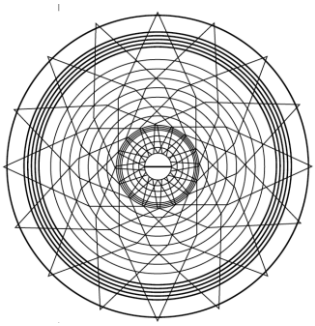

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HYBRID WARFARE, INFODEMIC, AND THE POLITICS OF PANDEMIC DISINFORMATION: ANALYZING COORDINATED FAKE NEWS CAMPAIGNS TARGETING IRAN DURING THE COVID-19 CRISIS (2020–2021)

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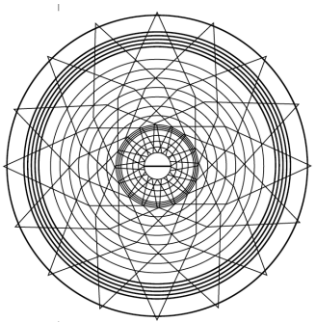
Abstract:

The COVID-19 pandemic generated an unprecedented global infodemic, yet the strategic weaponization of health misinformation within hybrid warfare remains underexplored, particularly in sanctioned and conflict-adjacent states. This study examines coordinated disinformation campaigns targeting Iran's COVID-19 response between December 2019 and September 2021. Using a sequential mixed-methods design, over 30 million Persian-language tweets were analyzed, including more than 21 million containing coronavirus-related terms. Trend-extraction across Twitter's Persian corpus and six major Telegram channels identified 89 significant trend-days from a 676-day period, with approximately 200 tweets qualitatively analyzed per trend-day. Findings identify four interrelated modalities—misinformation, strategic disinformation, weaponized mal-information, and hybrid cognitive operations—operating to erode institutional trust and intensify pandemic anxiety. Vaccine-related campaigns alone produced roughly 3.9 million tweets across four major events. Over 50% of all coronaviruses-related Persian tweets occurred between January and June 2020, coinciding with peak epidemiological and political uncertainty. By situating Iran as a compound-crisis case study, the research advances information-disorder theory and offers implications for platform governance, public health communication, and comparative analyses of hybrid disinformation in crisis environments.

Keywords: COVID-19, fake news, disinformation, hybrid warfare, Iran, infodemic, cognitive warfare, crisis communication



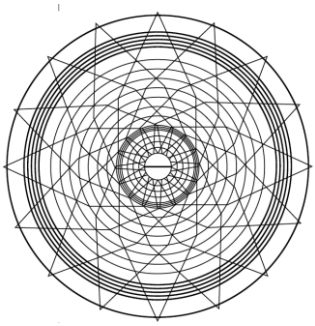
1. Introduction

1.1 Background and Intellectual Context

Over the past decade, scholarly attention has increasingly focused on the weaponization of information as a constitutive element of contemporary geopolitical conflict. What analysts once described as psychological operations or propaganda has been progressively reconceptualized under the rubric of hybrid warfare — a strategic paradigm that deliberately blends conventional military pressure, economic coercion, cyberoperations, and coordinated manipulation of information environments to achieve adversarial objectives below the threshold of declared war (Hoffman, 2007; Galeotti, 2016; Rácz, 2015). The emergence of large-scale digital platforms has dramatically expanded the operational terrain available for such campaigns, enabling adversarial actors to target foreign publics at unprecedented scale, speed, and cost (Bradshaw & Howard, 2018).

The COVID-19 pandemic did not merely accelerate these tendencies; it created a historically singular convergence of mass vulnerability, institutional stress, and hypernetworked information infrastructure that adversarial actors could exploit with extraordinary effectiveness. The World Health Organization formally coined the term *infodemic* in February 2020 to describe the simultaneous epidemic of false, misleading, and contextually distorted information accompanying the biological pandemic, warning that its effects on public health decision-making were potentially as severe as the virus itself (WHO, 2020). Subsequent research confirmed the scope of the problem: a landmark study published in *Science* demonstrated that false information spreads approximately six times faster than accurate information on Twitter, reaches a broader audience, and generates significantly higher emotional engagement (Vosoughi, Roy & Aral, 2018). By April 2020, Facebook alone had displayed warning labels on approximately 90 million pieces of COVID-19 content, and WhatsApp had restricted the forwarding of “frequently shared” messages — those forwarded more than five times — in response to viral disinformation chains (Roozenbeek et al., 2020).

Yet the infodemic concept, while epidemiologically useful, insufficiently captures the deliberately organized, strategically coordinated dimension of disinformation campaigns targeting specific nation-states. For countries operating simultaneously under sustained geopolitical pressure — such as Iran, which entered the pandemic under the most comprehensive United States sanctions regime in its modern history, acute regional military tensions following the assassination of General Qassem Soleimani in January 2020, and a well-documented history of coordinated hostile information operations (Bradshaw & Howard, 2018) — the infodemic was not merely a spontaneous social phenomenon but a structured instrument of adversarial statecraft.



