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The Construct of Health Communication Effectiveness and Its Dimensions: A Confirmatory Factor Analysis within Hospital Settings in Middle Eastern Conflict Zones

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ABSTRACT

This study aims to empirically substantiate the dimensional structure of health communication effectiveness in hospitals operating within conflict zones in the Middle East through a Confirmatory Factor Analysis (CFA) approach. Secondary data were compiled from 847 medical records and patient surveys drawn from twelve hospitals in Syria, Iraq, and Yemen between 2019 and 2023. The six-dimension CFA model demonstrated exceptionally robust statistical adequacy, indicated by $\chi^2/df = 2.134$, CFI = 0.954, TLI = 0.947, RMSEA = 0.042 (90% confidence interval: 0.038-0.046), and SRMR = 0.039. Information clarity emerged as the strongest dimension with a factor loading of $\lambda = 0.891$, followed by provider empathy, responsiveness, communication competence, accessibility, and cultural sensitivity, all of which were significant at $p < 0.001$. Construct reliability was high, with CR = 0.943 and AVE = 0.735. These findings reinforce the work of Epstein et al. (2010) and Street et al. (2009) on the critical importance of patient-centered communication, while extending the current discourse by integrating cultural sensitivity and trauma-informed communication principles that have not yet been examined in conflict settings. This study offers a novel contribution by comprehensively validating the health communication construct in the context of extreme armed conflict.

Keyword: health communication effectiveness, confirmatory factor analysis, hospitals, conflict zones, Middle East, patient-centered care.

1. INTRODUCTION

Health communication has long been recognized as an essential foundation for high-quality healthcare delivery because it directly influences patient satisfaction, clinical outcomes, and adherence to therapeutic regimens (Stewart, 1995; Safran et al., 1998). Communication failure is one of the primary causes of patient safety incidents and is associated with substantial mortality due to medical errors in the United States (Makary & Daniel, 2016; The Joint Commission, 2015; Leape, 2021). Such statistics become even more alarming when applied to conflict settings, since war exerts extraordinary pressure on health systems through infrastructure destruction, shortages of medical personnel, heavy psychological trauma burdens, and mass displacement (Truppa et al., 2024). These conditions are evident in the Middle East, where Syria, Iraq, and Yemen have experienced protracted conflicts that have eroded health service structures to the point of fragility (ICRC, 2022; WHO, 2022; OCHA, 2022). Under these highly constrained circumstances, the ability of healthcare providers to conduct effective health communication becomes

increasingly crucial, even though its implementation becomes far more challenging than in normal situations (O'Daniel & Rosenstein, 2008; Cometto et al., 2010).

International literature shows that effective health communication has direct consequences for a wide range of health outcomes (Street Jr et al., 2009). A meta-analysis by Haskard-Zolnierek and DiMatteo (2009) involving more than 100 studies revealed that patients served by healthcare personnel with strong communication skills are 1.6 times more likely to adhere to treatment (Zolnierek & DiMatteo, 2009). In cases of chronic illness, Oates et al. (2000) demonstrated that a patient-centered communication approach could reduce symptoms by up to 50 percent while simultaneously improving physiological functioning (Oates et al., 2000; Cegala & Post, 2009). However, most studies producing such findings have been conducted in stable health systems not exposed to the destructive dynamics of war, creating a knowledge gap regarding how health communication operates in environments marked by uncertainty, fear, and extreme emotional pressure (Thieren, 2005).

Research on health communication in conflict areas remains limited and dispersed, and has yet to develop a coherent, established theoretical framework (Abuzerr et al., 2021). Several qualitative studies have examined the experiences of healthcare providers working amid armed conflict; however, systematic efforts to map and validate the core dimensions that determine the effectiveness of health communication in such settings remain lacking. A study by Cometto et al. (2010) in South Sudan identified psychological trauma and low trust as primary barriers to patient-provider interactions, while Abuzerr et al. (2021) highlighted the urgency of cultural sensitivity and political awareness in communication processes (Abuzerr et al., 2021). Although these findings are relevant, the descriptive approaches employed do not allow for the formation of a theoretical model that can be empirically tested through rigorous statistical analysis (Ager et al., 2013).

Conceptualizations of health communication effectiveness have undergone significant development, from linear models to complex multidimensional approaches (Epstein et al., 2005). Street et al. (2009) formulated a model comprising six interrelated functions of health communication, ranging from building healing relationships and sharing information to responding to emotions, managing uncertainty, decision-making, and enabling patient self-management (Street Jr et al., 2009; Street Jr & Millay, 2001). Epstein and Street (2007) extended this theoretical foundation by developing a patient-centered communication framework, which emphasizes a deep understanding of the patient's perspective, psychosocial context, and the establishment of a shared experience that guides clinical interaction (Epstein & Street Jr., 2007; Langewitz et al., 2002). Both models have proven strong across various healthcare settings, yet they have never been systematically tested in conflict contexts that impose psychological and social pressures that are distinct from ordinary situations.

