

Evaluation of covid-19 vaccination costs for internally displaced persons in the town of Dori, Dori health district, 2022

Dr OUEDRAOGO HAMED SIDWAYA
Medical doctor, public health
S/C Ministry of Health and Public Hygiene
03 BP 7009 Ouagadougou 03
Email : hamsid2001@yahoo.fr
BURKINA FASO

Abstract

Introduction: *Within the framework of the implementation of COVID-19 (Coronavirus) vaccination activities in the Sahel region of Burkina Faso, we have evaluated the economic costs detailed in this document.*

Methodology: *an evaluation from a societal perspective was adopted, covering the period from August to October 2021.*

Results: *Vaccine acquisition costs predominated at over 60%, and the average cost of vaccination was 8,130 FCFA or 15 USD per person.*

Conclusion: *Vaccination in areas facing security crises is necessary to protect fragile populations, and requires greater resources and greater involvement from partners.*

Keywords: covid-19 vaccination costs, internally displaced persons, Dori, Dori health district

INTRODUCTION

Healthcare systems were shaken by the outbreak of the SARS-CoV-2 pandemic (Ye et Jin 2020), which began at the end of 2019 in Wuhan, Republic of China (World Health Organisation 2020b). This pandemic very quickly affected almost every country in the world, and was declared a public health emergency of international concern by the World Health Organization (WHO) so that appropriate measures could be taken. Burkina Faso announced its first cases in March 2020 (CENTRE DES OPERATIONS DE REPOSE AUX URGENCES SANITAIRES 2020). Despite the various guidelines proposed by WHO (World Health Organisation 2020a) and various health sector governance institutions, several countries have taken drastic measures, including confining entire countries and closing borders. As a result, the disease has seriously disrupted the functioning of the entire world, with a heavy human toll in less than a quarter (World Health Organisation 2020b; Le Monde 2020). These consequences have not spared the African continent, which is extremely dependent on the export of raw materials and consumes many imported products (Anyanwu et Salami 2021). In addition to the proposed measures concerning distancing, hygiene reinforcement (...), efforts to ensure the continuity of Reproductive, Maternal, Neonatal, Infant, and Adolescent Health (RMNIAH) services and vaccination (Mongbo et al. 2021), the major

pharmaceutical companies prioritized the development of vaccines against this new pandemic, which continued to spread despite the drastic measures taken on all five continents. They were supported by financial resources made available by several developed countries (McClung et al. 2020) and backed by emergency procedures authorized by various agencies such as the US Food and Drugs Agency (FDA) (Rosenblum et al. 2021). In less than a year, pharmaceutical giants such as Pfizer and Moderna have succeeded in developing a number of candidate vaccines which, because of their *modus operandi*, will take a long time to become accessible to countries with the least adapted health logistics, such as developing countries. The establishment of the COVAX mechanism by WHO and its partners will pave the way for vaccine deployment in developing countries (WHO 2021, 2022). This mechanism has led several countries to develop vaccine deployment plans, and to begin mobilizing resources to cover their populations with COVID-19 vaccines. Burkina Faso has developed its deployment plan, which aims to cover the entire population in a difficult security and humanitarian context, hence the need for this study to assess the economic impact of this vaccination in order to evaluate the possibilities of equitable access to this vaccination. The aim of this study was to evaluate the costs of COVID-19 vaccination campaign for IDPs during the first six months of 2021 in the commune of Dori (Dori health district) in the Sahel region of Burkina Faso.

METHODOLOGY

Type of evaluation

This is an economic evaluation of the costs of including IDPs in Covid-19 vaccination, with data collected over the period August to October 2021. For the time horizon, we took into account the entire period of preparation, organization, implementation and evaluation, from the organization of the first planning meeting to the submission of the final report on the campaign implementation.

A societal perspective has been adopted. It includes all costs, from the point of view of both the government and households.

Scope of the study

The study was conducted in Dori health district (Figure 1) (Wikipédia 2022). This is one of the four districts of the Sahel health region, and corresponds to the boundaries of SENO province. It hosts the regional capital. It has six (06) departments corresponding to six (06) municipalities, including one urban (Dori) and five (05) rural (Bani, Falangountou, Gorgadji, Sampelga, and Seytenga). There are 202 administrative villages, 08 sectors and 323 farming hamlets. It is bordered to the north by Gorom-Gorom district, to the south by Manni and Tougouri districts, to the west by Djibo health district and to the east by Sebba health district and the Republic of Niger. It covers an area of 6,997km². In 2021, its population is estimated at 408,320 inhabitants, with a density of 58 inhabitants per Km² (Ministère de la santé (Burkina Faso) 2021).