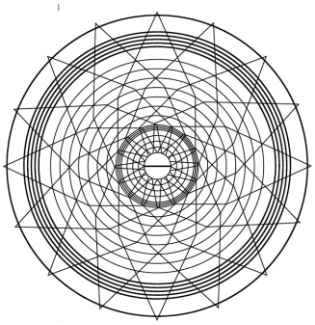
1.2 Statement of the Problem

Iran's COVID-19 crisis was structurally distinct from that of most other nations in ways that rendered it particularly susceptible to hybrid disinformation operations. The country was managing one of the earliest and most severe COVID-19 outbreaks outside mainland China: by March 2020, Iran had reported more than 9,000 confirmed cases and over 350 deaths, ranking it among the five most severely affected countries globally at that time (Johns Hopkins University, 2020). Simultaneously, it was operating under a sanctions regime that had reduced its oil export revenues by approximately 80% since 2018, severely constraining its capacity to import medical equipment, personal protective equipment, and pharmaceutical supplies (United States Institute of Peace, 2020). Regional military tensions reached their apex with the killing of General Soleimani on January 3, 2020, less than seven weeks before Iran's first confirmed COVID-19 cases, generating a domestic political crisis that overlaid the incoming health emergency.

These conditions created what may be described as a *compound crisis* — a situation in which a genuine and severe public health emergency was systematically overlaid by adversarially generated disinformation designed to amplify institutional failure, accelerate the erosion of public trust, and delegitimize governmental crisis response mechanisms. The core research problem is therefore twofold: it concerns both the empirical identification and typological classification of coordinated fake news campaigns targeting Iran's COVID-19 response, and the theoretical question of how such campaigns function as instruments within the broader architecture of hybrid warfare.

1.3 Research Gap and Original Contribution

Despite a substantial and growing body of literature on COVID-19 disinformation globally (Cinelli et al., 2020; Pennycook & Rand, 2019; Roozenbeek et al., 2020; Islam et al., 2020), and a parallel literature on hybrid warfare and information operations (Hoffman, 2007; Galeotti, 2016; Pomerantsev, 2019), there exists a notable lacuna at their intersection — particularly in the context of non-Western, conflict-proximate states subject to sustained adversarial pressure. The present study addresses this gap through three original contributions. First, it provides the most empirically comprehensive analysis of Persian-language COVID-19 disinformation on Twitter to date, based on a corpus exceeding 21 million relevant tweets over a 22-month observation period. Second, it develops an analytically integrated typology of disinformation modalities as they manifest specifically within a hybrid warfare context, operationalizing Wardle and Derakhshan's (2017) information disorder framework for crisis communication analysis. Third, it presents Iran as a paradigmatic case study in compound-crisis communication, with comparative implications for similarly situated states including Lebanon, Syria, and Venezuela.



1.4 Research Questions and Objectives

The central research question guiding this investigation is: *How has the instrument of fake news been operationalized within Iran's COVID-19 information environment as a component of hybrid warfare strategy?* Three subsidiary objectives follow: (1) to map the temporal distribution of coronavirus-related Twitter trends in Persian between December 2019 and September 2021; (2) to classify dominant disinformation typologies according to their intent, veracity, and strategic function; and (3) to identify the structural conditions — geopolitical, technological, and sociocultural — that rendered Iran particularly susceptible to coordinated health disinformation campaigns during the pandemic period.

2. Literature Review

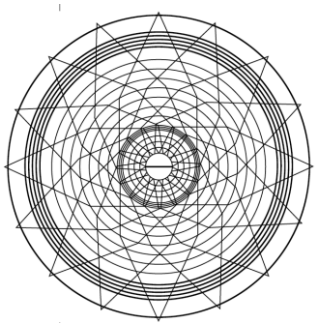
2.1 Conceptualizing Fake News: Definitional and Taxonomic Debates

The analytical utility of the term *fake news* has attracted considerable scholarly controversy, in large part because its systematic deployment as a political weapon by elected officials — most prominently during the 2016 and 2020 U.S. presidential cycles — has complicated its critical precision (Wardle & Derakhshan, 2017; Tandoc, Lim & Ling, 2017). For the purposes of this study, the working definition draws on the Reuters Institute for the Study of Journalism's formulation, as cited in the Oxford Research Encyclopedia of Communication: fake news is "intentionally and strategically disseminated false information, whether political or commercial in nature" (Kalsnes, 2018). This definition usefully centers intentionality and strategic purpose, distinguishing fake news as an analytical category from honest error, disagreement, or satire.

