

Article



A Multilingual Media Analysis of Pediatric and Thyroid-Related Newspaper Communications Following the Chernobyl and Fukushima Nuclear Disasters

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Abstract: Public media communication, particularly through newspapers, plays a critical role in shaping public awareness, governmental response, and remediation efforts following large-scale crises, including nuclear power plant accidents. Because children are biologically more vulnerable to the effects of ionizing radiation, understanding how media narratives include children following nuclear events is especially important. This study employed a novel multilingual computational approach to analyze newspaper coverage following the Chernobyl (1986) and Fukushima (2011) accidents in Russian and Japanese. Using structural topic modeling (STM), we examined dominant themes related to children, nuclear events, and thyroid-related health concerns across both contexts. The analysis identified four topics in the Russian-language newspaper and six topics in the Japanese newspaper. Themes in the Russian-language newspaper focused more on the geographical environment, affected populations, and disease, while the Japanese newspaper emphasized health management, surveys, peace education, the Fukushima nuclear disaster, radiation, and Chernobyl, showcasing specific cultural emphasis in media reporting. Coverage of the later accident drew explicitly on the earlier one, whereas no comparable precedent was available at the time of Chernobyl, indicating an asymmetry in the information environment available to support protective action. Although the small and uneven corpus limits generalizability, the study demonstrates the exploratory value of multilingual STM for comparing nuclear-disaster reporting across languages and historical contexts.

Keywords: media analysis; Chernobyl; Fukushima; multilingual; thyroid

1. Introduction

Communication with the public through media sources, such as newspapers, plays a critical role in public awareness and community response following large-scale disasters. Beyond their primary function of informing the public, newspapers also serve as an archival record of public, institutional, and national-level discourse at the time of and after a disaster, capturing how risks and crisis situations were named, explained, and prioritized. Previous research has shown how news coverage, both through social media and traditional news outlets, of nuclear disasters have influenced global risk perception and psychological distress, while helping manage public reaction and deliver accurate information. Given that inadequate crisis communication has been associated with



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downplayed health risks, heightened anxiety, and mistrust in government authorities, effective public communication through newspapers presents an important opportunity to support immediate response efforts and build public understanding of crisis situations and response measures [1–6].

Since the development of nuclear power technology, there have been three major nuclear accidents that involve significant reactor damage and subsequent radioactive release: Three Mile Island in the United States (1979), Chernobyl in Ukraine (then part of the USSR) (1986), and Fukushima in Japan (2011) [7–9]. Chernobyl and Fukushima are the only nuclear power plant disasters to have a Level 7 (maximum severity) rating on the International and Radiological Event Scale [10]. They constitute the empirical foundation of the international framework for radiological protection following a large nuclear accident, as outlined in ICRP Publication 146 [11]. These nuclear events had widespread and severe environmental contamination and health impacts [12–14]. In both cases, community evacuations, cleanup, risk assessment, and healthcare access have been complex [15–18]. However, it is important to recognize that nuclear related accidents can happen anywhere, with over 400 nuclear accidents having occurred globally, highlighting the value of integrating effective risk communication and disaster response measures to decrease panic and uncertainty, while facilitating community safety and health [8,19–22].

One of the most vulnerable populations that is impacted by radiation exposure following nuclear power plant disasters are children [23–25]. Children's thyroid glands are particularly sensitive to ionizing radiation; radioactive exposure significantly increases the risk of thyroid disease, such as thyroid cancer, benign nodules, hypothyroidism, and autoimmune thyroiditis, in children, which can manifest many years following initial exposure [26–29]. Following the Chernobyl disaster, there were increased detection rates for thyroid cancer cases in children and adolescents [30–32]. Those impacted by the Chernobyl disaster had higher exposure to radioactive iodine, compared to Fukushima, resulting in thousands of thyroid cancer cases being reported in children and adolescents [33,34]. Children and adolescents exposed to higher levels of radiation, such as those following nuclear disasters, are recommended to engage in thyroid monitoring given the long latency for emergence of associated medical conditions [35].

The international framework for radiological protection following a large nuclear accident, set out in ICRP Publication 146, draws directly on the Chernobyl and Fukushima experiences and distinguishes the early and intermediate phases of an accident, managed as emergency exposure situations, from the long-term phase, managed as an existing exposure situation [11]. Across all phases, the Commission holds that the implementation of protective actions should take account not only of radiological factors but also of societal, environmental and economic considerations, and it places weight on stakeholder involvement and the sharing of information to support decision-making. This is formalized in the co-expertise process, in which authorities, experts, and affected populations work together to make informed decisions about safety and protection. If a hazard is absent from public discourse or is present only in terms that do not connect it to available protective action, the conditions for shared decision-making are not met. Newspaper reporting is an accessible and effective method to create an information environment to satisfy the necessary preconditions needed under the ICRP protection framework.