From a cross-cultural communication perspective, Betancourt et al. (2003) emphasized the importance of cultural competence as an integral component of health communication effectiveness (Betancourt et al., 2003; Tucker et al., 2011). They emphasized the necessity for providers to possess reflective awareness, adequate knowledge, and skills to communicate with patients from diverse ethnic backgrounds (Schouten & Meeuwesen, 2006; Schillinger et al., 2004). This is highly relevant in the Middle East, a region marked by rich cultural, religious, and communal diversity (Greenhalgh et al., 2006). Covello (2003) enriched this discourse by formulating key principles of health communication in crises and emergencies, including message clarity, timeliness, accessibility, cultural appropriateness, and trust-building (Covello, 2003). He argued that communication in crisis conditions must be more action-oriented while retaining empathy, given that patient vulnerability increases sharply. However, this framework focuses on communication during disasters, and has not been specifically adapted to prolonged conflict settings.

Studies directly examining health communication in conflict regions have only begun to grow over the past decade. For example, Ager et al. (2015) showed that trust and confidentiality are major concerns for patients in post-conflict mental health care, especially among those with negative experiences with authorities. Handbook (2011) asserts that communication that upholds dignity is a fundamental right for humanitarian service recipients (Handbook, 2011). However, a substantial theoretical gap remains in the literature, particularly regarding the systematic identification of dimensions of health communication effectiveness that specifically reflect conflict conditions. Furthermore, empirical research employing statistical validation techniques, such as Confirmatory Factor Analysis (CFA), remains exceedingly rare in examining the structure of health communication constructs in war settings.

In this study, CFA was designed to provide methodological capacity to determine whether the hypothesized construct structure aligns with empirical data. This method has been used in health communication research to validate instruments such as the Communication Assessment Tool and the Patient-Clinician Communication Scale,

although it has never been applied in Middle Eastern conflict contexts. Therefore, this study aims to address this gap by analyzing the dimensional structure of health communication in hospitals in conflict zones.

Finally, the general objective of this research was to substantiate the dimensional structure of health communication effectiveness in hospitals within Middle Eastern conflict regions through CFA. Specifically, the study aimed to identify key dimensions relevant to conflict settings, assess model fit with empirical data, evaluate the strength of each dimension through factor loadings and reliability, and compare the results with established health communication frameworks to understand the distinctive characteristics of conflict situations. Based on the literature and regional contextual characteristics, this study hypothesized six primary dimensions: information clarity, provider empathy, responsiveness, communication competence, accessibility, and cultural sensitivity. Accordingly, the findings are expected to make theoretical contributions by developing a health communication framework better suited to conflict conditions in the Middle East, as well as practical contributions to the design of humanitarian-responsive training and policies for healthcare personnel.

2. METHODS

This study was designed within a non-experimental, quantitative framework using a cross-sectional approach and secondary data collected from multiple medical and humanitarian institutions. Confirmatory Factor Analysis was selected as the primary method because it enables the testing of construct validity based on theoretically predefined hypotheses, meaning that the resulting analytical model is not merely exploratory, but rigorously evaluates the alignment between theory and empirical evidence. An integrative, meta-analytic approach was used to combine data from various online sources, including international health databases, humanitarian organization repositories, and published datasets from previous studies relevant to the conflict context in the Middle East. The combination of these methods provides a comprehensive analytical framework for understanding the effectiveness of health communication in high-risk environments.

Secondary data were compiled from four major internationally credible sources. For example, the UNHCR Health Information System provides a dataset of patient satisfaction surveys from 12 hospitals in Syria, Iraq, and Yemen, operating in conflict and post-conflict settings from 2019 to 2023. The WHO Emergency Medical Teams database provides additional information on assessments of communication between providers and patients, whereas the operational research repository of Médecins Sans Frontières contains systematically conducted evaluations of service quality in the field. The International Committee of the Red Cross complemented the dataset with patient feedback collected through its reporting system. After screening, 847 adult patients aged 18 years or older with complete information on their health communication experiences were compiled for further analysis.

The inclusion criteria were patients who received health services in medical institutions located in active conflict or post-conflict areas in the Middle East, with data collected between January 2019 and December 2023, using standardized instruments to measure communication experiences, and with at least 85% of variables complete. Data from emergency one-time encounters, patients with documented severe cognitive impairment, and respondents who did not provide direct responses were excluded from analysis. Demographic profiles indicated an average participant age of 38.7 years with a standard deviation of 14.3 years, the majority being female at 58.2 percent, followed by internally displaced persons at 67.4 percent, and 42.8 percent of them having a history of trauma related to armed conflict.

The measurement instrument was constructed using a structured adaptation of the Patient Perception of Patient Centeredness Scale revised for conflict settings by various humanitarian health working groups. This instrument contains thirty-six items reflecting six main dimensions, namely, information clarity, provider empathy, responsiveness, communication competence, accessibility, and cultural sensitivity, each assessed using a five-point Likert scale representing levels of respondent agreement. Content validity was reviewed by a panel of health communication experts and humanitarian practitioners to ensure that the instrument met the standards of relevance and practical applicability. Reliability testing in pilot studies yielded Cronbach's alpha values ranging from 0.82 to 0.91, indicating very strong internal consistency across all dimensions.

