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Acceptance of chikungunya vaccination: a rapid survey in Reunion island during an epidemic

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ABSTRACT

During the 2025 chikungunya outbreak in Réunion Island, two vaccines—IXCHIQ (live-attenuated) and VIMKUNYA (virus-like particle)—received European Union authorization; a local campaign began in April 2025 and was temporarily adjusted for older adults after safety concerns. We assessed vaccine acceptability at the outbreak onset among residents, focusing on people with comorbidities. In January 2025, a cross-sectional web survey yielded 918 complete responses (mean age 44.5 years; 13.1 % prior chikungunya; 53.4 % healthcare workers). Acceptability was highest in the *hypothetical* full-reimbursement scenario (60.5 %) and was lower among women and those with prior chikungunya; healthcare workers were more likely to accept vaccination. In the *hypothetical* clinical-trial and self-financed scenarios, acceptability declined to 35.5 % and 20.1 %, respectively, with the same pattern of predictors. Comorbidities showed no significant association. Financing and implementation context, together with gender differences, were key drivers of uptake at the beginning of 2025 outbreak.

1. Introduction

Chikungunya is an emerging arboviral fever that may complicate through long-term disabilities and cause excess mortality during large epidemics [1,2]. In 2024, approximately 427,622 chikungunya cases and 213 deaths were reported globally [3].

During 2005–2006, health authorities in La Réunion, a French overseas department, reported the first large-scale chikungunya outbreak [4] with severe atypical forms. The latter were associated with a 10.6 % case fatality rate among confirmed cases admitted to the hospital, with a particularly high burden among the elderly [5]. Hypertension, underlying respiratory or cardiological conditions and use of non-steroidal anti-inflammatory drugs were independent risk factors for severe disease, while age over 85 years and alcohol abuse were risk factors for death [5].

While chikungunya virus was re-emerging in Réunion Island at the time of the study (January 2025; 523 confirmed autochthonous cases by February 4, 2025), by late August 2025 the epidemic phase hades at the end of June and only residual transmission persisted, with a cumulative total of 54,590 laboratory-confirmed cases since January 2025 [6,7].

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Compared with the previous epidemic, there are now two vaccines approved by the European Medicines Agency (EMA), which may reduce disease burden in future outbreaks and in high-risk contexts. Interestingly, these vaccines have been licensed based on immunogenicity studies, with immunological endpoints corresponding to a correlate of protection established from a prospective cohort in Philippines and their ability to demonstrate protection in non-human primates [8,9].

IXCHIQ (Valneva), a live-attenuated single-dose vaccine authorized in the European Union (EU) in 2024, shows high seroresponse and 24-month antibody persistence in adults [10,11]. In April 2025, French authorities launched a chikungunya vaccination campaign in Réunion and Mayotte and, following early pharmacovigilance signals, temporarily removed adults aged ≥65 years from target groups [12]. On 25 July 2025, the European Medicines Agency (EMA) lifted its temporary restriction for ≥65 years, advising use only when chikungunya risk is significant and after careful benefit–risk assessment [13]. On 22–25 August 2025, the U.S. Food and Drug Administration (FDA) suspended IXCHIQ's biologics license pending further review [14].

IXCHIQ (Valneva), a live-attenuated single-dose vaccine authorized in the European Union (EU) in 2024, shows high seroresponse and antibody persistence in adults [15,16]. In April 2025, French authorities implemented a vaccination campaign in Réunion and Mayotte, then temporarily removed adults aged ≥65 years from target groups following safety signals [12]. On 25 July 2025, EMA lifted its temporary restriction for ≥65 years, advising use only when chikungunya risk is significant and after careful benefit-risk assessment [13]. On 22–25 August 2025, the US FDA suspended Ixchiq's biologics license pending further review [14].

The CHIKV-VLP chikungunya vaccine (VIMKUNYA) is a single-dose, alum-adjuvanted virus-like particle vaccine derived from Senegalese strain 37,997. Developed at U.S. National Institute of Allergy and Infectious Diseases (NIAID) and transferred to Bavarian Nordic in 2023, it showed Day-21/22 seroresponse of 97.8 % in adults 12–64 and 87.3 % in those ≥65 in phase 3 trials [17]. EU authorization followed a positive CHMP opinion on January 31, 2025; the U.S. Food and Drug Administration (U.S. FDA) approved the vaccine on February 14, 2025.

