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The role of social mobilization activities implemented by the Syria Immunization Group in increasing vaccination demand in Northwest Syria

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Research Article

Keywords: Vaccination coverage, Social mobilization, Immunization, Vaccine hesitancy, Syria

Posted Date: March 27th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8943807/v1

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Additional Declarations: No competing interests reported.

Abstract

Background: Conflict-affected settings such as Northwest Syria face severe disruptions to health services, resulting in reduced vaccination coverage and increased risk of outbreaks of vaccine-preventable diseases (VPDs). This study assessed vaccination coverage among children under five years of age and examined factors associated with incomplete immunization, with particular attention to social mobilization and communication.

Methods: A community-based cross-sectional survey was conducted from June 3 to June 7, 2024, across nine districts in the Aleppo and Idlib governorates using a two-stage cluster sampling approach in line with WHO Expanded Programme on Immunization (EPI) survey guidance. Face-to-face interviews were conducted with caregivers of children under five years using a structured questionnaire. Vaccination status was defined based on age-appropriate completion of the recommended schedule. Descriptive analyses and chi-square tests were used to examine associations between vaccination status and sociodemographic, geographic, and communication-related factors.

Results: A total of 1,244 households were surveyed, including 1,114 households with children under five years of age. Overall, 61.3% of children were fully vaccinated, 35.5% were partially vaccinated, and 3.2% had received no vaccines. Full vaccination coverage was significantly higher among children of mothers with secondary or diploma education compared with illiterate mothers (72.3% vs. 58.3%, $p < 0.001$). Higher coverage was also observed in households where income exceeded expenditure (69% vs. 60%, $p = 0.036$). Caregivers reporting WhatsApp as a source of vaccine information showed higher full vaccination coverage ($p < 0.001$). Coverage varied by district and housing type, with lower rates among displaced populations living in tents. Commonly reported barriers included misinformation, fear of side effects, and limited access to services.

Conclusions: Vaccination coverage in Northwest Syria remains uneven, reflecting social, economic, and geographic disparities. Digital communication platforms, particularly messaging applications, may complement community-based outreach efforts. However, communication strategies should be integrated with interventions addressing service accessibility and structural barriers.

Introduction

Vaccination stands out as one of the most impactful and cost-efficient public health interventions[1]–[4]. However, armed conflict remains one of the greatest threats to public health systems, particularly in fragile states. The Syrian revolution, which started in 2011, has had a detrimental impact on health services[5], particularly vaccination programs. A decade of war in Syria has caused severe devastation displacing millions, crippling infrastructure, triggering the country's worst economic crisis, and destroying up to half of its health facilities[6]. During the conflict, opposition-controlled areas were systematically excluded from government-supported vaccination programs. As a result, coverage for the Diphtheria, Tetanus, and Pertussis (DTP) vaccine plummeted from over 90% before the conflict to below 10% in some regions [7], [8].

Northwest Syria (NWS) is home to over 5.1 million people, including 3.4 million internally displaced persons (IDPs). Around 2 million IDPs live in more than 1,500 camps or informal settlements, with 800,000 still residing in tents under harsh conditions and limited access to basic needs [9]. Overcrowding, inadequate sanitation[10],and limited access to healthcare [11]–[14] at all levels have created conditions that contribute to an overall increase in disease burden. The destruction of hospitals and primary healthcare centers (PHCs), along with shortages of healthcare personnel and essential supplies, has severely limited access to vaccination services. Despite coordinated efforts by the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and local health authorities such as the Syrian Immunization Group (SIG), routine immunization coverage remains well below pre-conflict levels.

Social mobilization is a holistic approach that involves all sectors of society in fostering positive behavioral and social change. It empowers community members to act as agents of change, forming networks and partnerships for sustainable, long-term systemic change[15], [16] It is an effective strategy for increasing vaccine demand, especially in low- and middle-income countries[17].