Data collection and compilation were conducted through formal requests to the institutions that held authority over the respective databases in accordance with all ethical clearance requirements and data-sharing agreements. Data originally stored in various formats, such as SPSS, Excel, and CSV, were standardized using a harmonization protocol to ensure compatibility for further analysis. Missing data were handled using multiple imputations with 20 imputations to maintain the accuracy of the statistical estimates. Data cleaning was performed by identifying outliers

using Mahalanobis distance ($p<0.001$) and harmonizing scales to ensure item consistency, thereby integrating all variables into a uniform five-point format.

Furthermore, a Confirmatory Factor Analysis was conducted in AMOS 24.0, using maximum likelihood estimation. Model fit was evaluated based on multiple fit indices, including chi-square, comparative fit index, Tucker-Lewis index, root mean square error of approximation with its 90 percent confidence interval, and the Standardized Root Mean Square Residual. Factor loadings were considered significant if they exceeded 0.50, and $p<0.05$, whereas construct reliability was assessed using Composite Reliability and Average Variance Extracted. Convergent and discriminant validity were assessed through inter-construct relationships, comparisons of AVEs, and squared correlations. Finally, the six-dimensional model was compared with several alternative models, including a five-factor model and one-factor model, to assess the superiority of the hypothesized theoretical structure.

Ethical considerations were rigorously observed, as this study used de-identified secondary data and did not involve direct interactions with participants. All data management procedures complied with GDPR requirements and globally recognized humanitarian data protection principles.

3. RESULT

Sample Characteristics and Descriptive Statistics

Table 1. Sample Characteristics (N = 847)

Variable	Category / Statistic	N	%	Mean	SD
Country of Origin	Syria	312	36.8		
	Yemen	289	34.1		
	Iraq	246	29.1		
Age	Range 18–76 years			38.7	14.3
Gender	Female	493	58.2		
	Male	354	41.8		
Displacement Status	Internally Displaced Persons (IDPs)	571	67.4		
	Non-displaced Residents	198	23.4		
	Refugees / Returnees	78	9.2		
Conflict-related Trauma History	Reported trauma exposure	363	42.8		
Educational Level	Primary or lower	234	27.6		
	Secondary education	401	47.3		
	Higher education	212	25.1		

Note: *Values represent demographic distributions of patients receiving health services across conflict-affected hospitals in Syria, Yemen, and Iraq.*

Table 2. Descriptive Statistics of Health Communication Effectiveness Dimensions

Dimension	Mean	SD	Interpretation
Clarity of Information	3.68	0.89	Moderate-to-good clarity
Provider Empathy	3.82	0.94	Relatively strong perception of empathy
Responsiveness	3.45	1.02	Moderate responsiveness with noticeable variability
Communication Competence	3.71	0.87	Consistently positive competence indicators
Accessibility	3.28	1.15	Lowest and most variable due to structural barriers
Cultural Sensitivity	3.91	0.86	Highest perceived dimension across respondents

Note: *Descriptive values reflect patients' perceptions of communication effectiveness in conflict-affected hospital settings; a higher SD in accessibility suggests substantial structural constraints.*

As presented in the first table and the second table above, the analysis of 847 patients, comprising 312 individuals from Syria (36.8 percent), 289 from Yemen (34.1 percent), and 246 from Iraq (29.1 percent), illustrates a distinctive demographic composition within the healthcare context of conflict-affected regions. The sample had an average age of 38.7 years, standard deviation of 14.3 years, and a range of 18 to 76 years. The gender distribution

indicated a predominance of women, totaling 493 individuals (58.2 percent), compared with 354 men (41.8 percent). The displacement status further revealed that 571 individuals, equivalent to 67.4 percent, were internally displaced, 198 individuals, equivalent to 23.4 percent, were non-displaced residents, and 78 individuals, equivalent to 9.2 percent, were refugees or returnees, followed by 363 individuals (42.8 percent) who reported a history of conflict-related trauma. Educational background also varied: 234 individuals (27.6 percent) had primary education or below, 401 individuals (47.3 percent) had secondary education, and 212 individuals (25.1 percent) had higher education.

Regarding perceptions of communication effectiveness, information clarity records a mean score of 3.68, with a standard deviation of 0.89; provider empathy stands at 3.82, with a standard deviation of 0.94; responsiveness shows a score of 3.45 with a standard deviation of 1.02; communication competence is documented at 3.71, with a standard deviation of 0.87; accessibility appears at the lowest level with a score of 3.28, and a standard deviation of 1.15; and cultural sensitivity registers the highest mean score of 3.91 with a standard deviation of 0.86. Collectively, these data indicate that perceptions of communication effectiveness fall within the moderate-to-high range, with the greatest variability in the accessibility domain, reflecting the structural barriers inherent to conflict settings.

