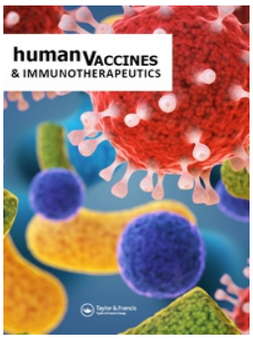

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Optimizing childhood vaccination coverage in Lubumbashi: Expert perspectives on the SCAVA / VACCIN+CONNECT- OS initiative

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ABSTRACT

The Expanded Programme on Immunization (EPI) is a public health intervention aimed at reducing child morbidity and mortality caused by vaccine-preventable infectious diseases, particularly in low-income countries. The Democratic Republic of Congo (DRC) is a country that introduced the national EPI program in 1978. Different ways exist to implement the EPI. The DRC opted for an initiative taken by the family. The coverage is however low, because the country did not conduct a research that identifies factors that constrain optimal vaccine implementation when the decision is at the household level. To get support for a project that investigates that knowledge, a survey was conducted among immunization experts to assess whether exploring the determinants of vaccination coverage in the city of Lubumbashi is worthwhile. Experts were purposively selected through a multidisciplinary approach, targeting individuals with substantial national and international experience in vaccine program implementation, both globally, locally in Africa, and in the DRC. An open-ended questionnaire was developed to explore expert perspectives on optimal vaccine delivery strategies that was conceived in the locally developed SCAVA / VACCIN+CONNECT- OS project (Adaptive Strategy for the Control of Vaccination Activities). Responses were analyzed using mixed quantitative and qualitative methods to identify expert consensus on the need for a local determinants study to enhance vaccine delivery. A total of 167 experts were contacted, and 111 responded (66%). Respondents represented a diverse sample in terms of gender (64% male), age (>50 y: 43%), experience (<10 y: 43%), and professional scope (local/global: 75%). Eighty percent (90/111) supported the initiation of the SCAVA / VACCIN+CONNECT- OS study, followed by the development of an actionable plan to address the identified barriers. They specified multiple reasons and causes of vaccine hesitancy at the household level. Twenty percent (21/111) held a different opinion, citing the immediate need for financial, logistical, and material resources to strengthen vaccination services. The survey demonstrates strong expert support for launching a determinant-focused study like SCAVA / VACCIN+CONNECT- OS as a prerequisite to successful and sustainable vaccination implementation in the DRC. The majority advocated for socio-anthropological and communication-centered public health models, addressing local economic, cultural, and behavioral factors, as an essential foundation for improving childhood immunization coverage.

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Introduction

The Expanded Programme on Immunization (EPI) was launched by the World Health Organization (WHO) in May 1974 as a global initiative to combat 7 major infectious diseases, responsible for high childhood mortality and morbidity.[1] Inspired by the successful eradication of smallpox, the EPI aimed to

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achieve similar outcomes against tuberculosis, diphtheria, tetanus, pertussis, measles, poliomyelitis, and meningitis A by 1990, ensuring equitable access to the vaccines worldwide. In 2024, the EPI celebrated its 50th anniversary, marking five decades of substantial progress.[2] The program has expanded its scope from 7 to 14 vaccines that prevent specific child diseases, driven by major international investments to accelerate the vaccine introduction in low-income countries. The establishment of the Global Alliance for Vaccines and Immunization (GAVI) in 2000 further catalyzed this progress, supporting the deployment of new vaccines against pneumococcal disease, rotavirus, and malaria in resource-limited settings.[3] Despite these achievements at the global level, comparable progress has not always been mirrored at national and subnational levels in low-income countries.[4] Achieving high vaccination coverage a key determinant of child survival remains critical for reducing preventable morbidity and mortality. It protects individuals directly through immunization but also reduces pathogen transmission within communities, strengthening the herd effect.[5]

The Democratic Republic of the Congo (DRC) introduced the EPI in 1978.[6] Different ways exist how to implement a vaccination program in a country going at the one extreme for a structural strategy driven by local authorities to vaccinate and follow-up every newborn versus on the other extreme the initiative should be taken by the household that goes for a vaccine to a healthcare center.[7] There are many variations between those two extremes, but the DRC has opted for the one where the initiative is taken by the family unit. Recent data however indicated that the effective vaccination coverage remained under these circumstances suboptimal, at approximately 48%, according to the 2023–2024 Demographic and Health Survey.[8,9] This low coverage contributes to persistently high rates of preventable child mortality due to recurrent outbreaks of vaccine-preventable infectious diseases.[10] Moreover, the situation in Lubumbashi is alarming, with vaccination rates among children aged 0–24 months as low as 32%. Improving effective coverage could potentially reduce avoidable mortality in this age group by up to 31%.[11]

Two main factors appeared to underlie this persistently low coverage.[12] On the one hand there are operational constraints that include insufficient resources to optimize vaccine logistics. On the other hand, there are the sociocultural determinants, such as limited understanding of community attitudes, beliefs, and perceptions toward vaccination, that hamper an easy acceptance of the vaccination.

