.6	26.8	12.8	30.8	29.4	22.7
- SHRUCs R2	22.3	20.9	2.3	21.2	11.9	33.5	37.6	27.1
Sindh - Malir - TPVICS R1	16.2	17.2	1.5	16.1	8.3	36.4	30.7	25.7
-TPVICS R2	19.5	20.3	0.5	19.3	7.7	39.1	26.8	20.5
- SHRUCs R1	23.7	19.6	3.8	24.8	12.0	32.8	34.2	27.4
- SHRUCs R2	23.3	24.2	1.3	23.1	12.8	31.4	36.6	29.2
Balochistan - Killa Abdullah - TPVICS R1	7.8	8.7	5.9	5.7	2.5	66.3	27.5	6.1
-TPVICS R2	10.2	9.1	21.2	9.7	60.9	85.2	19.3	6.7
- SHRUCs R1	65.5	36.3	23.2	65.4	25.4	58.3	48.5	35.8
- SHRUCs R2	48.5	43.1	5.4	49.1	34.5	69.2	45.0	38.0
Balochistan - Pishin - TPVICS R1	20.6	20.7	13.3	24.9	32.1	32.8	25.5	19.1
-TPVICS R2	29.7	29.8	15.8	30.8	43.9	67.6	50.2	23.8
- SHRUCs R1	32.0	34.3	6.3	32.8	27.9	41.6	35.3	31.3
- SHRUCs R2	50.2	53.8	1.4	49.3	35.9	60.0	49.9	40.0
Balochistan - Quetta - TPVICS R1	26.6	27.6	4.7	25.8	12.7	57.1	33.5	28.1
-TPVICS R2	18.7	18.9	0.3	18.4	11.1	44.0	28.9	20.7
- SHRUCs R1	28.7	30.2	9.9	29.5	20.0	45.9	30.8	25.9
- SHRUCs R2	32.5	31.0	0.4	29.8	20.0	48.5	52.7	40.4

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.

3.6. Dose intervals

The EPI schedule calls for doses in a series 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 TPVICS and SHRUCs data, all four vaccine series yield similar patterns, shown in **Table 39**, **Table 40**, **Table 41**, and **Table 42**. A small number of intervals were shorter than 28 days. Most intervals 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.

Across all four surveys, Pishin district consistently had the longest intra-dose intervals with the highest proportion of children experiencing intervals of 56+ days. In Karachi East 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 43 lists the median and 75th percentile for intra-dose intervals. 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. 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. 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 four times as long as they should, thus spending a very long portion of their young lives under-protected against these vaccine-preventable diseases.

Table 39. Penta dose interval categories among children aged 12-23 months, by district, TPVICS & SHRUCs

	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 = 2,621)	1.1	64.1	34.8
- SHRUCs R2 (N = 2,777)	2.1	65.6	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
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)	3.0	68.3	28.7
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)	4.0	72.5	23.5
- SHRUCs R2 (N = 929)	3.7	62.1	34.2
Balochistan - Killa Abdullah - TPVICS R1 (N = 260)	7.3	65.7	27.0
-TPVICS R2 (N = 106)	3.8	47.1	49.1
- SHRUCs R1 (N = 157)	1.3	53.5	45.2
- SHRUCs R2 (N = 210)	5.7	49.0	45.3
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 = 137)	4.4	43.8	51.8
- SHRUCs R2 (N = 177)	5.6	31.1	63.3
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)	2.0	65.9	32.1
- SHRUCs R2 (N = 471)	1.7	64.5	33.8

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 40. OPV dose interval categories among children aged 12-23 months, by district, TPVICS & SHRUCs

	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
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
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
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
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
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 = 138)	4.3	44.2	51.5
- SHRUCs R2 (N = 148)	5.4	31.8	62.8
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

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 41. PCV dose interval categories among children aged 12-23 months, by district, TPVICS & SHRUCs