While previous studies have investigated radiation and disaster risk communication, as well as community information seeking behaviors, in both the cases of Chernobyl and Fukushima, little research has been done comparing responses in multiple languages and between multiple national contexts in which a disaster occurred [3,22,36,37]. For example, studies following the Fukushima accident have reported associations between media consumption and health-related anxiety, media use and radiation anxiety over the longer term, the media sources evacuees rely upon and their current health anxiety, media communications across European nations, and information sources and perceived damage from harmful rumors [4,38–40]. However, comparing media responses to a disaster across countries, regions, and languages can reveal not only differences in how the event itself is reported and the accident-associated behaviors, but also broader differences in social values, media interpretations, risk perception, representations of affected populations, and policy contexts.

This study attempts to more deeply understand media response and public awareness following the Fukushima and Chernobyl nuclear disaster events by comparing and evaluating newspaper coverage in the primary languages used by the governments and media at the time of each disaster, Russian for Chernobyl and Japanese for Fukushima. Specifically, we utilize the case study of radiation effects on children and thyroid-related issues as a baseline for analysis, given the vulnerability of this population. As nuclear radiation disproportionately affects children, especially through elevated risks of thyroid disease, understanding how the media framed and communicated these issues is essential [23,24]. Pediatric thyroid disease offers a potential test case as it is a clearly established health outcome, arises through the same mechanism, and is preventable by protective actions that must be communicated within a short window. Differences in how it was reported can be attributable not only to the hazard itself, but also to the state of knowledge and the information regime.

While the cases of Chernobyl and Fukushima are different, this analysis allows for the development of a common framework, that will serve as a trial of multi-language analysis for improving nuclear disaster response. To our knowledge, no study to date has compared such reporting across both Level 7 accidents into the long-term phase around a single health endpoint. This will ultimately help get a clearer sense of how media shapes public understanding, disaster response, and the broader narrative of health risks in times of crisis, as well as the role that cultural differences and knowledge progression play in the development of these perceptions. This study therefore asks two main questions: how did the selected national newspaper in each nuclear disaster affected context report on children and thyroid-related health following the Chernobyl and Fukushima accidents? And what do the observed differences suggest about the information conditions and media perceptions available to support protective action and effective risk communication? Overall, we aim to assess the usefulness of Structural Topic Modeling as an exploratory tool for identifying cross-language similarities and differences in nuclear disaster reporting.

2. Methods

This was a bibliometric analysis and newspaper review study utilizing two news databases from the USSR/Russia and Japan. This study was conducted referring to the PRISMA-ScR statement [41]. The data were analyzed using both Structural Topic Modeling (STM) and a qualitative review of the articles to examine and compare how the two selected newspapers presented information about the Chernobyl and Fukushima nuclear disasters, particularly regarding radiation's impact on children and thyroid-related issues.

2.1. Data Selection

Data were selected based on two criteria: (1) the accessibility of the published newspaper, (2) availability and accessibility of a full database of the published newspaper itself. In both cases, the newspaper occupied the position of a mainstream national channel within its media system at the time of the accident it covered. National reach is the relevant criterion here because protective-action policy was set at the national level in both cases, and the information conditions under examination concern discourse addressed to a national public and to national authorities. Their archives constitute a durable record of public, institutional, and national-level discourse surrounding each disaster, allowing discourse to be compared. As these newspapers are functionally equivalent, it is possible to conduct a comparison across media systems differing substantially in ownership, regulation, and relationship to the state, by matching outlets on their position within each system rather than on institutional form. We expand on this in the limitations, but we recognize that this analysis focuses only on one published news source from each region and, in the context of Chernobyl, did not investigate local coverage in heavily affected regions in Ukraine and Belarus. However, the availability of newspapers from the USSR/Russia was limited due to the lack of comprehensive newspaper databases for nationally distributed sources.

2.2. Search Strategy

Researchers developed a list of key concepts in English relating to the Chernobyl and Fukushima nuclear disasters, children, and thyroid-related health issues. These search terms were then translated into Russian and Japanese and entered into their respective databases to run a search query (Table 1). The database searches included all articles published from 26 April 1986, the day of the Chernobyl nuclear disaster, until 30 September 2025. While Fukushima occurred 25 years after Chernobyl, the research team decided to include the full pre- and post-disaster timeline for the Fukushima search.

2.3. Data Collection & Cleaning

Following the database search using the identified search terms, the research team reviewed each article manually to ensure that it was applicable. For example, some articles initially appeared to match the search query but, upon further review, were found to be irrelevant to the topic of interest. Because these databases parse newspaper issues, some of which are available only in PDF or image format, there was room for error, which was mitigated through careful review.

The Russian newspaper, Pravda, originally published in the USSR as one of the country's main national newspapers and headquartered in Moscow, was accessed through the East View Information Services database (<https://on-demand.eastview.com/browse/publication/9305/udb/870/%D0%BF%D1%80%D0%B0%D0%B2%D0%B4%D0%B0>, accessed on 30 September 2025). While Chernobyl is geographically located in Ukraine, Russian was the primary language used for official communication and national media at the time of the disaster, and Pravda was the most accessible national newspaper during that period. Following manual analysis of the articles,

9 articles were removed for lack of applicability to the topic. The archive provides full page-level digitization with searchable text generated by optical character recognition (OCR). All scanned items meeting the search criteria were converted to Russian-language text and re-read in full by the research team, with the machine-generated text checked against the page images and corrected where necessary before analysis. The search covered the main Pravda outlet, which was one of the central media platforms of the Soviet Union, and all available years within the study window; the subscription used provides coverage through the present. While the manual verification corrects the text of articles that were retrieved, it cannot recover articles missed at the retrieval stage because of OCR error, which remains a limitation of any search over digitized historical newsprint. Two independent native Russian speakers reviewed the articles separately, and their results were subsequently compared to confirm full agreement.