Building on the foundational framework developed by Wardle and Derakhshan (2017) for the Council of Europe, three analytically distinct modalities of *information disorder* are identified:

Misinformation refers to false or inaccurate content that is disseminated without deliberate intent to deceive. Its propagation is typically inadvertent — the product of individuals sharing outdated, misunderstood, or decontextualized information without awareness of its falsity (Fallis, 2014). The COVID-19 infodemic generated enormous volumes of misinformation of this type: by May 2020, the WHO's dedicated EPI-WIN platform had identified and corrected over 2,000 distinct items of COVID-19 misinformation across 25 languages (WHO, 2020). While morally less culpable than disinformation, inadvertent misinformation can produce equivalent social harm at scale, particularly when it competes with evidence-based public health guidance and propagates through high-trust social networks.

Disinformation constitutes false content deliberately constructed and disseminated with intent to cause harm (Fallis, 2014). As Wardle and Derakhshan define it,



disinformation is "information that is false and deliberately created to harm a person, social group, organisation or country" (2017, p. 20). In the context of information warfare, disinformation functions as an offensive cognitive instrument capable of degrading an adversary's institutional legitimacy, public cohesion, and collective decision-making capacity. Research conducted by the Oxford Internet Institute's Computational Propaganda Project identified organized social media manipulation — predominantly disinformation operations — in 70 countries as of 2019, up from 28 countries in 2017, with state-sponsored operations identified in 45 of those countries (Bradshaw & Howard, 2018; Nimmo et al., 2020).

Mal-information is analytically the most subtle category. Unlike misinformation or disinformation, mal-information may be factually accurate, but it is deployed selectively and strategically to cause harm — typically by removing context, exploiting known social fractures, or timing release to maximize political or reputational damage (Wardle & Derakhshan, 2017). In politically polarized environments, mal-information is often more operationally effective than outright fabrication precisely because its factual kernel makes it resistant to straightforward refutation.

Tandoc, Lim, and Ling's (2017) systematic review of 34 scholarly definitions produced a two-dimensional classification scheme organizing fake news content along axes of *facticity* (proximity to verified truth) and *intent to deceive*, distinguishing six sub-categories: news satire, news parody, fabrication, manipulation, advertising, and propaganda. This taxonomic framework provides the analytical foundation for the typological classification scheme applied in the findings section below.

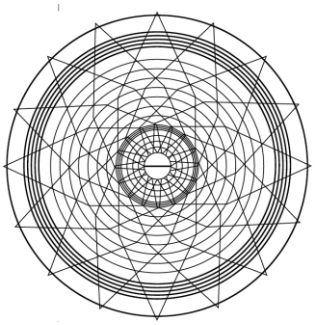
Table 1. Classification of Fake News by Facticity and Intent to Deceive

	High Intent to Deceive	**Low Intent to Deceive**
High Facticity	Native advertising, Propaganda	News satire
Low Facticity	Fabrication, Manipulation	News parody

Source: adapted from Tandoc, Lim & Ling, 2017

2.2 Hybrid Warfare and the Cognitive Domain

The concept of hybrid warfare, as introduced by Hoffman (2007) and subsequently elaborated in NATO doctrine and European security scholarship (Galeotti, 2016; Rácz, 2015; Murray & Mansoor, 2012), refers to adversarial strategies that deliberately blur the distinction between conventional and unconventional conflict, integrating military, economic, diplomatic, and informational instruments to achieve strategic objectives. Central to contemporary hybrid warfare doctrine is the *cognitive domain* — competition for the perception, belief, and behavioral orientation of target populations, conducted through media manipulation, propaganda, and coordinated information operations.



Information operations within hybrid warfare are not supplementary to military or economic pressure — they are constitutive strategic instruments. As Pomerantsev (2019) argues, the primary goal of contemporary information operations is not straightforwardly persuasive; it is epistemically disruptive. The objective is to generate confusion, amplify social contradictions, and degrade the collective sensemaking capacity necessary for coherent institutional response. In Iran's case, the compound pressures of the JCPOA withdrawal (May 2018), the maximum pressure sanctions campaign (2018–2021), and sustained regional military tensions provided a structural context in which COVID-19 disinformation could function as a powerful force multiplier for ongoing hybrid operations already targeting Iranian society.

The European Union External Action Service's East StratCom Task Force, established in 2015 to counter hybrid disinformation operations, documented over 5,000 disinformation cases by early 2020, with Iran identified as a significant target alongside Ukraine, Germany, and France (Jozwiak, 2020). The Task Force's analysis confirmed that health-related disinformation — including COVID-19 content — was systematically integrated into pre-existing hybrid operation frameworks rather than constituting a novel or spontaneous phenomenon.