	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
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
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
Sindh - Malir - TPVICS R1 (N = 769)	1.6	79.5	18.9
-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
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
Balochistan - Pishin - TPVICS R1 (N = 144)	2.8	55.5	41.7
-TPVICS R2 (N = 202)	5	41.0	54.0
- SHRUCs R1 (N = 136)	4.4	42.7	52.9
- SHRUCs R2 (N = 175)	5.1	32.6	62.3
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

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 42. Rota dose interval categories among children aged 12-23 months, by district, TPVICS & SHRUCs

	Too Short (%) < 28 days	Timely (%) 28-56 days	Too Long (%) > 56 days
KP - Peshawar - TPVICS R1 (N = 292)	1.0	62.0	37.0
-TPVICS R2 (N = 417)	2.2	70.0	27.8
- SHRUCs R1 (N = 1,361)	0.7	65.1	34.2
- SHRUCs R2 (N = 1,466)	1.9	66.9	31.2
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
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
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
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)	2.0	49.5	48.5
- SHRUCs R2 (N = 140)	3.6	47.8	48.6
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 = 80)	2.5	42.5	55.0
- SHRUCs R2 (N = 125)	4.8	30.4	64.8
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

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 43. Intra-dose interval median (50th percentile) and 75th percentiles, TPVICS and SHRUCs, Rounds 1 & 2

	Target Interval (Months)	Median (Months)				75th Percentile (Months)				Number of Intervals			
	All	Penta	OPV	PCV	Rota	Penta	OPV	PCV	Rota	Penta	OPV	PCV	Rota
Peshawar - TPVICS R1	1	1.6	1.6	1.6	1.6	2.6	2.6	2.6	2.6	550	546	550	292
- TPVICS R2	1	1.4	1.4	1.4	1.4	2.3	2.2	2.3	2.2	772	757	767	417
- SHRUCs R1	1	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	1.5	1.5	1.5	1.5	2.3	2.3	2.3	2.3	2,777	2,659	2,742	1,466
Karachi East - TPVICS R1	1	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.8	892	874	862	416
- TPVICS R2	1	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.8	753	748	742	390
- SHRUCs R1	1	1.5	1.6	1.5	1.6	2.8	2.8	2.7	3.0	355	356	354	195
- SHRUCs R2	1	1.5	1.5	1.5	1.6	2.6	2.6	2.7	3.0	478	467	469	261
Karachi West - TPVICS R1	1	1.3	1.3	1.3	1.3	1.9	1.9	1.9	1.8	913	914	907	456
- TPVICS R2	1	1.3	1.3	1.3	1.3	1.8	1.8	1.8	1.7	924	928	916	492
- SHRUCs R1	1	1.3	1.3	1.3	1.3	2.3	2.3	2.3	2.4	795	790	805	434
- SHRUCs R2	1	1.4	1.4	1.4	1.4	2.2	2.2	2.2	2.1	854	844	849	466
Malir - TPVICS R1	1	1.3	1.3	1.3	1.3	1.7	1.8	1.7	1.6	769	769	769	389
- TPVICS R2	1	1.3	1.3	1.3	1.3	1.9	1.9	1.9	1.8	947	941	942	511
- SHRUCs R1	1	1.3	1.3	1.3	1.3	2.0	2.0	2.0	2.1	775	749	778	414
- SHRUCs R2	1	1.5	1.5	1.4	1.4	2.7	2.8	2.6	2.7	929	918	927	507
Killa Abdullah - TPVICS R1	1	1.2	1.2	1.2	1.3	2.2	2.2	2.2	2.6	260	261	260	135
- TPVICS R2	1	1.9	1.9	1.9	1.8	2.6	2.6	2.5	2.4	106	103	104	58
- SHRUCs R1	1	1.7	1.7	1.7	1.9	2.4	2.4	2.4	2.5	157	157	157	101
- SHRUCs R2	1	1.8	1.8	1.8	1.9	4.0	4.0	4.0	4.0	210	208	209	140
Pishin - TPVICS R1	1	1.5	1.5	1.5	1.5	3.3	3.2	3.3	3.2	144	140	144	80
- TPVICS R2	1	2.1	2.1	2.1	2.2	3.3	3.3	3.3	3.3	208	202	202	126
- SHRUCs R1	1	2.1	2.1	2.1	2.1	4.3	4.3	4.4	4.5	137	138	136	80
- SHRUCs R2	1	2.4	2.4	2.4	2.4	3.9	4.0	3.9	4.1	177	148	175	125
Quetta - TPVICS R1	1	1.3	1.3	1.3	1.3	2.0	2.0	2.0	2.1	459	459	459	246
- TPVICS R2	1	1.3	1.3	1.3	1.4	1.9	1.9	1.9	2.0	392	390	390	208
- SHRUCs R1	1	1.5	1.5	1.4	1.4	2.5	2.5	2.5	2.3	352	349	350	204
- SHRUCs R2	1	1.5	1.5	1.5	1.5	2.6	2.6	2.6	2.6	471	471	471	273

