

Executive Summary

Introducing 5-dose Measles-Rubella Vaccine Vials in Zambia: Research Findings



The widespread use of multi-dose vaccine containers in low- and middle-income countries' immunization programs is assumed to offer benefits and efficiencies for health systems, such as reducing the purchase price per vaccine dose and easing cold chain requirements. But the broader impacts on immunization coverage, costs, and safety — and the tradeoffs among these factors — are not well understood.

DPCP explored decision making on dose per container (DPC) options in a number of countries to better understand the relationship between DPC and immunization system components.

In Zambia, from January 2017 through August 2018, DPCP conducted implementation research using quantitative and qualitative methods, introducing 5-dose vials of measles-rubella (MR) vaccine to a select group of health facilities to assess the effects on the immunization system of reducing the DPC from the 10-dose vials in use.



The six system components that may be impacted by a change in DPC.

Objectives

The primary objectives of this implementation research were to:

- Examine the relative effects of 5-dose compared to 10-dose vials of measles-containing vaccine (MCV) on first-dose (given at 9 months) and second-dose (given

at 18 months) coverage; open vial wastage; dropouts; session size and frequency; storage and distribution capacity; and logistics, service delivery, and total systems costs for routine immunization

- Understand how vial presentation may have an influence on missed opportunities for vaccination, timely coverage, equitable coverage, and safety
- Understand health care worker (HCW) preferences and examine their behavior for various vial presentations
- Identify the factors that enable and hinder the proper use of each of the two presentations

Implementation Research Design

For the DPCP research, a stratified-pair, cluster randomized field design was implemented in 14 districts in Central and Luapula provinces. The districts were paired into seven intervention and seven control districts. Health facilities in the intervention group received 5-dose vials of MCV, while those in the control group continued with the standard 10-dose vials.

The DPCP implementation research team collected data at baseline, during project implementation, and at endline, using the following methods:

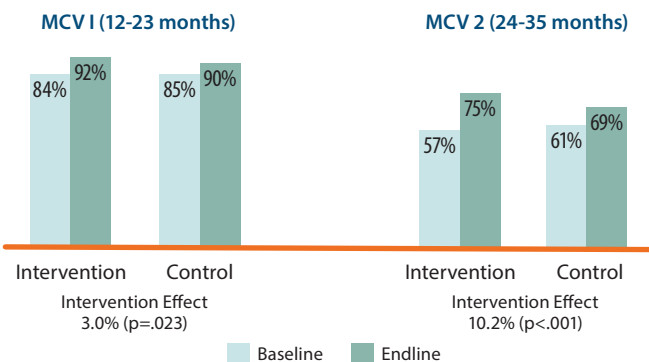
- Household coverage surveys
- Key informant interviews at facility, district, and national levels
- Observation of routine immunization sessions
- Retrospective administrative data review
- DPCP administrative data collection during implementation
- Costing surveys

Findings

Findings from DPCP's research show that in the balance between achieving high coverage and avoiding vaccine wastage, HCWs must decide when to open a vial, and this can affect timely and equitable coverage, wastage, and cost. HCWs using 5-dose MR vials were able to reduce wastage while achieving higher coverage, showing potential benefits of the smaller DPC.



Coverage: The household coverage survey found a statistically significant increase in coverage for both — a 3-percentage-point increase in MCV1 coverage and 10-percentage-point increase in MCV2 coverage — among children in districts using 5-dose vials, compared to those using 10-dose vials (based on review of vaccination cards plus caregiver recall). In addition, MCV1 to MCV2 dropout rates reduced significantly (a 13-percentage-point change) due to the switch from 10-dose to 5-dose vials. There was not a significant difference in timely coverage attributable to the intervention.



Wastage: Wastage also decreased statistically significantly in facilities using 5-dose MR vials — from 31% in facilities using 10-dose MR vials to 16% for 5-dose vials — even while coverage increased. HCWs in Zambia reported that although they are not held to wastage targets by their supervisors, the supervisors do monitor wastage and offer strategies to mitigate wastage, resulting in HCWs feeling conscious of wastage and tailoring their decisions whether to open a vial to achieve low wastage rates, which can affect timely and equitable immunization coverage.



Costing: Considering wastage rates documented in this research, wastage-adjusted vaccine price per dose was only \$0.04 higher with 5-dose vials than with 10-dose vials, and in small health facilities, vaccine purchase costs were lower using 5-dose vials because the reduction in wastage outweighed the increase in vaccine price. No additional costs were reported for cold chain, transport, outreach, or waste disposal when switching to 5-dose vials, with the only cost category showing increases being human resources. The incremental annual costs for switching to 5-dose vials (excluding the value of vaccines) was \$0.11 per dose used.



Safety: Due to the low frequency of immunization sessions to observe, a lack of reporting on adverse events following immunization (AEFI), and no respondents at health facilities mentioning any reports from communities on AEFI or abscesses, DPCP was unable to draw conclusions on safety.



Cold chain space: An analysis of cold chain equipment in intervention facilities showed that there was sufficient space to accommodate the small increase (4.9%) required when switching from 10-dose to 5-dose MR vaccine vials. In addition, the reduction in wastage also resulted in reducing the required cold chain space. No HCWs reported challenges with cold chain space at the facility, during outreach, or during transport from districts when switching to 5-dose vials.



Health care worker perceptions, behavior, and preferences: When using 10-dose vials, HCWs waited for an average of five children before opening a vial. However, when using 5-dose vials, HCWs stated that they felt they could reach more children, as they could open a vial even when only one eligible child is present. This may explain the significant difference in coverage between the intervention and control study arms. These findings suggest that a reduction in missed opportunities for vaccination is an important benefit of switching to 5-dose MR vials.

HCWs also expressed a strong preference for smaller-dose vials, with none saying that they wanted to return to using 10-dose vials at the end of implementation.