

Assessment of the Operational Coordination of Surveillance and Response to Noncommunicable Diseases in the Butembo Branch of the North Kivu Provincial Health Division, DRC

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Abstract Coordinated surveillance and response are essential for transforming data on noncommunicable diseases (NCDs) into evidence-based prevention and care interventions. This study assessed the level of such coordination in the health districts under the jurisdiction of the Butembo provincial health division in the Democratic Republic of the Congo. This quantitative, descriptive, cross-sectional, evaluative study used a comprehensive approach across all 17 health districts under the Butembo provincial health division. Data were collected using a framework combining a structured questionnaire, observation rubrics, a document review, and the extraction of indicators from the District Health Information Software 2 (DHIS2). Standardised scores were classified as low (<50%), moderate (50–74%), or high (≥75%). The average overall coordination score was $33.76 \pm 5.90\%$, and all districts scored at a low level. The mean score was $45.93\% \pm 7.16\%$ for surveillance coordination, $34.74\% \pm 3.85\%$ for organizational capacity and $17.86\% \pm 11.35\%$ for response coordination. Indicators extracted from DHIS2 had the highest score (86.76%), while coordination of risk factor surveillance was nearly nonexistent (3.43%). The existing system was primarily oriented towards data collection and transmission, with limited translation of surveillance data into concrete prevention and care interventions. Strengthening the surveillance system and integrating NCDs into health and humanitarian emergency preparedness and response plans are essential.

Keywords Coordination, DHIS2, Non Communicable Diseases, North Kivu, Response, Surveillance.

Introduction

Noncommunicable diseases (NCDs) are currently one of the major global public health challenges. According to the World Health Organization [1] in 2021, NCDs were responsible for approximately 43 million deaths worldwide, including at least 18 million premature deaths, that is, deaths occurring before the age of 70 years. This mortality is primarily attributable to four major groups of conditions: cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases. These diseases are strongly associated with four major risk factors: tobacco use, physical inactivity, harmful use of alcohol, and unhealthy diets. The situation is particularly alarming in low- and middle-income countries (LMICs), which account for approximately 73% of NCD-related deaths and 82% of premature deaths, at a time when these countries are undergoing demographic, nutritional, and epidemiological transitions [2-5].

In the WHO African Region, NCDs occur within the context of a dual health burden, characterized by the coexistence of chronic diseases, communicable diseases, public health emergencies, and humanitarian crises. The WHO Regional Office for Africa [6, 7] reports that NCDs account for an increasingly large share of total mortality in the region. This trend is exacerbated by shortages of essential medicines, screening and diagnostic technologies, trained human resources, and mechanisms for long-term follow-up of patients with chronic conditions. This situation in many resource-limited countries reflects the inadequate preparedness of health systems to meet the growing needs associated with NCDs [8, 9].

In the Democratic Republic of the Congo (DRC), the lack of reliable nationwide data is among the challenges related to NCDs; this limits our understanding of the scale of the problem, even as the country is undergoing a

demographic transition amid a difficult socioeconomic and security context. Consequently, controlling NCDs while carrying out activities to combat communicable diseases remains a difficult task [10, 11]. However, the WHO's "*Health at a Glance*" report published in 2021 highlights that the estimated number of deaths reported by the DRC was 857,667, of which 35% were associated with NCDs [12].

In North Kivu, the extent of NCDs remains insufficiently documented. However, routine data from DHIS2 for the period 2019–2023 indicate a significant clinical burden associated primarily with hypertension, diabetes, heart failure, bronchial asthma, and strokes [13]. In the Nyiragongo health district in North Kivu, for example, the prevalence of hypertension among adults was 36.1%, while only 2.4% of people with hypertension were receiving treatment [14].

