



Culturally Tailored Vaccination Communication in Mobile Populations

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Abstract

Vaccination programs serving mobile populations operate across complex communication environments shaped by linguistic diversity, changing residence, different health-system experiences, variable documentation, disrupted continuity of care, and heterogeneous beliefs about vaccines and public institutions. Generic communication can provide technically accurate information yet remain ineffective when its language, messenger, format, assumptions, or service instructions do not correspond with the population's lived context.

The present study develops a framework for culturally tailored vaccination communication that integrates language accessibility, culturally responsive message design, trusted community messengers, explicit service-navigation information, and respectful dialogue with structural measures addressing mobility-related discontinuity. Mobile populations are treated as heterogeneous rather than as a single cultural category. Because no original participant or vaccination-program dataset was supplied, the study uses a transparent simulation-based design. A synthetic dataset of 420 hypothetical mobile-population participants was generated using Cultural Tailoring Effectiveness, Institutional Trust, Language Accessibility, Mobility/Service Discontinuity, and Vaccination Action Readiness.

Mean readiness increased from 2.55 under low communication tailoring to 3.04 under moderate tailoring and 3.59 under high tailoring. Multiple regression produced positive coefficients for Cultural Tailoring Effectiveness ($B = 0.477$), Institutional Trust ($B = 0.237$), and Language Accessibility ($B = 0.173$), while Mobility/Service Discontinuity showed a negative coefficient ($B = -0.201$). The model explained 59.4% of simulated outcome variance. Using a methodological midpoint threshold, 18.6%, 53.4%, and 83.2% of simulated cases in the low-, moderate-, and high-tailoring groups respectively met the vaccination-action-readiness criterion. These estimates are illustrative rather than empirical population effects. The findings support a communication model in which cultural tailoring does not simply translate existing messages but adapts language, framing, messengers, channels, and service information through community-informed processes while maintaining scientific accuracy, informed choice, and equitable access.

Keywords: vaccination communication, mobile populations, migrants, refugees, cultural tailoring, vaccine confidence, immunization access, health communication, community engagement



1. Introduction

Vaccination is one of the principal tools for preventing vaccine-preventable infectious diseases, yet vaccine availability does not guarantee that every eligible population receives vaccines according to recommended schedules. Migrants and refugees may encounter incomplete vaccination records, differences between national immunization schedules, administrative barriers, difficulty identifying appropriate services, language barriers, interrupted continuity, and uneven eligibility or access arrangements. A WHO European evidence review concluded that immunization policies for migrants and refugees varied substantially among countries while common access and utilization barriers were identifiable across settings.

The term mobile populations is used in this paper as a broad analytical category encompassing people whose movement across geographic, administrative, or health-service boundaries can disrupt continuity of vaccination information or services. This may include some migrants, refugees, asylum seekers, seasonal or mobile workers, and other populations experiencing frequent changes in residence or care location. These populations should not be treated as culturally homogeneous. Migration status, language, religion, education, country of origin, legal circumstances, socioeconomic resources, duration of residence, and prior health-system experiences can vary substantially. Evidence on vaccine-preventable disease burden and immunization coverage among migrants also presents a heterogeneous rather than universally uniform pattern.

Communication is one component of this wider access environment. Abdi, Menzies, and Seale's qualitative study among East African refugee and migrant communities in Australia identified language barriers, limited risk perception, and inadequate education among reported barriers, while participants described resources in their own languages and consistent reminder systems as potential facilitators. WHO's synthesis of communication strategies for refugees and migrants identifies cultural mediation, interpretation, translation of health information, and provider guidance or training as distinct approaches rather than treating communication improvement as translation alone.

Vaccination communication must also be distinguished from the broader concept of vaccine hesitancy. MacDonald and the WHO SAGE Working Group defined vaccine hesitancy around delayed acceptance or refusal despite the availability of vaccination services and emphasized that it is context- and vaccine-specific. In mobile populations, apparent non-vaccination may arise from hesitancy, but it can also arise from inaccessible clinics, uncertain entitlement, missing records, changing addresses, language difficulties, inability to complete multidose schedules, or lack of information about where vaccination is available. Treating every missed vaccination as a belief problem can therefore produce communication interventions that fail to address the actual barrier.

