Policy Brief Series # 84

Research And Development Solutions

Mapping the Overlap: Zero Dose Children and Polio Hotspots

INTRODUCTION

Ending polio in Pakistan requires reaching both **zero-dose children and those lost to follow-up**. Conventional coverage indicators blur the line between **exclusion and dropout**. This brief shows how **OZD–TZD heatmaps, overlaid with polio cases, act as program-ready tools** to diagnose failure types and enable precision targeting for polio and EPI programs.

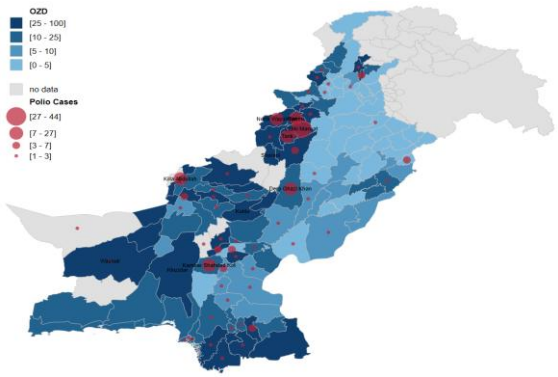
Operational Zero-Dose (OZD): Children who have never received any routine vaccination, indicating systematic exclusion from immunization services.

True Zero-Dose (TZD): Children who enter the immunization system but fail to complete vaccination, reflecting dropout and weak follow-up rather than lack of access.

KEY FINDINGS

OZD heatmaps pinpoint where polio risk is structurally embedded: mapping polio cases against Operational Zero-Dose (OZD) prevalence shows that nearly two-thirds of polio cases (157 of 231) occur in districts with OZD above 25%, visually identifying areas of systematic exclusion where children never enter the immunization system and transmission risk is highest.

Figure 1: OZD & Polio Cases



Polio transmission clusters spatially, as revealed by hotspot maps: OZD–polio overlay maps show that 66% of cases within high-OZD districts are concentrated in just four contiguous districts of southern KP, demonstrating that corridor-level targeting, not uniform provincial action, is critical for interrupting transmission.

TZD heatmaps explain why polio persists beyond zero-dose hotspots: overlaying polio cases with True Zero-Dose (TZD) maps reveals that 39% of cases occur in districts with TZD below 5%, particularly in Punjab and KP, indicating that weak follow-up and incomplete vaccination—not access alone—sustain transmission.

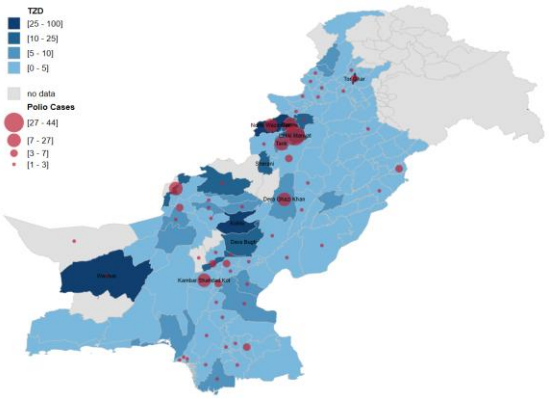
Mid-range TZD maps highlight silent risk zones: districts with 5–25% TZD prevalence, many in Balochistan, appear as moderate-risk zones on heatmaps yet account for a substantial share of cases, signalling gaps in service continuity that are easily overlooked in aggregate coverage statistics.

KEY MESSAGES

Heatmaps convert surveillance into strategy, enabling programs to target the right districts with the right interventions at the right time.

1. **Heatmaps are decision tools:** overlaying polio cases with OZD and TZD heatmaps distinguishes *access failures* from *follow-up failures* in ways that routine indicators cannot.
2. **Uniform national strategies are inefficient:** geospatial clustering shows that polio risk is highly local, requiring district- and corridor-level targeting.
3. **Eliminating polio requires addressing two distinct problems:** reaching children who never enter the system and ensuring completion of vaccination among those who do.

Figure 2: TZD & Polio Cases



RECOMMENDATIONS

1. **Institutionalize OZD and TZD heatmap dashboards** within routine EPI and polio program planning at provincial and district levels.
2. **Integrate geospatial analytics into micro-planning**, enabling real-time targeting of high-risk districts instead of uniform national approaches.
3. **Prioritize districts with OZD prevalence above 25%** for intensive outreach, catch-up immunization, and integrated service delivery.
4. **Use TZD mapping to strengthen follow-up systems**, ensuring children who enter the system complete vaccination schedules.
5. **Focus supervision and social mobilization in districts where polio persists despite low TZD**, addressing weaknesses in service quality and continuity.

This report was made possible with support from Gates Foundation (GF). The contents are the responsibility of Research and Development Solutions, Private Limited and do not necessarily reflect the opinion of GF.

For more information, please contact
Dr. Adnan Khan, MBBS, MS.
adnan@resdev.org