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

3.7. 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 a home-based record of vaccination visits can be used to identify MOSVs and summarize their frequency.

This section summarizes (a) the proportion of vaccination visits at which a MOSV occurred, in aggregate and for each individual dose (**Table 44**) and (b) the proportion of children who experienced one or more MOSVs (**Table 45**), and (c) whether those missed opportunities were corrected at later health centre visits or had not been corrected by the time of the survey (**Table 46**).

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 seven districts in all four 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 47 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 3 months and half took longer. The 90th percentiles indicate that in many rows at least 10% of MOSV corrections took longer than 6 months.

Table 44. Percent of visits with MOSVS: children were eligible for the dose and did not receive it, TPVICS and SHRUCs, Rounds 1 & 2

	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	51.1	15.5	0	24.1
-TPVICS R2	8	1.5	7	3	5.7	8.6	1.5	4.6	6.4	2	8.6	9.2	1.5	40.7	13.3	2	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	4	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
Sindh - Karachi East - TPVICS R1	1.5	0.9	8.7	2.2	2.5	7.8	2.4	2.7	12.8	2	2.8	22	4.6	47	9.9	0	20.3
-TPVICS R2	6.2	1	14.4	4.4	3.9	12.5	2.6	4.9	16.3	2.9	3.9	21.3	3.9	44.1	16	0.7	20
- SHRUCs R1	7.9	0	28.5	8	5.7	29.3	7.5	8.1	29.3	7.6	5.2	30.3	11.8	62.7	37	8.7	42.4
- SHRUCs R2	14.2	0	23	8.4	11.2	21.9	8.7	9.3	23	8	13.1	24.8	12.1	56	30.7	4	35.8
Sindh - Karachi West - TPVICS R1	2.4	1	12	2.6	1.7	11.4	2.8	1.7	12.2	2.2	1.7	16.6	5.4	43.6	12.2	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	4.7	6.1	23.6	4.7	6.6	24.1	4	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	4.6	9.4	23.6	6.1	53.5	27.6	3.4	29.7
Sindh - Malir - TPVICS R1	5.3	1.1	10.5	1.3	2	10.2	1.3	2.5	10.2	1	2.5	12.1	1.8	42.8	16.5	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	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	32.6
- SHRUCs R2	16.6	0.4	24.3	4.8	13.8	24.5	4.7	6.8	25.2	5	6.1	27	8	64.9	31.8	0	37.4
Balochistan - Killa Abdullah - TPVICS R1	49	12.5	14.5	1.6	6.5	14.9	0.8	6.4	15	0.8	6.5	16.2	0.8	69.4	58.1	0	69.7
-TPVICS R2	45.1	28.6	20.2	5.5	9.1	20.7	6.9	11.1	20	5.4	9.1	21.3	6.9	70.2	41.8	12.5	65.4
- SHRUCs R1	64.5	0	10.4	1	14.5	9.8	1	14.5	9.8	1	14.5	10.4	2	49.3	27.7	0	60.8
- SHRUCs R2	61.8	4.7	16	7.4	17.1	15.9	7.3	19.5	16	7.3	22.1	16.3	9	66.4	43.4	14.3	71.7
Balochistan - Pishin - TPVICS R1	9.3	0	17.1	2	4.4	17.8	2	2.2	17.8	2	6.3	14.3	1.8	60.3	29.3	0	44.7
-TPVICS R2	13.6	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	5.9	12.1	1.3	14.1	11.2	2.6	14.1	11.2	3.8	14.3	10.9	3.7	56.6	25.5	16	41.2
- 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
Balochistan - Quetta - TPVICS R1	7.1	1.5	20.2	3.7	5	19.9	4.9	5	20.3	4.5	5.4	23.8	3.4	60.5	23.4	1.9	33.7
-TPVICS R2	3.6	0	10.4	2	4.4	10.3	2	3.3	10.4	2	2.8	11.4	5.8	52.9	16.3	0	25.2
- SHRUCs R1	7.8	1.5	11.4	3.5	4.5	11.3	3.5	4.5	11.3	3	7	12.9	4.8	60	18.8	8.3	35.8
- SHRUCs R2	5	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