The present study proposes that culturally tailored communication is most defensible when it is understood as responsive communication embedded within an accessible vaccination pathway. WHO's Tailoring Immunization Programmes approach emphasizes diagnosing locally specific barriers and motivators, community engagement, and understanding the perspectives of susceptible or low-coverage populations before designing interventions. WHO's 2019 guidance for refugees and migrants similarly highlights mainstream immunization access together with more targeted approaches where required. The study uses simulation to demonstrate how communication tailoring, institutional trust, language

accessibility, and mobility-related service discontinuity could be modeled together without presenting hypothetical participants as real research subjects.

2. Objectives of the Study

2.1 To Examine Culturally Tailored Vaccination Communication

The first objective is to conceptualize cultural tailoring as a structured communication process rather than as the simple translation of a standard vaccine leaflet. The proposed model includes language concordance, culturally comprehensible examples, appropriate message framing, trusted communication channels, opportunities to ask questions, and explicit information concerning where and how vaccination can be obtained. WHO's communication-barrier review supports this multidimensional interpretation by identifying cultural mediation, interpretation, translated health information, and provider training as separate but potentially complementary strategies.

The framework deliberately avoids assuming that every member of a culturally or nationally defined group shares identical vaccine beliefs. Tailoring is therefore based on formative assessment and community engagement rather than stereotype-based assumptions. The WHO TIP approach similarly emphasizes understanding specific susceptible populations and locally diagnosed challenges before intervention design. Effective tailoring should preserve accurate benefit–risk communication and voluntary informed decision making while improving the accessibility and relevance of that communication.

2.2 To Assess Trust and Language Accessibility as Communication Mechanisms

The second objective is to examine Institutional Trust and Language Accessibility as independent contributors to Vaccination Action Readiness. Communication can be understandable yet ineffective when the source is considered untrustworthy, and a trusted provider can still communicate poorly when the recipient cannot understand the language, medical terminology, or procedural instructions. These mechanisms should therefore be analyzed separately rather than collapsed into a single communication-quality measure.

Qualitative evidence among East African migrants and refugees has specifically identified language barriers and misinformation-related issues in immunization decision making. Research among Somali refugee women concerning HPV vaccination also illustrates how knowledge, beliefs, decision-making processes, and culturally situated concerns can shape vaccine discussions. The framework consequently treats comprehension and trust as conditions through which culturally responsive communication may translate into action.

2.3 To Examine Mobility-Related Service Discontinuity

The third objective is to examine whether mobility and discontinuity in vaccination services can constrain action even when communication quality is high. Individuals moving between jurisdictions may encounter different schedules, uncertain records, unfamiliar service systems, changing providers, administrative documentation requirements, or difficulty completing subsequent doses. WHO and ECDC guidance for newly arrived migrants has emphasized the importance of equitable access, catch-up vaccination, and organized service delivery in addition to communication.



The analytical implication is important because communication should not be evaluated solely through attitudes or intentions.

A person may understand a vaccination recommendation, trust it, and intend to act but remain unable to locate an accessible provider or complete the vaccination series. The study therefore incorporates Mobility/Service Discontinuity as a structural constraint rather than attributing every difference in readiness to culture or individual psychology.

3. Review of Literature

3.1 Vaccination Inequity and Access Among Migrant and Refugee Populations

Charania, Gaze, Kung, and Brooks reviewed studies published from 2006 to 2016 concerning vaccine-preventable diseases and immunization coverage among migrants and non-migrants. Their review found a complex evidence base rather than a single universal migrant disadvantage, but it documented important coverage and disease-burden concerns in specific migrant groups and settings. This heterogeneity reinforces the need for targeted assessment instead of assuming that mobility itself inevitably causes under-immunization.

De Vito and colleagues' WHO Health Evidence Network review examined immunization policies, access, and utilization for migrants and refugees in the European Region. The authors identified considerable policy heterogeneity and recurring implementation and access barriers and emphasized the importance of culturally competent immunization services and stronger information provision. The review demonstrates that vaccine uptake is partly produced by institutional arrangements rather than solely by personal acceptance.

Hui and colleagues' systematic review of newly arrived migrants in the EU/EEA found relatively limited direct intervention evidence but identified social mobilization, vaccination programs, and education campaigns as promising approaches. The authors also examined the economics of selected catch-up vaccination strategies. Charania and colleagues' 2020 global scoping review subsequently identified interventions intended to reduce vaccine-preventable disease burden among migrants and refugees and reinforced the importance of addressing access-related barriers while involving communities in intervention design.

