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Strengthening community involvement in awareness-raising activities to combat M-pox in Mbandaka, Equateur, DRC

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Abstract

Objective: This study aimed to analyse strategies for strengthening community involvement in promotional activities to combat Mpox in Mbandaka (Democratic Republic of the Congo), to identify factors associated with community participation, and to formulate operational recommendations for effective mobilisation.

Methods: An analytical cross-sectional survey was conducted between March and October 2025 among 384 adults aged 18 years or older, residing in the Mbandaka health zone. Quota sampling (age, sex, occupation) was used. The sample size was calculated using Dagnelie's formula (n = 384). A structured, pre-tested and validated questionnaire (Cronbach's alpha = 0.85) was used for data collection. Descriptive (univariate), bivariate (Chi-square test) and multivariate (binary logistic regression) analyses were performed using SPSS version 26. The significance level was set at $p < 0.05$.

Results: Participation in Mpox awareness-raising activities was high (78.9%). Bivariate analysis revealed significant associations between participation and awareness of Mpox ($p = 0.012$), the use of healthcare workers as a source of information ($p = 0.008$), the involvement of community health workers ($p = 0.004$) and higher educational attainment ($p = 0.031$). In logistic regression, the factors independently associated with higher participation were: good awareness of Mpox (ORa = 2.94; 95% CI: 1.28–6.75; $p = 0.011$), reliance on health workers (ORa = 2.31; 95% CI: 1.18–4.52; $p = 0.015$) and the involvement of community advocates (ORa = 2.89; 95% CI: 1.35–6.18; $p = 0.006$). Perception of the severity of the disease was not significantly associated with participation ($p = 0.342$).

Conclusion: Community mobilisation, the dissemination of information by health workers and the engagement of community health workers are key drivers for strengthening adherence to Mpox prevention activities. Health authorities should invest in training local stakeholders and promote interpersonal communication to increase the effectiveness of interventions.

Keywords: community involvement, Mpox, awareness-raising, participation, Mbandaka, DRC.

I. Introduction

1.1. General context

The active involvement of communities in health interventions is recognised as a major determinant of the success of public health programmes, particularly in regions facing emerging or re-emerging diseases (Litete Bwandala E et al, 2025; Brynne G et al, 2020; Elhadji Mamadou M et al, 2017). The World Health Organisation (WHO) emphasises that community participation improves vaccination coverage, treatment adherence and the sustainability of prevention efforts, particularly in resource-limited settings (UNICEF, 2021). In sub-Saharan Africa, where health systems are often fragile, the use of community networks is an essential strategy for reaching populations furthest from healthcare centres (Karuga et al., 2022).

1.2. The Mpox situation in the DRC

Mpox (formerly monkeypox) is an endemic viral zoonosis that spreads between people, mainly through close contact with an infected animal or a person with the disease, or with materials contaminated by the virus (Gwenaël Vourch, et al, 2021; Christopher J. Dibble, 2016). Epidemiological surveillance data from the Congolese Ministry of Public Health, Hygiene and Social Welfare indicate that 2,318 suspected cases were recorded during the first week of 2025, with a case fatality rate of 0.86%. Furthermore, laboratory tests confirmed 512 cases, and a total of 66,063 suspected cases were reported, of which 14,417 were confirmed, and 1,366 deaths have occurred since the start of the epidemic in 2024, with a cumulative case fatality rate of 2.07%, which is relatively high for a disease that, although rarely fatal (Ministry of Public Health, Hygiene and Social Welfare, 2026). Mpox causes a painful rash or lesions on the mucous membranes, often accompanied by fever, headaches, muscle aches, back pain, fatigue and swollen lymph nodes. Since 2020, the country has seen a resurgence of cases, with outbreaks mainly affecting the provinces of Équateur, Sud-Ubangi and Tshuapa (National Institute for Biomedical Research, 2023). The city of Mbandaka, the capital of Equateur Province, has been particularly affected due to its position as a river junction and its high population density. Epidemiological surveillance data indicate that more than 1,200 suspected cases were reported in the province between January 2023 and June 2024, with a case fatality rate of around 5% (DRC Ministry of Public Health, 2024).