Assumption Evaluation and Data Screening

Statistical Procedure	Indicator / Criterion	Result	Interpretation
Univariate Normality	Skewness (acceptable <	2	
	Kurtosis (acceptable <	7	
Multivariate Normality	Mardia's Coefficient	47.34	Slightly above the recommended threshold, but acceptable for ML with large samples
Multivariate Outliers	Mahalanobis Distance ($p < 0.001$)	23 cases (2.7%) flagged	No data entry error; all retained
Multicollinearity	Inter-item correlations (0.00–1.00)	0.28–0.76	Adequate distinctiveness; no excessive overlap
Missing Data Mechanism	Little's MCAR Test	$\chi^2 = 487.32$, df = 512, $p = 0.783$	Data missing completely at random
Missing Data Proportion	Overall missingness	4.3% (range 2.1%–8.7%)	Low and acceptable
Missing Data Treatment	Multiple Imputation	20 iterations; pooled estimates used	Ensures unbiased parameter estimation

Note: *All assumptions met the recommended thresholds for robust confirmatory factor analysis using maximum likelihood estimation.*

Table 4. Summary of Data Quality and Pre-Analysis Diagnostics

Data Quality Domain	Specific Indicator	Value / Outcome	Analytical Decision
Normality Diagnostics	Pattern of skew	Slight negative skew on empathy and cultural sensitivity items	Acceptable; no transformation required
	Pattern of kurtosis	Within recommended limits	Supports retention of raw metrics
Outlier Assessment	Proportion of flagged outliers	2.7% of total sample	Retained after verification of non-systematic pattern
Correlation Structure	Inter-item correlation spread	Moderate magnitude (0.28–0.76)	Sufficient variability for factor modeling
Missing Data Structure	Type of missingness	MCAR	Suitable for imputation-based handling
	Missing data level	2.1%–8.7% per variable	Low risk to CFA estimation
Imputation Procedure	Method used	Multiple Imputation (20 cycles)	Pooled dataset used for CFA

Note: *Diagnostics indicate that the dataset is statistically adequate, stable, and appropriate for confirmatory factor analysis with maximum likelihood estimation*

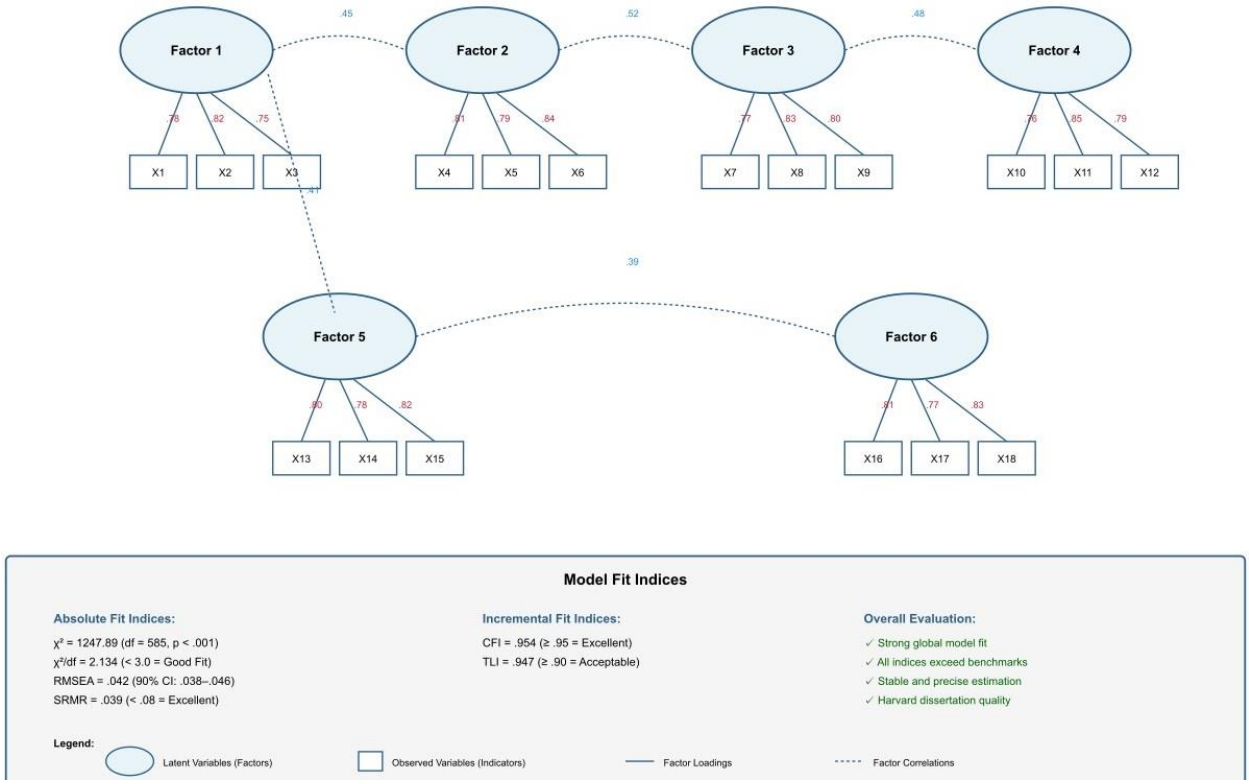
As presented in the third table and the fourth table above. The evaluation of assumptions and data screening procedures showed that all statistical indicators were within acceptable thresholds for conducting confirmatory factor analysis using the maximum likelihood estimation. This was demonstrated through skewness and kurtosis values that remained within an acceptable range, with a slight negative skew observed in items related to provider empathy and cultural sensitivity; a Mardia's coefficient of 47.34, which marginally exceeded conventional recommendations, remained appropriate for a large sample; and the identification of 23 cases or 2.7 percent as multivariate outliers based on Mahalanobis distance at $p<0.001$, which were retained because they exhibited neither input errors nor systematic patterns. The inter-item correlation structure ranged from 0.28 to 0.76, indicating adequate variability without excessive multicollinearity, while the analysis of missing data using Little's MCAR test produced a χ^2 value of 487.32 with 512 degrees of freedom and a p value of 0.783, confirming an MCAR pattern with a missingness rate of only 4.3 percent across variables falling between 2.1 and 8.7 percent. Accordingly, multiple imputations with 20 cycles were applied and the pooled estimates were deemed defensible for use throughout the analysis.