The district has 33 health centers, including four which are still closed due to security issues; ten (10) health centers host IDPs. All functional health centers offer vaccination services, mainly as a fixed strategy in view of the security context.

The municipality of Dori comprises 8 sectors and 78 villages. Its population is estimated at 180,512 inhabitants (GCPH 2019). In terms of health, it hosts Dori Regional Hospital Center (CHR), two (02) medical centers and nine (09) health and social promotion centers (CSPS).

According to CONASUR, the number of IDPs in the municipality of Dori stood at 52428 on August 31, 2021 (CONASUR, 31/08/2021). The target population to be vaccinated (aged 18 and over) represents 46%, or 24,117 inhabitants.

Study population

The study population is made up of staff from the Vaccination Prevention Department, the Sahel Regional Health Department, health district management teams and peripheral health facilities. The population of the town of Dori concerned by this vaccination is Internally Displaced Persons (IDPs) aged over 18 from IDP sites in the municipality of Dori. The partner institutions of the Sahel regional health department took part in the study

Identification of resources and activities

Vaccination resources and activities were identified according to the different levels of our health system: the central level represented by the Vaccine Prevention Division (DPV), the intermediate level represented by the Regional Health Directorate of the Sahel (DRS/Sahel) and the peripheral level represented by the district management team (ECD/Dori) and the health and social promotion centers (CSPS) in the town of Dori.

Cost estimation methods

We followed the following steps to estimate costs: identification of the resources required for vaccination, quantification of these resources, valuation of these resources in monetary terms.

The prices used are replacement prices (current cost of the input).

Data collection

Data collection was carried out at central, regional and district levels under the coordination of the Sahel Regional Health Director by trained investigators. The following techniques and tools were used:

❖ **Techniques**

We used the literature review and survey.

❖ **Data collection tools**

Data were collected using a questionnaire, a semi-structured interview grid and a literature review grid.

❖ **Collected data**

The following data were collected from a variety of sources (Table 3), and focused on different variables identified in relation to the evaluation objectives.

Types of costs studied

Capital costs (non-recurring)

Non-recurring or capital costs apply to resources that last longer than one year, such as cold chain equipment and vehicles. Capital goods and services used for immunization include initial investments, such as introduction costs (microplanning, initial training and social mobilization/elaboration of IEC materials) as well as additional cold chain equipment, necessary vehicles and incinerators.

The costs taken into account in our study were: refrigerator, vaccine carrier, cold accumulators, building, motorcycle and car rentals.

Recurring costs

Recurring costs apply to resources lasting less than a year (Boonstoppel et al. 2021). In our study, these costs included: vaccine and vaccination consumables, transport of vaccine and consumables, laboratory inputs, human resources, training and coordination meetings, supervision, social mobilization and communication, safety, vehicle and motorcycle maintenance, vehicle rental.

Costs specific to vaccinated people

These costs include travel costs to the vaccination site (fuel required), any payments for vaccination and the costs of lost productivity and/or opportunity due to time lost to vaccination.

Sampling

Size of the sample

To determine the number of vaccinated people to be asked about costs, we used Schwartz's formula (SCHWARTZ, s. d.) below:

$$n = \left(\frac{Z_{\alpha}^2 * P(1 - P)}{e^2} \right)$$

- z_{α} = 11.96 for a risk α of 0.05;
- e = absolute margin of error, set at 0.05 ;
- P : the proportion of people vaccinated, estimated at 0.01

To account for non-respondents, we have added 20%, giving a headcount of 20.

Date Analys données

The data were entered into Word and Excel and then analysed using these programs. A content analysis was done the speeches delivered to us.

Ethical considerations

The study protocol was submitted to the authorities of Burkina Faso Ministry of Health (Sahel Regional Health Directorate). The study obtained approval for data collection from the authorities of Burkina Faso Ministry of Health through a note from the Sahel Regional Health Director (note N° 2021-193/MS/RSHL/DRS dated August 18, 2021). Participation in this study was voluntary. Interviews were conducted in strict confidence. We ensured the confidentiality of our database by entering codes instead of people's first and last names. The data were password-protected. The use of the results of our work will be limited to the strict exploitation linked to the objectives of our study.