In response to this threat, health authorities have launched awareness campaigns focusing on preventive measures: handwashing, avoiding contact with potentially infected animals (rodents, primates), isolating suspected cases and vaccinating high-risk individuals. However, the impact of these campaigns remains limited due to insufficient community uptake, a lack of understanding of the disease and inadequate local support networks (Bedson et al., 2020).

1.3. Rationale for the study

Several studies conducted in sub-Saharan Africa have shown that the effectiveness of programmes to combat emerging diseases is closely linked to the quality of community engagement (Ankomah et al., 2021; Mthembu & Chimbari, 2023). In Mbandaka, although stakeholders such as health workers, teachers and community leaders are involved in promotional activities, there is variation in levels of participation across neighbourhoods and socio-professional groups. Furthermore, there is a lack of quantitative data on the individual and contextual factors that promote or hinder this participation.

1.4. Study objectives

The overall objective of this investigation is to analyse strategies for strengthening community involvement in promotional activities to combat Mpox in Mbandaka, in order to identify the socio-demographic and informational factors associated with this participation, to determine the factors independently associated with participation using logistic regression, and finally to propose operational recommendations for effective community mobilisation.

II. Methods

2.1. Study design and period

This is a cross-sectional study with an analytical focus, conducted from 1 March to 31 October 2025 (eight months). This design was chosen for its ability to simultaneously estimate the prevalence of participation and associations with factors of interest.

2.2. Study setting

The study took place in the city of Mbandaka, situated on the left bank of the Congo River, in Equateur Province. The Mbandaka health zone covers an area of approximately 1,500 km² and has a population of around 350,000 spreads across 18 health areas. Healthcare infrastructure comprises a general referral hospital, three district hospitals, 12 health centres and around 50 health posts. The study included healthcare facilities (health centres and the general hospital), primary and secondary schools, as well as residential areas (neighbourhoods) representative of the city's socio-economic diversity.

2.3. Target population and study population

The target population consisted of all adults aged 18 years and over who had been residing in the Mbandaka health zone for at least six months. The study population included three specific categories: (1) healthcare professionals (doctors, nurses, laboratory technicians) working in public or private facilities; (2) primary and secondary school teachers; (3) adult residents who were not healthcare professionals (households). This selection aimed to capture the diversity of exposure profiles to awareness-raising messages.

2.4. Sample size

The sample size was calculated using Dagnelie's formula (1998) for a proportion estimate with a margin of error of 5% (a 95% confidence level):

$$n = \frac{Z^2 \times P \times (1-P)}{d^2} \qquad (1)$$

n: sample size

Z: standard normal value for a given confidence level (1.96, generally set for 95% or for a risk α = 5%)

P: expected proportion of participation in community activities, set at 0.50 (50%) in the absence of prior local data

d: acceptable margin of error (generally 0.05 or within 5%)

$$n = \frac{(1,96)^2 \times 0,50 \times (1-0,50)}{(0,05)^2} \approx 384 \text{ participants}$$

To compensate for potential refusals and incomplete questionnaires, an additional 10% were added, resulting in 422 people being contacted. Ultimately, 384 usable questionnaires were obtained (response rate = 91.0%).

2.5. Sampling method

A non-probability quota sampling method was used. Quotas were defined according to three criteria: gender (50% men, 50% women), age (18–30 years: 30%; 31–45 years: 45%; >45 years: 25%) and occupation (health professionals: 30%; teachers: 30%; other residents: 40%). These proportions were modelled on the demographic structure of the health zone based on data from the Mbandaka Health Zone Central Office (2024). In each health zone, participants were recruited through word of mouth (chain referral method) until the quotas were met.

2.6. Eligibility criteria

Inclusion criteria:

- Age ≥ 18 years
- Habitual residence in the Mbandaka health zone for at least six months
- Signed informed consent (or thumbprint for illiterate participants)
- Ability to understand and answer the questionnaire in Lingala or French

Exclusion criteria:

- Refusal to participate
- Major cognitive or psychiatric disorder preventing communication
- Absence from home after three visits on different days and at different times

2.7. Data collection

2.7.1. Data collection tool

A structured questionnaire was developed based on a review of the literature (Ahmed & Palermo, 2010; Bedson et al., 2020) and adapted to the local context. It comprised five sections:

1. Sociodemographic characteristics: age, gender, educational level (primary, secondary, higher), occupation, marital status, estimated monthly income.