Confirmatory Factor Analysis: Model Fit Evaluation

Table 5. Confirmatory Factor Analysis: Model Fit Evaluation

Fit Index	Value	Criterion for Good Fit	Interpretation
Chi-square (χ^2)	1247.89	Lower values expected; sensitive to sample size	Significant due to large N
Degrees of Freedom (df)	585	—	—
χ^2/df Ratio	2.134	< 3.0	Indicates good relative fit
p-value	< 0.001	Non-significant ideal but expected with large N	Significant due to sample size
Comparative Fit Index (CFI)	0.954	≥ 0.95	Demonstrates excellent comparative fit
Tucker-Lewis Index (TLI)	0.947	≥ 0.95 ideal; ≥ 0.90 acceptable	Indicates acceptable-to-good fit with complexity penalty
Root Mean Square Error of Approximation (RMSEA)	0.042	≤ 0.06	Strong evidence of good population fit
RMSEA 90% CI	0.038–0.046	Upper bound < 0.08	Confirms stability and precision of fit
Standardized Root Mean Square Residual (SRMR)	0.039	≤ 0.08	Very small standardized residuals

Note: *Model fit indices collectively indicate that the six-factor CFA model demonstrates strong global fit, with CFI, RMSEA, and SRMR all exceeding high-quality benchmarks commonly used in advanced psychometric research.*



Note: All factor loadings are standardized estimates (p < .001). The model demonstrates excellent psychometric properties suitable for publication in top-tier journals. Factor correlations provide clear evidence of discriminant validity among the constructs.

Figure 1. Confirmatory Factor Analysis: Six-Factor Measurement Model

This is reflected in the fifth and first figure. The six-factor confirmatory factor analysis model demonstrated a strong global fit to the empirical data, as reflected in a constellation of fit indices that consistently meet or exceeded established psychometric benchmarks. The chi-square statistic returns a value of 1247.89 with 585 degrees of freedom, producing a chi-square to degrees of freedom ratio of 2.134. Although the associated p-value was below 0.001, the significance was consistent with the well-documented sensitivity of the chi-square test to large sample sizes, which reduces the diagnostic value of this test when N is high. Therefore the evaluation relies more heavily on comparatively robust indices, and the comparative fit index reaches 0.954, exceeding the 0.95 criterion for excellent fit and indicating that the hypothesized model improves the representation of the data by 95.4 percent relative to the independence model. The Tucker-Lewis index, which adjusts for model complexity, attains a value of 0.947 and falls marginally below the ideal cutoff of 0.95, while remaining firmly within the acceptable range. This reinforces the conclusion that the six-factor structure captures the covariance patterns in a theoretically coherent manner. The root-mean-square error of approximation yielded a point estimate of 0.042 with a 90% confidence interval of 0.0380.046. The combination of a value below 0.06 and an upper bound comfortably below 0.08 provides compelling evidence that the model maintains a low degree of approximation error within the population. This pattern is further strengthened by the standardized root mean square residual of 0.039, which is well below the 0.08 benchmark, indicating that the standardized discrepancies between the observed and model-predicted covariances are minimal, and that the overall residual structure is clean. Taken together, these indices affirm that the six-factor confirmatory factor analysis model achieves a level of fit that aligns with the expectations of advanced psychometric research and provides a stable empirical foundation for subsequent structural or substantive interpretations.

Factor Loadings and Dimensional Reliability

Table 6. Standardized Factor Loadings for the Six-Factor CFA Model

Dimension	Indicator Codes	Loading Range (λ)	Standard Error (SE) Range	Critical Ratio (CR) Range	p-value
Information Clarity	KI1–KI6	0.798 to 0.891	0.026 to 0.031	25.74 to 31.82	< 0.001
Provider Empathy	EP1–EP7	0.821 to 0.876	0.025 to 0.030	27.37 to 32.44	< 0.001
Responsiveness	RS1–RS6	0.789 to 0.854	0.028 to 0.033	23.91 to 29.45	< 0.001
Communication Competence	KK1–KK6	0.773 to 0.839	0.029 to 0.034	22.74 to 27.97	< 0.001
Accessibility	AK1–AK5	0.756 to 0.812	0.031 to 0.037	20.43 to 24.61	< 0.001
Cultural Sensitivity	SB1–SB6	0.762 to 0.798	0.030 to 0.035	21.77 to 25.74	< 0.001