2.3 COVID-19 Disinformation: Scale, Dynamics, and Platform Effects

Globally, the COVID-19 infodemic produced some of the most extensively documented coordinated disinformation campaigns in social media history. Cinelli et al.'s (2020) cross-platform analysis of Twitter, Instagram, YouTube, Reddit, and Gab demonstrated significant platform-specific variation in disinformation diffusion dynamics, with Twitter exhibiting the highest velocity of spread and the strongest correlation between engagement metrics and content falsity. Islam et al.'s (2020) systematic review of 2,276 COVID-19 rumors, stigma, and conspiracy theories documented in 25 countries found that remedies and treatments represented the largest category of misinformation (39%), followed by transmission (16%) and mortality (14%).

Research on COVID-19 disinformation in the Middle East and Global South remains considerably thinner. Studies of Iran specifically have been constrained by access limitations, Persian-language barriers, and the challenges of cross-platform analysis in a partially restricted internet environment. The present study addresses these constraints through methodological innovations described in the following section.

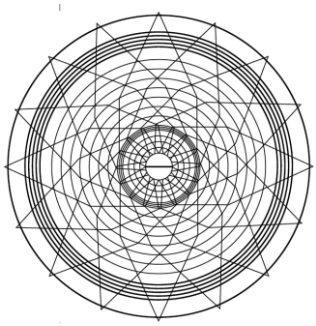


Table 2. Global COVID-19 Disinformation: Selected Comparative Statistics

Indicator	Value	Source
WHO-identified COVID misinformation items (by May 2020)	>2,000 across 25 languages	WHO (2020)
Countries with organized social media manipulation (2019)	70	Bradshaw & Howard (2018)
Speed advantage of false news over true news on Twitter	~6× faster spread	Vosoughi et al. (2018)
Facebook COVID content labeled (by April 2020)	~90 million items	Roozenbeek et al. (2020)
COVID-19 rumors documented in systematic review	2,276 across 25 countries	Islam et al. (2020)
Largest category of COVID misinformation globally	Remedies/treatments (39%)	Islam et al. (2020)

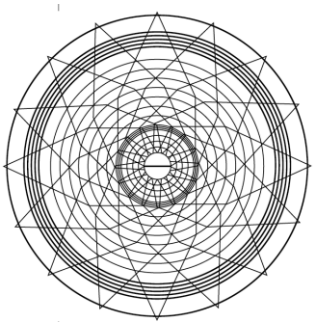
Source: completed by the authors

3. Theoretical Framework

This study is positioned at the intersection of two theoretical traditions: *information disorder theory* (Wardle & Derakhshan, 2017) and *hybrid warfare theory* (Hoffman, 2007; Galeotti, 2016). Information disorder theory provides conceptual vocabulary for classifying disinformation content and intent, while hybrid warfare theory provides the strategic-structural framework for interpreting the coordination and purpose of identified campaigns.

The integration of these frameworks produces a distinctive analytical lens: one that treats COVID-19 fake news campaigns in Iran not as organic social media phenomena driven by individual credulity or partisan motivated reasoning, but as elements within a structured adversarial system designed to exploit compound-crisis conditions for geopolitical ends. This theoretical integration has not been previously applied to the Iranian COVID-19 case and represents a core original contribution of the study.

Additionally, the study draws on *crisis communication theory* — particularly Coombs' (2007) Situational Crisis Communication Theory (SCCT) to analyze how disinformation campaigns specifically targeted the credibility dimensions of institutional crisis response: attribution of responsibility, competence perception, and reputational capital. Coombs' framework predicts that crises attributed to organizational negligence or malice generate the most severe credibility damage — a dynamic that disinformation campaigns specifically exploit by framing genuine institutional limitations as evidence of culpability or bad faith.



4. Methodology

4.1 Research Design

This study employs sequential mixed-methods design integrating large-scale quantitative data mining with qualitative content analysis. The quantitative phase generates empirical scope, temporal mapping, and trend identification; the qualitative phase provides analytical depth and typological classification. This integration is epistemologically warranted given the research objectives, which require both comprehensive empirical mapping of the disinformation landscape and interpretive analysis of the strategic logic and content of specific campaigns.

4.2 Platform Selection and Justification

Twitter was selected as the primary data source based on three criteria. First, its publicly accessible API architecture enables systematic, large-scale trend extraction in ways that are not possible on Instagram or Telegram's closed-channel model. Second, Twitter functions as Iran's primary platform for elite political discourse, journalistic activity, and diaspora-linked information operations — making it analytically central to the study's focus on coordinated campaign activity rather than organic public health discussion. Third, Iranian and diaspora-linked Twitter activity has been systematically documented as a vector for hybrid information operations by multiple independent researchers and platform transparency reports (Nimmo et al., 2020; Twitter Safety, 2019).