Addressing these issues requires an in-depth understanding of both systemic and community-level barriers to vaccination uptake.[13] New vaccine introductions in low-income countries, including the DRC, frequently encounter implementation challenges – particularly during the first year following rollout. Common problems include stockouts, cold chain failures, inadequate financing for transport and fuel, outdated data management tools, and insufficiently trained health personnel about the new vaccines.[14]

Moreover, the pressure to rapidly introduce new vaccines without adequate readiness assessments often exposes systemic weaknesses within national immunization programs. These include poor monitoring of adverse events following immunization (AEFI), inadequate waste management systems for increased biomedical waste, and suboptimal vaccine distribution and record-keeping mechanisms.[15]

Rapid vaccine introduction, when the initiative to vaccinate, remains at the level of the family unit also generates communication challenges, such as poorly defined eligibility criteria, parental concerns about multiple injections, logistical complexity, and limited adaptation of health information systems. Effective vaccine rollout in such an environment normally requires a comprehensive, phased approach, involving coordinated planning, training, monitoring, and communication strategies tailored to local contexts.[16,17]

Recognizing these challenges, the research team at the University of Lubumbashi developed the SCAVA / VACCIN+CONNECT- OS initiative (*Adaptive Strategy for the Control of Vaccination Activities*), a context-sensitive vaccination control strategy designed specifically for the Lubumbashi area. The SCAVA / VACCIN+CONNECT- OS framework focuses on four key determinants influencing the vaccine uptake when the initiative remains at the level of the household which are: the household economic condition (particularly that of mothers managing childcare), the local socio-cultural and ethnic dynamics, the social media and communication practices, and the religious and traditional beliefs.

Proposed interventions include improving logistical accessibility for mothers, adapting communication to local languages and customs, engaging religious leaders to promote vaccination, countering misinformation on mass media, and training auxiliary health staff. SCAVA / VACCIN+CONNECT- OS will be piloted in a semi-urban area of Lubumbashi to assess its effectiveness in addressing these multifactorial barriers for improving vaccine coverage.

The development of SCAVA / VACCIN+CONNECT- OS represents an important step toward conceptualizing a socio-anthropological and communication-based model for public health vaccination strategies in the DRC, especially when the initiative to vaccinate is at the level of the community and not the authority. However, assessing the perceived relevance and feasibility of this approach among experts is essential to ensure alignment with national and international priorities. The present study therefore sought to gather expert opinions on the relevance, necessity, and opportunity of implementing the SCAVA / VACCIN+CONNECT- OS project in Lubumbashi, and to identify key insights explaining the country's persistently low vaccination coverage.

Materials and methods

Study design

To obtain expert support for the SCAVA / VACCIN+CONNECT- OS project, an exploratory, open-ended survey was conducted among professionals with relevant experience in immunization implementation. The questionnaire consisted of qualitative, open-response questions tailored to the SCAVA /VACCIN+CONNECT- OS initiative, allowing participants to express their views freely rather than selecting predefined answers. The methodology was implemented through three main stages: selection of experts, development of the open-ended questionnaire, and analysis of the collected responses.

Selection of experts

The research team at the University of Lubumbashi, which leads the SCAVA / VACCIN+CONNECT- OS project, emphasized the importance of assembling a multidisciplinary and representative panel of experts. Selection criteria included diversity in age, gender, level of professional experience, and domain of expertise (e.g., managerial, clinical, administrative, analytical). The sampling strategy sought to ensure balanced representation across local, national, and international levels.

A minimum of 100 experts was targeted to ensure adequate representation of perspectives and expertise on vaccination implementation challenges in the DRC. Recruitment began in December 2024 and concluded in August 2025.

Data collection involved both in-person interviews (for experts based in Lubumbashi) and telephone interviews (for those residing elsewhere). The list of eligible participants was obtained from the Epidemiological Surveillance Directorate (DES) of the Ministry of Health.

