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Assessment of Vaccination Coverage of Children Aged 12-23 Months in the Provinces of Ituri and Haut-Katanga, Democratic Republic of the Congo in 2019

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Abstract: Vaccination of children continues to pose problems, and the vaccination coverage rate is very low in DR Congo. Cultural, social and economic constraints at various levels are thought to be the main causes. Faced with this health emergency, the Congolese government has implemented strategies to increase the level of immunization coverage among children, and to help reduce child morbidity and mortality linked to vaccine-preventable diseases. A household survey was carried out in 2019 in the provinces of Ituri and Haut-Katanga to estimate the level of coverage at grassroots level. A representative cluster sample was used to exhaustively cover 63 health zones (36 in Ituri and 27 in Haut-Katanga). Over 6,300 mothers/caregivers of children aged 10-23 months were interviewed, at a rate of 100 mothers/caregivers per health zone. The results of this survey show that overall, nearly 49% of children aged 10-23 months are fully vaccinated in Ituri, compared with 53.12% in Haut-Katanga. There are still large numbers of zerodose children (those who have never been vaccinated since birth). For all vaccines, results varied: 53.12% of children in Ituri and 46.88% in Haut-Katanga received the bacillus Calmette and Guerin (BCG) vaccine. BCG vaccine was administered at birth to 39.76% of children in Ituri, versus 60.24% in Haut-Katanga. The discrepancies suggest a missed opportunity and therefore unmet needs for several reasons, principally vaccine stock-outs. For other antigens, there is a downward trend in both provinces between input and output doses. This suggests a lack of effective monitoring. Only 49.6% of children in Ituri and 50.33% of children in Haut-Katanga received the entry dose of polio vaccine (OPV0).

Keywords: Vaccine Coverage Survey, Antigen, Plan Mashako, DR Congo, Ituri, Haut-Katanga

1. Introduction

The World Health Organization (WHO) estimates that vaccination prevents around 2.5 million child deaths worldwide every year. Although immunization is one of the most successful and cost-effective health interventions, having significantly reduced child mortality and the prevalence of several diseases, in low-income countries, there are still millions of children, with almost 20% of all newborns not receiving the full course of vaccines during their first year of life [1-3].

Vaccination therefore makes a crucial contribution to achieving the third Sustainable Development Goal (SDG) on health and well-being, more specifically the second following sub-goal (target): "by 2030, eliminate preventable deaths of newborns and children under 5 years of age, with all

countries aiming to reduce neonatal mortality to no more than 12 per 1,000 live births (LB) and under-5 mortality to no more than 25 per 1,000 LB" [4].

In the Democratic Republic of Congo (DRC), the situation is more worrying. Despite the resources invested in reducing mortality among children under 5, this rate has decreased from 158 per 1000 LB in 2007 [5] to 104 per 1000 LB in 2013 [6]. This excess child mortality is largely attributable to diseases whose causes are currently vaccine-preventable. Compliance with the new vaccination schedule, according to the new vaccine chronology, remains a major challenge. According to the non-profit association primary healthcare in rural areas (SANRU), the vaccines recommended in the DRC are as follows: (i) Bacille Calmette and Guerin (BCG) vaccines against tuberculosis; (ii) vaccines against diphtheria, tetanus, pertussis, hepatitis and Haemophilus influenzae type b (DTP-HepB-Hib); (iii) oral polio vaccine (OPV) and inactivated polio vaccine (IPV) against poliomyelitis; (iv) Pneumonia vaccine (PCV-13); (v) Measles vaccine (VAR) against measles; (vi) Amaril vaccine (VAA) against yellow fever; and (vii) Tetanus vaccine (Td) against maternal and neonatal tetanus [7-13].

In order to have a tool for implementing and monitoring the progress made by the EPI, a methodological protocol has been drawn up by the EPI "Mashako plan" for this purpose. The aim of this protocol is to collect quality data within health zones, to complement routine data of poor quality, as well as data from large surveys that are often representative of the former provinces. Better than the MICS and DHS surveys, which have large samples with a limited number of children aged 12-23 months, the Mashako Plan does just the opposite, focusing on a smaller scale (health zone) but with a much larger population. Analyses are all the more in-depth, while coverage is disaggregated by different socio-demographic characteristics to encourage more targeted interventions [14].