The Japanese newspaper, The Yomiuri Shimbun, headquartered in Tokyo, was accessed through Yomidas: Yomiuri Database Service (<https://yomidas.yomiuri.co.jp/login/en>, accessed on 7 July 2025). With a circulation of approximately 5.8 million copies as of 2024, The Yomiuri Shimbun remains the most widely read national newspaper and serves as a major discourse in Japan. The search was restricted to the national edition of the Yomiuri Shimbun as indexed in the main Yomidas database; regional editions and The Japan News archive were not included. This scope was chosen for consistency with the national-level comparison described above; it means, however, that region-specific reporting from Fukushima Prefecture itself is not captured in this dataset. Two independent native Japanese speakers (Y.N. and H.S.) reviewed the articles separately, and their results were subsequently compared to confirm full agreement.

Table 1. Search terms used to run the newspaper query in English, Russian, and Japanese.

English	Russian	Japanese
Concept A: Children/adolescents/minors AND Concept B: School setting/school health infrastructure AND Concept C: Thyroid conditions	(студент OR студентка OR ученик OR ученица OR ребёнок OR дети OR мальчик OR девочка OR юноша OR молодёжь OR подросток OR подростки OR “подростковый возраст” OR малолетний OR малолетняя OR малолетнее OR малолетние OR “молодой человек” OR “молодая девушка” OR несовершеннолетний OR несовершеннолетняя OR школьник OR школьница) AND (школа OR школы OR школьная медицинская служба OR школьный медпункт) AND (щитовидный OR щитовидная железа OR тиреоидная железа OR “новообразования щитовидной железы” OR “рак щитовидной железы” OR “заболевания щитовидной железы”) AND	(学童 OR 児童 OR 生徒 OR 学生 OR 中高生 OR 高校 OR 学校 OR 18 歳未満 OR 18 才未満 OR 小児 OR 青年 OR 青少年 OR 未成年 OR 若年 OR 未成年者 OR 子ども OR 子供) AND (学校 OR 学校保健) AND (甲状腺がん OR 甲状腺腫瘍 OR 甲状腺 癌)

2.4. STM Analysis

Structural topic modeling (STM) was conducted using the stm package in R (v1.3.6) [42], with stop-word lists appropriate for each language (Russian and Japanese) referring to previous research [43,44]. Japanese morphological analysis was then conducted using RMeCab, an R interface for the MeCab analyzer (<https://rmecab.jp/>, accessed on 7 July 2025). The number of topics was selected after reviewing held-out likelihood, semantic coherence, exclusivity, residuals, and the lower bound, and discussing these diagnostics among the researchers. The diagnostic value was evaluated as the topic number increased from 2 to 10. Because the two newspapers yielded different numbers of relevant articles, the final number of topics differs between the Russian and Japanese analyses.

Higher held-out likelihood values indicated better model performance in predicting unseen data. Semantic coherence was used to assess how interpretable the generated topics were—higher coherence meant the topics made intuitive sense. Lower residuals were preferred because they reflect more accurate predictions and smaller gaps between observed and expected word distributions. The lower bound provided an approximation of the model’s parameter fit and helped compare candidate topic solutions.

After determining the appropriate number of topics, the STM was run for each newspaper. For every topic, the model generated the top high-probability words, and the FREX words (the words that are both frequent and exclusive) were used to understand and interpret the content of each topic in both the Russian and Japanese analyses.

Representative sentences were then extracted to illustrate each topic. The first author (D.L.) reviewed the Russian text, using the top topics and their high-probability words to identify and extract representative sentences from the text in Russian. The same approach was taken by the second and third authors (Y.N. and H.S.) for the Japanese text. All authors subsequently reviewed and discussed the topic names and the extracted sentences to reach a consensus.

Following the STM modeling, the Russian and Japanese results were analyzed separately before the researchers reviewed them together and conducted a brief comparison of the key words in English. Importantly, researchers used an iterative process to determine themes, building on both the quantitative and qualitative components of the media articles that passed the original screening. Themes were derived inductively rather than from a pre-specified coding frame. Topics were generated by the model from word co-occurrence within each corpus, and topic labels were assigned afterwards by the authors based on the high-probability and FREX words together with a reading of the underlying articles. The radiological protection framework described above informs the interpretation of the resulting topics, but was not used to define, constrain, or code them. The themes are meant to act as an initial point of comparison, before more in depth analysis across several media platforms is conducted in future studies. This comparison is further explored in the results section.