At the time of the study (January 2025), France had not yet issued an official vaccination recommendation, as the Haute Autorité de Santé (HAS) had not decided on its integration into national strategies; internationally, the WHO was still discussing recommendations for large-scale use [18].

Vaccine hesitancy remains a key barrier to immunization, heightened in France during the COVID-19 pandemic by controversies over safety and public health policies [19,20]. Vaccine hesitancy varies by demographics; where older individuals, males, ethnic minorities, and healthcare professionals are generally more willing to receive vaccine, though low health literacy can counteract this trend [21,22]. These disparities highlight the need for ongoing assessment of vaccine-specific acceptability, to strengthen immunization strategies for populations at risk.

As Réunion Island was at the beginning of the chikungunya epidemic (January 2025) and two promising vaccines—VLA1553 (IXCHIQ) and CHIKV virus-like particle (VLP) (VIMKUNYA)—became available, this study assessed vaccine acceptability under three scenarios: (1) recommended and free, (2) offered through a clinical trial, and (3) recommended but not covered financially.

2. Methods

A cross-sectional web-based survey was conducted on the Skezia® platflorm from January 25 to 31, 2025, at the start of the chikungunya epidemic declared by public authorities [23]. Disseminated via social media (Facebook ®, Whatsapp ®), it aimed to reach diverse participants across the island. Data were collected during the early phase of the 2025 outbreak, prior to the April 2025 vaccination campaign and subsequent safety-related adjustments.

2.1. Survey instrument and scenarios

The questionnaire assessed vaccine acceptability under three hypothetical scenarios, by asking: *"Would you get vaccinated if the vaccine was …"*

1. "recommended by health authorities and free (covered by national health insurance)"
2. "offered within a clinical trial"
3. "officially recommended but not covered, with an estimated cost corresponding to the actual retail price at pharmacies at the time of the study (160–180 €/dose)"

Participants could choose one of five possible answers: *"Yes certainly", "Yes probably", "I do not know yet", "Probably not", or "No certainly not"*. Vaccine acceptability was subsequently recoded as a binary variable, grouping *"Yes certainly"* and *"Yes probably"*. The commercial name of the vaccine and the manufacturer were intentionally not mentioned to avoid brand-related bias.

The survey also collected demographic data (age, gender) and clinical history, including prior chikungunya and comorbidities such as diabetes, hypertension, chronic kidney disease, respiratory failure, heart failure, asthma, COPD, hypercholesterolemia, anxiety or depression, inflammatory diseases under treatment, active cancer treatment, and obesity. Participants could report other conditions or indicate no comorbidities. They were also asked if they were healthcare professionals. The full 10-question survey is provided as Supplementary File 1.

2.2. Statistical analysis

Because this was a cross-sectional study with a binary outcome (vaccine acceptability: yes vs no), we used logistic regression models to identify factors associated with acceptability for each scenario. For the binary outcome "willingness to receive vaccination," responses "Yes, certainly" and "Yes, probably" were coded as Yes; "I do not know yet" was coded as No together with "Probably not" and "No, certainly not," reflecting that undecided respondents were treated as not yet willing to be vaccinated. Univariate logistic regression models were first fitted for each explanatory variable (age, gender, healthcare worker status, history of chikungunya). Variables with $p < 0.20$ in univariate analysis were considered for multivariable logistic regression models. Multivariable models were then built separately for each scenario, with vaccine acceptability as the dependent variable and the selected variables as independent variables. Results are expressed as odds ratios (OR) with 95 % confidence intervals (CI). Statistical significance was set at two-sided $p < 0.05$. All analyses were performed using Stata, version 13.0 (StataCorp LLC, College Station, TX, USA).

2.3. Qualitative analysis

A thematic analysis was conducted on the free-text responses to the question *"Do you have any information to share about the chikungunya vaccine?"* to identify key concerns and perceptions regarding vaccine safety, efficacy, necessity, and acceptability. Responses were systematically coded and categorized into major themes.