2. Methodology

2.1. Type of Study

This is a cross-sectional study carried out in 2019. Data were collected directly from households with at least one child aged between 10 and 23 months.

2.2. Study Framework

The survey took place in the provinces of Ituri and Haut-Katanga. A total of 63 health zones were covered.

2.3. Sampling

2.3.1. Study Population

The study targeted two populations: children aged 12 to 23 months as the primary target, and children aged 10 to 11 months as the secondary target. The advantage of collecting data from the secondary target was to obtain a "real-time" estimate and encourage timely vaccinations. This method made it possible to measure progress in implementing vaccination.

2.3.2. Estimating Sample Size

The sample is constituted at different levels. In the first stage, the provinces, Ituri and Katanga, which were selected by the Expanded Programme on Immunisation, are considered a priori. At the second level, all health zones are also covered. The aim is to cover the entire population exhaustively. It's only at the third stage, concerning the health areas (HA) within the health zones, that the survey begins. In each health zone, 5 health areas are randomly selected. In the fourth stage, neighborhoods and villages are drawn from the HA. Within these statistical units, a plot survey and enumeration is carried out to identify eligible and accessible households. In the final stage, a sample of 20 children per AS was drawn at random, using the following formula for estimating a proportion (vaccination coverage):

$$n \geq [Z^2 xpxq/d^2]\ x\ deff$$

Where:

Z: coefficient for a 95% confidence level

P: proportion of children aged 12-23 months fully vaccinated in the province of Kinshasa = 0.68 (DHS II 2013) as the reference adopted;

q: proportion of children aged 12-23 months not fully vaccinated; deff: cluster effect (design effect = 1.5);

d: degree of precision (= 0.02);

The minimum size of the main target (children aged 12-23 months) was calculated on the basis of the following considerations: expected vaccination coverage at provincial level is 68%, given that we wanted to estimate this coverage at provincial level with a margin of error of 2% and a confidence level of 95%. To comply with the design of the Mashako Plan, a quota of 100 children was allocated to each health zone, which weighed the sample at 6300 children, i.e. 5166 children aged 12-23 months and 1134 children aged 10-11 months, representing a proportion of 18%. The difference in the margins of error used for the two targets was justified by the fact that the immunization coverage indicators for children aged 12-23 months should be as accurate as possible at provincial level, so that they can also be disaggregated by health zone. Using a margin of error of 2% at provincial level, the margin of error increases to 10% for coverage between health zones.

On the other hand, "real-time" vaccination coverage data obtained by targeting children aged 10-11 months, who represent only 18% of the total sample. Their data is only representative at the provincial level and carries an acceptable margin of error of 5%.

3. Results

3.1. Socio-Demographic Characteristics

3.1.1. Age and Gender Structure

The table below shows the distribution of children aged

10-23 months by sex, in the two provinces concerned by this study. Overall, the survey reached almost 48% of children aged 10-23 months in Ituri and 52.28% of children in the same age group in Haut-Katanga.

Table 1. *Proportion of children aged 10-23 months by gender.*

Province	Gender		Total
	Male	Female	
Ituri	52.41	47.59	100
Haut-Katanga	53.31	46.69	100
Set	52.88	47.12	100

Female children are represented at 47.59% and 46.69% respectively in Ituri and Haut-Katanga. The sex ratio is therefore 110 boys per 100 girls in Ituri and 114 boys per 100 girls in Haut-Katanga, reflecting an over-representation of boys compared to girls in both provinces.

Table 2. *Distribution (%) of mothers/caregivers by age group.*

Age groups	Ituri (%)	Haut-Katanga (%)
15 - 19	3.2	5.3
20 - 24	16.9	19.7
25 - 29	32.1	32.4
30 - 34	26.1	20.3
35 - 39	15.2	15.6
40 - 44	5.3	4.0
45 - 49	0.5	0.5
50 - 54	0.1	1.9
55 - 59	0.1	0.2
60 - 64	0.5	0.1
Total	100	100

Detailed examination of the age structure shows that mothers/caregivers of children aged 25-29 account for at least 32% in both provinces. The percentages of the other age groups are more or less evenly distributed between the two provinces.

The age pyramid for mothers/caregivers below shows a classic pattern for countries with high fertility: the base (15-19 years) narrows sharply, widens around 25-29 and narrows again as you move towards older ages.