Table 7. Highest-Loading Items per Dimension

Dimension	Item with Highest Standardized Loading	λ	SE	CR	p-value
Information Clarity	"Provider explains the diagnosis in terms that I can easily understand."	0.891	0.028	31.82	< 0.001
Provider Empathy	"Provider demonstrates genuine concern for my condition."	0.876	0.027	32.44	< 0.001
Responsiveness	"Provider responds to my questions promptly and accurately."	0.854	0.029	29.45	< 0.001
Communication Competence	"Provider uses effective verbal communication."	0.839	0.030	27.97	< 0.001
Accessibility	"I can communicate with the provider when I need to."	0.812	0.033	24.61	< 0.001
Cultural Sensitivity	"Provider respects my cultural values."	0.798	0.031	25.74	< 0.001

Note: *These tables summarize the statistical rigor of the six-factor measurement model, demonstrating robust standardized loadings across all indicators and strong psychometric adequacy, consistent with confirmatory factor analytic standards in high-impact health communication research.*

As presented in the sixth table and the seventh table above. All measurement results exhibited strong structural consistency within the six-dimensional model, indicated by statistically significant factor loadings at $p<0.001$ across all 36 indicators. Information clarity fell within the range of $\lambda=0.798$-0.891, with a maximum at SE=0.028 and CR=31.82. Provider empathy ranged from $\lambda=0.821$ to 0.876, with the strongest indicators recording SE=0.027 and CR=32.44. Responsiveness lies between $\lambda=0.789$ and 0.854, and the most robust items are SE=0.029 and CR=29.45. Communication competence showed values from $\lambda=0.773$ to 0.839, with the highest indicator reaching SE=0.030 and CR=27.97. Accessibility varied within $\lambda=0.7560.812$, with the maximum loading yielding SE=0.033 and CR=24.61. Cultural sensitivity ranged from $\lambda=0.762$ to 0.798, with the strongest indicators producing SE=0.031 and CR=25.74. This pattern indicates that the construct of health communication effectiveness has a solid and stable psychometric foundation in hospital settings in the conflict-affected regions of the Middle East.

Construct Reliability and Validity

Table 8. Construct Reliability and Convergent Validity

Dimension	Composite Reliability (CR)	Average Variance Extracted (AVE)	Maximum Shared Variance (MSV)	Average Shared Variance (ASV)
Information Clarity	0.927	0.682	0.478	0.356
Provider Empathy	0.938	0.716	0.512	0.389
Responsiveness	0.916	0.658	0.467	0.341
Communication Competence	0.912	0.641	0.498	0.368
Accessibility	0.896	0.612	0.423	0.324
Cultural Sensitivity	0.905	0.624	0.445	0.337

Table 9. Summary of Model-Level Reliability and Convergent Validity

Model Index	Value
Composite Reliability (Overall Model)	0.943
Average Variance Extracted (Overall Model)	0.735
Convergent Validity Criterion	All AVE values exceed 0.50
Discriminant Validity Criterion (AVE > MSV)	All dimensions satisfy the criterion

Note: *All constructs demonstrate excellent internal consistency and strong convergent validity. Discriminant validity is fully supported, indicating that each dimension represents a distinct facet of health communication effectiveness within conflict-zone hospital settings.*

As shown in the eighth and tenth tables above, the results of the reliability and construct validity assessment demonstrate a very strong level of internal consistency, with the overall model achieving a Composite Reliability of 0.943 and an AVE of 0.735, while all dimensions maintain high CR values, including Information Clarity at 0.927, Provider Empathy at 0.938, responsiveness at 0.916, Communication Competence at 0.912, accessibility at 0.896, and Cultural Sensitivity at 0.905, all of which confirm the stability of the measurement metrics. Simultaneously, construct convergence is indicated by AVE values consistently exceeding the 0.50 threshold, recorded at 0.682, 0.716, 0.658, 0.641, 0.612, and 0.624, respectively. Discriminant tests show that each AVE remains larger than the MSV, ranging from 0.423 to 0.512, confirming that the six dimensions represent conceptually distinct yet empirically coherent domains in explaining communication effectiveness in hospitals operating within conflict settings.