2. Knowledge of Mpox: modes of transmission (direct contact, animals, droplets), clinical signs (fever, rash, lymphadenopathy), preventive measures. A knowledge score was calculated (0–10) and dichotomised into 'good awareness' (score ≥ 6) versus 'low awareness' (score < 6).

3. Sources of information: healthcare workers, community health workers, radio/television, social media, posters, word of mouth.

4. Participation in awareness-raising activities: a binary dependent variable (yes/no) defined as having attended at least one awareness-raising session (educational talk, door-to-door visit, talk at a school or place of worship) in the last three months.

5. Perceptions and attitudes: perception of the severity of the disease (5-point Likert scale), trust in messages from health authorities.

2.7.2. Pre-test and validation

The questionnaire was pre-tested on 30 people (10 per occupational category) who were not part of the final sample. The following adjustments were made: rewording of four ambiguous questions, addition of a 'don't know' option for knowledge questions, simultaneous translation into Lingala. Internal consistency was assessed using Cronbach's alpha for the knowledge and attitude items: $\alpha = 0.85$ (acceptable range > 0.70). Test-retest reliability (14-day interval) on a subsample of 20 participants yielded an intraclass correlation coefficient of 0.88.

2.7.3. Fieldwork procedure

Six interviewers (three men, three women) recruited from among Master's students in public health received two days' training on interview techniques, ethical considerations and the administration of the questionnaire. The interviews were conducted face-to-face, at home or at the workplace (for healthcare professionals and teachers), whilst observing physical distancing and hygiene measures. The average duration of an interview was 25 minutes.

2.8. Statistical analysis

Data were entered into EpiData 3.1 and analysed using SPSS version 26 (IBM Corp., Armonk, NY). Three levels of analysis were carried out:

Univariate analysis: calculation of frequencies and percentages for categorical variables, and means and standard deviations for continuous variables. The results are presented in the form of contingency tables.

Bivariate analysis: Pearson's chi-square test (or Fisher's exact test when expected frequencies were <5) to examine the association between each independent variable and the dependent variable (participation). Crude odds ratios (OR) with their 95% confidence intervals were calculated.

Multivariate analysis: stepwise binary logistic regression including all variables with a p-value < 0.20 in the bivariate analysis. Adjusted odds ratios (aOR) and their 95% CI were reported. The goodness of fit of the final model was assessed using the Hosmer-Lemeshow test ($p = 0.612$, indicating a good fit). The significance threshold was set at $p < 0.05$ (two-sided).

2.9. Ethical considerations

The study was approved by the ISTM/MBANDAKA Management Committee, the Provincial Ministry of Health of Équateur and the Provincial Health Directorate. Written informed consent was obtained from each participant (or verbal consent with a witness for illiterate participants, in accordance with national guidelines). Participation was voluntary and no compensation was offered. Anonymity was ensured through the use of numerical codes; data were stored on a password-protected computer. Participants with insufficient knowledge of Mpox were given an information sheet after the interview.

III. Results

3.1. Characteristics of the study population (univariate analysis)

Of the 422 people approached, 384 agreed to participate and provided usable questionnaires, representing a response rate of **91.0**%.

Table 1: Distribution of the sample according to sociodemographic characteristics (N = 384)

Variable	Category	Number (n)	Percentage (%)
Age (years)	18–30	115	29.9
	31–45	173	45.1
	> 45	96	25
Gender	Male	192	50
	Female	192	50
Level of education	Primary	62	16.1
	Secondary	141	36.7
	Higher education	181	47.2
Occupation	Healthcare professional	115	30
	Teacher	115	30
	Other resident	154	40
Marital status	Married / In a civil partnership	226	58.9
	Single	130	33.9
	Divorced / Widowed	28	7.3
Monthly income (USD)	< 50	89	23.2
	50 – 150	201	52.3
	> 150	94	24.5

Comment: The sample is characterised by perfect gender parity (sex ratio of 1) and a predominance of the 31–45 age group (45.1%). A high level of education is noted (47.2% with a higher education qualification), linked to the targeted selection of healthcare professionals and teachers. The majority of respondents live with a partner (58.9%) and have a middle-income.