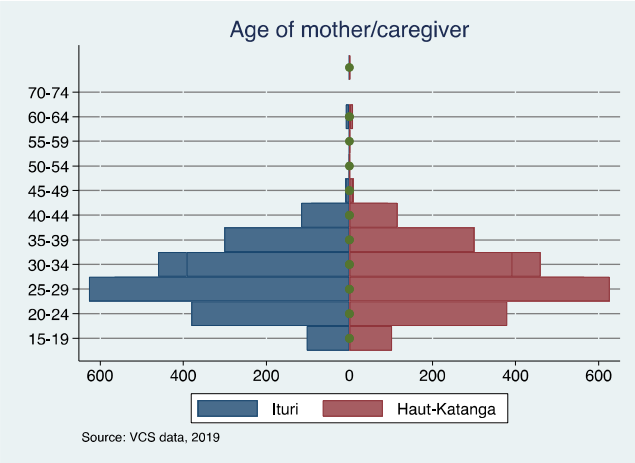

Figure 1. *Age pyramid of mothers/caregivers in the two provinces.*

Table 3. *Distribution (%) of mothers/caregivers according to relationship to head of household.*

Province	Relationship		Total
	Head of Household's Spouse	Other	
Ituri	89.24	10.76	100
Haut Katanga	90.58	9.42	100
Set	89.94	10.06	100

The table above shows that, overall, 89.24% of children aged 10-23 months are raised (looked after) by their mothers in Ituri and 90.68% in Haut-Katanga.

3.1.2. Marital Status

The marital status question was asked of all mothers/caregivers of children usually living in the household. For the 2019 VSS in Haut-Katanga and Ituri, all legally married mothers/caregivers and those living in consensual (free) unions were considered to be in union. The survey results clearly show that, of all the mothers/caregivers eligible for the survey, 86.83% are married (87.95% in Ituri and 87.64% in Haut-Katanga). The proportion of mothers/caregivers living outside a union is relatively low in both provinces (8.5% in Ituri and 6.51% in Haut-Katanga).

Table 4. *Distribution (%) of mothers/caregivers by marital status.*

Province	Marital status			Total
	Outside union	Common-law union	Married	
Ituri	8.50	5.55	85.95	100
Haut-Katanga	5.51	5.84	87.64	100
Set	7.46	5.79	86.83	100

3.1.3. Mother's Level of Education /Childcare Provider

Mother/caregiver education is one of the main determinants of children's well-being. It is therefore important to identify this variable, and in particular its evolution in relation to external collection operations.

Table 5. *Distribution (%) of mothers/caregivers by level of education.*

Education level	Ituri (%)	Haut Katanga (%)
No	5.30	10.90
Primary	42.0	38.50
Secondary	44.9	44.20
Superior	7.80	6.40
Set	100	100

VCS data reveal that 5% of children in Ituri and 10.9% in Haut-Katanga have mothers/caregivers with no education. On the other hand, 42% and 38.5% of children in Ituri and Haut-Katanga respectively have mothers/caregivers with primary education. There are 44.9% of children in Ituri and 44.2% of children in Haut-Katanga whose mothers/caregivers have secondary education. On the other hand, children whose mothers/caregivers have a higher level of education are under-represented, with 7.8% and 6.4% respectively in Ituri and Haut-Katanga.

3.2. Vaccination Coverage of Children Aged 10-23 Months

The fourth Millennium Development Goal (MDG) is to reduce child mortality by two-thirds between 1990 and 2015.

Immunization coverage plays a key role in achieving this goal. There are still 27 million children in the world who are not systematically vaccinated. As a result, over two million children die every year from vaccine-preventable diseases [15-16].

One of the objectives of a World Fit for Children is to guarantee full immunization coverage for 90% of children under one year of age at national level, with coverage of at least 80% in each district (Health Zone) or equivalent administrative unit [17-20].