3. Results

3.1. Newspaper Article Selection

The database search for Russian-language articles identified 32 results. After data cleaning and manual review, 23 articles were retained for analysis. The database search for Japanese-language articles returned 90 results. Following manual screening, 9 articles were excluded from the Russian-language source and 27 articles were excluded from the Japanese-language source due to lack of relevance to the topic (diseases in a general context, lack of applicability of children, not related to disasters). After data cleaning, 63 articles were retained for analysis (Figure 1).

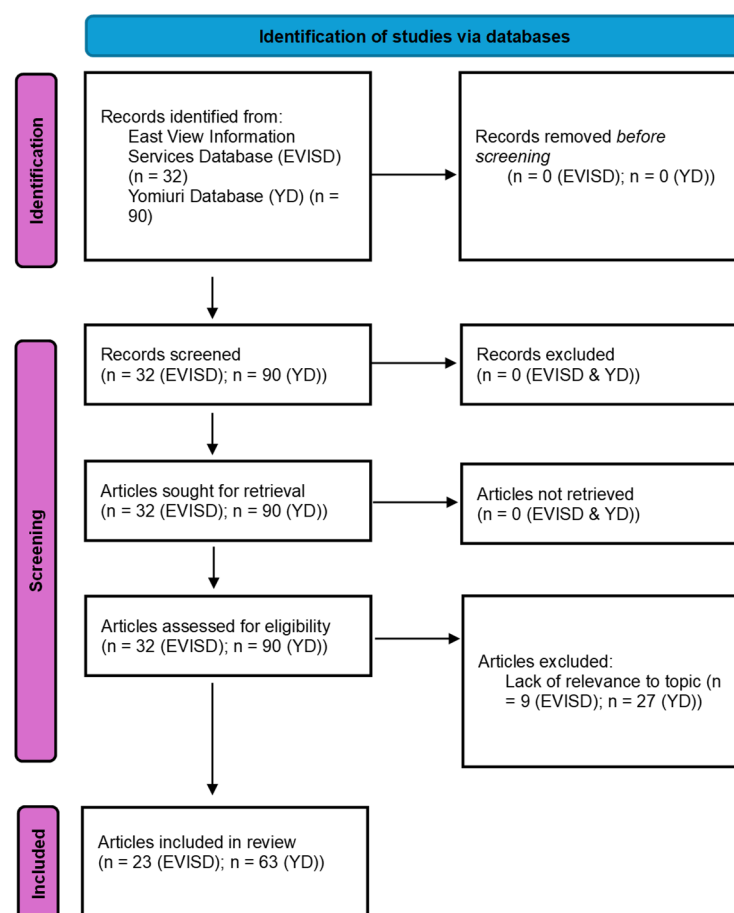


Figure 1. PRISMA flow diagram of the systematic review process for Russian- and Japanese-language database searches [41]. Adapted from Ref. [45] under the Creative Commons Attribution 4.0 International License. Copyright 2021.

3.2. Media Analysis in Russian

Following an evaluation of the diagnostic values of held-out likelihood, semantic coherence, residuals and lower bound from topic numbers 2 to 10, and after additional consideration of coherence and exclusivity, the topic number selected for the analysis in Russian was 4 (see Figures S1 and S2 in Supplementary Materials). High probability words for the 4 topics that emerged are shown in Figure 2 (also see Figure S3 in Supplementary Materials).

The four main themes that emerged from the analysis are: (1) Chernobyl Zone and Cleanup Response, (2) Nuclear Explosion and Affected Populations, (3) Disaster and Radiation Consequences, and (4) USSR and Belarusian Context (Figure 2; see Figure S3 in Supplementary Materials).