While the response to NCDs implies transforming surveillance data into concrete actions in terms of prevention, screening, diagnosis, treatment, referral, long-term follow-up, and continuity of care, many frontline services remain inadequately prepared to manage NCDs, particularly at the primary care level [15]. These weaknesses relate in particular to trained human resources, diagnostic tests, clinical guidelines, essential medicines, equipment, and mechanisms for improving the quality of care. These gaps are particularly evident at the peripheral level of the health system, which is nonetheless the gateway to prevention, screening, management, and community-based follow-up for chronic diseases [8, 16-18]. Coordinating surveillance and the response to NCDs in fragile settings becomes even more critical. Continuity of care for patients with chronic conditions is severely disrupted, due in particular to service disruptions and organizational barriers to access [19]. From this perspective, integrating NCDs into preparedness and response approaches for all health risks appears

necessary [20]. In North Kivu, this issue is particularly acute due to insecurity, population displacement, the disruption of services, and repeated health emergencies, all of which can affect the quality of surveillance, supervision, and the organization of an appropriate response [12, 21-23].

Most available studies in LMICs focus on health-facility readiness, particularly the availability of trained staff, guidelines, diagnostic technologies, medicines, and models of primary care [8, 15-18]. However, less attention has been paid to how district-level coordination links routine surveillance data to prevention, care, referral, and continuity interventions, especially in fragile and humanitarian settings [19, 20].

Since coordination mechanisms between the District Management Office (DMO), health facilities, routine data, and response interventions have been little explored particularly within the Butembo provincial health division branch this study aims to assess the level of coordination in surveillance and response to noncommunicable diseases (NCDs) to identify the system's strengths and weaknesses, as well as organizational shortcomings that may limit the use of data and the implementation of an appropriate NCD response in the context of North Kivu Province. This evidence gap is particularly important in North Kivu, where recurrent insecurity and service disruptions may weaken both routine surveillance and the translation of data into sustained NCD action [21-23].

Materials and Methods

Study Design

The study was conducted using a quantitative, descriptive, cross-sectional, and evaluative approach at the central offices of the health districts under the Butembo PHD branch. It aimed to assess the level of coordination of surveillance and response to NCDs based on measurable indicators. Using DHIS2, reporting indicators were documented retrospectively for

the period from January to December 2025, while other data related to routine activities reflected the situation observed at the time of the survey.

Study Setting

The study was conducted at the Butembo provincial health division branch, North Kivu Province, in the Democratic Republic of the Congo; this branch comprises 17 health districts, each coordinated by a district management office (DMO), which serves as the operational level for coordinating health activities, including the coordination of surveillance and response to noncommunicable diseases. Thus, the DMO, not individual health facilities was the unit used to assess district-level operational coordination.

Study Population

The study focused on a population comprising the 17 health districts under the jurisdiction of the Butembo provincial health division branch, selected using an exhaustive approach. The units of observation for this study were the DMOs, the structures responsible for planning, coordinating, monitoring, supervising, and managing health facilities at the health district level. In practice, information was obtained from a member of the district management team (district management officer, supervising nurse, data manager); this information was supplemented by a document review and direct observation.

Sampling

Due to the limited size of the population, the 17 health districts under the jurisdiction of the Butembo provincial health division branch were selected exhaustively as study units through their district management offices; this provided a comprehensive assessment of the capacity to coordinate surveillance and response to NCDs across the entire branch.

Data Collection Techniques and Tools

Data collection was conducted exclusively by the principal investigator between June and July 2026 using a data collection form programmed in KoboToolbox. This form combined a structured questionnaire, direct observation, a document review, and data extraction from DHIS2. Certain statements were verified against the DMO's records, reports, operational plans, meeting minutes, and other archives. Three components were evaluated. First, surveillance, which covered risk factors, organization and management, morbidity, mortality, complications, the information system, the quality of reporting, and data use. The response component, for its part, focused on prevention, governance, diagnosis, medications, emergencies, referrals, business continuity, and community participation. Finally, organizational capacities included human, logistical, and financial resources, partnerships, and monitoring.

Items were scored on a scale of 1 to 3: 1 for an element that was absent or not implemented; 2 for an element that was partially present, irregular, or insufficiently documented; and 3 for an element that was available, structured, and documented. Reporting indicators namely completeness, timeliness, quality of data entry, and feedback were retrospectively extracted from DHIS2 for January through December 2025. For these indicators, a score of 1 corresponds to a percentage < 80%; a score of 2 corresponds to a percentage between 80 and 89%; and a score of 3 corresponds to a percentage ≥ 90%.