RESULTS

Vaccine types and strategy

Several types of vaccine are being considered by Burkina Faso for the first phase of its vaccination program, considered is this study. The Janssen vaccine (Johnson & Johnson) has been selected for the vaccination of IDPs. The vaccine is administered in a single dose. Vaccination at fixed sites in the form of a campaign for people present during the campaign. Those who did not received doses will go to the training centers, where routine vaccination will continue. Ministry documents indicate that the first doses available will be supplied by the COVAX system (SII-AZ AZD1222 produced by

Astrazeneca and vaccine supplied by the Republic of China). The deployment plan full integrates internally displaced populations in its forecasts, but the first-phase forecasts are inadequate in terms of health facility sites, and the absence of specific teams to reach localities with advanced strategies. This option seems beneficial according to the assessments (table 1).

Size of IDP population to be vaccinated and people surveyed

According to a report by the National Emergency and Rehabilitation Council (*Conseil National de Secours d'Urgence et de Réhabilitation (CONASUR)*) (Ministère en charge de l'action humanitaire (BF) 2021), the number of IDPs in the commune of Dori stood at 52,428 on August 31, 2021. The target population to be vaccinated (aged 18 and over) accounted for 46% of IDPs (D. S. D. Ministère de la santé 2021), or 24,117 people. During this study, we were able to interview 137 people, including 51.82% women.

Non-recurring costs

Non-recurring costs (table 4) amounted to 28,396,200 FCFA (USD 51,747). These costs were mainly represented by cold chain equipment (45%) and the construction of an EPI building (39%). Rental of rolling equipment accounted for 17%.

Recurring costs

Recurring costs (table 5) amounted to 172,428,119 FCFA (314,220 USD). The main costs were for the purchase and transport of vaccine and consumables (43.7% and 32.6%), human resources (6%), reproduction of tools (8%) and social mobilization (3.4%).

Breakdown of total costs

The total cost (table 6) of IDPs vaccination in the municipality of Dori is estimated at 200,824,319 FCFA (365,967 USD). It is made up of 14% capital costs and 86% recurrent costs.

In terms of expenditure categories (table 7), the purchase and transport of vaccine and consumables accounted for over 60% of expenditure, followed by reproduction of tools (6.9%), cold chain equipment (6.3%), buildings (5.5%), human resources (5.2) and social mobilization (3%).

Cost integration

The amount of expenditure that could be integrated into the vaccination of the general population was 173,753,949 FCFA, i.e. 87% of the budget. The main items concerned were cold chain equipment, vaccine purchase and transport, laboratory inputs and management of AEFI (adverse events following immunization), training and coordination meetings.

Costs specific to vaccinated people.

The costs amounted to 905,175 FCFA, with an average of 6,607 FCFA. The lowest cost was 0FCFA and the highest cost was 49,000 FCFA. Loss of production due to time wasted on vaccination was estimated at 784,275 FCFA, or 87% of the costs. The of free care vaccination policy was effective, as no participant paid to be vaccinated.

Cost per person vaccinated

The total cost of the vaccination campaign was estimated at 200,824,319 FCFA for 24,117 people to be vaccinated, giving a cost per person vaccinated of 8,130 FCFA (15 USD).

DISCUSSIONS

The vaccination campaign undertaken by the Ministry of Health is of great importance in the response to the pandemic, and the data analysed allow us to assert that internally displaced populations are being taken into account (B. F. Ministère de la santé 2021). However, specific actions will need to be targeted at them, including motivation and reassuring communication (Davis, Golding, et McKay 2021) to ensure good community participation (Ridde et al. 2021; Lazić et al. 2021) and improve the level of IDPs' knowledge, especially those newly arrived in the city, and who may be less exposed to awareness-raising messages. In addition to this consideration, and in line with the guiding principles of the roll-out plan, a strict follow-up of the vaccine used, SII-AZ AZD1222, will be required, in view of the side effects already noted, to ensure maximum benefit for the population (Rosenblum et al. 2021; Knoll et Wonodi 2021; Kim, Marks, et Clemens 2021).

Assessment of the campaign costs

The total cost for vaccinating IDPs in the municipality of Dori is estimated at 200,824,319 FCFA. This amount is very high for a town in a developing country, and the share of recurrent costs indicates the need for support, and the COVAX initiative (WHO 2022) will be supplemented by local partners. This is in line with the amount of the campaign announced at national level, which is 3 billion for the 3% of the population whose coverage needs are heavily dominated (86, 87%) by recurrent costs (B. F. Ministère de la santé 2021). The same observation was made by other studies that have examined strategies for implementing this vaccination (Mandal et al. 2021).

These costs could be increased depending on the evolution of the security situation (Ouedraogo et al. 2020).