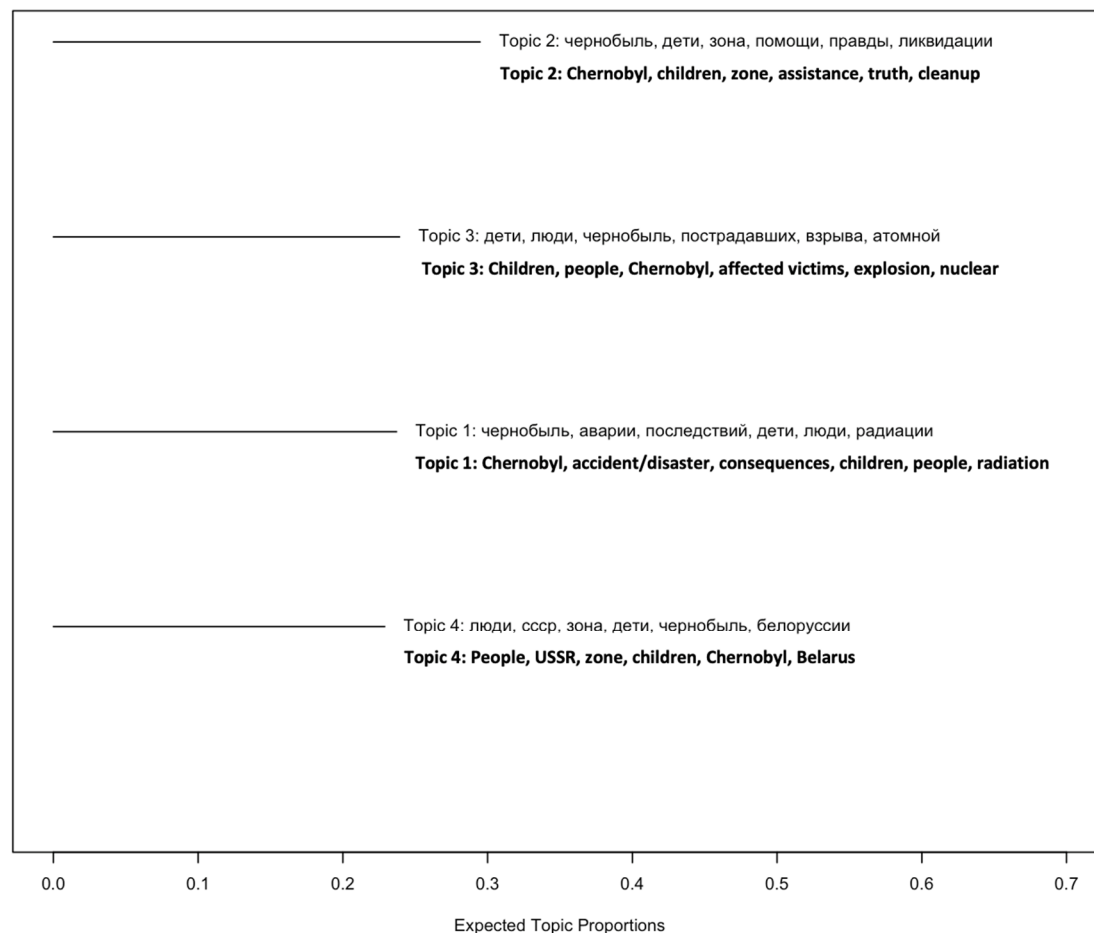


Figure 2. Top words in topics following STM analysis for articles in the newspaper publication *Pravda* (East View Information Services Database).

Topic 1: Chernobyl Zone and Cleanup Response, centered on geographic contamination, administrative control, and the lived experience within designated radiation zones. For example, a 19 February 1990, article in *Pravda* reported:

“После чернобыльской аварии Злынковский район Брянской области оказался в зоне жесткого контроля: плотность загрязнения территории составляет 15–40 кюри на квадратный километр. Пребывание людей здесь, особенно детей, не остается без последствий.”

“After the Chernobyl accident, the Zlynkovsky district of the Bryansk region fell under strict control: contamination density amounts to 15–40 curies per square kilometer. Living here, especially for children, does not remain without consequences.”

Topic 2: Nuclear Explosion and Affected Populations, focused on responses and organized assistance in affected areas. One article from 7 June 1991, in *Pravda* described:

“Акция ‘Брянские ребята’—это передача лекарств для медицинских учреждений области, передача партии индивидуальных дозиметров в школы и детсады...”

“The ‘Bryansk Kids’ campaign involves delivering medicines to regional medical institutions and distributing individual dosimeters to schools and kindergartens...”

Topic 3: Disaster and Radiation Consequences, emphasized medical outcomes and the human toll of radiation exposure. For instance, an article published on 9 July 1990, in *Pravda* discusses:

“Возросло количество онкологических заболеваний, и очень прискорбно, что по этой причине уходят из жизни дети дошкольного и школьного возраста.”

“The number of oncological diseases has increased, and it is deeply tragic that preschool and school-age children are dying for this reason.”

Topic 4: USSR and Belarusian Context, situates the disaster within broader Soviet political and geographic structures, often describing responses in Belarus. One article from 24 April 1990, in *Pravda* noted:

“Ни человека нет теперь в Бабчине. Ни курицы, ни поросенка, ни воробья...”

“There is not a single person left in Babchin. No chicken, no piglet, no sparrow...”

3.3. Japanese Media Analysis

Similarly to the analysis for the newspaper written in Russian, the Japanese newspaper analysis followed a similar framework for evaluating the diagnostic values of held-out likelihood, semantic coherence, residuals and lower bound from topic numbers 2 to 10. After also consulting coherence and exclusivity, the topic number selected for the Japanese analysis was 6 (see Figures S4 and S5 in Supplementary Materials). High probability words for the 6 topics that emerged are shown in Figure 3 (also see Figure S6 in Supplementary Materials).