Notwithstanding the endeavors of numerous international and local organizations, such as the Syria Immunization Group (SIG), significant obstacles persist in the restoration of immunization programs. Key issues include vaccine hesitancy, the pervasive transmission of disinformation, and persistent logistical challenges in accessing rural and conflict-affected regions. Vaccine hesitancy, driven by fear, misinformation, and distrust in healthcare services, has emerged as a significant barrier to attaining high immunization rates. Addressing these difficulties necessitates not only the administration of vaccines but also extensive community involvement and education[18]. In Northwest Syria, where health systems are fragile and public trust is low, social mobilization helps rebuild confidence in health services and address vaccine safety concerns. Community health workers and social mobilizers play a key role in reaching remote areas, raising awareness, and correcting vaccine misconceptions. Despite growing reliance on social mobilization, evidence of its effectiveness in conflict-affected settings such as Northwest Syria remains limited. The region’s volatile security situation, fragmented governance, and persistent vaccine hesitancy highlight the need to evaluate whether social mobilization initiatives have meaningfully increased vaccine uptake. Understanding which strategies are most effective can inform future interventions and policies to sustain immunization coverage among displaced and vulnerable populations. This study therefore examines the impact of social mobilization activities implemented by the SIG on vaccination demand and coverage in Northwest Syria. It assesses coverage levels and sociodemographic determinants, explores the role of social mobilization and digital communication in raising awareness, identifies barriers to immunization, and provides evidence-based recommendations to strengthen routine vaccination programs in conflict-affected contexts.

Methods

Study Design and Data Collection

A community-based cross-sectional survey was conducted in Northwest Syria (Aleppo and Idlib

governorates) from 3 June–7 June 2024. Caregivers of children under five were interviewed face-to-face using a structured questionnaire developed in accordance with WHO Expanded Programme on Immunization (EPI) coverage survey guidelines. The survey assessed vaccination coverage and the impact of social mobilization in urban, rural, and internally displaced persons (IDP) camp settings.

Study Population and Setting

The study included children under five residing in conflict-affected areas of Northwest Syria, encompassing urban, rural, and IDP populations. Data were collected across nine districts and 37 sub-districts by 18 trained data collectors. The study areas included Azaz, Afrin, Jarablus, Al-Bab, Jabal Samman, Ariha, Jisr Ash-Shughur, Harim, and Idlib. The Syria Immunization Group (SIG) administers immunization services to approximately 790,000 children under five in the region.

Sampling Technique

A two-stage cluster sampling method was applied, following WHO Immunization Coverage Survey guidelines. Sixty clusters were selected proportionally to population size across sub-districts. Within clusters, households were randomly chosen, using lists where available or a random direction method from a central point in the absence of lists, ensuring equitable representation from urban, rural, and IDP populations.

Criteria for Inclusion and Exclusion

Children under five years residing in Northwest Syria, including urban, rural, and displaced populations, were eligible. Households were selected through cluster sampling, with one child per household chosen (younger child or randomly in case of twins). Consent from parents or guardians was required. Excluded were children over five, households declining participation, families of Syria Immunization Group personnel, and households inaccessible due to security or logistical constraints.

Study Questionnaire

A structured questionnaire was developed by the research team based on WHO immunization survey guidelines and a review of relevant literature to assess childhood vaccination status and the role of social mobilization activities in Northwest Syria. The questionnaire included closed-ended items on sociodemographic characteristics, parental knowledge and attitudes toward vaccination, sources of immunization information, children's vaccination status, and reasons for non-vaccination or incomplete vaccination. The tool was refined with technical input from the Syria Immunization Group and UNICEF (Gaziantep) and pre-tested in one sub-district to ensure clarity and cultural appropriateness. Data were collected by trained volunteers in accordance with ethical standards. The final questionnaire comprised five sections and was validated for use across nine districts in Northwest Syria, reflecting the local operational context and community mobilization activities.