The scoring grid was developed based on the WHO PEN [24], the SARA approach [25], and the WHO STEPS framework [26]. It was reviewed by three independent experts two researchers in NCDs and one expert in epidemiological surveillance and then pretested in early June 2026 in the Nyangezi health district in South Kivu.

Data Analysis

The data were analysed using IBM SPSS Statistics software, version 22, and were subjected to descriptive analysis, including frequencies, percentages, means, medians, and standard deviations (SD). The internal consistency of the assessment grid was evaluated using Cronbach's alpha [27]. To assess the performance level in each domain studied, the various scores assigned to the indicators were converted into percentages. In the absence of normative thresholds, operational thresholds were defined to facilitate the interpretation of the scores obtained in each domain. Since each item was rated on a scale from 1 to 3, the scores were converted to a percentage of the maximum possible (POMP), according to the POMP method proposed by Cohen et al. and recently applied by Schwappach et al. [28, 29] using the following formula:

$$\text{Standardised score} = \frac{\text{score achieved} - \text{lowest possible score}}{\text{Highest possible score} - \text{Lowest possible score}} \times 100$$

Through this transformation, the scores were scaled to a range of 0 to 100%, without altering the initial rating scale of 1 to 3 [28]. Thus, for practical purposes, a score below 50% was classified as low; a score between 50% and 74% was classified as moderate; and a score of 75% or higher was classified as high. Using the scores obtained for all items, the overall score was calculated as the sum of the scores obtained relative to the total range of theoretically possible scores, then scaled to a range of 0 to 100. These cut-offs were operational rather than normative; scores therefore indicate relative attainment of the assessed coordination criteria, not clinical performance standards.

Ethical Considerations

Ethical approval was obtained from the Ethics Committee of Lukanga Adventist University (CER/UNILUK/CER-FRIDI-UNILUK/2026/0028). In addition to this approval, an authorization to collect data was issued by the Head of the North Kivu provincial health division under number 251/178/DPS-NK/BN/2026. Participation in the study was formalized by the signing of an informed consent form that specified the study's objectives, the right to refuse to answer certain questions, and the guarantee of anonymity and confidentiality of the information collected. However, this anonymization did not apply to the identification of health districts as units of data analysis.

Results

General Characteristics of the Studied Health Districts

The health districts (HD) under the Butembo Provincial Health Division, Butembo branch are predominantly rural, with 13 out of 17 HD or 76.5% being rural; three HD or 17.6% are urban; and only one district or 5.9% is urban-rural. Ten health districts, or 58.8%, have average accessibility, while three districts, or 17.6%, are considered difficult to access; four health districts, or 23.5%, are relatively easy to access. Support from technical and financial partners for NCDs remains limited; thirteen out of 17 health districts (76.5%) received no specific support for NCD surveillance and response activities, while four others (23.5%) reported only occasional support. No health districts reported regular, structured support specifically dedicated to NCDs (Table 1).

Table 1. General Characteristics of the Health Districts

	Sample Size (n = 17)	Percentage
Type of Health District		
Rural	13	76.5
Urban	3	17.6
Urban-rural	1	5.9
Geographic Accessibility		
Difficult	3	17.6
Average	10	58.8
Easy	4	23.5
Partner Support for NCDs		
No support	13	76.5
Occasional support	4	23.5
Regular support	0	0.0

Internal Consistency of the Instrument

For the instrument as a whole, internal consistency was high, with a Cronbach's alpha of 0.905; this value indicates that the items collectively contributed to a consistent measurement of the level of operational coordination despite the small number of

observation units and the multidimensional nature of the scale. The surveillance dimension showed good internal consistency ($\alpha = 0.811$), while the response dimension had excellent internal consistency ($\alpha = 0.918$). In contrast, the alpha for organizational capacities was low ($\alpha = 0.485$); this result can be explained by the multidimensional nature of this component,

which encompasses human resources, logistics, funding, partnerships, supervision, and continuous improvement.

Overall Level of Operational Coordination of Surveillance and Response

The overall level of operational coordination of monitoring and response is presented in Table 2. The analysis focused on three complementary components: NCD surveillance, the operational response to these diseases, and the organizational capacities required for their coordination. Overall, the results indicate that the system established for NCD surveillance and response remains underperforming. The average overall score for operational coordination was $33.76\% \pm 5.90$, with a median of 34.04%. The observed values ranged from 26.60% to 49.47%, highlighting a relatively moderate dispersion but, more importantly, the fact that not a single health district reached the 50% threshold

corresponding to the average level. Thus, all 17 health districts were generally classified in the low coordination level category.