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 45. Percent of children who experienced an MOSV, TPVICS and SHRUCs. Rounds 1 & 2

	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	67.8	14.1	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	2	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
- SHRUCs R2	5.2	1.6	5.8	2.3	6.8	5.5	1.3	2.9	6	1.4	3.6	5.8	2.8	44.8	12.4	1.5	53.8
Sindh - Karachi East - TPVICS R1	0.4	0.6	7.5	2.3	2.5	7.8	2.4	2.2	9.6	2.1	2.3	15.4	3	50.4	9	0	49.2
-TPVICS R2	2.9	1	14.2	2.9	4	13.7	1.6	4.8	14.9	2.4	4	17.7	3.2	49.1	13	0.7	45.8
- SHRUCs R1	6	0	34.6	7.8	5.9	34.3	7.4	7.9	34.3	7.4	5.3	35	10.3	74.8	36.2	9.1	76.1
- SHRUCs R2	10.1	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
Sindh - Karachi West - TPVICS R1	2.1	1	12.6	2.4	1.7	12.4	2.6	1.7	13.2	2.2	1.7	14.2	4	49.2	11.5	0	47
-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	4.4	4.9	27.6	4.4	5.5	27.9	3.8	5.6	29	5.4	56.8	25.7	1.3	62.7
- SHRUCs R2	7	0.4	24	4.3	7.6	24.2	3.6	7.5	24.7	4	8	24.6	5	60	24	2.7	63
Sindh - Malir - TPVICS R1	2.8	1.2	10.9	1	1.7	10.8	1	2.3	10.8	0.8	2.3	11.9	1.6	45.6	13.7	0	45.5
-TPVICS R2	4.2	0.3	13.1	0.6	4	13	0.4	3	13.4	0.4	3.3	13.7	0.6	52.7	16.6	1.2	52.3
- SHRUCs R1	7	0.5	30.1	6	8.4	30.6	5.3	4.7	31.4	5.5	4.1	31.4	6.7	68.2	28.1	0	66.6
- SHRUCs R2	11.1	0.4	27.4	4.5	13.2	27.4	4.6	6.1	28	4.7	5.3	28.8	6	75.6	30.9	0	73.8
Balochistan - Killa Abdullah - TPVICS R1	25.9	12.5	16	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	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	7	85.5	37.9	12.5	94.4
- SHRUCs R1	45.7	0	10.5	1	12.1	9.8	1	12.1	9.8	1	12.1	10.5	2	50.4	28.4	0	76.4
- SHRUCs R2	53.2	4.7	16	7.5	15.1	15.9	7.4	17.8	16	7.4	19.4	16.8	9.2	73.3	43	14.3	83.9
Balochistan - Pishin - TPVICS R1	9.7	0	18.3	2	4.7	19.4	2	2.2	19.4	2	6.7	16.2	1.8	71.2	23.4	0	71.3
-TPVICS R2	7.9	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	6.3	13.6	1.3	13.3	12.5	2.7	13.3	12.5	4	13.6	12.1	3.8	68.2	25.3	13	70.6
- 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
Balochistan - Quetta - TPVICS R1	4.3	1.5	24.8	3.8	5	23.9	5	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	10.9	1.5	3.4	10.9	1.5	3.4	10.9	1.5	2.8	12.1	4	61.8	14.4	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	9	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