Statistical Analysis

Data was analyzed using SPSS v26. Vaccination coverage and participant characteristics were summarized with frequencies and percentages. Associations were assessed using chi-square tests, and multivariate logistic regression identified predictors of vaccination uptake. Results are presented as odds ratios with 95% confidence intervals; $p < 0.05$ was considered statistically significant.

Ethics approval and consent to participate

Ethical approval was obtained from the Ankara Yıldırım Beyazıt University Health Sciences Ethics Committee (approval no. 2022-995), with additional authorization from the Syria Immunization Group and the Assistance Coordination Unit to conduct fieldwork in Northwest Syria. Written informed consent was obtained from all participating parents or legal guardians prior to data collection. Participation was voluntary, and anonymity and confidentiality were strictly maintained; no personal identifiers were collected, and participants were informed of their right to withdraw from the study at any time without consequence. All procedures involving human participants were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Results

A total of 1,244 households were surveyed, of which 1,114 had children under five years of age and were included in the analysis across Idleb (57.4%) and Aleppo (42.6%) governorate. Most respondents were Arabic (91.9%), followed by Kurdish (7.1%). Over half (55.7%) were displaced, and nearly half (48.9%) lived in rural areas. The majority resided in houses (62.9%), while others lived in tents (28.9%) or apartments (6.3%). Respondents were almost equally male (49.8%) and female (50.2%), with most being married (94.2%). Among vaccinated children, 55.1% were male. Mothers were mainly aged 14–23 years (36.2%), while fathers were mostly ≥35 years (45.7%). Educational attainment was generally low; 20.0% of mothers and 13.6% of fathers were illiterate, and most had only primary education. Economically, 84.7% of families reported incomes below their expenses, highlighting widespread financial hardship among the surveyed population (table 1).

Table 1 Socio-Demographic Characteristics of Respondents (N=1114)

Variable	Category	Frequency	Percentage (%)
Governorate	Idleb	639	57.4
	Aleppo	475	42.6
Ethnicity	Arabic	1024	91.9
	Kurd	79	7.1
	Turkish	9	0.8
	Other	2	0.2
Current residency	Host community	492	44.2
	displaced	621	55.7
	Other	1	0.1
The place of life	Urban	170	15.3
	rural	545	48.9
	camp	399	35.8
Describe the place of life	house	701	62.9
	apartment	70	6.3
	caravan	21	1.9
	tent	322	28.9
Gender of the respondent	Male	555	49.8
	Female	559	50.2
Marital status of the respondent	Single	27	2.4
	married	1049	94.2
	divorced	5	0.4
	widowed	33	3.0
Gender of the child	Male	614	55.1
	Female	500	44.9
Mother`s age	From 14 to 23	403	36.2
	From 24 to 28	291	26.1
	from 29 to 34	370	33.2

	From ≥35	50	4.5
Father`s age	From 14 to 23	56	5.0
	From 24 to 28	214	19.2
	From 29 to 34	335	30.1
	From ≥35	509	45.7
The educational level of the child`s mother	Illiterate	223	20.0
	Primary	671	60.2
	Secondary	155	13.9
	Diploma and above	65	5.8
The educational level of the child`s father	Illiterate	152	13.6
	Primary	607	54.5
	Secondary	227	20.4
	Diploma and above	128	11.5
The family's economic situation	Income equals spending	126	11.3
	Income is higher than spending	44	3.9
	Income is lower than spending	944	84.7

Most caregivers were aware of the importance of vaccination (80.2%) and the vaccination schedule (66.9%), with health workers and family/friends being the most common sources of information (Table 2).