Surveillance nevertheless remained the relatively most developed dimension, with an average score of $45.93\% \pm 7.16$. It outperformed organizational capacities, which averaged $34.74\% \pm 3.85$. The response to NCDs appeared to be the component with the greatest shortcomings, at only $17.86\% \pm 11.35$. The gap of nearly 28 points between surveillance and response indicates that mechanisms for collecting and transmitting information are more firmly established than concrete interventions for the prevention, diagnosis, management, and follow-up of NCDs at the Butembo provincial health division branch. Accordingly, the higher surveillance score should not be interpreted as strong NCD surveillance overall, because it was largely driven by routine DHIS2 reporting while risk-factor surveillance remained extremely weak.

Table 2. Overall Operational Coordination

Dimension	Mean $\pm$ SD (%)	Median (%)	Min–Max (%)
Surveillance of NCDs	45.93 ± 7.16	45.59	30.88–61.76
NCD response	17.86 ± 11.35	19.64	3.57–46.43
Organizational capacity	34.74 ± 3.85	35.94	28.12–40.62
Overall coordination	33.76 ± 5.90	34.04	26.60–49.47

Results by Assessed Domains

Table 3 presents the different results by assessed area. A high degree of heterogeneity in performance emerges upon detailed examination of the various domains. Reporting indicators extracted from the DHIS2 platform showed the highest score, at $86.76\% \pm 26.69$, corresponding to an overall high level. The areas of reporting, data quality, analysis, and improvement, meanwhile, achieved an average score of $57.45\% \pm 11.27$. However, the other components of surveillance remained weak. Institutional organization and management scored $46.57\% \pm 5.94$, while tools, resources,

and information systems scored $42.86\% \pm 7.99$. Surveillance of morbidity, complications, and mortality scored $36.93\% \pm 5.87$. The main weakness concerned the surveillance of NCD risk factors, for which the average score was only $3.43\% \pm 4.23$.

Areas related to the response were particularly inadequate, indicating a low level of coordination or support from the DMOs regarding staff training, equipment, funding, and supervision. The DMOs' involvement in governance, prevention, and response coordination scored $10.29\% \pm 12.68$. DMO support regarding the availability of tests and

diagnostic technologies reached $16.54\% \pm 14.14$, while coordination of continuity of care, referral, community engagement, and patient support stood at $13.87\% \pm 10.56$. Coordination regarding medications, supplies, emergencies, and ongoing care showed a slightly higher, though still low, score of $29.83\% \pm 16.02$.

Organizational capacities revealed poor coordination; the area of human resources and their competencies scored $24.63\% \pm 7.15$, and logistical and financial resources and partnerships scored $26.96\% \pm 7.53$. Supervision, support for health facilities, and continuous improvement reached $34.71\% \pm 11.25$.

Table 3. Performance of Operational Coordination Components

Component	Coordination Areas Evaluated	Mean $\pm$ SD (%)	Average Score Classification
Surveillance	Reporting indicators extracted from DHIS2	86.76 ± 26.69	High
Surveillance	Reporting, Quality, Analysis, and Improvement	57.45 ± 11.27	Medium
Surveillance	Institutional Organization and Management	46.57 ± 5.94	Low
Surveillance	Tools, Resources, and Information Systems	42.86 ± 7.99	Low
Surveillance	Surveillance of morbidity, complications, and mortality	36.93 ± 5.87	Low
Organizational capacities	Supervision, support for health facilities, and continuous improvement	34.71 ± 11.25	Low
Response	Medications, supplies, emergencies, and ongoing care	29.83 ± 16.02	Low
Organizational capacities	Logistical and financial resources and partnerships	26.96 ± 7.53	Low
Organizational capacity	Human resources and skills	24.63 ± 7.15	Low
Response	Tests and diagnostic technologies	16.54 ± 14.14	Low
Response	Continuity, referral, community, and support	13.87 ± 10.56	Low
Response	Governance, prevention, and response coordination	10.29 ± 12.68	Low
Surveillance	Surveillance of risk factors	3.43 ± 4.23	Low