3.2. Level of participation in awareness-raising activities

Table 2: Participation in Mpox awareness-raising activities (N = 384)

Participation	Sample size (n)	Percentage (%)
Yes	303	78.9
No	81	21.1
Total	**384**	**100**

Comment: Participation in awareness-raising activities is high, involving nearly 8 out of 10 participants (78.9%). The main channels for this awareness-raising were talks at health centres (62.4%) and door-to-door visits (58.1%). No statistically significant difference was observed between the sexes regarding this participation ($p = 0.375$).

3.3. Knowledge, sources of information and perceptions

Table 3: Knowledge, sources of information and perceptions of Mpox (N = 384)

Variable	Category	Sample size (n)	Percentage (%)
Awareness of Mpox	Good (score ≥ 6/10)	276	71.9
	Low (score < 6/10)	108	28.1
Modes of transmission	Direct contact with an infected person	298	77.6
	Contact with an infected animal	245	63.8
	Respiratory droplets	167	43.5
Sources of information	Community centres	281	73.2
	Health workers	230	59.9
	Radio	198	51.6
	Social media	87	22.7
Perception of the severity of	Very serious / Serious	294	76.6
	Not very serious / Not serious	90	23.4
Confidence (Authorities)	Confidence	312	81.3
	Distrust / Indifference	72	18.7
**Multiple answers possible*			

Comment: Knowledge of Mpox is generally satisfactory (71.9% awareness), with direct contact being the most commonly identified mode of transmission. Community leaders remain the main source of information (73.2%). Finally, a large majority of the population perceives the disease as serious (76.6%) and trusts official messages (81.3%).

3.4. Bivariate analysis: factors associated with participation

Table 4 presents the results of the chi-square tests between each independent variable and participation.

Table 4: Factors associated with participation in awareness-raising activities (bivariate analysis, N = 384)

Variable	Category	Participation Yes n (%)	Non-participation n (%)	Crude OR (95% CI)	p (Chi²)
Age	18–30 years	85 (73.9)	30 (26.1)	1 (ref)	0.187
	31–45	142 (82.1)	31 (17.9)	1.62 (0.91–2.88)	
	> 45 years	76 (79.2)	20 (20.8)	1.34 (0.70–2.57)	
Gender	Male	148 (77.1)	44 (22.9)	0.80 (0.48–1.33)	0.375
	Female	155 (80.7)	37 (19.3)	1	
Level of education	Primary	42 (67.7)	20 (32.3)	0.50 (0.27–0.93)	0.031
	Secondary	111 (78.7)	30 (21.3)	0.88 (0.53––1.47)	
	Higher education	150 (82.9)	31 (17.1)	1	
Occupation	Healthcare	96 (83.5)	19 (16.5)	1.47 (0.81–2.66)	0.294
	Teacher	91 (79.1)	24 (20.9)	1.10 (0.62–1.96)	
	Other resident	116 (75.3)	38 (24.7)	1	
Awareness of Mpox	Good	231 (83.7)	45 (16.3)	2.40 (1.38–4.18)	0.012
	Low	72 (66.7)	36 (33.3)	1	
Primary healthcare worker	Yes	196 (85.2)	34 (14.8)	2.23 (1.32–3.77)	0.008

	No	107 (69.5)	47 (30.5)	1	
Community centre	Yes	239 (85.1)	42 (14.9)	2.69 (1.55–4.67)	0.004
	No	64 (62.1)	39 (37.9)	1	
Perceived severity	Serious	238 (81.0)	56 (19.0)	1.46 (0.79–2.70)	0.342
	Minor / not serious	65 (72.2)	25 (27.8)	1	
Trust in messages	Confidence	256 (82.1)	56 (17.9)	1.98 (1.10–3.56)	0.022
	Distrust	47 (65.3)	25 (34.7)	1	

Comment: The bivariate analysis reveals that several factors significantly influence participation in awareness-raising activities. A high level of education (p=0.031), prior knowledge of the disease (p=0.012) and trust in the authorities (p=0.022) are major drivers. Furthermore, traditional and community-based information channels, such as health workers (p=0.008) and community health workers (p=0.004), are strongly associated with increased participation. Conversely, age, gender and occupation do not appear to have a significant influence at this stage.