3.2 Cultural and Linguistic Adaptation of Vaccination Communication

Communication adaptation is frequently discussed as though translation alone is sufficient. WHO's Health Evidence Network report by McGarry and colleagues provides a broader framework. Across the WHO European Region, evaluated strategies included cultural mediation, interpretation, translated health information, and guidance and training for health-care providers. This distinction matters because literal translation can transmit words accurately while leaving unexplained assumptions concerning disease risk, preventive care, appointment processes, or the role of particular health professionals.

Cultural mediation can add contextual interpretation by helping providers and communities understand differences in health-system expectations and communication norms. However, the role should not be confused with persuading a community to accept vaccination irrespective of concerns. Ethical vaccination communication requires opportunities for questions and understandable explanations of benefits, expected adverse reactions, contraindications, dosing schedules, and service options. The

WHO TIP methodology is valuable because it begins with diagnosis of barriers and motivators rather than beginning with a preselected communication campaign.

Abdi and colleagues' East African case study offers a practical illustration. Participants described language barriers and knowledge-related challenges while identifying translated resources and reminders among possible facilitators. Such evidence supports a model in which culturally tailored communication combines comprehensible content with operational support. A well-translated message that omits clinic location, eligibility, required documentation, timing, or follow-up information may improve knowledge without improving vaccination completion.

3.3 Trust, Vaccine Confidence, and Mobility-Responsive Communication

Trust is relevant because vaccination involves accepting a preventive intervention before disease occurs, often on the recommendation of institutions or professionals. General vaccine-hesitancy literature shows that vaccination decisions are influenced by multiple contextual, individual, group, and vaccine-specific factors rather than a single universal cause. The large-scale analysis by de Figueiredo and colleagues also demonstrated substantial geographic variation in vaccine confidence over time, supporting the conclusion that confidence is dynamic and context-sensitive rather than fixed.

For mobile populations, institutional trust can be shaped by experiences extending well beyond immunization. Immigration procedures, prior health systems, legal uncertainty, discrimination, previous encounters with government institutions, and confidence in local health professionals may influence how a vaccination message is interpreted. This does not mean that distrust should automatically be attributed to culture. Communication design should recognize that trust can be relational and institutional and can be strengthened through consistency, respectful engagement, transparent information, and reliable delivery of promised services.

Mobility adds another temporal dimension. Vaccination may involve multiple doses or catch-up schedules, and relocation can disrupt reminders, records, and continuity. WHO's 2019 refugee and migrant immunization guidance explicitly addresses service organization and targeted delivery rather than reducing the problem to message acceptance. Culturally tailored communication should consequently be mobility responsive: information should remain understandable across service transitions, records should be portable where feasible, subsequent doses should be clearly explained, and users should know how to continue vaccination after relocation.

4. Research Methodology

4.1 Research Design and Synthetic Sample

The study adopts a quantitative simulation-based design because no original vaccination survey, migrant-health dataset, immunization registry, intervention trial, or community communication dataset was supplied. The use of synthetic data prevents hypothetical observations from being presented as actual responses from mobile populations. The simulated results are intended to demonstrate an analytically testable framework rather than to estimate population prevalence or causal effects.

A reproducible synthetic sample of 420 hypothetical individuals was generated. Cultural Tailoring Effectiveness, Institutional Trust, Language Accessibility, and Mobility/Service Discontinuity were represented on five-point continua. Vaccination Action Readiness was also represented on a five-

point scale and reflected the modeled likelihood of moving from communication exposure toward an appropriate vaccination-related action.

The term action readiness was selected deliberately instead of vaccination uptake. Actual receipt of a vaccine requires verified clinical or registry data, which were not available. Readiness represents a nearer communication outcome that could include intention to seek vaccination, willingness to clarify vaccination status, readiness to attend a catch-up service, or preparedness to complete a recommended next dose.

4.2 Operational Framework and Proposed Questionnaire

Table 1: Operational Framework for Culturally Tailored Vaccination Communication

Construct	Operational Definition	Scale	Analytical Role
Cultural Tailoring Effectiveness	Degree to which communication reflects appropriate language, culturally comprehensible framing, trusted messengers, responsive dialogue, and locally relevant service information	1–5	Primary predictor
Institutional Trust	Confidence that vaccination providers and relevant health institutions communicate and act reliably	1–5	Predictor
Language Accessibility	Degree to which vaccine information and navigation instructions can be understood in an appropriate language and literacy level	1–5	Predictor
Mobility/Service Discontinuity	Difficulty maintaining vaccination continuity because of movement, records, administrative transitions, changing providers, or interrupted access	1–5	Negative predictor
Vaccination Action Readiness	Readiness to verify status, seek recommended vaccination, attend an appointment, or complete an indicated dose	1–5	Outcome
Tailoring Category	Low, moderate, or high communication tailoring	Categorical	Descriptive analysis