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 46. Percent of MOSVs that had been corrected by the time of the survey, TPVICS and SHRUCs. Rounds 1 & 2

	BCG	OPV0	OPV1	OPV2	OPV3	PENTA1	PENTA2	PENTA3	PCV1	PCV2	PCV3	ROTA1	ROTA2	IPV1	MCV1	MCV2	All MOSVs were corrected (%)
KP - Peshawar - TPVICS R1	25	100	83.3	100	50	83.3	100	50	83.3	100	66.7	84	100	82.2	56.8	0	75.9
-TPVICS R2	60.7	0	80.6	40	30.8	73.5	66.7	58.3	83.9	40	25	73	66.7	82.7	60	33.3	68.6
- SHRUCs R1	65.9	100	94.5	77.8	23.7	95.1	81.8	55.6	94.6	80	50	93.3	72.7	96.1	79.2	50	83.8
- SHRUCs R2	45.2	11.8	69.3	34.4	16.3	73.8	61.1	40.5	64.8	50	32.6	71.9	42.5	86.2	73.7	75	67.3
Sindh - Karachi East - TPVICS R1	0	0	86.1	70	80	84.2	63.6	77.8	80.4	66.7	66.7	67.1	41.7	65.4	51.4	0	60.8
-TPVICS R2	71.4	33.3	68.9	63.6	61.5	71.2	50	68.8	70.3	55.6	53.8	65.8	66.7	70	55.6	0	64.6
- SHRUCs R1	80	0	79.5	53.3	55.6	76.8	57.1	58.3	76.8	57.1	50	75	60	69.1	62.7	50	59.4
- SHRUCs R2	60	0	79	61.9	38.9	80	63.6	56.3	79.5	60	40.9	77.6	53.6	69	56.2	33.3	56
Sindh - Karachi West - TPVICS R1	58.3	66.7	83.3	63.6	85.7	84.6	66.7	71.4	84.1	60	71.4	75.3	38.9	74.4	44.4	0	66
-TPVICS R2	63.6	0	76.5	75	45.8	78.2	75	50	74.7	66.7	56.5	72.6	50	66.8	70.5	100	63.4
- SHRUCs R1	59.4	50	79.5	72.2	52.9	79.3	72.2	63.2	78.8	68.8	65	78.4	65.2	73.2	55.7	0	65.4
- SHRUCs R2	54.8	100	73.1	47.4	27.6	73.5	50	37.9	71.2	61.1	38.7	70.5	52.2	63.5	43.1	50	54.5
Sindh - Malir - TPVICS R1	84.6	66.7	89.4	50	66.7	87.2	50	62.5	87.2	33.3	75	82.4	50	69.9	33.3	0	65.9
-TPVICS R2	48	0	80.6	100	58.8	80.6	100	46.2	78.4	100	50	76.3	100	63.1	53.4	0	59
- SHRUCs R1	61.5	0	80.9	70.8	73.1	81.3	61.9	62.5	81.3	63.6	57.1	80.7	63	62.5	54.1	0	60.3
- SHRUCs R2	38.2	100	69.3	40.9	68.5	68.4	47.8	48	68.5	43.5	40.9	66.5	46.7	55.4	52.3	0	48.7
Balochistan - Killa Abdullah - TPVICS R1	5.6	0	95	100	60	95.2	100	60	95.2	100	60	87	100	89	83.8	0	62.7
-TPVICS R2	11.5	0	88.9	0	25	89.5	33.3	40	88.9	0	25	89.5	25	57.7	45.5	0	36.5
- SHRUCs R1	1.7	0	69.2	100	28.6	75	100	28.6	75	100	28.6	69.2	100	59.1	72.4	0	28
- SHRUCs R2	7.6	0	39.6	20	9.1	39.6	20	15.4	39.6	20	14.3	36.8	23.1	32	30.6	0	12.1
Balochistan - Pishin - TPVICS R1	42.9	0	81.8	0	100	83.3	0	100	83.3	0	100	81.8	0	75	45.5	0	64.9
-TPVICS R2	33.3	0	69	80	100	69.7	83.3	100	68.8	66.7	100	63.6	55.6	50	43.5	100	42.1
- SHRUCs R1	66.7	100	92.9	100	37.5	92.3	100	37.5	92.3	100	37.5	92.3	100	71.2	63.6	33.3	64.3
- SHRUCs R2	35.6	0	49.2	37.5	33.3	64.8	33.3	50	63.2	33.3	53.8	59.7	42.9	50.3	25	0	35.6
Balochistan - Quetta - TPVICS R1	23.1	0	91.4	44.4	10	89.7	50	20	90	50	22.2	82.7	25	59.1	41	0	55.5
-TPVICS R2	28.6	0	81.5	33.3	50	81.5	33.3	50	81.5	33.3	40	80	37.5	62.5	52.2	0	61.3
- SHRUCs R1	20	100	83.3	57.1	14.3	83.3	57.1	14.3	83.3	50	25	77.4	40	65.5	85.2	0	60.2
- SHRUCs R2	18.8	0	83.3	0	25	86.2	0	25	86.2	0	25	83.3	16.7	62.6	50	0	55.1