Beyond this cost, the benefits reported in various studies (Ouedraogo et al. 2020; Deng et al. 2018; Yeung et al. 2021), and the impact of this pandemic on the economic fabric (Anyanwu et Salami 2021) with the risks of exacerbations due to the arrival of variants (LEMONDE), recommend that the necessary resources be found for the deployment of this vaccination in an equitable manner with effective consideration of IDPs. Skilful implementation based on well-monitored health logistics, with corrections of shortcomings resulting from good monitoring, will help to protect people and the economy (Mandal et al. 2021).

FINDINGS:

The dominant cost in this evaluation remains the cost of vaccine acquisition, like several studies have shown. The cost of allowing these populations located in difficult areas to receive the vaccine is 8,130 FCFA (15 USD). This cost can be used by the Ministry of Health and its partners to plan other campaigns or develop vaccine strategies.

CONCLUSION, LIMITS & RECOMMENDATIONS:

Burkina Faso has a deployment plan for COVID-19 vaccination, and internally displaced populations are clearly considered. The assessment of the costs of IDPs' vaccination in the town of Dori focused on the estimation of recurring costs, which appear high and in line with national and international planning. These recurring costs essentially comprise the purchase and transport of vaccine and consumables, human resources, the reproduction of tools and social mobilization. A large part of these costs could be integrated into a vaccination campaign for the general population. The advantages of vaccines such as those supplied by Astrazeneca mean that we can hope for a more cost-effective implementation, regarding the health logistics already in place in the field.

The main recommendation was to strengthen the mobilization of partners working in the humanitarian field, which remains essential to support the health district in meeting the costs that could arise from any deterioration in security conditions complicating the operationalization of the campaign.

This study shows the importance of such evaluations, which could be carried out rapidly by Joseph Ki-Zerbo University, the Ministry of Health's National Institute of Public Health and all other research institutions, and inform the decisions to be taken for better coverage of hard-to-reach populations.

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FIGURES

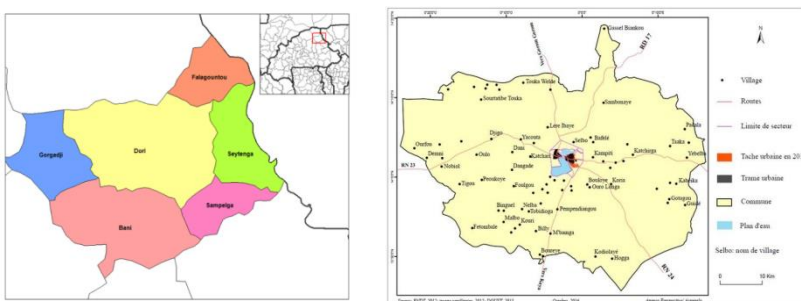


Figure 1 : Map showing the town of Dori, Sahel Health Region, Site of our study

TABLES

Table 1 : Descriptive table of possible options for vaccination of IDPs and their consequences.

	Options	Consequences
Decision tree	<ul style="list-style-type: none"> PDI included in the routine system 	<ul style="list-style-type: none"> Minimal additional cost Fewer IDPs vaccinated Risk of disease spread Epidemic persists over time in the locality High mortality among IDPs (vulnerable group)
	<ul style="list-style-type: none"> Setting up of a remote health post or training of specific teams to care for IDPs 	<ul style="list-style-type: none"> Significant additional cost More IDPs vaccinated Rapid control of the epidemic in the area Protection of host population

Table 2 : Nature of data collection variables

The campaign	Collected data
Social mobilization	Number of internally displaced people in the district, Implementation of social mobilization/communication activities.
Training	Training costs, transport costs, reproduction of tools,
Vaccination	Number of IDPs in the district, type of vaccination strategy used, type of vaccine used, quantity and unit price of vaccine, number of refrigerators and freezers, number of vehicles and unit prices, cost of transport, number of doses received by each IDP vaccinated, maintenance.
Supervision	Cost of transport, reproduction of tools
Monitoring	Demographic data, reproduction of tools, data management, campaign evaluation, communication costs, monitoring