A future empirical instrument could include exactly five proposed questions. Q1: “Vaccination information is provided in language that I can easily understand.” Q2: “Vaccination messages address concerns that are relevant to people with experiences similar to mine without making assumptions about everyone in my community.” Q3: “I trust the health professionals or community sources who provide

me with vaccination information.” Q4: “The information clearly explains where and how I can obtain or continue recommended vaccinations if I move or change health services.” Q5: “After receiving vaccination information, I feel able to decide on and complete the appropriate next vaccination-related action.” These items are proposed only and were not administered.

Before empirical use, the questionnaire should undergo community review, cognitive interviewing, translation and back-translation where appropriate, assessment of measurement equivalence, pilot testing, reliability analysis, and construct validation. The tailoring construct should also be evaluated independently across different population groups because a communication format that is appropriate in one setting cannot be assumed to be culturally suitable in another.

4.3 Simulation Model, Statistical Procedure, and Ethics

Cultural Tailoring Effectiveness was grouped into low, moderate, and high categories for descriptive comparison. Multiple ordinary least squares regression was then used to estimate the simulated associations of the four predictors with Vaccination Action Readiness. For the graph, a score of 3.0 or above was classified as being at or above the methodological vaccination-readiness midpoint. This threshold is not a validated clinical or behavioral cut-off.

No real migrants, refugees, workers, asylum seekers, or other mobile individuals were recruited. No vaccination histories, immigration information, health records, legal status, language identity, ethnicity, religion, or identifiable information were processed. Human-participant ethical approval was therefore not applicable to the simulation. A future empirical study involving mobile populations should use voluntary informed consent, privacy protections, culturally appropriate recruitment, secure handling of migration-related information, and safeguards ensuring that participation or vaccination decisions do not affect immigration or service entitlement.

5. Analysis

5.1 Vaccination Readiness Across Tailoring Levels

The synthetic sample contained 102 cases in the Low-Tailoring group, 223 in the Moderate-Tailoring group, and 95 in the High-Tailoring group. Mean Vaccination Action Readiness increased from 2.552 under low tailoring to 3.035 under moderate tailoring and 3.586 under high tailoring. Standard deviations were 0.483, 0.519, and 0.516 respectively.

The difference between the low- and high-tailoring categories was approximately 1.03 points on the five-point readiness scale. The gradient illustrates the central theoretical hypothesis: communication that is more understandable, context-sensitive, actionable, and trusted may be more likely to support progression toward vaccination-related action than generic communication.

The remaining within-group dispersion is important. Even highly tailored communication does not produce identical readiness because communication operates alongside service access, prior experiences, institutional trust, vaccination history, perceived disease risk, mobility, and individual preferences. The simulation therefore does not support a deterministic interpretation in which cultural tailoring automatically produces vaccination.