A corrected MOV means that the respondent had received a valid dose by the time of the survey.
The denominator for MOV uncorrected and corrected (%) is the number of MOVs.
Shaded cells are scaled such that if 100% MOSVs were corrected, the cell would be entirely filled with color.

Table 47. MOSVs for IPV1 Details, TPVICS and SHRUCs, Rounds 1 & 2

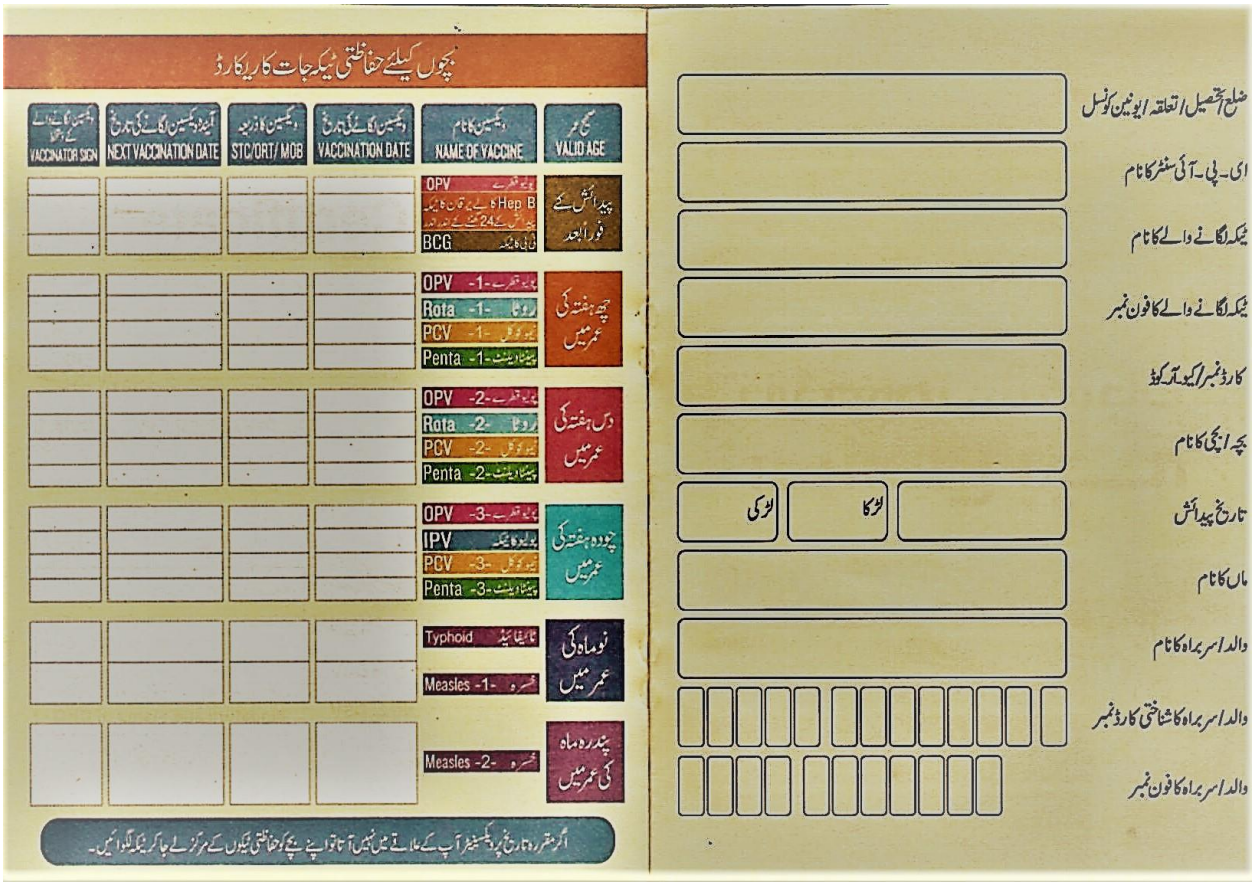
	Number of Respondents (N)			Experienced MOSV for IPV1 (%)			Time to Correction Percentile (Months)	
	Had visits eligible for IPV1 (N)	Had MOV for IPV1 (N)	Had Corrected MOSV for IPV1 (N)	No MOSV (%)	Uncorrected MOSV (%)	Corrected MOSV (%)	50th	90th
KP - Peshawar - TPVICS R1	323	219	180	32.2	12.1	55.7	2.4	7.8
-TPVICS R2	457	214	177	53.2	8.1	38.7	2.1	8.3
- SHRUCs R1	1,386	617	593	55.5	1.7	42.8	2.1	5.9
- SHRUCs R2	1,554	696	600	55.2	6.2	38.6	2.2	6.9
Sindh - Karachi East - TPVICS R1	458	231	151	49.6	17.4	33.0	1.5	4.9
-TPVICS R2	407	200	140	50.9	14.7	34.4	1.9	7.0
- SHRUCs R1	242	181	125	25.2	23.1	51.7	3.6	8.3
- SHRUCs R2	324	213	147	34.3	20.4	45.3	2.9	8.8
Sindh - Karachi West - TPVICS R1	500	246	183	50.8	12.6	36.6	2.3	6.3