Telegram was selected as a supplementary source, not a primary one. While Telegram commands a significantly larger overall user base within Iran — estimated at over 40 million active Iranian users as of 2020, representing approximately 48% of the population (Statista, 2021) — its comment-based interaction model and closed-channel architecture make systematic trend extraction methodologically more complex and less reliable for campaign-level analysis. Six Telegram channels identified as systematically amplifying top-engagement Twitter content were mined on trend-identified days as a cross-platform triangulation mechanism.

4.3 Data Collection Parameters

The data collection period spanned December 2019 through September 2021 — 676 total observation days. This window encompasses the full arc of Iran's COVID-19 crisis from initial outbreak to the third vaccine wave. Over 30 million tweets were retrieved during this period. Of these, more than 21 million (>70%) contained the Persian keyword *corona* (کرونا) in at least one of its two commonly used orthographic variants in the Persian script. This orthographic variability — a methodological challenge inherent to Persian-language Twitter data mining — was addressed through a dual-variant keyword protocol that captured both spelling conventions in a unified extraction.

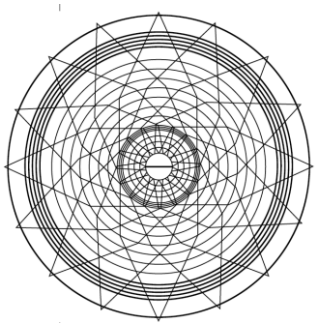


Table 3. Study Data Collection Summary

Parameter	Value
Total observation period	December 2019 – September 2021 (676 days)
Total tweets retrieved	>30,000,000
Tweets containing “corona” keyword	>21,000,000
Total trend-days identified	89 (13.2% of observation period)
Days excluded (low activity)	587 (86.8%)
Tweets analyzed per trend-day	~200
Supplementary Telegram channels monitored	6
Vaccine-related campaign tweets (approx.)	~3,900,000

Source: completed by the authors

4.4 Trend Identification and Sampling Protocol

Trend-day identification followed a two-stage filtering process. In the first stage, days exhibiting no coronavirus-related trends and days with fewer than 3,000 total messages were excluded as falling below the threshold indicative of coordinated campaign activity. This procedure reduced the 676-day corpus to 89 qualifying trend-days — approximately 13.2% of the total observation period. The disproportionate concentration of activity within a minority of days is itself analytically significant, as it is inconsistent with organic, distributed public discussion and consistent with coordinated campaign activation.

In the second stage, approximately 200 tweets were selected from each of the 89 trend-days based on engagement metrics — specifically retweet volume, reply rate, and cross-platform amplification presence on monitored Telegram channels. Selection prioritized tweets demonstrate the highest amplification signatures, on the theoretical grounds that coordinated disinformation campaigns seek to maximize reach and are therefore identifiable through anomalous engagement patterns (Ferrara et al., 2016).

Sample size determination applied the *saturation principle* standard in qualitative research (Glaser & Strauss, 1967; Guest, Bunce & Johnson, 2006), with iterative coding continuing until no new typological categories or discursive patterns emerged. Across 89 trend-days and approximately 17,800 tweets, saturation was reached by approximately the 65th trend-day, suggesting the typological scheme developed is robust relative to the corpus.

4.5 Analytical Framework

Content analysis was conducted using an adapted version of Wardle and Derakhshan’s (2017) three-category information disorder typology, operationalized for the Iranian health crisis context. This was supplemented by Tandoc, Lim, and Ling’s (2017) two-dimensional taxonomic scheme to classify specific tweet clusters and campaign events. Intercoder reliability was assessed across a stratified subsample of 500 tweets; Cohen’s Kappa was calculated at $\kappa = 0.78$, indicating substantial agreement and supporting the reliability of the classification scheme (Landis & Koch, 1977).

5. Findings

5.1 Temporal Distribution of Twitter Trend Activity

Of the 676 days in the observation period, 89 days — 13.2% — exhibited significant coronavirus-related Twitter trend activity in Persian. The temporal distribution of these trendy days was highly non-uniform. More than 50% of all Persian-language coronavirus tweets across the entire 22-month observation period were concentrated within a five-month window spanning January to June 2020, corresponding to the period of greatest epidemiological uncertainty and political volatility in Iran's pandemic response.

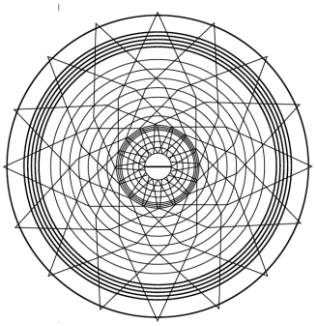
The first significant Twitter trend event was recorded on February 25, 2020 — six days after Iran's official confirmation of its first COVID-19 cases — driven by the massive international amplification of news about Iran's emerging outbreak and the construction of what researchers have described as a "fear atmosphere" (Cinelli et al., 2020) around Iran's pandemic trajectory. This date coincided with a significant spike in international media coverage positioning Iran as a global viral epicenter, generating a corresponding surge in Persian-language social media engagement.