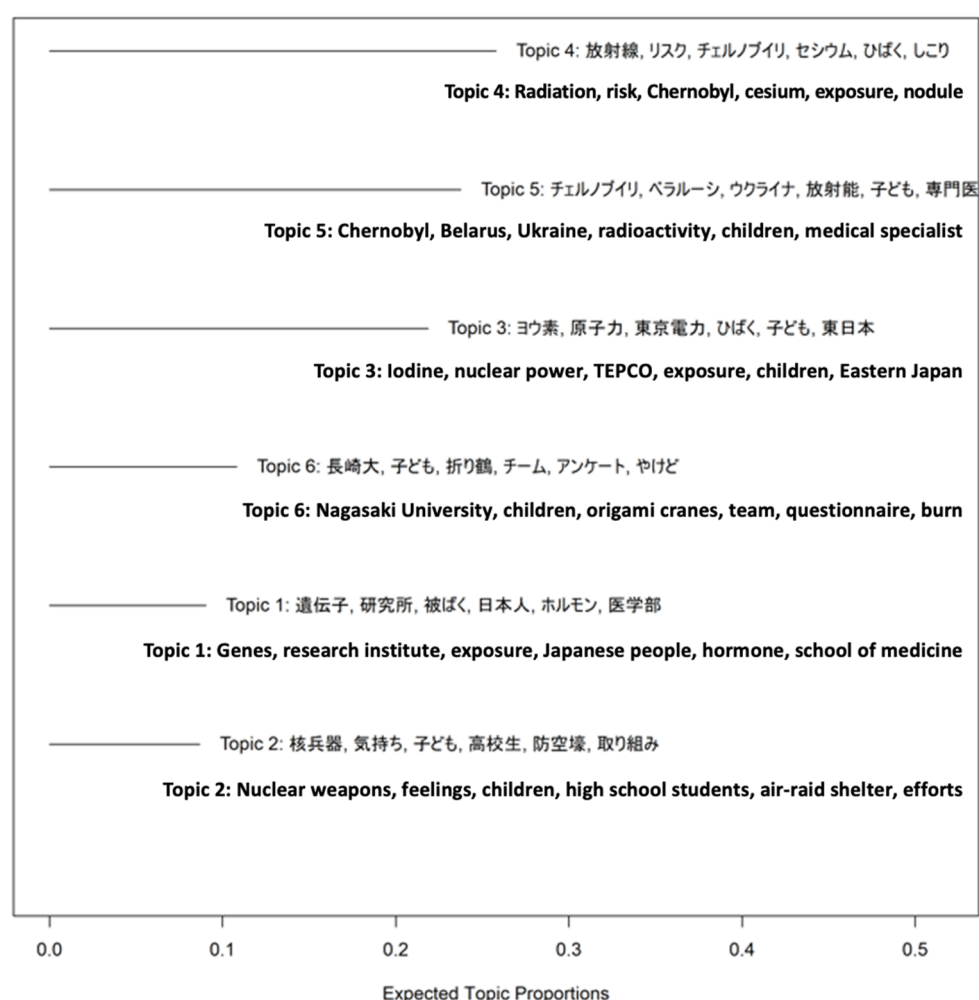


Figure 3. Top words in topics following STM analysis for articles in the newspaper publication (Yomidas: Yomiuri Database Service).

Topic 1: centered on genes, research institute, exposure, Japanese people, hormone, and the school of medicine, focused on the scientific research and educational initiatives related to the radiation exposure. For example, an article published on 1 August 2017, discusses the shifting importance of education:

“講座では小、中学生らに原爆被害などを教えているが、福島第一原発事故以降、放射線教育の重要性が見直されている。”

“While the courses have taught elementary and junior high school students about atomic bomb damage, the importance of radiation education has been re-evaluated since the Fukushima Daiichi nuclear power plant accident.”

Topic 2: encompassing nuclear weapons, feelings, children, high school students, air-raid shelter, efforts, centers on anti-war messages and the lived experiences of those affected by nuclear facilities or disasters. An article from 25 July 2024, highlights the connection between personal suffering and the call for nuclear abolition:

“当時70歳代の後半。1987年まで操業した核施設の近くに住み、施設から放出された放射性降下物で被曝し、甲状腺がんを患っていると語った...一人でも多くにキノコ雲の下で起きた惨状を知ってもらうことが、核廃絶につながる道だと信じる。”

“Living near a nuclear facility that operated until 1987, the individual was exposed to radioactive fallout released from the facility and suffers from thyroid cancer ... They believe that letting as many people as possible know about the tragedy that occurred under the mushroom cloud is the path to nuclear abolition.”

Topic 3: involving Iodine, nuclear power, TEPCO, exposure, children, and Eastern Japan, focused on the response and investigation results following the Fukushima Daiichi accident during the Great East Japan Earthquake. A 12 January 2013 article reported on radiation dose estimations:

“福島県浪江町民について、原発事故で放出された放射性ヨウ素による甲状腺被曝量を推定した結果、最大18ミリ・シーベルトだった...「十分に低い値でほぼ問題ない」としている。”

“Regarding the residents of Namie Town in Fukushima Prefecture, the estimated thyroid exposure dose from radioactive iodine released during the nuclear accident was a maximum of 18 mSv... The report states it is ‘a sufficiently low value and poses almost no problem’.”

Topic 4: characterized by radiation, risk, Chernobyl, cesium, exposure, nodule evaluates the risks of the Fukushima accident by comparing it with the Chernobyl disaster. An article from 30 January 2013, mentions the ongoing health monitoring:

“福島の原子力発電所事故で発症が心配される子供の甲状腺がん。その検査を福島県立医科大学の放射線医学県民健康管理センターが進めている。...チェルノブイリ原発事故の時より住民の被曝量が低いうえ、そのチェルノブイリでも甲状腺がんの発症は4、5年後だったとされている”

“Childhood thyroid cancer is a concern following the Fukushima nuclear power plant accident. The Radiation Medical Center for the Fukushima Health Management Survey at Fukushima Medical University is conducting these examinations. ... The radiation exposure doses of residents are lower than those at the time of the Chernobyl accident; furthermore, even in Chernobyl, the onset of thyroid cancer was said to have occurred four to five years after the disaster.”