-TPVICS R2	526	241	161	54.2	15.2	30.6	2.0	6.6
- SHRUCs R1	519	295	216	43.2	15.2	41.6	2.4	7.5
- SHRUCs R2	562	337	214	40.0	21.9	38.1	2.4	7.1
Sindh - Malir - TPVICS R1	430	196	137	54.4	13.7	31.9	2.1	6.5
-TPVICS R2	550	290	183	47.3	19.4	33.3	2.2	6.0
- SHRUCs R1	481	328	205	31.8	25.6	42.6	2.3	8.9
- SHRUCs R2	626	473	262	24.4	33.7	41.9	2.4	8.1
Balochistan - Killa Abdullah - TPVICS R1	125	118	105	5.6	10.4	84.0	3.4	6.0
-TPVICS R2	83	71	41	14.5	36.2	49.3	3.8	8.5
- SHRUCs R1	131	66	39	49.6	20.6	29.8	2.5	5.4
- SHRUCs R2	329	241	77	26.7	49.8	23.5	3.3	6.6
Balochistan - Pishin - TPVICS R1	73	52	39	28.8	17.8	53.4	3.7	11.2
-TPVICS R2	190	160	80	15.8	42.1	42.1	3.2	8.5
- SHRUCs R1	107	73	52	31.8	19.6	48.6	4.2	9.0
- SHRUCs R2	237	179	90	24.5	37.5	38.0	3.6	8.8
Balochistan - Quetta - TPVICS R1	291	208	123	28.5	29.2	42.3	2.2	5.9
-TPVICS R2	246	152	95	38.2	23.2	38.6	2.5	6.8
- SHRUCs R1	236	168	110	28.8	24.6	46.6	2.8	7.4
- SHRUCs R2	331	227	142	31.4	25.7	42.9	2.8	7.7

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 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 43** shows IPV listed with the other 14-week doses on an HBR.