Variations in the Level of Coordination among Health Districts

The operational coordination scores by health district are presented in Table 4. Although all districts were classified as “low,” their scores revealed distinct profiles. Beni ranked first with an overall score of 49.47%, close to the threshold for the average level. This

district also had the highest score for surveillance (61.76%) and the highest response score (46.43%), even though its organizational capacity remained low (39.06%). Maseraka ranked second with 39.89%, followed by Mabalako (39.36%), Vuhovi (37.77%), and Kyondo (37.23%). These districts generally combined relatively more developed

surveillance with a response that was still insufficient.

An intermediate group consisted of the Alimbongo, Kayna, and Oicha health districts, each scoring 34.57%, followed by Mutwanga (34.04%) and Musienene (32.45%). Kamango had an overall score of 31.38%. The lowest scores were observed in Lubero and Manguredjipa (29.79% each), Katwa (28.72%),

Kalunguta (27.13%), as well as in Biena and Butembo (26.60% each). However, the same overall score could mask different situations. Lubero achieved 50.00% for surveillance but only 5.36% for response. Biena had the highest organizational capacity of all districts (40.62%), while its surveillance score was only 30.88%. Butembo recorded the lowest response score, at 3.57%.

Table 4. Operational Coordination Scores by Health District

Rank	Health District	Surveillance (%)	Response (%)	Organizational Capacity (%)	Overall Score (%)	Level
1	Beni	61.76	46.43	39.06	49.47	Low
2	Maseraka	55.88	23.21	37.50	39.89	Low
3	Mabalako	51.47	25.00	39.06	39.36	Low
4	Vuhovi	52.94	26.79	31.25	37.77	Low
5	Kyondo	45.59	26.79	37.50	37.23	Low
6	Alimbongo	44.12	21.43	35.94	34.57	Low
6	Kayna	47.06	19.64	34.38	34.57	Low
6	Oicha	42.65	23.21	35.94	34.57	Low
9	Mutwanga	45.59	17.86	35.94	34.04	Low
10	Musienene	42.65	19.64	32.81	32.45	Low
11	Kamango	45.59	5.36	39.06	31.38	Low
12	Lubero	50.00	5.36	29.69	29.79	Low
12	Manguredjipa	36.76	21.43	29.69	29.79	Low
14	Katwa	44.12	5.36	32.81	28.72	Low
15	Kalunguta	42.65	7.14	28.12	27.13	Low
16	Biena	30.88	5.36	40.62	26.60	Low
17	Butembo	41.18	3.57	31.25	26.60	Low

Discussion

Operational coordination was low overall (33.76%), with surveillance performing better than organizational capacity and response. This pattern suggests the system is stronger in routine data reporting than in converting information into coordinated NCD prevention and care.

The low overall level observed is corroborated by the results of several studies conducted in low- and middle-income countries characterized by a lack of preparedness in primary care systems to manage NCDs. A systematic review conducted by Kabir et al.[15]

highlighted frequent shortages of trained personnel, clinical guidelines, equipment, diagnostic tests, and essential medications in primary care facilities. Similar findings were observed in several South Asian countries, despite the rapidly increasing burden of NCDs, although these findings related more to health facility assessment than to DMO coordination [8]. A distinctive feature of the African context remains the fact that limited resources are primarily directed toward acute communicable diseases and humanitarian emergencies [9, 30].

Surveillance was the relatively most developed area, primarily due to the

performance driven by indicators extracted from DHIS2 namely, completeness, timeliness, data entry quality, and feedback with an average score of 86.76. However, this performance should be interpreted with caution; it appears to be a result of the routine reporting system and the achievements of SNIS/DHIS2 in the area of reporting, unrelated to the strengthening of specific surveillance for NCDs. Indeed, good reporting indicators can coexist with insufficient surveillance of risk factors, complications, longitudinal follow-up, and the effective use of data for decision-making; this can thus mask the shortcomings specific to NCD surveillance, particularly in a system more concerned with the administrative transmission of data to higher levels than with its local use [26, 31]. The mere availability of DHIS2 does not guarantee effective surveillance. Analytical skills, along with organizational support and a culture conducive to using data for decision-making, are all elements that must be leveraged to ensure the effectiveness of DHIS2 [32].