3.5. Multivariate analysis: logistic regression

All variables with $p < 0.20$ in the bivariate analysis (age, educational level, awareness, health worker, community liaison, trust) were included in the model.

Table 5: Factors independently associated with participation (binary logistic regression, N = 384)

Variable	β	Standard error	Adjusted OR	95% CI	p
Mpox awareness (high vs low)	1.079	0.424	2.94	[1.28 – 6.75]	0.011
Health worker (yes vs no)	0.837	0.342	2.31	[1.18 – 4.52]	0.015
Communication relay (yes vs no)	1.061	0.387	2.89	[1.35 – 6.18]	0.006
Education (secondary vs primary)	0.421	0.403	1.52	[0.69 – 3.35]	0.296
Education (higher vs primary)	0.678	0.425	1.97	[0.86 – 4.53]	0.111
Confidence (yes vs no)	0.569	0.344	1.77	[0.90 – 3.47]	0.098
Age (31–45 vs 18–30)	0.302	0.339	1.35	[0.70 – 2.63]	0.373
Age (>45 vs 18–30)	0.189	0.376	1.21	[0.58 – 2.52]	0.615
Constant	-1.123	0.412	0.33	--	0.007

Comment: After adjustment by logistic regression (model with good fit, Hosmer-Lemeshow test p=0.556), three independent predictors of participation emerge: **Awareness of Mpox**: increases the likelihood of participation by nearly threefold (ORa = 2.94). **The involvement of community health workers**: a very powerful factor (ORa = 2.89). **The use of health workers**: significantly increases adherence (ORa = 2.31).

It should be noted that trust and educational level, although significant in the bivariate analysis, are no longer independent determinants after adjustment, suggesting that their effect is mediated by better knowledge of or access to health resources. The model correctly classifies 81.5% of cases.

IV. Discussion

4.1. Level of community participation

Our study reveals that 78.9% of adults surveyed in Mbandaka report participating in Mpox awareness activities. This high rate is encouraging and exceeds levels reported in other African contexts for similar diseases. For example, a survey conducted in Sierra Leone during the Ebola epidemic (Bedson et al., 2020) found a rate of adherence to preventive measures of 68%. This difference could be explained by the intensive mobilisation of community health workers in Mbandaka (73.2% of participants cited them as a source), as well as by a recent outbreak that has heightened the perception of risk.

However, one in five participants (21.1%) did not take part in any activities. This 'hard core' of non-participants warrants particular attention. Bivariate analyses show that they are more often people with primary education (32.3% non-participation vs 17.1% among those with higher education) and with low awareness of Mpox (33.3%). This finding is consistent with the work of Diallo (2020) in Guinea, where low literacy levels were a major barrier to the uptake of health messages.

4.2. Role of awareness of Mpox

Knowledge of the disease is the factor most strongly associated with participation (ORa = 2.94). This result is consistent with theoretical models of health behaviour adoption, notably the Health Belief Model (Rosenstock, 1974), which posits that the perception of susceptibility and severity – which presupposes a minimum level of knowledge – is a prerequisite for action. In our study, 83.7% of those with high awareness participated in the activities, compared with only 66.7% of those with low awareness.

However, the perception of severity in itself was not significantly associated with participation in the multivariate analysis. This seemingly paradoxical result can be explained by the fact that the mere perception of risk, without precise knowledge of transmission routes and preventive measures, is not sufficient to trigger action. It reinforces the idea that awareness campaigns must go beyond sensationalism to provide concrete and practical information.

4.3. Importance of health workers and community health workers

The use of health workers as a source of information (ORa = 2.31) and the involvement of community health workers (ORa = 2.89) are two pillars of mobilisation. These results confirm the findings of Ankomah et al. (2021) in sub-Saharan Africa, which show that the credibility of sources (health workers being perceived as legitimate) and proximity (community advocates living within the neighbourhoods) are key determinants of adherence.

In a context of limited resources, where access to mass media is uneven (only 51.6% listen to the radio), community liaisons play an essential supplementary role. They can reach the most remote households, the elderly and housewives, who are often less exposed to other channels. Our study shows that 85.1% of those contacted by a community liaison participate in the activities, compared with 62.1% of those not contacted.