Experts were categorized into five professional groups: international experts (global or Africa-focused), experts from vaccine manufacturing companies, national experts involved in public health or immunization policy, provincial and local health directors, and local field experts involved in direct service delivery.

Questionnaire design

The survey instrument was an open-ended questionnaire designed to collect both general and specific information. The general section explored how each expert perceived the current vaccination situation in the DRC or their region of responsibility. The specific section included questions addressing relevance, necessity, and feasibility of the SCAVA / VACCIN+CONNECT- OS project; expected benefits of the project in improving vaccine coverage; reasons for non-vaccination and vaccine hesitancy; impact of infodemics and misinformation; financial and logistical aspects of vaccination sessions (see Appendix A).

Data analysis

Responses were analyzed using a mixed qualitative – quantitative approach. Quantifiable data were summarized as frequencies or proportions representing positive, neutral, or negative opinions.

Open-text responses were coded thematically and classified into five levels of support: high, moderate, low, neutral, and negative. This categorization enabled a clearer interpretation of expert opinions regarding

the perceived value of SCAVA / VACCIN+CONNECT- OS and the overall determinants of suboptimal vaccine coverage.

Ethical considerations

All participants were informed of the purpose of the study and gave their verbal consent before participation. Data were collected anonymously and treated confidentially. The study protocol was reviewed and approved by the Ethics Committee of the University of Lubumbashi under reference number UNILU/CEM/006/2025 dated January 07, 2025, in accordance with national research ethics guidelines.

Results

Characteristics of respondents

A total of 111 experts participated in the study on 167 requests (66% response rate), providing their views through the open-ended questionnaire. Among the respondents, 64% (n = 71) were male and 57% were older than 50 y, with 22% aged over 70 y. More than half (approximately 55%) had 6–10 y of professional experience, while 21% had over 15 y. All respondents were either directly involved in or provided technical support to EPI. The composition of experts by category, age, gender, and experience is summarized in Table 1.

Perceived relevance, necessity, and feasibility of the SCAVA / VACCIN + CONNECT-OS project

A large majority of respondents (80%) considered the SCAVA / VACCIN + CONNECT- OS project to be a necessary and timely initiative to improve vaccination coverage at local level. However, 20% expressed reservations, arguing that financial, logistical, and material constraints represented more immediate priorities. This minority consisted mainly of frontline field experts rather than higher-level decision-makers.

Evaluation and monitoring opportunities

Experts emphasized that existing vaccination monitoring systems were too routine and standardized and did not capture operational realities in the field. They noted that improved documentation – specifically identifying *who administered which vaccine, how, to whom, and when*—was essential to accurately assess performance.

The introduction of an updated vaccination record card, including the new vaccines, was identified as a key tool for improving the accuracy and reliability of coverage assessments. Respondents agreed that rigorous and consistent data collection was critical for demonstrating real improvements in immunization outcomes.

Reasons for non-vaccination

The vast majority of the respondents attributed vaccine hesitancy primarily to socio-anthropological barriers.[18] These included economic hardship, social and religious beliefs, cultural misconceptions, and the use of non-local languages in communication campaigns. Such barriers

Table 1. Composition of participating experts.

Type of Experts	Number	<50 y	>50 y	Male	Female	<10 y experience	>10 y experience
International Experts – Global	4	2	2	3	1	2	2
International Experts – Africa	2	1	1	1	1	1	1
Pharmaceutical Industry Experts	15	10	5	10	5	11	4
National Experts	7	4	3	4	3	3	4
Provincial Health Directors	24	11	13	16	8	13	11
Local Health Directors	7	2	5	5	2	5	3
Local Field Experts	52	18	34	32	20	28	24
Total	111	48 (43%)	63 (57%)	71 (64%)	40 (36%)	63 (57%)	48 (43%)