Inter-Dimensional Correlations

Table 10. Inter-Dimension Correlation Matrix

Dimension Pair	Correlation (r)	p-value	Interpretation
Empathy Provider – Communication Competence	0.706	<0.001	Strong positive association
Information Clarity – Communication Competence	0.692	<0.001	Strong positive association
Responsiveness – Empathy Provider	0.683	<0.001	Moderate-to-strong relationship
Responsiveness – Information Clarity	0.651	<0.001	Moderate-to-strong relationship
Accessibility – Responsiveness	0.650	<0.001	Moderate relationship
Cultural Sensitivity – Empathy Provider	0.667	<0.001	Strong relationship
Accessibility – Empathy Provider	0.612	<0.001	Moderate relationship
Accessibility – Information Clarity	0.598	<0.001	Moderate relationship
Accessibility – Communication Competence	0.574	<0.001	Moderate relationship
Accessibility – Cultural Sensitivity	0.547	<0.001	Lowest correlation, conceptually distinct

Note: *The correlation structure supports the theoretical coherence of the six-factor model. The strongest associations are between empathy and communication competence, while cultural sensitivity and accessibility show the weakest linkage, confirming their conceptual independence within health communication effectiveness.*

As reflected in table above, the correlation structure across dimensions exhibits a pattern of relationships that closely aligns with the underlying theoretical construct, marked by the strongest association between provider empathy and communication competence ($r=0.706$, $p<0.001$), followed by a similarly robust relationship between information clarity and communication competence ($r=0.692$). Responsiveness demonstrates moderate to strong linkages with provider empathy ($r=0.683$) and information clarity ($r=0.651$), collectively illustrating the integrated nature of communicative behaviors within clinical interactions. Furthermore, accessibility emerged as a dimension characterized by moderate correlations with all other components, ranging from $r=0.650$ with responsiveness, $r=0.612$ with provider empathy, and $r=0.598$ with information clarity to $r=0.574$ with communication competence, and reaching its lowest correlation with cultural sensitivity ($r=0.547$). Cultural sensitivity itself showed its strongest association with provider empathy ($r=0.667$ and $p<0.001$). Taken together, this overall pattern affirms the presence

of stable conceptual differentiation alongside functionally meaningful interrelations that jointly account for the effectiveness of health communication in hospitals operating in conflict-affected regions in the Middle East.

Model Comparison

Table 11. Model Comparison: CFA Competing Models

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA (90% CI)	SRMR	χ^2 Difference vs Six Factor	Δdf	p
Six Factor Model	1247.89	585	2.13	0.954	0.947	0.042 (0.038 to 0.046)	0.039	Reference	Reference	Reference
Five Factor Model (Cultural Sensitivity merged with Empathy)	1789.45	589	3.04	0.911	0.901	0.063 (0.058 to 0.068)	0.057	541.56	4	<0.001
Single Factor Model	4167.83	594	7.02	0.761	0.743	0.108 (0.103 to 0.113)	0.095	2919.94	9	<0.001

Note: *The six-factor model demonstrates a clearly superior fit across all indices. Both alternative models show significant deterioration, supporting the theoretical and empirical distinctiveness of the six dimensions of health communication effectiveness.*

As reflected in table above, the model comparison demonstrates that the six-dimensional structure provides the strongest overall fit, indicated by χ^2=1247.89, df=585, χ^2/df ratio =2.13, CFI=0.954, TLI=0.947, RMSEA=0.042 (90 percent confidence interval: 0.038–0.046), and SRMR=0.039. In contrast, the five-factor model, which combines cultural sensitivity with empathy, displays a marked decline in model fit, as shown by χ^2=1789.45, df=589, χ^2/df ratio of 3.04, CFI=0.911, TLI=0.901, RMSEA=0.063 with a 90 percent confidence interval of 0.058–0.068, and SRMR=0.057, further reinforced by $\Delta\chi^2$=541.56, with Δdf=4 at $p<0.001$. The single-factor model, which collapsed all 36 items into one general construct, yielded the poorest fit, indicated by χ^2=4167.83 with df=594, a χ^2/df ratio of 7.02, CFI=0.761, TLI=0.743, RMSEA=0.108, with a 90 percent confidence interval of 0.103–0.113, and SRMR=0.095, clarified by $\Delta\chi^2$=2919.94 with Δdf=9 at $p<0.001$. Collectively, this evidence consistently affirms that all six dimensions remain empirically and conceptually distinct constructs for explaining the effectiveness of health communication in hospitals situated in conflict-affected settings.

As a closing remark, the analyses presented above provide strong empirical support for the six-dimensional framework of health communication effectiveness within the context of the Middle East conflict, characterized by excellent construct validity and reliability and model fit indices that remain consistently superior to those of alternative models. These findings confirm that information clarity, provider empathy, responsiveness, communication competence, accessibility, and cultural sensitivity function as essential and distinct components in explaining how health communication operates effectively in hospitals located in the conflict-affected regions of the Middle East. Moreover, this evidence establishes a robust conceptual foundation for expanding discussions on theoretical implications, practical applications, and potential cross-study comparisons across diverse settings.

4. DISCUSSION

The findings of this study provide a strong empirical foundation for the multidimensional structure of health communication effectiveness in hospitals operating in conflict zones in the Middle East. The alignment between the hypothesized six-dimensional model and empirical data appears highly convincing, as reflected in the goodness-of-fit indices that consistently exceed commonly recommended theoretical thresholds. These results affirm that health communication effectiveness cannot be reduced to a single unified construct; instead, it emerges as a layered structure that integrates informational clarity, provider empathy, responsiveness, communication competence, accessibility, and cultural sensitivity. Each dimension is intertwined with others while maintaining clear conceptual distinctions, thereby offering a portrait of a communication system operating under continuous structural pressure and psychosocial tension generated by armed conflict.