2.4. Ethical considerations

Participation was anonymous and voluntary, and informed consent was obtained electronically prior to survey completion. No personal information was collected to ensure confidentiality.

3. Results

A total of 1656 participants logged on to the platform, of whom 918

completed the survey. Only completed responses were analyzed (Table 1). The mean age of participants was 44.5 years (SD ± 11.4), healthcare workers accounted for 53.4 % (490/918) and non-healthcare workers for 46.6 % (428/918). A past medical history of chikungunya was reported by 13.1 % ($n = 120$) of respondents.

Vaccine acceptability varied significantly across the three scenarios (Table 2).

Scenario 1 — recommended and fully reimbursed: Overall, 60.5 % (555/918) of participants expressed willingness to be vaccinated. In multivariate analysis, acceptability was lower among women (OR = 0.48, 95 % CI: 0.33–0.69, $p < 0.001$) and participants with a history of chikungunya (OR = 0.43, 95 % CI: 0.26–0.70, $p < 0.001$), while healthcare workers were more likely to accept vaccination (OR = 2.54, 95 % CI: 1.84–3.51, p < 0.001). Age and comorbidities were not significantly associated with acceptability.

Scenario 2 — clinical trial setting: Acceptability decreased to 35.5 % (326/918). The same patterns were observed: lower among women (OR = 0.55, 95 % CI: 0.39–0.76, $p < 0.001$) and those with a history of chikungunya (OR = 0.59, 95 % CI: 0.35–0.99, $p = 0.05$), higher among healthcare workers (OR = 1.97, 95 % CI: 1.42–2.72, p < 0.001). Age showed a modest positive association (OR = 1.01 per year, 95 % CI: 1.00–1.03, $p = 0.043$), while comorbidities were not significant.

Scenario 3 — recommended but not financially covered (€160–180): Acceptability fell to 20.1 % ($n = 185$). Acceptability was again lower among women (OR = 0.55, 95 % CI: 0.37–0.82, $p = 0.004$) and those with prior chikungunya infection (OR = 0.32, 95 % CI: 0.14–0.77, $p = 0.01$), and higher among healthcare workers (OR = 2.78, 95 % CI: 1.82–4.26, $p < 0.001$). Older age was slightly but significantly associated with higher acceptability (OR = 1.01 per year, 95 % CI: 1.00–1.04, $p = 0.04$), while comorbidities were not significant.

Interaction analysis: In a mixed-effects logistic regression including all scenarios with an Age×Scenario interaction term, the association between age and acceptability differed significantly by scenario (p < 0.001 for interaction). Per 10-year increase in age, the adjusted odds ratios were 0.87 (95 % CI: 0.67–1.14, $p = 0.318$) in Scenario 1, 1.45 (1.09–1.91, $p = 0.009$) in Scenario 2, and 1.31 (0.98–1.76, $p = 0.070$) in Scenario 3.

Table 1
Population characteristics.

Variable	Total Population $n = 918$ (%)	Non-healthcare workers $n = 428$ (%)	Healthcare workers $n = 490$ (%)	*p*-value
Mean Age (years, ± SD)	44.5 (± 11.4)	46.5 (± 12.0)	42.9 (± 10.6)	<0.005
Mean Age (years ± SD)	44.5 (±11.4)	46.5 (±12.0)	42.9 (±10.6)	<0.001
Age range (years)	18–80	18–80	20–80	<0.001
Age group <30	54 (7.0)	33 (8.9)	21 (5.2)	
Age group 30–39	220 (28.4)	73 (19.6)	147 (36.5)	
Age group 40–49	244 (31.5)	119 (32.0)	125 (31.0)	
Age group 50–59	169 (21.8)	90 (24.2)	79 (19.6)	
Age group ≥60	88 (11.4)	57 (15.3)	31 (7.7)	<0.001
Gender (%)				0.363
– Male	299 (32.6)	136 (31.8)	163 (33.3)	
– Female	617 (67.2)	292 (68.2)	325 (66.3)	
– Non-binary	2 (0.2)		2 (0.4)	
History of Chikungunya (%)				0.006
– Yes	120 (13.1)	71 (16.6)	50 (10.2)	
– No	710 (77.4)	319 (74.5)	389 (79.4)	
– Unknown	87 (9.5)	38 (8.8)	51 (10.4)	
Comorbidities* (%)	406 (44.2)	220 (51.5)	238 (48.6)	0.038