According to the guidelines of the Ministry of Health, through the Expanded Program on Immunization (EPI) in the DRC, for a child to be declared fully immunized in 2019, he or she should receive before his or her first birthday: BCG and OPV0 vaccination at birth; at 6th week first dose of DTP-HepB-Hib; first dose of OPV, first dose of PCV-13, first dose of Rotacill; at 10th week, second dose of DTP-HepB-Hib; second dose of OPV, second dose of PCV-13, second dose of Rotacill; at 14th weeks, third dose of DTPHepB-Hib; third dose of OPV, third dose of PCV-13, third dose of Rotacill and one dose of (IPV); at 9th months, one dose of AAV and one dose of VAR. During the vaccination coverage survey in Ituri and HautKatanga in 2019, mothers and/or guardians were asked to produce vaccination records. The interviewers copied the vaccination information into the VCS questionnaire. If the child did not have a booklet, the interviewer asked the mother to recall whether or not the child had received each of the vaccinations listed above and, for DTP-HepB-Hib, OPV and PCV-13, how many times he or she had received them. Mothers and/or caregivers were also asked to mention vaccinations received during mass vaccination days.

3.2.1. Vaccination Coverage by Antigen According to Unicef, WHO and EPI Guidelines

The EPI requires all children to be fully vaccinated by their first birthday. Despite this requirement, the performance criterion is set at 95% of children fully vaccinated in relation to the target. This study shows that vaccination coverage for all antigens remains low. The results show that only 53.12% of children received BCG in Ituri province, compared with 46.88% in Haut-Katanga province. Only 39.76% of children in Ituri and 60.24% in Haut-Katanga received this dose of vaccine, which protects newborns against tuberculosis, at birth. The data also show that almost half the children (49.67%) received OPV_0 at birth in Ituri province, compared with 50.33% in Haut-Katanga province. Similarly, 53.13% of children in Ituri province and 46.87% of children in Haut-Katanga province received the first dose of DTP-HepB-Hib. While. On the other hand, 53.21% and 46.79% of children respectively received the second dose of DTP-HepB-Hib in Ituri and Haut-Katanga provinces. In Ituri and Haut-Katanga provinces, 53.25% and 46.75% of children respectively received the third dose of DTP-HepB-Hib. In Ituri, 53.01% of children received the first dose of PCV13, compared with 46.99% in Haut-Katanga. In Ituri and Haut-Katanga, 52.94% and 47.06% of children respectively received the second dose of PCV13. In contrast, 53.24% of children received the third dose of PCV13 in Ituri, versus 46.76% in Haut-Katanga. VAR coverage before the age of 12 months is 51.95% in Ituri and 48.05% in Haut-Katanga, and VAA coverage is 51.67% in Ituri versus 48.33% in Haut-Katanga.

Table 6. *Vaccination coverage by antigen in the two provinces.*

Frequency	Antigens	Province	
At birth		**Ituri (%)**	**Haut-Katanga (%)**
	BCG	39.76	60.24
	VPO_0	49.67	50.33
6th week	VPO_1	53.03	46.97
	PCV13_1	53.01	46.99
	DTC-HepB-Hib1	53.13	46.87
	Rota 1*	-	-
10th week	VPO_2	53.13	46.87
	PCV13_2	52.94	47.06
	DTC-HepB-Hib2	53.21	46.79
	Rota 2*	-	-
14th week	VPO_3	52.75	47.25
	PCV13_3	53.24	46.76
	DTC-HepB-Hib3	53.25	46.75
	Rota 3*	-	-
	VPI	53.66	46.34
9th months	VAR	51.95	48.05
	VAA	51.67	48.33

*: The absence of data in relation to the Rotacill antigen is explained by the fact that it had just been introduced into the DRC childhood immunization schedule during the conduct of this 2019 immunization coverage survey.

3.2.2. Possession of Vaccination Card

Just under half of mothers/caregivers (45.19%) in Ituri have child immunization cards. In Haut-Katanga, just over half of mothers/caregivers (54.81%) have these cards.