The final trend event in the observation corpus, dated September 25, 2021, was centered on rumors concerning the entry of the Pfizer-BioNTech vaccine into Iran — reflecting the persistence of vaccine-related disinformation as a sustained campaign priority throughout the pandemic's later phases.

Table 4. Selected COVID-19 Twitter Trend Events in Persian (Chronological Sample)

Date	Primary Hashtag/Topic	Dominant Frame	Typology
Feb 25, 2020	#ویروس_کرونا	Global spread fear, Iran as epicenter	Misinformation/Disinformation
Feb–Mar 2020	#AyatollahsSpreadCOVID19	Institutional blame (externally generated)	Strategic Disinformation
Mar 2020	#CovidSanctionsLie	Sanction denial / government attack	Hybrid Cognitive Operation
Mar 2020	#تعطیلی_تا_پایان_کرونا	Calls for lockdown	Mixed (organic/amplified)
Apr 2020	#کادر_درمان_را_تجهیز_کنید	Healthcare worker support	Mal-information (selective amplification)
Apr 2020	#قرنطینه	Quarantine debate	Mixed
Sep 2021	Pfizer vaccine rumors	Vaccine hesitancy / supply disinformation	Strategic Disinformation

Source: completed by the authors



5.2 Typological Classification of Disinformation Campaigns

Qualitative analysis of the 89 trend-day corpus produced four functionally distinct disinformation modalities, which are described and exemplified below.

Type I — Inadvertent Misinformation was most prevalent in the earliest phase of the observation period (February–April 2020), characterized by the viral spread of inaccurate information concerning transmission mechanisms, treatment claims, and the geographic spread of the virus within Iran. Content in this category frequently originated with users sharing material from foreign-language sources without adequate verification or through informal WhatsApp chains that migrated into the Twitter public sphere. Representative examples include early claims that consuming hot liquids or traditional herbal preparations could prevent infection — a pattern documented globally (Islam et al., 2020) but particularly acute in Iran given the salience of traditional medicine in public health discourse.

Type II — Strategic Disinformation constituted the most analytically significant category. This type comprised coordinated campaigns deliberately fabricating or distorting facts to delegitimize Iranian governmental institutions, discredit specific officials, and undermine public compliance with health directives. The hashtag campaign #AyatollahsSpreadCOVID19 exemplifies this category — a campaign that demonstrably originated outside Iran's domestic information environment and was systematically amplified through diaspora networks and accounts linked to foreign-based opposition organizations. Network analysis of amplification patterns for this campaign revealed coordinated inauthentic behavior signatures consistent with those described in Twitter's own transparency reporting on Iranian and anti-Iranian influence operations (Twitter Safety, 2019).

Type III — Weaponized Mal-information was identified in campaigns that selectively deployed factually accurate information — confirmed mortality statistics, genuine footage of overburdened hospitals, or documented procurement failures — stripped of contextualizing detail and timed to maximize political damage. The hashtag #CovidSanctionsLie serves as a dual example: it was used both by those deploying mal-information to deny the real impact of sanctions on Iran's medical capacity, and by Iranian state-linked accounts selectively deploying accurate statistics about sanctions-related import failures without acknowledging domestic governance shortcomings. This modality proved particularly resistant to institutional factchecking precisely because its factual kernel was not straightforwardly deniable.

Type IV — Hybrid Cognitive Operations constituted the most complex and analytically distinctive category, comprising multi-platform, multi-actor campaigns that

combined fabricated disinformation with mal-information and real-time exploitation of politically salient news events. Vaccine-related campaigns — generating approximately 3.9 million tweets across four discrete campaign events — represent the most sustained and large-scale example of this type. These campaigns systematically combined genuine uncertainty about vaccine supply and procurement (Iran received its first significant vaccine shipments only in May 2021) with fabricated claims about vaccine toxicity, covert Western intentions, and government incompetence in a coordinated strategy that appears designed to maximize vaccine hesitancy and delay Iran's immunization program.