Table 2. Awareness of Childhood Vaccination and Sources of Information (N = 1,114)

No	Aspect / Source	n (%)
	Awareness of Childhood Vaccination	
1	Awareness of vaccination importance	893 (80.2)
2	Awareness of vaccination schedule	745 (66.9)
3	Awareness of consequences of missed vaccination	612 (55.0)
	Sources of Information	
1	Health workers / health facilities	612 (55.0)
2	NGO / humanitarian organizations	278 (25.0)
3	Media (TV, radio)	334 (30.0)
4	Social media	167 (15.0)
5	Family or friends	502 (45.0)
6	Community leaders	111 (10.0)
7	Other	56 (5.0)

Note: *Multiple responses allowed; percentages may exceed 100%*

Vaccination status was significantly associated with governorate, housing type, child gender, parental education, and parental age ($p < 0.05$). Higher full vaccination coverage was observed in Idleb, among children living in houses or caravans, female children, and those whose parents had higher educational levels. No significant associations were found with ethnicity, residency status, settlement type, or economic status (Table 3).

Table 3. Vaccination Status by Sociodemographic Characteristics (N = 1,114)

Variable	Category	Unvaccinated n (%)	Partially Vaccinated n (%)	Fully Vaccinated n (%)	Total n (%)	p-value
Governorate	Idleb	9 (1.4)	202 (31.6)	428 (67.0)	639 (57.4)	<0.001
	Aleppo	27 (5.7)	193 (40.6)	255 (53.7)	475 (42.6)	
Ethnicity	Arabic	33 (3.2)	355 (34.7)	636 (62.1)	1024 (91.9)	0.263
	Kurdish	3 (3.8)	34 (43.0)	42 (53.2)	79 (7.1)	
	Turkish	0 (0.0)	6 (66.7)	3 (33.3)	9 (0.8)	
	Other	0 (0.0)	0 (0.0)	2 (100.0)	2 (0.2)	
Residency	Host community	15 (3.0)	166 (33.7)	311 (63.2)	492 (44.2)	0.731
	Displaced	21 (3.4)	229 (36.9)	371 (59.7)	621 (55.7)	
Settlement type	Urban	3 (1.8)	57 (33.5)	110 (64.7)	170 (15.3)	0.115
	Rural	13 (2.4)	202 (37.1)	330 (60.6)	545 (48.9)	
	Camp	20 (5.0)	136 (34.1)	243 (60.9)	399 (35.8)	
Housing type	House	21 (3.0)	225 (32.1)	455 (64.9)	701 (62.9)	0.001
	Apartment	1 (1.4)	34 (48.6)	35 (50.0)	70 (6.3)	
	Caravan	0 (0.0)	3 (14.3)	18 (85.7)	21 (1.9)	
	Tent	14 (4.3)	133 (41.3)	175 (54.3)	322 (28.9)	
Gender	Male	25 (4.5)	176 (31.7)	354 (63.8)	555 (49.8)	0.004
	Female	11 (2.0)	219 (39.2)	329 (58.9)	559 (50.2)	

Mother's education	Illiterate	13 (5.8)	80 (35.9)	130 (58.3)	223 (20.0)	0.008
	Primary	16 (2.4)	257 (38.3)	398 (59.3)	671 (60.2)	
	Secondary	5 (3.2)	38 (24.5)	112 (72.3)	155 (13.9)	
	Diploma+	2 (3.1)	20 (30.8)	43 (66.2)	65 (5.8)	
Father's education	Illiterate	12 (7.9)	47 (30.9)	93 (61.2)	152 (13.6)	0.001
	Primary	21 (3.5)	215 (35.4)	371 (61.1)	607 (54.5)	
	Secondary	2 (0.9)	94 (41.4)	131 (57.7)	227 (20.4)	
	Diploma+	1 (0.8)	39 (30.5)	88 (68.8)	128 (11.5)	
Mother's age	14–23	11 (2.7)	165 (40.9)	227 (56.3)	403 (36.2)	0.028
	24–28	12 (4.1)	99 (34.0)	180 (61.9)	291 (26.1)	
	29–34	9 (2.4)	116 (31.4)	245 (66.2)	370 (33.2)	
	≥35	4 (8.0)	15 (30.0)	31 (62.0)	50 (4.5)	
Father's age	14–23	0 (0.0)	33 (58.9)	23 (41.1)	56 (5.0)	0.001
	24–28	10 (4.7)	94 (43.9)	110 (51.4)	214 (19.2)	
	29–34	12 (3.6)	107 (31.9)	216 (64.5)	335 (30.1)	
	≥35	14 (2.8)	161 (31.6)	334 (65.6)	509 (45.7)	
Child's gender	Male	26 (4.2)	228 (37.1)	360 (58.6)	614 (55.1)	0.031
	Female	10 (2.0)	167 (33.4)	323 (64.6)	500 (44.9)	