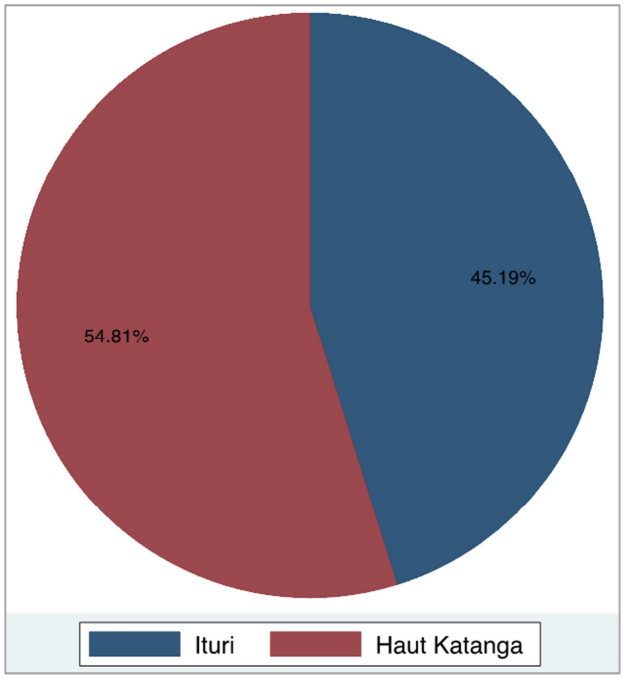

Figure 2. *Possession of vaccination cards by mothers/caregivers of children.*

3.2.3. Full Vaccination Coverage

The results presented in the figure below show that only 48.68% of children had received all vaccinations at any time prior to the survey in Ituri, compared with 51.32% in Haut-Katanga.

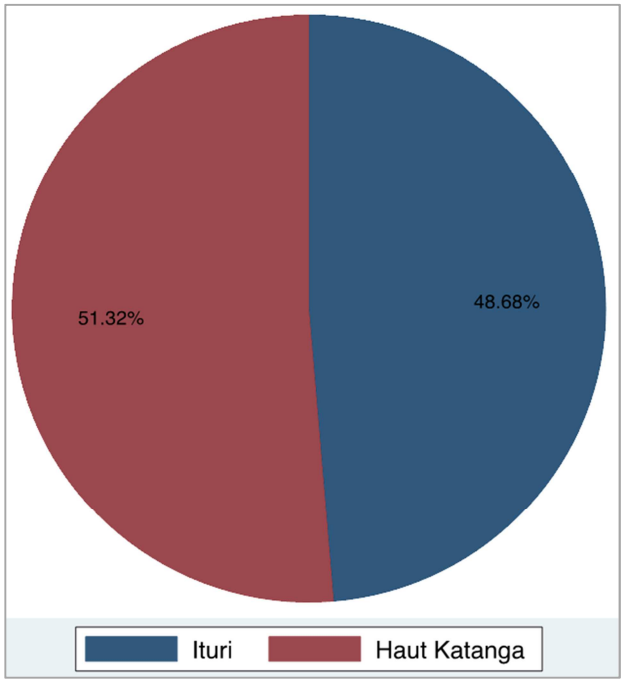

Figure 3. *Complete vaccination coverage.*

The following table shows the reasons why large proportions of children were not fully vaccinated. The data indicate that "mothers/caregivers are often mistaken, thinking that the child was fully vaccinated". This is the main reason for non-vaccination or incomplete vaccination, which accounts for almost 32% of mothers/caregivers in both provinces. Other reasons, such as "postponing the vaccination session to another time", were cited by over 13% of mothers/caregivers in both provinces.

Table 7. *Vaccination coverage by antigen in the two provinces.*

Reasons why children have not received certain vaccines	%
Thought the child was fully vaccinated	31.84
Unaware of child's need for vaccination	4.41
Ignores the need to return for future vaccinations	2.82
Place and/or period of vaccination unknown	2.57
Postponed to another time	13.72
Mother/childminder too busy	7.84
Family problems, including child's illness	2.51
No confidence in vaccination	1.29
Fear of side effects	1.78
Myths/Rumors	0.43
Fear of contraindications	0.24
Vaccination site too far away	1.04
No vaccination agents	0.86
Vaccines not available	4.04
Long waiting times	1.04
Financial barriers	3.55
Sick child - taken to center but	1.29
Sick child - not taken to center	0.73
Other to be specified	18.0
Total	100

