



# Vaccine wastage in Nigeria: An assessment of wastage rates and related vaccinator knowledge, attitudes and practices



Aaron S. Wallace<sup>a,\*</sup>, Fred Willis<sup>c</sup>, Eric Nwaze<sup>b</sup>, Boubacar Dieng<sup>c</sup>, Naawa Sipilanyambe<sup>c</sup>, Danni Daniels<sup>a</sup>, Emmanuel Abanida<sup>b</sup>, Alex Gasasira<sup>d</sup>, Mustapha Mahmud<sup>b</sup>, Tove K. Ryman<sup>e</sup>

<sup>a</sup> Global Immunization Division, Centers for Disease Control and Prevention, Atlanta, GA, USA

<sup>b</sup> Immunization Division, National Primary Health, Abuja, Nigeria

<sup>c</sup> Maternal and Child Health Team, UNICEF, Abuja, Nigeria

<sup>d</sup> Vaccines, Immunizations and Biologicals, World Health Organization, Abuja, Nigeria

<sup>e</sup> Bill and Melinda Gates Foundation, Global Immunization Division, Centers for Disease Control and Prevention, Seattle, WA, USA

## ARTICLE INFO

### Article history:

Received 21 July 2017

Received in revised form 25 September 2017

Accepted 26 September 2017

Available online 21 October 2017

### Keywords:

Measles  
Immunization  
Nigeria  
Wastage

## ABSTRACT

**Introduction:** The introduction of new vaccines highlights concerns about high vaccine wastage, knowledge of wastage policies and quality of stock management. However, an emphasis on minimizing wastage rates may cause confusion when recommendations are also being made to reduce missed opportunities to routinely vaccinate children. This concern is most relevant for lyophilized vaccines without preservatives [e.g. measles-containing vaccine (MCV)], which can be used for a limited time once reconstituted.

**Methods:** We sampled 54 health facilities within 11 local government areas (LGAs) in Nigeria and surveyed health sector personnel regarding routine vaccine usage and wastage-related knowledge and practices, conducted facility exit interviews with caregivers of children about missed opportunities for routine vaccination, and abstracted vaccine stock records and vaccination session data over a 6-month period to calculate wastage rates and vaccine vial usage patterns.

**Results:** Nearly half of facilities had incomplete vaccine stock data for calculating wastage rates. Among facilities with sufficient data, mean monthly facility-level wastage rates were between 18 and 35% across all reviewed vaccines, with little difference between lyophilized and liquid vaccines. Most (98%) vaccinators believed high wastage led to recent vaccine stockouts, yet only 55% were familiar with the multi-dose vial policy for minimizing wastage. On average, vaccinators reported that a minimum of six children must be present prior to opening a 10-dose MCV vial. Third dose of diphtheria-tetanus-pertussis vaccine (DTP3) was administered in 84% of sessions and MCV in 63%; however, the number of MCV and DTP3 doses administered were similar indicating the number of children vaccinated with DTP3 and MCV were similar despite less frequent MCV vaccination opportunities. Among caregivers, 30% reported being turned away for vaccination at least once; 53% of these children had not yet received the missed dose.

**Discussion:** Our findings show inadequate implementation of vaccine management guidelines, missed opportunities to vaccinate, and lyophilized vaccine wastage rates below expected rates. Missed opportunities for vaccination may occur due to how the health system's contradicting policies may force health workers to prioritize reduced wastage rates over vaccine administration, particularly for multi-dose vials.

Published by Elsevier Ltd.

## 1. Introduction

Since the 1980s, wide-scale use of vaccinations against diseases such as measles, polio, pertussis and hepatitis B has resulted in substantial childhood mortality reductions worldwide. New vaccines against pneumonia, rotavirus and other diseases are rapidly

being introduced in low-income countries to further reduce childhood mortality. Effective vaccine management is continues to be crucial [1] since these new vaccines are substantially more expensive than existing vaccines [2]. Appropriate vaccine management includes recommendations to minimize vaccine wastage [1], however, concern exists about how wastage policies may contribute to missed opportunities to vaccinate (MOV), particularly in low-income countries with high vaccine-preventable disease burden [1,3–7].

\* Corresponding author.

E-mail address: [AWallace@cdc.gov](mailto:AWallace@cdc.gov) (A.S. Wallace).

A vaccine dose is considered wasted if not used to vaccinate an eligible child [6]. Global guidelines address ways to reduce wastage, including the multi-dose vial policy (MDVP) which states open vials of specific (generally liquid) vaccines can be reused up to 28 days [8]. However, the MDVP does not apply to lyophilized vaccines without preservative, including commonly used 10-dose measles-containing vaccine (MCV) and 20-dose Bacillus Calmette Guérin (BCG) vaccine, as they must be discarded within 6 h of reconstitution or end of the vaccination session (whichever comes first). The World Health Organization (WHO) considers the discard of remaining doses in lyophilized vaccine vials to be an unavoidable reason for wastage [6]. Reasons for wastage that are considered avoidable include: vaccine expiration, vial breakage, inappropriate vial freezing, discarding liquid vaccine before 28 days, prolonged heat exposure and theft of the vaccine [6]. Both unopened and opened vaccine wastage rates should be monitored to help determine appropriate response strategies [6] since unopened wastage is largely due to supply chain practices, whereas opened wastage is due to both supply chain and immunization practices. Globally, recommended maximum wastage rates range from 15% to 50% for lyophilized vaccines and from 5% to 25% for liquid vaccines [9,10]. How well these various policies and recommendations are known and implemented at the service delivery level is not well documented.