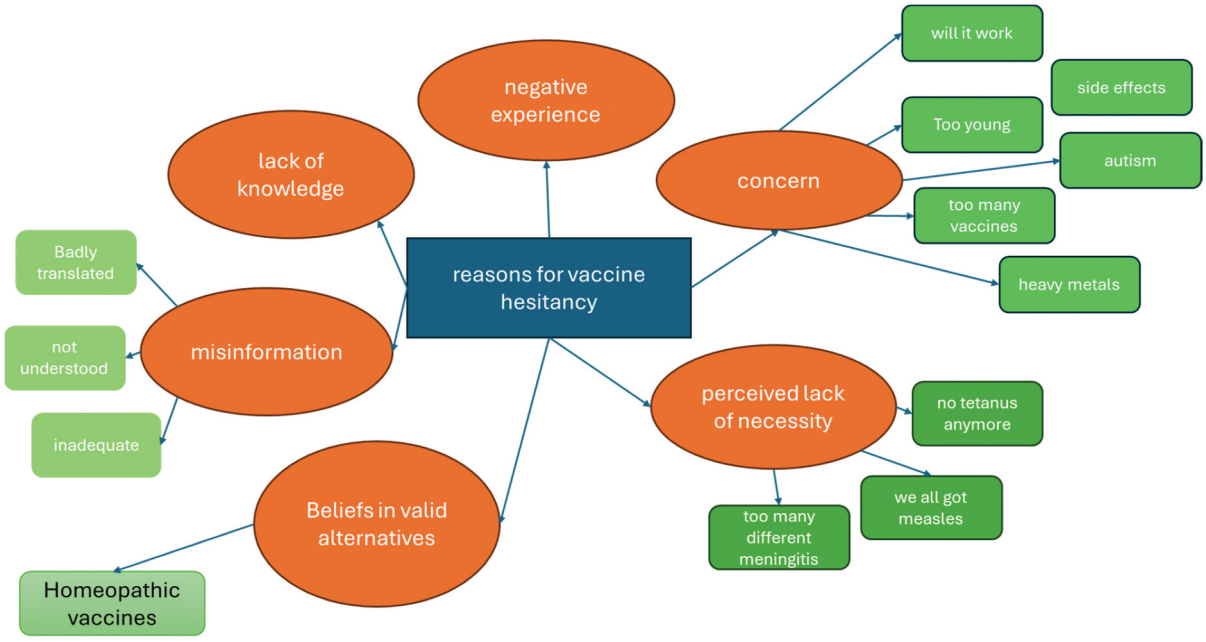

Figure 1. Potential causes of vaccine hesitancy reported by the experts.

were often reinforced by infodemics – the rapid spread of misinformation about vaccines through social media and local communication channels. Approximately 20% of the experts emphasized that vaccines should remain free of charge at all immunization sessions and that greater community participation, especially involving indigenous and local actors, was necessary. The experts estimated that vaccine hesitancy affected about one in five mothers of newborns. These mothers often expressed doubts and anxiety rather than outright rejection of vaccines, largely due to misinformation, perceived lack of necessity, or insufficient knowledge. Figure 1 summarizes the main causes of vaccine hesitancy as reported by respondents.[19,20]

Infodemics and health communication

Nearly 80% of the respondents believed that infodemics were a major factor driving public mistrust in vaccination. They noted a lack of effective risk communication and limited use of behavior-change communication (BCC) approaches to address misinformation or track progress in vaccination coverage. Around 20% of the respondents even identified health professionals themselves as occasional sources of misinformation, either unintentionally or due to contextual economic and social pressures. Experts highlighted the importance of interpersonal communication between health professionals and mothers, emphasizing that this should be participatory and empathetic. They suggested organizing small-group interactive meetings during antenatal care or early postnatal visits to improve understanding and vaccine acceptance. According to the respondents, effective communication should not be limited to factual information on risks and benefits but should also acknowledge and address parental concerns. By doing so, healthcare providers could better respond to the emotional and cognitive dimensions underlying vaccine hesitancy. Many experts recommended a multi-stakeholder approach to communication, combining institutional messaging with community-level dialogue, religious engagement, and media regulation to reduce misinformation and build trust.[21–23]

Vaccine costs during immunization sessions

A large majority (80%) of the respondents strongly supported the free provision of vaccines during immunization sessions in all healthcare facilities. The remaining 20% believed that the government should assume full financial responsibility under the framework of universal health coverage.

Table 2. Summary of expert opinions.

Item	High	Moderate	Low	Neutral	Negative	Total
Relevance, necessity, and feasibility of SCAVA / VACCIN+CONNECT- OS	62%	20%	7%	6%	5%	100%
Evaluation and monitoring opportunities	70%	14%	3%	6%	7%	100%
Reasons for non-vaccination	72%	12%	4%	5%	7%	100%
Infodemics and health communication	74%	8%	7%	6%	5%	100%
Cost of vaccines during sessions	75%	6%	7%	6%	6%	100%

Summary of expert opinions

Table 2 provides an overview of expert responses categorized by the level of support expressed. The first two indicators relate to the evaluation and implementation of the SCAVA / VACCIN+CONNECT- OS project, while the remaining three highlight priority focus areas for successful project outcomes.