4. Determinants of Complete Vaccination of Children Aged 10-23 Months

This section proposes a model of explanatory factors for full childhood vaccination, informed by binary logistic regression. This explanatory model essentially helps us to understand how certain characteristics of mothers/caregivers affect their behaviours towards the vaccination of children aged 10-23 months. In concrete terms, the aim is to understand the influence of each explanatory factor and to identify the determinants of full child immunization in the two provinces (Ituri and Haut-Katanga). We look first at the gross effects and then at the net effects of each explanatory factor. It allows us to check whether the variations observed can be explained by the socio-demographic characteristics of mothers/caregivers in the two provinces. To do this, we first perform a logistic regression, considering complete vaccination (all antigens) as a dichotomous variable, coded 0 if the children received all vaccines and 1 if they did not. Modality 1 is the reference category, given the high proportion of children aged 10-23 months who have received all vaccines. Overall, the results of the regressions presented in the logistic regression model below show that the factors that determine the complete vaccination of children aged 10-23 months are not necessarily the same in Ituri and Haut-Katanga provinces. In terms of gross effects, not all the factors in the one-to-one model influence the complete vaccination of children aged 10-23 months in both provinces. In Ituri, marital status, standard of living and the approximate distance between the household and the health facility (healthcare establishment) affect complete vaccination, while in Haut-Katanga province, the factors influencing complete

vaccination are marital status, the mother/caregiver's professional occupation, standard of living and the approximate distance between the household and the healthcare establishment. As for the net effects of the models, the results show a difference in the factors influencing the complete vaccination of children in the two provinces. The professional occupation of mothers/caregivers affects the complete vaccination of children aged 10-23 months in Haut-Katanga province. On the other hand, the professional occupation of mothers/caregivers does not affect the complete vaccination of children in Ituri province. The age of mothers/caregivers does not affect complete vaccination in either province. Ituri mothers/caregivers in common-law unions are 2.2 times more likely to fully vaccinate their children than single mothers/caregivers, while those in Haut-Katanga province are 40% less likely to vaccinate their children than single mothers/caregivers. Mothers/caregivers in Haut-Katanga who are traders are 1.5 times more likely to fully vaccinate children aged 10-23 months than mothers/caregivers with no occupation, and 1.8 times more likely for mothers/caregivers who are farmers than the reference modality. On the other hand, the professional occupation of mothers/caregivers of children aged 10-23 months did not affect the complete vaccination of children in Ituri.

Mothers/caregivers in Haut-Katanga who belong to the "Église de réveil" religion are 50% more likely to fully vaccinate their children than Catholic mothers/caregivers, while religion has no influence on the full vaccination of children aged 10-23 months in Ituri province. We find that mothers/caregivers in Haut-Katanga province with a high standard of living are 70% less likely to fully vaccinate their children than poor mothers/caregivers. However, standard of living has no effect on the complete vaccination of children aged 10-23 months among mothers/caregivers of children in Ituri province. The approximate distance between the household and the health facility has an influence on the complete vaccination of children aged 10-23 months in both provinces. Mothers/caregivers in Ituri living between 500 m and 1 km from the health facility were 60% less likely to vaccinate their children completely, compared with mothers/caregivers living less than 500 m away. On the other hand, mothers/caregivers in Haut-Katanga province were 60% less likely to vaccinate their children if they lived at an approximate distance of 1km or more between their household and the health facility, compared with those living at a distance of less than 500m. However, the distance between the household and the health facility is a key factor in children aged 10-23 months not being fully vaccinated.

Table 8. *Logistic regression model of complete vaccination of children aged 10-23 months.*

Explanatory variables	Ituri Odds-ratio		Haut-Katanga Odds-ratio	
	Gross effect	Net effect	Gross effect	Net effect
Age of mother/childminder				
15-24 years (Ref)	1	1	1	1
25-34 years	0.9	0.9	0.8	0.8
35-44 years	0.8	0.7	0.9	0.9
45 and over	0.6	0.7	0.2	0.2
Marital status of mother/caregiver				
Living alone (Ref)	1	1	1	1
Common-law union	2.1*	2.2**	0.5*	0.4**
Bride	1.2	1.4	0.8	0.8
Occupation of mother/childcataker				
No profession (Ref)	1	1	1	1
Civil servant	0.8	0.9	1.1	1.3
Retailer	1.1	1.2	1.4	1.5*
Agriculture	1.1	1.3	1.6***	1.8***
Religion of mother/caregiver				
Catholic (Ref)	1	1	1	1
Protestant	1.2	1.2	0.9	1.0
Revival Church	1.3	1.4	1.1	1.5*
Other religion	1.7	1.9*	0.9	1.1
Standard of living of mother/childminder				
Poor (Ref)	1	1	1	1
Medium	0.9	0.9	1.1	1.2
Rich	1.5***	1.3	0.7**	0.7*
Approximate distance between household and health facility				
Less than 500 meters (Ref)	1	1	1	1
Between 500 metres and 1 KM	0.7	0.6**	1,0	1.1
1 Km and more	1.2*	1.0	0,6**	0.6*
Constante		0.6		0.6*
Number of observations		3600		2700
LR chi2		38.9		33.9
Prob>chi2		0.0006		0.0035
R2 username		0.0259		0.0275