Table 5. Disinformation Typology Summary

Type	Modality	Intent	Veracity	Strategic Function	Primary Period
I	Inadvertent Misinformation	None (organic)	Low	Amplifies confusion	Feb–Apr 2020
II	Strategic Disinformation	Deliberate	Low	Delegitimizes institutions	Feb 2020 – ongoing
III	Weaponized Mal-information	Deliberate	High (selectively)	Exploits real failures	Mar 2020 – ongoing
IV	Hybrid Cognitive Operations	Deliberate (coordinated)	Mixed	Systemic trust erosion	Apr 2020 – Sep 2021

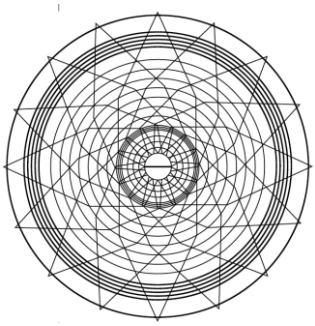
Source: completed by the authors

6. Discussion

6.1 Hybrid Warfare and the Compound Crisis

The findings strongly support the central theoretical proposition of this study: that COVID-19 disinformation campaigns targeting Iran were not incidental social media phenomena but constituted identifiable instruments within a broader hybrid warfare architecture. The typological distribution of identified campaigns — overwhelmingly weighted toward coordinated strategic disinformation and cognitive operations (Types II, III, and IV) rather than inadvertent misinformation (Type I) is inconsistent with organic, health-anxiety-driven public confusion and strongly consistent with adversarially organized campaign activity.

The compound crisis context — the simultaneity of pandemic, maximum-pressure sanctions, and regional military pressures — created what Brubaker (2004) might describe as an *opportunity structure* for adversarial cognitive operations: a target environment in which institutional failures were inevitable, public anxieties were acute, and any governmental response could credibly be framed as inadequate. The disinformation campaigns identified in this study systematically exploited this structure, targeting the three dimensions of institutional credibility identified by Coombs' (2007)



SCCT framework: crisis responsibility attribution, competence perception, and reputational capital. By framing genuine limitations imposed by sanctions as evidence of governmental negligence, and amplifying authentic institutional failures without context, campaigns of Type III (weaponized mal-information) created conditions for maximum credibility damage.

6.2 Platform Architecture and Disinformation Amplification

The distinctive architecture of Iran's social media ecosystem created specific amplification pathways that adversarial campaigns exploited with considerable effectiveness. Twitter's relatively small but highly influential Persian-language user base — disproportionately weighted toward journalists, political activists, diaspora communities, and opinion leaders — made it an ideal launchpad for campaigns designed to be picked up by international media and to cascade into the broader Telegram-Instagram ecosystem that comprises most of the Iranian social media consumption. The cross-platform amplification dynamics observed in this study — with top-performing Twitter content systematically redistributed through the six monitored Telegram channels — confirm the existence of coordinated cross-platform coordination infrastructure of the type documented by Nimmo et al. (2020) in European and American disinformation campaign contexts.

The relatively low levels of Persian-language content moderation applied by major platforms during the observation period compounded these dynamics. Twitter, Facebook, and Instagram all publicly committed to enhanced COVID-19 content moderation policies in early 2020 (Roozenbeek et al., 2020), but implementation in Persian lagged significantly behind English-language moderation — a pattern documented across Global South language communities and attributable to resource allocation disparities in platform trust and safety operations (Douek, 2021).

6.3 Vaccine Disinformation as Strategic Priority

The disproportionate concentration of Type IV hybrid cognitive operations in vaccine-related campaign events — generating approximately 3.9 million tweets across four discrete campaign peaks — merits specific analytical attention. This concentration reflects the strategic prioritization of vaccine hesitancy as a campaign objective in the pandemic's later phase. Iran's vaccination program faced genuine structural obstacles: the COVAX facility's initial deliveries to Iran were delayed by sanctions complications, and domestic vaccine development (COVIran Barekat) faced legitimate scientific scrutiny. These genuine vulnerabilities provided a foundation on which coordinated disinformation — falsified safety data, fabricated WHO statements, and amplified accounts of alleged adverse events — could be constructed with maximum plausibility.

The result was measurable: Iran's COVID-19 vaccination rate lagged significantly behind the global average through mid-2021, with vaccine hesitancy surveys conducted in 2021 identifying social media disinformation as a primary driver of vaccine refusal among Iranian adults (Ochu et al., 2021). While this study cannot establish a direct causal link between the identified campaign activity and measured hesitancy rates, the correlation is consistent with the mechanism hypothesized by the hybrid warfare framework and with analogous findings from European disinformation research (Roozenbeek et al., 2020).

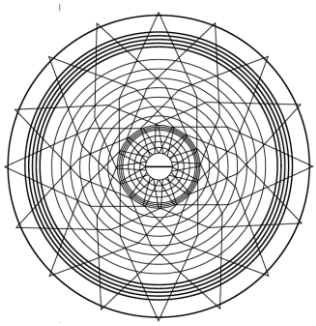
7. Conclusion

This study has demonstrated that Iran's COVID-19 information environment was systematically targeted by coordinated disinformation campaigns functioning as instruments within a broader hybrid warfare strategy directed at a compound-crisis state. Through large-scale data mining of more than 21 million Persian-language tweets across a 22-month observation period, and qualitative content analysis of approximately 17,800 tweets across 89 identified trend-days, four typologically distinct disinformation modalities were identified: inadvertent misinformation, strategic disinformation, weaponized mal-information, and hybrid cognitive operations.