5.2 Multivariable Regression Analysis

Table 2: Simulated Descriptive and Regression Results

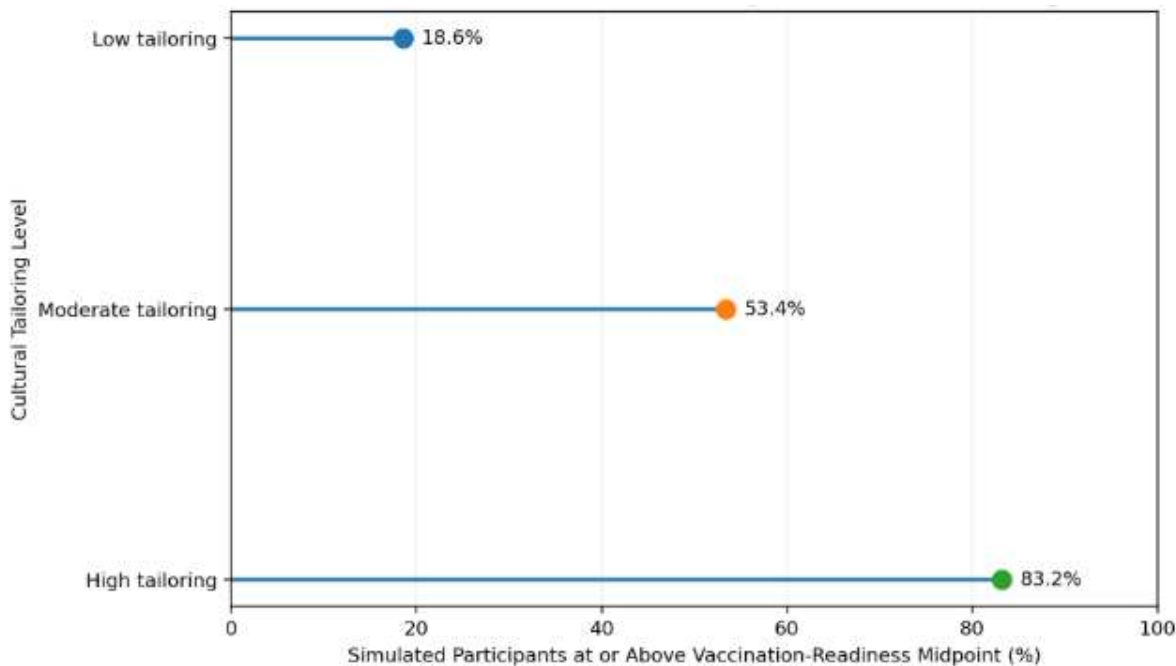
Analytical Component	Statistic	Estimate	Interpretation
Low Cultural Tailoring	n	102	Synthetic cases
	Mean Readiness	2.552	Lowest simulated readiness
	SD	0.483	Simulated dispersion
Moderate Cultural Tailoring	n	223	Synthetic cases
	Mean Readiness	3.035	Intermediate readiness
	SD	0.519	Simulated dispersion
High Cultural Tailoring	n	95	Synthetic cases
	Mean Readiness	3.586	Highest readiness
	SD	0.516	Simulated dispersion
Regression	Cultural Tailoring Effectiveness, B	0.477	Positive association
	SE	0.023	—
	t	20.525	—
	p	< .001	Recoverable synthetic effect
Regression	Institutional Trust, B	0.237	Positive association
	SE	0.026	—
	t	9.128	—
	p	< .001	Recoverable synthetic effect
Regression	Language Accessibility, B	0.173	Positive association
	SE	0.026	—
	t	6.733	—
	p	< .001	Recoverable synthetic effect

Cultural Tailoring Effectiveness produced the largest positive coefficient in the simulated regression. Institutional Trust and Language Accessibility retained independent positive associations, indicating that the model distinguishes culturally responsive communication from the more specific mechanisms of source confidence and comprehensibility.

Mobility/Service Discontinuity remained negatively associated with readiness even after the communication variables were included. The simulated pattern is theoretically important because it demonstrates that improved messaging cannot completely compensate for interrupted vaccination pathways. Communication and access should therefore be evaluated together in subsequent empirical research.

5.3 Vaccination-Readiness Midpoint by Communication Tailoring

Graph 1: Simulated Vaccination Action Readiness by Communication Tailoring Level



Approximately 18.6% of the Low-Tailoring group reached or exceeded the simulated readiness midpoint. The percentage increased to 53.4% under Moderate Tailoring and 83.2% under High Tailoring. The lollipop graph emphasizes the progressive rather than binary nature of the simulated relationship.

The graph should not be interpreted as evidence that culturally tailored communication will produce 83.2% vaccination uptake. Uptake requires verified vaccination data and can be constrained by service availability, eligibility, supply, contraindications, personal decisions, and continuity of care. The graph illustrates only the structure of the simulated readiness model.

6. Discussion

6.1 Cultural Tailoring as Responsive Communication Rather Than Translation

The results support a conceptualization of cultural tailoring that extends substantially beyond literal language translation. WHO's evidence synthesis on refugee and migrant communication identifies cultural mediation, interpretation, translation, and health-care-provider training as distinct strategies. Translation is essential when linguistic mismatch exists, but culturally responsive communication must also consider whether the message uses understandable risk concepts, whether the source is trusted, whether examples are locally meaningful, and whether the information addresses the practical questions that prevent action.

The WHO TIP approach reinforces this principle by beginning with social and behavioral diagnosis rather than assuming that the same intervention should be deployed across every low-coverage population. Its implementation review found value in social-science methods, interdisciplinary work, community engagement, and understanding community perspectives. This approach is particularly appropriate for mobile populations because the same language group can include people with widely different migration histories, educational backgrounds, vaccination experiences, and attitudes toward institutions.