Discussion

This exploratory study aimed to gather expert perspectives on the perceived relevance, necessity, and feasibility of the SCAVA / VACCIN+CONNECT- OS initiative in improving childhood immunization coverage in Lubumbashi. The findings demonstrate broad consensus on the urgent need for innovative, context-sensitive strategies to overcome persistent barriers to vaccination uptake, especially in an environment where the vaccination initiative had to be taken by the family or household. A key insight from this study is that most experts view socio-anthropological factors – rather than logistical or financial constraints – as the primary drivers of low vaccination coverage. This aligns with evidence from other low- and middle-income countries (LMICs), where vaccine hesitancy often arises from complex interactions among cultural norms, misinformation, economic insecurity, and limited health literacy.

The experts' overwhelming support for a socio-anthropological approach underscores a broader shift in public health thinking: effective vaccination cannot rely solely on the biomedical model or supply-side interventions. Instead, it requires a holistic understanding of community beliefs, social structures, and communication dynamics, which are critical for building trust and ensuring sustained behavioral change.

Socio-anthropological and behavioral dimensions

The persistence of vaccine hesitancy in the DRC reflects deep-rooted social determinants that have long been underexplored in vaccination programs. As highlighted by the respondents, economic hardship, religious and cultural beliefs, and language barriers often intersect to shape parental decision-making. This finding reinforces the need for contextualized interventions that integrate behavioral and anthropological insights into immunization policy.

Globally, recent studies have shown that community engagement and culturally adapted communication strategies – particularly those involving trusted local figures such as religious leaders, traditional authorities, and community health workers – significantly increase vaccine acceptance.[24–26] The SCAVA / VACCIN +CONNECT- OS model, by incorporating these elements, aligns with current best practices in human-centered public health design.

The role of communication and infodemics

Another major theme emerging from the study is the growing influence of infodemics – the uncontrolled spread of misinformation during health crises – on vaccine confidence. Experts consistently identified misinformation on social media and poor communication practices as critical obstacles. While traditional health promotion campaigns often focus on delivering factual information, evidence suggests that emotional resonance and dialogue-based approaches are far more effective in correcting false beliefs and motivating action.

In this context, interpersonal communication at the point of care – particularly between mothers and health workers – plays a pivotal role. When trust and empathy are established, vaccine uptake tends to

improve significantly. Therefore, training healthcare workers in communication and counseling skills should be considered a strategic priority for the SCAVA / VACCIN+CONNECT- OS project and the national EPI program as a whole.

Operational and systemic barriers

Although most respondents emphasized socio-behavioral factors, several also highlighted persistent operational weaknesses that undermine immunization efforts. These include vaccine stockouts, cold chain disruptions, limited funding for transport and fuel, and insufficiently trained staff. These systemic issues compound the effects of vaccine hesitancy and contribute to public frustration, further eroding confidence in the health system. A comprehensive strategy such as SCAVA / VACCIN+CONNECT- OS should therefore combine behavioral interventions with operational strengthening, ensuring reliable vaccine supply, real-time data collection, and continuous performance monitoring. In particular, digitized vaccination registers could play a transformative role in improving the traceability and evaluation of immunization coverage. Understanding well the economic dilemma of family mothers about time to be spent every day about nutritional focus for the whole family versus the vaccination of one child imposes that the vaccination procedure must most efficient, easily accessible, and time flexible to the demand and need of the requirement of the families.[27]

Policy implications

The high level of expert support for the SCAVA / VACCIN+CONNECT- OS initiative suggests strong potential for national adoption. The DRC's Ministry of Health and its partners could leverage SCAVA / VACCIN+CONNECT- OS as a pilot model for integrated immunization strategies, combining socio-anthropological insights with improved management and communication practices. Such an approach would also align with WHO's *Immunization Agenda 2030 (IA2030)*, which emphasizes context-driven, people-centered, and equity-focused vaccination programs.[28]

The experts' responses also highlight the importance of capacity-building within the health workforce. Training modules on communication, anthropology, and data-driven management should be incorporated into the national immunization curriculum. Strengthening interdisciplinary collaboration among epidemiologists, anthropologists, and communication specialists will be essential to operationalize this vision.