Topic 5: relating to Chernobyl, Belarus, Ukraine, radioactivity, children, and medical specialists, addresses the long-term health consequences in Ukraine and Belarus following the Chernobyl disaster. An 24 April 2006, article describes the expanding scale of health issues:

“放射性物質に覆われた事故現場周辺は立ち入りが禁じられ、被災者はなお後遺症にさいなまれている。...

被災地域一帯では放射線被害の後遺症がむしろ拡大傾向にある。ウクライナとベラルーシでは、汚染地で搾られた牛乳などを飲んだ子供約4000人が甲状腺がんになった。”

“Access to the area surrounding the accident site, which remains covered in radioactive materials, is prohibited, and victims continue to suffer from long-term health consequences. ... In fact, the

aftereffects of radiation damage are showing an increasing trend across the affected regions. In Ukraine and Belarus, approximately 4000 children who consumed milk produced in contaminated areas developed thyroid cancer.”

Topic 6: centered on Nagasaki University, children, origami cranes, teams, questionnaires, and burns, focused on the perspectives of atomic bomb survivors (Hibakusha) and their concerns regarding the future. An 4 August 2007, article based on a survey reported:

“アンケートで、「あの日の記憶」の乏しさに苦悩しつつ、体験を語り継ごうとする強い意識がうかがえた。…差別や偏見を経験し、子や孫への遺伝を心配する。”

“In the questionnaire, survivors expressed a strong desire to pass on their experiences while struggling with their sparse memories of ‘that day’ ... They have experienced discrimination and prejudice and worry about the genetic effects on their children and grandchildren.”

4. Discussion

Effective media communication following large-scale nuclear-related disasters is critical, especially for children who face increased risk of thyroid-related diseases when exposed to high doses of radiation [22–27]. Clear and accurate messaging helps the public understand health consequences, while also shaping awareness, trust, and the ability of parents to take informed action [1–6]. This study conducted a novel primary analysis of nuclear-disaster media discourse focused on children and thyroid disease following the Chernobyl and Fukushima disasters, using sources in the primary languages of the regions where the events occurred. This analysis emphasized understanding media narratives and how they evolved over the 25 years between the two nuclear power plant disasters. Overall, the analysis underscored differences in the topics covered by the media following the events and highlighted the lack of a substantive nuclear-disaster risk response and emphasis on risk prevention for children and thyroid health in the aftermath of both events.

Using article data from one major national newspaper from the USSR/Russia, Pravda, and Yomiuri in Japan, and applying STM, four topics were identified for the newspaper written in Russian and six for the Japanese newspaper. The main themes in the newspaper written in Russian, focused broadly on the geographical environment, affected populations, and diseases. Notably, none of the four Russian-language topics centered on protective action for children, which is consistent with the knowledge of radiation-induced pediatric thyroid cancer at the time; its recognition was itself a lesson drawn from that event. In contrast, the main themes in the Japanese newspapers were more specifically on radiation and health, disasters in Fukushima and Chernobyl, as well as peace education. Despite these cultural and contextual differences, coverage of the later accident drew explicitly on the earlier one as Chernobyl appeared as a reference point in two of the six Japanese topics, whereas no comparable prior case was available in Pravda. The availability of a precedent can be viewed as its own communication resource. While the current analysis is unable to demonstrate improvement in communication effectiveness between these two accidents, the presence of a previous disaster and wider media repertoire ahead of the Fukushima accident provides an opportunity for previous contexts to help interpret their environment and situation.

A couple of takeaways from the comparison between the newspaper results were that the Japanese paper included more technical terminology and showed overlap with discussions about the atomic bombings in Hiroshima and Nagasaki when looking at public discourse on children and thyroid disease. In Yomiuri, pediatric radiation risk is presented substantially through a Hiroshima/Nagasaki war-memory and peace-education lens rather than a radiological-protection frame, showcasing the cultural specificity of their approach in media reporting of the accident. Terms such as “iodine” and “exposure” also frequently appeared among the high-frequency words. This reflects growing awareness that, following possible exposure to radioactive iodine, stable iodine has been recognized as an important preventive measure [46–48]. The analysis in Russian was more focused on the accident itself and the community impact, while the Japanese one leaned more toward the underlying scientific research and risk, showcasing how knowledge on this topic, and the way it is communicated, has evolved. This shift can be interpreted to be consistent with the developing knowledge about radiation-induced pediatric thyroid disease. Interestingly, the Japanese analysis also included mention of Chernobyl, which highlights one of the key goals of this study: understanding how nuclear disasters can inform media discourse and strengthen how we communicate about protecting children exposed to high levels of radiation following such events. Text analysis that aims to understand not only media reporting but also people’s opinions can help inform how information provision, recovery efforts, and services are tailored to people’s evolving needs [49]. Moreover, incorporating such analysis into health systems is essential for continued long-term recovery efforts.