Legend: ***: p<0.01; **: p<0.05; *: p<0.10
Source: DHS-RDC 2013-2014, Weighted sample (Individuals with a partner)

5. Conclusion

In the 63 health zones of the two provinces of Ituri and Haut-Katanga, the results of the study reveal that the challenges to be met are enormous, with full immunization coverage at 55.5% and 45.4% respectively. The results also show that 5.5% of children in Ituri have never been vaccinated, compared with 5.4% in Haut-Katanga. This situation constitutes a reservoir of epidemics of vaccine-preventable diseases that will hinder the efforts of EPI and other stakeholders involved in vaccinations from achieving their desired full immunization coverage. Before prioritizing complete universal coverage, it is essential to ensure the data's quality, reliability and relevance. Indeed, for an antigen such as BCG, which is normally and easily given at birth, we observe that 60.8% of mothers/caregivers of children who confirm on declaration versus 34.5% à la carte in Ituri province The same trend was observed in Haut-Katanga, with 55.4% and 38% respectively. The effectiveness of the system is questionable, given that the vast majority of women who give birth in hospitals (95%) do not have vaccination cards, and their children are late in receiving this antigen from birth. This suggests a malfunction at several levels of the health pyramid: stock-outs of vaccination cards, which are sometimes sold out, stock-outs of vaccines when women leave the maternity ward after giving birth, ignorance on the part of mothers who are not made aware of vaccinations, etc [14-16]. In the studies carried out, there is not always a real need to compare the dates of vaccine administration with the vaccination schedule in force in the DRC. This limitation does not always make it possible to determine the real coverage of "fully vaccinated" children. Mothers'/caregivers' declarations are always at odds with the information on vaccination cards. With two sources, the first less reliable than the second, it will be difficult to achieve the desired results.

Vaccine effectiveness in the health zones is only possible if the branch itself supplies the vaccine stock without too many interruptions, campaigns are regular and mothers/caregivers are sufficiently sensitized. Discussion of the results shows that routine indicators will be of little use for monitoring purposes. What's more, coverage data from the MICS DRC (2010) and DHS II DRC (2013-2014) surveys do not allow us to estimate the performance of antennas and health zones. Data from vaccination coverage survey (VCS) studies in the provinces provide an opportunity to start questioning aspects of quality in addition to quantity in vaccinations. With 55.5% of children aged 12-23 months fully vaccinated in Ituri versus 45.4% in Haut-Katanga, and disparities by health zone, immunization coverage is far from having reached the desired optimum level, i.e. 80% at health zone level for each antigen. The coverage figures obtained from this survey highlight the discrepancies with administrative coverage figures, which generally show vaccination performance at provincial level. It is imperative for the EPI and the managers of the Provincial Health Divisions of Ituri and Haut-Katanga, as well as those of the management teams of the 63 health zones, to harmonize the demographic and health data relevant to the calculation of coverage, as well as the methods of calculation. Calculations based on the simple addition of coverage derived from declarations by mothers/caregivers and card-holding do not provide a true picture of coverage. For VCS studies, it would be wiser to rely more on vaccination cards, whose data are more reliable than simple declarations.

A few recommendations are essential for effective vaccination follow-up:

1. Diligent map-only studies to effectively understand and monitor coverage, schedule adherence and attrition;
2. Avoid stock-outs, which are one of the causes of missed vaccination opportunities at a time when mothers/caregivers are ready;
3. Make vaccination cards available to all facilities offering vaccination services;
4. Mobilize greater resources for the EPI;
5. Create more health facilities to reduce the distance between the household and the health facility;
6. Bring vaccination services closer to the hard-to-reach population by implementing advanced strategies;
7. Regular training for EPI technical management providers to bring them up to date on immunization;
8. Regularly raise public awareness of the benefits of vaccination.

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