The main weakness in surveillance coordination remains the inadequate surveillance of risk factors, with an average score of 3.43% and a median of zero; in other words, at the operational level, interventions targeting tobacco use, harmful alcohol use, physical inactivity, and unhealthy diets were barely integrated into the routine activities of health districts. Attention is primarily focused on diagnosed diseases and services provided, thereby limiting health officials' knowledge of risk factors in a context where no STEPwise survey has ever been conducted in North Kivu Province [33].

Coordination of NCD response activities was particularly weak. The areas of governance, prevention, and coordination scored an average of 10.29%, while activities supporting the availability of diagnostic tests and technologies reached 16.54%. Support for continuity of care, referral, community engagement, and patient support scored

13.87%. These results are consistent with evaluations that have shown low availability of essential NCD control services in several primary care systems, which struggle to translate the data they generate into concrete screening, diagnostic, treatment, and follow-up services [16, 17]. Inadequate monitoring of tests, technologies, medications, and supplies is likely to lead to diagnostic delays, treatment interruptions, and an increase in complications. These observations confirm the importance of an integrated package that combines essential medicines, basic technologies, clinical protocols, and trained personnel, in accordance with WHO PEN guidelines [24].

In the specific context of North Kivu, which is suffering the negative effects of insecurity, population displacement, and service disruptions, the lack of support from the DMOs for the continuity of chronic care remains a concern for NCDs that require prolonged follow-up. Integrating the NCD dimension into preparedness and response plans for humanitarian crises could reduce medication shortages and disruptions in care pathways [19, 20].

The organizational capacities of health districts to address NCDs were also weak, particularly in terms of human resources and skills which scored an average of 24.63% as well as logistical and financial resources and partnerships, which scored 26.96%. Indeed, the lack of regular support from a partner in nearly all health districts could contribute to the shortcomings observed in their organizational capacities [34]. However, the organizational capacity dimension showed low internal consistency ($\alpha = 0.485$), which may reflect conceptual heterogeneity among the components grouped within this dimension. Its aggregate score was therefore interpreted with caution.

Finally, all health districts showed a low overall level, but their profiles varied from one district to another. Beni had the highest score, at 49.47%, while Biena and Butembo had the

lowest scores, at 26.60%. Some districts had relatively better surveillance but a very weak response, such as Lubero, whose scores were 50.00% and 5.36%, respectively. These variations indicate that improvement measures should be tailored to the profile of each health district.

However, the descriptive nature of the study and the small number of units do not allow for the identification of the factors responsible for these differences. Further qualitative and analytical studies are therefore needed to explore the role of accessibility, partner support, team competencies, and the security context.

Conclusion

Operational coordination of NCD surveillance and response was low across all 17 health districts (33.76%), with response (17.86%) and organizational capacity (34.74%) lagging behind surveillance (45.93%).

The apparent surveillance advantage was largely driven by DHIS2 reporting, whereas risk-factor surveillance and translation of data into prevention and care remained weak.

Limitations of the Study

The main limitations were the cross-sectional design, the small number of units (17 districts), partial reliance on respondent-reported information, and the use of operational rather than validated normative score thresholds. These factors limit causal inference and broader generalization.

Recommendations

Priority actions should directly address the weakest domains: integrate routine surveillance of NCD risk factors, strengthen district support for prevention, diagnosis, referral and continuity of care, and improve human-resource and logistical capacity. Given the

strong DHIS2 reporting score, emphasis should shift from data transmission alone toward local analysis and use of data for action.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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Ethical Approval

Ethical approval for this study was granted by the Ethics Committee of the Adventist University of Lukanga (No. CER/UNILUK/CER-FRIDI-UNILUK/2026/0028). All participants provided informed consent before participating in the study.

Authors' Contributions

The lead author designed the study, developed the tools, collected the data, analyzed the data, and drafted the manuscript. The co-authors contributed to the scientific oversight, critical review, and final validation of the manuscript.

Data Availability

The data supporting the findings of this study are not publicly available to protect respondent confidentiality. An anonymized dataset may be obtained from the corresponding author upon reasonable request, subject to applicable ethical requirements.

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