We recognize several limitations associated with this analysis. Primarily, the limited amount of data, especially from the Russian newspaper, means that the structured topic modeling may not be a strong predictor, as there were not enough sources to fully stabilize the model. However, the analysis still provides meaningful insight into potential ways to explore recurring themes in disaster media response, and each article was individually reviewed by the researchers to confirm that these themes were iterated. STM with a larger number of media sources and articles would allow for the development of clearer, more concrete themes without the need for individual qualitative analysis. Another limitation stems from using only one national newspaper for each country, which narrowed the scope of available data. Archive availability constrained the corpus and we treat the resulting analysis as a proof point of the opportunity to engage in more multilingual research rather than a concrete finding. A further limitation is that Russian was the language of official Soviet Union communication rather than the first language of the most affected populations in Ukraine and Belarus; findings from the Pravda corpus may therefore reflect the discourse of the Soviet Union press specifically rather than reporting within the affected regions. Similarly, on the Japanese side, our search was limited to the national edition of the Yomiuri Shimbun; regional editions, including the Fukushima prefectural edition, were not included. As with the Russian-language corpus, this means that reporting specifically addressed to, or produced within, the most directly affected region may differ from what is captured here. The Japanese dataset also included articles referencing Hiroshima and Nagasaki, which offer important insight into radiation risk and exposure but do not relate directly to nuclear power plant reactor disasters. Still, they provide valuable context on how public communication around radiation has developed and how lessons from past events can inform stronger responses in future nuclear disasters. Lastly, an important limitation is the political context in which these newspapers operated. The Japanese newspaper is owned by a private company, which may introduce publication bias, and some of the articles in the newspaper written in Russian were published during the Soviet period, when information was heavily censored and limited public reporting may reflect the government's failure to respond transparently or provide coherent information following the Chernobyl explosion.

The present study suggests that STM can provide a useful exploratory approach for comparing newspaper coverage across languages and historical contexts. While the small and uneven corpus limits the generalizability of the findings, STM helped identify recurring themes and differences in emphasis that may not be immediately visible through manual reading alone. In this sense, the contribution of this study is methodological as well as substantive: it demonstrates how computational text analysis can complement conventional content analyses in the study of nuclear disaster communication. The value of this study therefore lies in its unique approach to understanding nuclear-disaster response and public communication about healthcare impacts on children associated with increased radiation exposure, using structured topic modeling in non-English newspaper sources. This served as one example of multi-language analysis to explore how we can assess and ultimately strengthen nuclear-disaster communication, especially for pediatric care and thyroid disease, depending on differing cultural contexts, community perceptions, and media interpretations. As most research on nuclear disaster communication is conducted within a single language, findings about framing cannot readily be distinguished from features of the language, media system, or period in which they were observed. Cross-language comparison can supply the contrast case needed to make that distinction, and the differences it reveals matter as the co-expertise process requires that affected populations have access to information connecting the hazard to available protective action. Cross-language comparison is not only feasible but useful for identifying overlapping themes and meaningful differences in how nuclear risks are reported. The variation between the Russian and Japanese newspapers suggests that reporting practices, risk framing, and pediatric health narratives have evolved over time, and that learning from past disasters remains critical for improving future responses for pediatric health.

Future studies should extend the analysis to more local outlets serving across different regions and affected populations. For example, for Chernobyl, Ukrainian- and Belarusian-language regional press would test whether the patterns identified here are an artifact of the Soviet Union's Russian-language press rather than a feature of reporting within the most affected regions, subject to the constraints of archive digitization. As media plays a central role in shaping public understanding, disaster communication, and health-risk narratives for children and thyroid disease, continuing to analyze and compare global media coverage is essential. If another nuclear disaster occurs, clearer communication and better-prepared response strategies will be necessary to protect potentially exposed children and support more effective public-health action, which can only happen if lessons are learned from previous communication gaps and disaster responses.

Supplementary Materials

The additional data and information can be downloaded at: <https://media.sciltp.com/articles/others/2609091439381932/JHRR-26060195-SI.pdf>.

Author Contributions

D.L.: conceptualization, methodology, data analysis, validation, visualization, writing—original draft preparation, reviewing and editing; Y.N.: conceptualization, methodology, validation, data analysis, visualization, writing—reviewing and editing; H.S.: data analysis, writing—reviewing and editing; A.G.: conceptualization, methodology, supervision, writing—reviewing and editing. All authors have read and agreed to the published version of the manuscript.

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Not applicable.

Informed Consent Statement

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Data Availability Statement

The datasets generated during this study are available from the corresponding author upon reasonable request. Access to the original newspaper articles may be subject to database licensing restrictions from East View Information Services (Pravda) and Yomidas: Yomiuri Database Service (Yomiuri Shimbun).

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Conflicts of Interest

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Use of AI and AI-Assisted Technologies

During the preparation of this work, the authors used Open AI Chat-GPT 5.6 to English proofreading and editing. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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