* At least one comorbidity among: diabetes, hypertension, chronic kidney disease, respiratory failure, heart failure, asthma, chronic obstructive pulmonary disease (COPD), hypercholesterolemia, anxiety or depression, inflammatory diseases under treatment, active cancer treatment, obesity, or others reported.

Table 2
Vaccine acceptability.

Scenario	Acceptability (%) ($n = 918$)
Recommended by Health authorities and fully covered by national health insurance	555 (60.5)
Provided for free in a clinical trial	326 (35.5)
Recommended by Health authorities but not covered (price around 160–180€)	185 (20.1)

Pooled proportions of respondents completing the full online questionnaire who answered either « Yes certainly » or « Yes probably » to the question « Would you get vaccinated if the vaccine was … ».

The qualitative survey revealed key themes in vaccine perception. Safety concerns were prevalent, with respondents questioning long-term risks. One noted, *"We need more information, particularly on side effects."* A strong demand for clarity emerged, especially on the vaccine's mechanism and relevance post-infection, reflected in questions like, *"Is the vaccine protective for life?"* Doubts about efficacy also surfaced, with some questioning its necessity given acquired immunity: *"Is the vaccine really useful if I have already had chikungunya?"* While some hesitated, others saw it as essential prevention: *"It is the solution."* Concerns about its experimental nature were evident, with questions about development time: *"Is it experimental? How many years has it been tested?"*

4. Discussion

This study shows that chikungunya vaccine acceptability in La Réunion Island is highest (60.5 %) when recommended and fully reimbursed but drops sharply in a clinical trial (35.5 %)—a 70 % decline—and is lowest when not covered (20.1 %), making it three times less accepted.

Because our survey was conducted at the very beginning of the outbreak (January 2025), before the April 2025 campaign and the subsequent safety-related changes, our estimates likely reflect pre-announcement intentions; publicized safety reviews and shifting recommendations may have attenuated willingness thereafter, particularly among older adults, whereas clearer guidance and reimbursement decisions could conversely enhance acceptance in groups sensitive to access barriers.

To put these figures in perspective, coverage rates for mandatory vaccination for children are 85–88 % (diphtheria–tetanus–poli, Pertussis…) [24], while, as an example, COVID-19 vaccination coverage was only 1.9 % among those >65 years during the 2023 campaign [24].

Regarding individual factors influencing acceptability, women and those with a history of chikungunya consistently showed lower acceptability. No significant link was found between comorbidities and vaccine decisions, highlighting the need for targeted awareness campaigns to address gaps in risk perception and vaccination motivation. Interestingly, the additional interaction analysis revealed that the association between age and vaccine acceptability was scenario-dependent. Older individuals were more likely to accept vaccination when it was free, whereas their willingness decreased in the clinical trial scenario and dropped further when vaccination required out-of-pocket payment. This finding highlights the importance of financial coverage for ensuring vaccine uptake among older populations.

Vaccine acceptability is highest when vaccination is recommended and fully reimbursed, underscoring the role of financial coverage in promoting uptake. Evidence from other immunization programs likewise shows that reimbursement or no-cost delivery increases adherence [18]. This is particularly relevant in La Réunion Island, where socioeconomic disparities are greater than in mainland France (36 % live under poverty compared to 14.5 % in mainland France [25],

highlighting the need for financial coverage to ensure equitable access. Integrating chikungunya vaccination into publicly funded programs is crucial. Women showed lower acceptability, consistent with concerns over vaccine risks, especially side effects [19,20]. Understanding factors like mistrust in new vaccines, perceived risk, and family decision-making is key.