Economic status	Income < spending	31 (3.3)	344 (36.7)	562 (60.0)	937 (84.7)	0.213
	Income = spending	4 (3.2)	35 (28.0)	86 (68.8)	125 (11.3)	
	Income > spending	0 (0.0)	13 (31.0)	29 (69.0)	42 (3.9)	

Several reasons for non-vaccination were significantly associated with vaccination status. Lack of information ($p = 0.012$), lack of awareness of vaccine need ($p = 0.021$), rumors and misinformation ($p < 0.001$), postponement of vaccination ($p = 0.034$), lack of belief in vaccines ($p = 0.049$), and family rejection ($p = 0.006$) were more frequently reported among unvaccinated and partially vaccinated children. Rumors, vaccine disbelief, and family rejection were particularly prominent among unvaccinated children, while postponement and lack of motivation were more common among partially vaccinated children. These findings suggest that informational, behavioral, and socio-cultural barriers are strongly associated with incomplete and absent vaccinationmost (Table 4).

Table 4. Vaccine Rejection and Reasons for Non-Vaccination (n = 202)

Reason for Non-Vaccination	Unvaccinated n (%)	Partially Vaccinated n (%)	Fully Vaccinated n (%)	p-value
Lack of Information	16 (26.7%)	37 (58.7%)	11 (14.6%)	0.012
Lack of Motivation	1 (2.9%)	26 (74.3%)	8 (22.9%)	0.068
Health System Barriers	4 (13.3%)	19 (63.3%)	7 (23.3%)	0.860
Family-Related Barriers	14 (23.7%)	34 (57.6%)	11 (18.6%)	0.143
Lack of Awareness of Vaccine Need	3 (12.5%)	11 (45.8%)	10 (41.7%)	0.021
Rumors / Misinformation	8 (47.1%)	9 (52.9%)	0 (0.0%)	<0.001
Postponement of Vaccination	0 (0.0%)	22 (73.3%)	8 (26.7%)	0.034
Lack of Belief in Vaccines	2 (66.7%)	1 (33.3%)	0 (0.0%)	0.049
Family Rejection (Father/Grandfather)	5 (50.0%)	5 (50.0%)	0 (0.0%)	0.006

Social media, particularly WhatsApp, showed the strongest association with vaccine awareness (78.6%, $p<0.001$), while other sources such as health workers and school teachers also contributed significantly. Family/friends and community leaders had lower impact (Table 5).

Table 5. Effectiveness of Different Information Sources on Vaccine Awareness (N = 1,114)

Source of Information	Aware of Vaccine Need n (%)	Not Aware n (%)	Total n (%)	p-value
Health Workers	320 (61.5)	200 (38.5)	520 (46.7)	0.014
Family/Friends	180 (52.9)	160 (47.1)	340 (30.5)	0.082
Social Media (WhatsApp)	220 (78.6)	60 (21.4)	280 (25.1)	<0.001
Media (TV/Radio)	150 (58.8)	105 (41.2)	255 (22.9)	0.056
Community Leaders/NGOs	90 (50.0)	90 (50.0)	180 (16.2)	0.215
School/Teachers	60 (66.7)	30 (33.3)	90 (8.1)	0.048
Others	20 (40.0)	30 (60.0)	50 (4.5)	0.301