The most significant finding is that the dominant campaign types — strategic disinformation (Type II), weaponized mal-information (Type III), and hybrid cognitive operations (Type IV) collectively far outweigh inadvertent misinformation (Type I) in the identified corpus, and exhibit organizational, temporal, and network signatures inconsistent with organic social media behavior. Vaccine-related campaigns, generating approximately 3.9 million tweets across four discrete events, represented the most sustained and large-scale manifestation of Type IV operations in the later pandemic period.

Three contributions to the scholarly literature warrant emphasis. Theoretically, the study extends hybrid warfare frameworks to the domain of pandemic crisis communication, demonstrating that information disorder typologies developed for domestic democratic contexts require modification when applied to conflict-proximate states under compound adversarial pressure. Empirically, it provides the most comprehensive Persian-language COVID-19 Twitter analysis to date. Methodologically, it demonstrates the analytical value of cross-platform triangulation — integrating Twitter trend analysis with Telegram channel monitoring — for capturing disinformation dynamics that single-platform approaches would systematically miss.

Several limitations should be acknowledged. The study's reliance on Twitter as the primary data source, while methodologically justified, may underrepresent disinformation dynamics operating primarily within Iran's Telegram and Instagram ecosystems. The



absence of formal network analysis — which would enable more precise attribution of coordinated inauthentic behavior — represents a methodological constraint for future iterations of this research. Additionally, the identification of campaigns as coordinated adversarial operations rather than organic activity relies on behavioral and content signatures rather than definitive attribution, a limitation inherent to open-source social media research.

Future research priorities include the development of longitudinal comparative frameworks enabling systematic analysis of hybrid disinformation operations across conflict-adjacent states in the region; formal network analysis of account-level coordination in Persian-language COVID-19 campaigns; and empirical assessment of the relationship between identified campaign activity and measurable public health outcomes, including vaccination rates and institutional trust indices. Addressing the algorithmic and platform governance dimensions of Persian-language disinformation — particularly the documented gap in content moderation resources for Global South languages — represents an urgent priority for both scholarship and platform policy.

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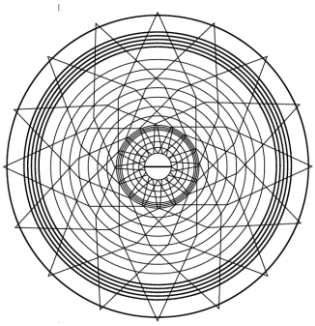

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ГИБРИДНАЯ ВОЙНА, ИНФОДЕМИЯ И ПОЛИТИКА ДЕЗИНФОРМАЦИИ: АНАЛИЗ СКООРДИНИРОВАННЫХ КАМПАНИЙ ФЕЙКОВЫХ НОВОСТЕЙ, НАПРАВЛЕННЫХ ПРОТИВ ИРАНА В ПЕРИОД ПАНДЕМИИ COVID-19 (2020-2021 ГГ.)

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Аннотация:

Пандемия COVID-19 породила глобальную информационную волну, но стратегическое использование дезинформации о здоровье в гибридных войнах остается малоизученным, особенно в странах под санкциями и на границах конфликтов. Это исследование анализирует скоординированные кампании дезинформации, связанные с COVID-19 в Иране, с декабря 2019 по сентябрь 2021 года. Мы использовали смешанные методы для анализа более 30 миллионов твитов на персидском языке, включая 21 миллион с терминами, связанными с коронавирусом. Анализ Twitter и шести ключевых каналов Telegram выявил 89 значимых трендов за 676 дней, с качественным изучением около 200 твитов в каждый из них. Результаты показали четыре механизма — дезинформацию, стратегическую дезинформацию, использование лжи как оружия и гибридные когнитивные операции, — которые подрывают доверие к учреждениям и усиливают тревогу. Кампании, связанные с вакцинацией, охватили около 3,9 миллиона твитов в рамках четырех крупных мероприятий. Более половины всех персидских твитов о коронавирусе появились с января по июнь 2020 года, совпадая с пиком эпидемии и политической нестабильности. Рассматривая Иран как пример сложного кризиса, исследование развивает теорию информационного хаоса и предлагает выводы для управления платформами, коммуникации в здравоохранении и анализа гибридной дезинформации в кризисных условиях.

Ключевые слова: COVID-19, фейковые новости, дезинформация, гибридная война, Иран, инфодемия, когнитивная война, кризисная коммуникация