Cultural tailoring should therefore be co-designed rather than stereotyped. Public-health teams should test messages with the intended population, involve community organizations and relevant health professionals, and revise communication based on identified misunderstandings or barriers. Tailoring should never involve withholding scientifically relevant information or using cultural assumptions to pressure vaccination. Its purpose is to make accurate information and service navigation comprehensible, respectful, and usable.

6.2 Trust and Language as Independent Pathways to Vaccination Action

The positive simulated associations for Institutional Trust and Language Accessibility suggest that communication effectiveness can fail through more than one pathway. A message may be linguistically understandable but originate from an institution that the recipient does not trust. Conversely, a trusted clinician may be unable to communicate effectively when language concordance, qualified interpretation, or accessible written information is unavailable.

Abdi and colleagues' qualitative work among East African refugees and migrants illustrates this interaction. Participants identified language barriers and knowledge-related concerns and suggested resources in community languages and reminder systems as facilitators. Somali refugee research concerning HPV vaccination similarly demonstrates that vaccination discussions can be embedded in broader knowledge, belief, and decision-making contexts. Communication programs should therefore avoid assuming that providing more information alone will resolve every concern.

Trust can be strengthened through consistent service delivery as well as through message design. If a communication campaign promises free vaccination but the user later encounters unexpected charges, unavailable appointments, or unclear eligibility, subsequent messages may lose credibility. Trust should therefore be treated as an outcome of institutional behavior, transparency, and reliable access—not merely as a psychological characteristic of the audience.

6.3 Mobility-Responsive Vaccination Systems and Equity Implications

The negative Mobility/Service Discontinuity coefficient demonstrates why culturally tailored communication cannot be separated from vaccination-system design. WHO's refugee and migrant immunization guidance emphasizes both incorporation into mainstream immunization services and targeted delivery where needed. The earlier WHO evidence review by De Vito and colleagues also documented recurring access and utilization barriers across migrant and refugee vaccination systems.

A mobility-responsive system should make it as easy as reasonably possible to continue vaccination after movement. Portable documentation, clearly explained schedules, reminders that remain usable after address changes, catch-up pathways, flexible service locations, and understandable instructions about how to resume vaccination can reduce the consequences of interrupted continuity. Outreach may also be useful where conventional clinic-centered provision repeatedly misses mobile populations, although intervention design should be based on local evidence rather than assumed need.

Equity requires avoiding a deficit narrative in which mobile populations are presented primarily as vaccine hesitant or difficult to reach. Charania and colleagues' reviews show that vaccination disparities and intervention needs are shaped by multiple service and population factors, while Hui and colleagues found that social mobilization, vaccine programs, and education campaigns may contribute to improved migrant vaccination access. Effective policy should therefore combine respectful communication with practical access, continuity, affordable or entitlement-consistent service provision, reliable records, and community partnership.

7. Conclusion

Culturally tailored vaccination communication has potential value in mobile populations because generic messages may fail to account for linguistic differences, previous health-system experiences, locally relevant concerns, trusted information sources, and the practical realities of obtaining or completing vaccination while moving between services. The strongest pre-2021 evidence does not support reducing this problem to message translation or vaccine hesitancy alone. WHO guidance and migrant-immunization research consistently point toward a broader combination of culturally competent communication, community engagement, and accessible service delivery.

The simulation developed in this study illustrates that framework. Mean Vaccination Action Readiness increased from 2.55 under Low Tailoring to 3.04 under Moderate Tailoring and 3.59 under High Tailoring. Institutional Trust and Language Accessibility also contributed positively, whereas Mobility/Service Discontinuity contributed negatively. These values are intentionally identified as synthetic outputs. They provide a reproducible theoretical demonstration rather than evidence of actual vaccination behavior.

The study's principal contribution is the distinction between cultural tailoring and cultural stereotyping. Effective tailoring begins with listening, formative research, and community participation; it does not assume that ethnicity, nationality, language, or migration status automatically predicts a vaccine belief. Communication should adapt its language, messenger, framing, format, and navigation support while retaining scientifically accurate information and respect for informed individual choice.

Future empirical research should compare generic and community-informed communication using verified vaccination outcomes, examine whether trust and comprehension mediate effects, and

measure service barriers alongside attitudes. Longitudinal studies should also examine continuity after relocation and completion of multidose vaccination schedules. The most equitable vaccination strategy for mobile populations is likely to be one in which communication is understandable and trusted and the service pathway remains practically accessible as people move.

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