Table 2 : Data sources

Item	Source and Method
Vaccine costs	<ul style="list-style-type: none"> Electronic stock management register (UNICEF)
Reproduction of tools	<ul style="list-style-type: none"> Micro-planning data for the immunization deployment plan with the department in charge of prevention through immunization
Rental of motorcycles and vehicles	<ul style="list-style-type: none"> Micro-planning data for the vaccination deployment plan with the department in charge of prevention through vaccination
Composition of AEFI kits	<ul style="list-style-type: none"> Guidelines for the use of 151,200 doses of Johnson & Johnson vaccine against COVID-19, 06 August 2021, Burkina Faso
Price of medicines and medical consumables	<ul style="list-style-type: none"> Joint Order N°2019-0306 MCIA/MS setting sales prices for essential generic medicines under international non-proprietary names
Number of IDPs	<ul style="list-style-type: none"> CONASUR - BURKINA FASO. Registration of internally displaced persons, 31/08/2021
Vaccination target (18 years old and beyond)	<ul style="list-style-type: none"> Population data for COVID vaccination of IDPs, July 2021 (DRS/Sahel)
Patient time	<ul style="list-style-type: none"> Response of vaccinated persons
Distances	<ul style="list-style-type: none"> Burkina Faso distance cards (DPV)
Fuel	<ul style="list-style-type: none"> DPV maintenance (0.2 liters per 100 km for vehicles and 50 FCFA/km for motorcycles) Joint order n°2020/014/MCIA/MINEFID setting retail consumer prices for hydrocarbons. Communiqué n°021/0008/MICA/CAB of March 19, 2021 on the increase in hydrocarbon prices.

Table 3 : Breakdown of non-recurring costs for IDPs' vaccination in the municipality of Dori.

Components	Amount CFA	Amount USD	Proportion
Cold chain equipment (refrigerators, accumulators, vaccine carriers)	12 646 200	22 993	45%
Buildings	11 000 000	20 000	39%
Rolling equipment (vehicles and motorcycles)	4 750 000	8 636	17%
Total Non-recurring costs	28 396 200	51 629	100%

1 USD = 548,75 (07/09/2021), <https://www.bceao.int/fr/cours/cours-des-devises-contre-Franc-CFA>

Table 6 : Breakdown of recurring costs for IDPs' vaccination in the municipality of Dori.

Components	Amount CFA	Amount USD	Proportion
Vaccines and consumables	75 354 611	137 320	43,7%
Transport of Vaccines and consumables	56 247 988	102 502	32,6%
Laboratory	2 251 400	4 103	1,3%
Individual protective equipment	1 550 000	2 825	0,9%
Human resources	10 393 000	18 939	6,0%
Training and meetings	2 259 470	4 117	1,3%
Tool reproduction	13 832 500	25 207	8,0%
Transport	1 493 000	2 721	0,9%
Social mobilization	5 946 000	10 836	3,4%
DBM management	224 400	409	0,1%
Campaign evaluation	1 077 500	1 964	0,6%
Management of AEFI case	1 198 250	2 184	0,7%
Other costs (Unforeseen)	600 000	1 093	0,3%
Total Recurring costs	172 428 119	314 220	100%

1 USD = 548,75 (07/09/2021), <https://www.bceao.int/fr/cours/cours-des-devises-contre-Franc-CFA>

Table 7 : Breakdown of different categories of expenditure for IDPs' vaccination in the municipality of Dori.

Components	Amount CFA	Amount USD	Proportion
Cold chain equipment (refrigerators, accumulators, vaccine carriers)	12 646 200	23 045	6,3%
Buildings	11 000 000	20 046	5,5%
Rolling equipment (vehicles and motorcycles)	4 750 000	8 656	2,4%
Vaccines and consumables	75 354 611	137 320	37,5%
Transport of Vaccines and consumables	56 247 988	102 502	28,0%
Laboratory	2 251 400	4 103	1,1%
Individual protective equipment	1 550 000	2 825	0,8%
Human resources	10 393 000	18 939	5,2%
Training and meetings	2 259 470	4 117	1,1%
Reproduction of tools	13 832 500	25 207	6,9%
Transport	1 493 000	2 721	0,7%
Social mobilization	5 946 000	10 836	3,0%
DBM management	224 400	409	0,1%
Campaign evaluation	1 077 500	1 964	0,5%
Management of MAPI cases	1 198 250	2 184	0,6%
Other costs (Unforeseen)	600 000	1 093	0,3%
Total Couts	200 824 319	365 967	100%

1 USD = 548,75 (07/09/2021), <https://www.bceao.int/fr/cours/cours-des-devises-contre-Franc-CFA>

Table 8 : Breakdown of costs by type of cost for the vaccination of IDPs in the commune of Dori

Components	Amount CFA	Amount USD	Proportion
Non-recurring costs	28 396 200	51 747	14%
Recurring costs	172 428 119	314 220	86%
Total	200 824 319	365 967	100%

1 USD = 548,75 (07/09/2021), <https://www.bceao.int/fr/cours/cours-des-devises-contre-Franc-CFA>

Table 9: Estimated number of vaccination teams

Item	Quantity
Total number of people to be vaccinated (N)	24 117
Number of people to be vaccinated per day (n)	100
Number of vaccination days (t)	10
Number of teams required (N/(n*t))	25

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