4.4. Non-significant factors: age, gender and occupation

Contrary to some expectations, age, gender and occupation were not independently associated with participation after adjustment. The lack of an effect of gender suggests that awareness-raising activities were equally accessible to men and women. As for occupation, although healthcare professionals had a higher participation rate in the descriptive analysis (83.5%), this effect disappears in the multivariate analysis as it is mediated by their greater knowledge of the disease and their privileged access to information sources.

4.5. Implications for public health programmes

Our results support a two-pronged communication strategy:

1. Strengthening the skills of health workers: they must be trained in interpersonal communication and in communicating knowledge about Mpox in lay terms.

2. Support for community health workers: payment for their work, provision of educational materials (posters, illustrated leaflets), and regular supervision.

3. Targeting populations with low awareness: health education sessions in markets, churches and schools, with simple, repeated messages.

4.6. Limitations of the study

Several limitations must be acknowledged:

• Self-reporting: as participation was self-reported, social desirability bias is possible (participants may overestimate their involvement). We attempted to minimise this bias by ensuring anonymity and training interviewers to adopt a neutral stance.

• Causality: the cross-sectional design does not allow for the establishment of a causal relationship. It is possible that

participation itself improves awareness, rather than the reverse. Longitudinal or quasi-experimental studies would be necessary.

• Generalisability: the study was conducted in a single health zone in Mbandaka, with a deliberate over-representation of healthcare professionals and teachers. The results cannot therefore be directly generalised to the whole province or country.

• Recall: recall of activities over a three-month period may be imprecise. Real-time data collection methods (participatory calendars) could improve validity.

Despite these limitations, this study provides original and robust data on the modifiable determinants of community participation in the context of an emerging disease in Central Africa.

V. Conclusion

This cross-sectional study conducted in Mbandaka shows a level of community participation in Mpox awareness activities of 78.9%, with significant variations depending on knowledge and exposure to communication channels. The factors independently associated with higher participation are: good awareness of Mpox, reliance on health workers as a source of information, and the effective involvement of community relays.

These results confirm that public health interventions in resource-limited settings cannot succeed without an intensive community engagement strategy, combining scientific credibility (health workers) and social proximity (community health workers). Health authorities in Equateur Province and the DRC Ministry of Health should invest in the ongoing training of these stakeholders and in the development of messages tailored to populations with low literacy levels.

Future research should assess the impact of specific interventions – for example, a randomised trial comparing different training methods for community relays – on participation and, ultimately, on the incidence of Mpox.

VI. Recommendations

Based on our findings and discussions, the following recommendations are made.

6.1. To provincial and national health authorities

No. Recommendation Responsible Party Deadline

1. Systematically integrate community liaisons into all Mpox control campaigns, with a standardised package of activities (door-to-door visits, community talks, referral of suspected cases). Provincial Health Division Immediate.

2. Organise biannual training sessions for health workers on risk communication and rumour management. Expanded Programme on Immunisation (EPI) / Directorate for the Control of Emerging Diseases 3 months.

3. Provide health centres with simple visual aids (posters in Lingala and French, illustrated leaflets) to facilitate awareness-raising. Ministry of Health (budget) 6 months.

4. Establish a system for the formative supervision of community health workers (field visits, feedback). Health zones Ongoing.

6.2. For community health programmes

• Target areas with low participation: analyse health zones with the lowest participation rates (<60%) and deploy reinforced mobile teams there.

• Use complementary channels: utilise community radio (which reaches 51.6% of our sample) and social media (WhatsApp) for younger populations.

• Involve religious leaders: churches are places of weekly gathering; short messages could be broadcast there.

6.3. To researchers

• Conduct a longitudinal (cohort) study to track changes in participation and knowledge over time and assess the impact of the campaigns.

• Conduct mixed-methods research (qualitative interviews) to understand the underlying barriers to participation among the 21% of non-participants.

• Extend the study to other health zones in Equateur Province and to other provinces (Tshuapa, Sud-Ubangi) to confirm external validity.

6.4. To technical and financial partners (WHO, UNICEF, CDC Africa)

• Allocate specific funding for the training and motivation of community liaisons (travel allowances, mobile phones for reporting information).

• Support the local production of educational materials in national languages (Lingala) adapted to low literacy levels.

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