Beyond vaccine hesitancy, natural immunity perception influences vaccination decisions. Studies show chikungunya virus-specific antibodies can persist for years, indicating durable immunity [21]. Despite a 38.2 % attack rate during the epidemic 20 years ago [26], 2024 seroprevalence from blood donors (before the outbreak) is estimated at only 17 % (Unpublished data, ArboFrance, requested by MOH, 2025). This suggests a large portion of the population remains susceptible, reinforcing the need for vaccination even among those assuming protection. While crucial for the unexposed, low herd immunity highlights the necessity of broader immunization efforts to reduce the impact of future outbreaks and residual transmission.

Healthcare workers show higher vaccine acceptability across all scenarios, reflecting a stronger benefit-risk perception. Their role as vaccination advocates should be leveraged through enhanced training and targeted informational strategies to boost uptake [22,27]. The severe morbidity and mortality of the 2005–2006 outbreak may have heightened their awareness [5].

Vaccine hesitancy in clinical trials is driven by past negative vaccine experiences, low disease risk perception, trial safety concerns, and mistrust in research institutions [28]. Targeted education and transparent communication are essential to building public trust in research and improving trial enrollment.

Unexpectedly, the presence of comorbidities do not significantly impact vaccine acceptability, despite higher severe disease risk [22,28]. This lack of association might also be partly explained by the timing of the survey, which was conducted before the regional health authority (ARS) campaign specifically targeting individuals with comorbidities gained visibility. Nevertheless, Reunionese adults over 40 years old were generally familiar with chikungunya and its risks due to the large 2005–2006 outbreak, which may have shaped baseline awareness independently of formal campaigns.

Further research is needed to determine whether this is reflective of decreased awareness or risk misperception. Targeted sensitization and specific campaigns for high-risk individuals should address this gap.

5. Study limitations and perspectives

This study has several limitations. The main one is the lack of representativity of the general population. The high proportion of healthcare workers suggests network bias, as professional and social circles likely influenced survey dissemination. Nevertheless, 500–700 respondents are generally considered sufficient to provide a snapshot of the 900,000 inhabitants of the island based on main sociodemographic parameters, and survey institutes frequently rely on samples of similar size (equivalent to our non-healthcare workers group).

Another drawback of a web-based, social-media disseminated survey is the difficulty in reaching individuals with low digital literacy, which may have contributed to selection bias. The short 7-day survey window may also have limited participation.

The survey did not assess participants' prior knowledge of chikungunya, which could influence vaccine acceptability. However, all respondents lived in La Réunion, a region that experienced a large-scale epidemic in 2005–2006, which may contribute to a general awareness of the disease. Future studies should assess vaccine attitudes over time as the epidemic evolves and recommendations emerge.

Finally, some relevant determinants such as socioeconomic status, political orientation, educational level, and health literacy were not collected. These variables will be incorporated in future surveys to better explore vaccine hesitancy determinants.

6. Conclusion

To improve vaccine coverage, targeted strategies should include financial subsidies, messaging on post-infection immunity, and healthcare worker engagement as vaccine ambassadors. A comprehensive approach combining financial access, tailored communication, and community involvement is essential. Post-2025 campaign monitoring of vaccination intentions and safety perceptions should guide public health strategies for future outbreaks and inter-epidemic periods.

CRediT authorship contribution statement

Rodolphe Manaquin: Writing – review & editing, Project administration, Investigation, Conceptualization. **Anissa Desmoulin:** Writing – review & editing. **Liem Binh Luong Nguyen:** Writing – review & editing, Methodology. **Dimitri Kornblum:** Writing – review & editing, Project administration, Investigation. **Xavier Deparis:** Writing – review & editing. **Cyril Ferdynus:** Writing – review & editing, Methodology. **Antoine Bertolotti:** Writing – review & editing. **Pierre Verger:** Writing – review & editing, Conceptualization. **Eric D'Ortenzio:** Writing – review & editing, Project administration, Funding acquisition. **Armelle Pasquet:** Writing – review & editing, Project administration, Funding acquisition. **Carole Eldin:** Writing – review & editing. **Patrick Gérardin:** Writing – review & editing, Conceptualization. **Emilie Mosnier:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2025.127720.

Data availability

Data will be made available on request.

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