Study limitations

The study has several limitations. First, it relies on self-reported opinions, which may be influenced by respondents' professional backgrounds or personal experiences. Second, because the survey was exploratory and nonrandom, its findings cannot be generalized to all immunization experts in the DRC or globally. Nevertheless, the diversity and depth of expertise represented – spanning international, national, and local levels – provide valuable insights into the structural and behavioral barriers to vaccination coverage in low-resource settings.

Key takeaways

Overall, this study reinforces the idea that increasing vaccination coverage in an environment where mothers or other family members must initiate the wellness to vaccinate their children requires more than logistical efficiency. It depends on cultural understanding, effective communication, and systemic accountability.

The SCAVA / VACCIN+CONNECT- OS model offers a promising framework for integrating these dimensions and see how it works out at best in a replicable pilot project for other provinces in the DRC and similar contexts across Sub-Saharan Africa. It could also emphasize that maybe the other ways of implementing vaccination is the better option to go for when the cultural diversity and heterogeneity of the population complexify too much public health interventions at great benefit.

Conclusion

This study highlights the urgent need for a new, contextually grounded approach to improving vaccination coverage in DRC. Despite decades of national and global efforts under the EPI program, progress remains uneven and hindered by both systemic and socio-anthropological barriers. The SCAVA / VACCIN+CONNECT - OS initiative – based on a behavioral and communication-centered public health model – emerges as a promising framework for addressing these challenges when the initiative to vaccinate remains in the hands of family or household. By emphasizing community engagement, cultural sensitivity, effective communication, multidisciplinary collaboration, with the focus to comply at best with the economic needs and demands of the local people (family mothers), SCAVA / VACCIN+CONNECT- OS offers a pathway toward more sustainable immunization outcomes.

Expert consensus underscores the importance of strengthening interpersonal communication between healthcare providers and caregivers with the use of local languages; engaging trusted local actors – including religious and traditional leaders – to foster vaccine confidence; ensuring operational reliability, particularly in logistics, financing, data management, accessibility and time flexibility; and integrating socio-anthropological research into national immunization strategies.

Moving forward, the implementation of SCAVA / VACCIN+CONNECT- OS in Lubumbashi could serve as a pilot model for scaling up similar interventions across other provinces and potentially in comparable contexts in Sub-Saharan Africa. To achieve lasting impact, the initiative must be embedded within the national immunization framework and supported by adequate policy, financial, and institutional mechanisms. Ultimately, improving vaccination coverage in the DRC will require not only vaccines and infrastructure, but also trust, dialogue, and social participation – the very principles at the heart of the SCAVA / VACCIN+CONNECT- OS model.

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All authors contributed to this work and have read and approved the final version.

Author contributions

CRediT: **Badypwyla Israël:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing; **Marc Raes:** Conceptualization, Formal analysis, Supervision, Validation, Writing – review & editing; **Jean Marie Dikanga Kazadi:** Conceptualization, Formal analysis, Writing – review & editing; **Emmanuel Mpinga Kabengele:** Formal analysis, Writing – review & editing; **Gilbert Malemba N'sakila:** Conceptualization, Methodology, Validation, Writing – review & editing; **André Mutombo Kabamba:** Conceptualization, Methodology, Validation, Writing – review & editing.

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Notes on contributor

Badypwyla Israël, a medical doctor specialized in epidemiology and preventive medicine, with a professional orientation focused on disease control and population health. I serve as a Senior Lecturer (Chef de Travaux) at the Faculty of Medicine, University of Lubumbashi, and I am an international expert in regional and intercontinental integration frameworks, particularly within HAQAA3 and OBREAL initiatives.

My expertise is firmly grounded in integrated approaches to health promotion, the evaluation of public health interventions, and the improvement of evidence-based community health practices. I am actively engaged in scientific research, academic supervision, and inter-institutional collaboration within my department, faculty, and university, as well as in various international public health networks.

My work is specifically oriented toward improving childhood vaccination coverage indicators among children aged 0 to 24 months, through effective, sustainable, and context-adapted public health strategies. This reflects a strong scientific and operational commitment to strengthening health systems and improving community well-being.

Within this applied research and systems-thinking framework, I developed the integrated conceptual model **SCAVA / VACCIN+CONNECT- OS**, an innovative approach aimed at improving vaccination coverage by addressing the multidimensional determinants of low immunization rates in Lubumbashi.

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