Figure 43. Sample of home-base record being used in Pakistan



This notion 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 47** 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 will be elucidated further in the TPVICS Round 2 report.

3.8. 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, they asked why the child was not fully vaccinated and they recorded all of the reasons that the caregiver mentioned. ***Table 48*** 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.

Table 48. 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	6.3	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
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
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
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	6.3	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
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
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	20.2	1.2	14.5	1.2	1.2	0.0	1.7	64.7	64.2	40.5	2.3	0.6	0.0	0.0	4.6	0.0	0.0	11.6	173
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

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. Discussion

This section highlights the most important survey findings, as well as strengths and limitations of the project design and methods.

Both the TPVICS and SHRUCs surveys were conducted in two rounds between late 2020 and 2022. **Table 8** summarizes the statistically significant changes in coverage for both TPVICS and SHRUCs. Card availability improved notably in one or both surveys in six of the seven SHRUCs districts, with only Quetta showing no change. The evidence in Killa Abdullah was mixed with TPVICS showing significantly lower coverage (down 10.6% from Round 1 to 2) and SHRUCS showing significantly higher (18.2% increase). Overall, the news about card availability was positive, and that bodes well for having documented evidence for all coverage indicators.

Table 8 also indicates that there was some improvement in prevalence of zero dose children in the SHRUCs survey in five districts. Only Killa Abdullah showed a significant increase of SHRUCS zero dose children. For TPVICS, there were no significant improvements in zero dose, and two districts showed significant increases in zero dose prevalence (Karachi East increased by 3.2% and Killa Abdullah increased by 22.8%). The proportion of children fully-vaccinated showed evidence of declining in the Balochistan districts, two in TPVICS and two in SHRUCs. Only Karachi West showed significant increase in the fully vaccinated outcome (12.5% increase).

Table 8 showed more improvements than declines in individual dose coverage in the KP and Sindh districts, and the declines were quite modest. In Balochistan, however, there are three different stories. TPVICS shows consistent and large declines in coverage across all doses except OPVWC. The SHRUCs survey shows a mix of improvements and declines. In Pishin both TPVICS and SHRUCS show notable declines in coverage (except for a large increase in the % who had received at least one OPV dose when we also include doses received in campaigns). In Quetta, TPVICS showed no change except for dramatic improvements in OPVWC coverage of about 40%. The SHRUCs survey there showed a mix of significant improvements and declines.

The timeliness outcomes documented in **Figure 15** - **Figure 42** 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 begin 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 missed opportunities for simultaneous vaccination for IPV and for MCV1. 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 tremendous portion of children received the doses 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 missed opportunities for simultaneous vaccination 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, so between late administration and MOSVs, the children in this survey spent quite a lot of time under-protected against these vaccine preventable diseases.

The tables and figures are set up here to facilitate comparisons between Round 1 and Round 2 of both the TPVICS and SHRUCs surveys. There is evidence of effective OPV campaigns in the SHRUCs with OPVWC 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 43** shows that the longer intradose intervals were longer in SHRUCs than in TPVICS.

The SHRUCs surveys have several strengths. They followed shortly after the TPVICS surveys and were 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 to 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 age 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 yields an opportunity to compare outcomes in high-risk union councils with the representative results of those districts as a whole, to see which outcomes are better or worse or comparable to the surrounding district. Finally, the implementation of Round 1 and Round 2 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 in Round 1 would be very similar to those in Round 2.

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 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.

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