An MOV occurs when an individual interacts with the health system and does not receive the vaccines for which they are eligible [11,12]. Studies have found associations between wastage practices and MOV [5,13]. WHO recommends that vaccines be administered anytime an eligible child presents for vaccination, irrespective of the total number of children present in the clinic (i.e. ‘every opportunity’ or ‘vial-opening’ recommendation) [6,14]. Yet, multiple MOV assessments in low-income countries using health facility exit interviews with child caregivers indicate that children are turned away specifically for BCG and MCV vaccinations [4,5]. Few studies have conducted in-depth vaccinator surveys to examine the decision-making processes that lead to children being turned away, particularly to the roles of vaccine wastage concerns and vial usage practices. Although studies have examined vaccine wastage rates [15–19], none have done so while also examining vaccinator knowledge, attitudes and practices associated with vaccine vial usage and management guidelines. Examining both wastage rates and related vaccinator knowledge and attitudes could provide a more in-depth understanding of observed vaccine usage patterns and assist with developing interventions to address identified issues.

In 2011, Nigeria began preparations to introduce pneumococcal conjugate vaccine, replace diphtheria-tetanus-pertussis (DTP) vaccine with DTP-hepatitis B-Haemophilus influenzae type b (pentavalent) vaccine and endorse a goal to eliminate measles by 2020. In this study, we assessed health sector staff knowledge, attitudes and practices related to vaccine vial usage and wastage guidelines, calculated vaccine wastage rates and usage patterns over a 6-month period at both service delivery and storage levels, compared vaccine wastage rates between liquid and lyophilized vaccines to determine if rates differed based on policies such as the multi-dose vial policy, and evaluated child caregiver experiences with MOV. This information provides evidence for policy-makers in Nigeria regarding strategies to improve vaccination coverage, and informs future research addressing the relationship between wastage rates and vaccination coverage.

## 2. Materials & methods

### 2.1. Definitions

In Nigeria, routine vaccinations are generally administered by one or more trained health workers at health facility level. Routine

vaccinations are generally administered during a multi-hour vaccination session, which may be held at the facility, or at an outreach site in a village far from the facility; one or more routine vaccines may be administered during this session. Health workers who provide vaccinations are supervised by local government area (LGA, equivalent to districts in most countries) immunization officers and vaccine logisticians. Vaccines are supplied from the national level to states, and then to LGAs. Vaccines are stored in LGA cold stores until they are needed for administration at health facility level. Unopened vaccine wastage is defined as loss of doses in an unopened vial; opened vaccine wastage is defined as loss of doses in an opened vial. A wastage rate is the sum of both opened and unopened wastage rates. An MOV in this study is defined as the event when a child eligible for vaccination attended the health facility for health services (vaccination, curative care) and did not receive the vaccine(s) for which they were eligible.

### 2.2. Sampling

We conducted two-stage random sampling of LGAs and health facilities where routine vaccinations are provided in each of Nigeria's six zones and its Federal Capital Territory (FCT). In each zone, we used probability proportional-to-size sampling to randomly select two LGAs; in FCT, the team randomly selected one LGA. In each LGA, the team used simple random sampling to select five health facilities – on average, 20% of the facilities in each LGA – to conduct vaccinator interviews. At each facility, we aimed to interview 5 caregivers of children <24 months as they exited the facility after receiving health services for the child, using convenience sampling. Our total target sample was 13 LGAs, 65 health facilities and 325 caregivers.

### 2.3. Data collection

#### 2.3.1. Data collection team and activities

Data collection occurred in August 2011. The data collection team was composed of national and state vaccine logistics officers employed at Nigeria National Primary Health Care Development Agency (NPHCDA) and UNICEF. We assigned logistics officers as data collectors in areas where they were not employed to minimize interviewer bias. In selected LGAs, data collectors interviewed the LGA immunization officer (who supervises health facility vaccinators) and vaccine logistician (who maintains the LGA-level vaccine supply chain) and reviewed vaccine stock records. At health facilities, data collectors interviewed the health worker who provided the majority of the vaccinations (whom we refer to as the vaccinator) and reviewed vaccine stock and vaccination session records. The data collectors also conducted facility exit interviews with caregivers of children aged <24 months who had received any health services.

#### 2.3.2. Information collected

To calculate monthly LGA and health facility wastage rates and assess vaccine usage patterns, data collectors abstracted vaccine stock management data from January through June 2011 from vaccine management ledgers designed to track routine use of vaccine. Abstracted data per month were: starting monthly balance of vaccine doses, number of vaccine doses received from a higher administrative level, vials opened (collected at facility level only), number of children vaccinated (collected at facility level only), ending monthly balance of vaccine and reason for discard of unopened doses (expiration, breakage, VVM status, freezing, other).

To calculate vaccination session wastage rates and assess usage patterns, data collectors abstracted vaccination session data for the immediately preceding three months (June–August 2011) from vaccination session tally sheets used to tally vaccine use per daily

Download English Version:

<https://daneshyari.com/en/article/8486649>

Download Persian Version:

<https://daneshyari.com/article/8486649>

[Daneshyari.com](https://daneshyari.com)