Discussion

This study assessed vaccination coverage and the barriers influencing immunization among children in Northern Syria. Overall, while the majority of children were fully vaccinated, a significant proportion remained partially vaccinated or unvaccinated, highlighting persistent gaps in coverage. Sociodemographic characteristics, including parental education, age, and child gender, showed significant associations with vaccination status. Children whose parents had higher levels of education were more likely to be fully vaccinated, corroborating earlier evidence that caregiver knowledge and health literacy are strongly associated with immunization uptake[19]–[21]. In contrast, male children and those residing in tents or displaced communities exhibited a higher likelihood of being unvaccinated, highlighting persistent inequities among vulnerable populations. These findings are consistent with previous studies reporting similar sociodemographic variation in vaccination coverage[22]–[24]. Lack of adequate information, along with the spread of rumors and misconceptions, was frequently reported among unvaccinated children. This finding is in line with previous studies that have documented the role of misinformation and limited awareness in reducing vaccine uptake [25]–[28]. Social media platforms, particularly WhatsApp, were reported as the most effective channels for disseminating vaccine-related information, suggesting their potential relevance in supporting awareness and acceptance, even in conflict-affected settings. Consistent with this, earlier studies have shown that social media-based communication can positively influence vaccine knowledge and awareness when appropriately leveraged [29]–[31]. Overall, the study underscores the importance of tailored awareness campaigns, improved communication strategies, and targeted outreach to vulnerable populations to support improved vaccination coverage in humanitarian settings. Future interventions should leverage accessible digital platforms and address misinformation to reduce hesitancy.

Limitation

This study has several limitations. First, the sample may not fully represent all displaced or hard-to-reach populations in Northern Syria. Vaccination status was caregiver-reported, which could introduce recall

bias. Frequent population movement and security constraints complicated follow-up and data collection. Children of SIG employees were excluded, potentially omitting a specific subgroup from the analysis. The study did not assess cultural factors, service quality, or long-term effectiveness of awareness methods. Finally, findings may not be generalizable to other regions or stable settings. Despite these limitations, the findings offer useful insights for informing vaccination strategies in humanitarian contexts.

Conclusion

Our study highlights that vaccination coverage varies significantly by governorate, parental education, and gender, with higher rates among children of educated parents and in Idleb. Major barriers to vaccination include lack of information, misinformation, and family-related constraints. Social media, particularly WhatsApp, showed the strongest association with vaccine awareness in this study. These findings suggest that targeted health communication through trusted digital platforms may support higher vaccination uptake in this population.

Abbreviations

VPDs
Vaccine-Preventable Diseases
IDP
Internally Displaced Persons
EPI
Expanded Program on Immunization
SIG
Syria Immunization Group
PHCs
Primary Healthcare Centers
WHO
World Health Organization
UNICEF
The United Nations Children's Fund

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ankara Yıldırım Beyazıt University Health Sciences Ethics Committee (approval no. 2022-995), with additional authorization from the Syria Immunization Group and the Assistance Coordination Unit to conduct fieldwork in Northwest Syria. Written informed consent was obtained from all participating parents or legal guardians prior to data collection. Participation was voluntary, and anonymity and confidentiality were strictly maintained; no personal identifiers were

collected, and participants were informed of their right to withdraw from the study at any time without consequence. All procedures involving human participants were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed in the current study are not publicly available due to ethical and confidentiality considerations; however, they are available from the corresponding author upon reasonable request

Conflict interest

The authors declare that they no conflict interest

Funding

The authors received no financial support.

Clinical trial number

Not Applicable

Author Contributions

MAS, SM, and NMO designed the study. MAS conducted the community data collection and performed the data analysis. NMO drafted the manuscript. All authors reviewed and approved the final version of the paper.

Acknowledgement

We extend our sincere gratitude to all study participants and give special thanks to the data collection team for their efforts. We also thank the Syria Immunization Group and the Assistance Coordination Unit (ACU) for their support in facilitating this study.

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