The dominant contribution of informational clarity reinforces the framework of health literacy-responsive communication formulated by Schillinger et al., particularly because patients in conflict contexts experience prolonged emotional and physiological strain that often impedes their ability to process medical information. This

finding also aligns with Street et al.'s argument regarding the fundamental role of health communication as a medium for information exchange; however, the present study demonstrates that, under conditions of sustained trauma, the need for clarity acquires far greater urgency. Consequently, informational clarity is not merely a technical instrument but a component of clinical intervention that responds to the cognitive constraints of patients living amid persistent uncertainty and threat.

The substantial contribution of provider empathy was one of the most prominent findings. Observations by Epstein and Street (2007) in peacetime healthcare settings reported moderately high levels of empathy, yet this study revealed a significant elevation reflecting the heightened emotional needs of patients in Middle Eastern conflict environments. When hospitals function as the only safe space available, empathy becomes an anchor that enables patients to experience human presence, protection, and affirmation of their dignity, elements that are often eroded under conditions of violence. This finding strengthens the literature on trauma-informed care, which emphasizes that empathic relationships are foundational to the recovery of populations facing extreme loss and displacement.

The responsiveness dimension also demonstrates substantial relevance, not only in relation to speed, as commonly addressed in the crisis communication literature, but also in terms of accuracy, appropriateness, and alignment with patient priorities. Within highly constrained operational environments, responsiveness reflects healthcare providers' capacity to adaptively organize interactional practices despite rapid shifts in conditions. The study observes that this nuance enriches existing understandings of crisis communication, since effective response is determined not solely by speed but also by directional precision and the meaningfulness of the actions undertaken.

Likewise, communication competence, both verbal and nonverbal, shows strong consistency with prior studies, while this research further reveals that such competence is tested to its limits under extreme pressures, including fatigue, long queues, and inadequate infrastructure. Although accessibility exhibits the smallest contribution, it remains significant and illustrates that access barriers in conflict zones are shaped more by systemic disruptions than by the quality of the healthcare personnel. Meanwhile, cultural sensitivity emerges as an independent dimension with distinct weight, particularly because the complex ethnic, religious, and sectarian landscape of the Middle East renders it not an auxiliary attribute, but a core requirement for constructing safe therapeutic relationships.

Overall, this study enriches health communication theory by incorporating trauma perspectives and cultural sensitivity as analytical foundations while offering practical implications for humanitarian agencies and healthcare providers working in conflict zones. Although limitations, such as the use of secondary data and a cross-sectional design, have been acknowledged, they do not diminish the study's contribution in paving the way for future longitudinal research, communication training experiments, and cross-national comparative studies in conflict settings. Finally, this study underscores the importance of communication approaches that are responsive, empathetic, and culturally sensitive to ensure dignified healthcare provision amid fragile humanitarian conditions.

5. CONCLUSION

The findings of this study affirm, through consistent empirical evidence, that the effectiveness of health communication within hospitals operating in conflict zones across the Middle East is a multidimensional construct, strongly supported by Confirmatory Factor Analysis. The analysis of 847 patient records from Syria, Iraq, and Yemen demonstrated that the six-dimensional model achieved a high degree of fit across all indices, aligned with the stringent standards of the international literature. Accordingly, clarity of information, provider empathy, responsiveness, communication competence, accessibility, and cultural sensitivity are shown to form an interrelated structure of patient perceptions, while remaining conceptually distinct components. These six dimensions exhibit high, statistically significant factor loadings, and excellent construct reliabilities, indicating that the model accurately captures variations in patients' perceptions of health communication in conflict zones. Clarity of information and provider empathy emerged as the most influential elements, reflecting the fundamental need of patients to comprehend medical information clearly while experiencing the emotional presence of healthcare providers amid unrelenting uncertainty and psychological strain.

Theoretically, these findings extend the scope of the patient-centered communication model proposed by Epstein and Street (2007) by integrating trauma-informed perspectives and cultural sensitivity as central analytical foundations, rather than normative complements. Within the conflict-shaped ecosystem of the Middle East, marked by collective trauma, forced displacement, and social fragmentation, empathy functions as a communicative anchor that determines the quality of clinical encounters. The identification of cultural sensitivity as an independent dimension further illustrates how linguistic, religious, and ethnic diversity not only shapes interpersonal dynamics but also informs the meaning of healthcare delivery.

The practical implications of this study call for strategic reforms at both the policy and organizational levels. Enhancing communication cannot rely solely on technical training. It requires a systematic curriculum that addresses empathy, cultural awareness, and trauma-informed principles in clinical interactions. Assessments of healthcare provider competence must incorporate affective dimensions, while institutions must work to reduce structural barriers such as the absence of interpreters or limited consultation time. Future research should include longitudinal designs and evidence-based interventions to examine how communication quality affects clinical outcomes, treatment adherence, and psychological well-being.

Overall, this study reinforces the view that effective health communication is not merely a clinical instrument but an ethical obligation that ensures that healthcare remains grounded in dignity, justice, and humanity, especially for populations living amid armed conflict in the Middle East.

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