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PFAS IN NEWS MEDIA: A QUANTITATIVE AND QUALITATIVE ANALYSIS

by

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ABSTRACT

News media analysis allows for a greater understanding of mainstream public concerns throughout time. The history of US news articles covering per- and polyfluoroalkyl substances (PFAS), a class of chemicals posing increasing threats to public health and the environment, demonstrates Americans' awareness and perceptions of these chemicals over time. Based on the quantitative and qualitative analyses of PFAS-related national news articles in 2012-2022, this study discusses media representations and public perceptions of PFAS during the stated period. Results indicate an over 5700% increase in PFAS-related news articles over the 10-year timespan. Further, thematic analysis reveals that PFAS-related news articles are generally framed via three main themes: public health concerns, critique of government/industry, and environmental concerns. Overall, this study illustrates a substantial increase in PFAS-related news media alongside rising public interest and concern over time. Government agencies and other regulatory bodies can use news media analyses like this one to inform policy decision-making and public outreach efforts.

I. Introduction

Per- and polyfluoroalkyl substances (PFAS), colloquially referred to as “forever chemicals,” are a class of highly stable carbon-fluorine compounds known for their stubborn persistence and limited capacity to break down in the environment (DeLuca et al., 2021; ITRC, 2022; Tansel, 2022; Rapazzo et al., 2017; US EPA, 2022; Zodrow et al., 2022). The properties of PFAS impart strength, durability, chemical resistance, and electrical insulation to products (Tansel, 2022). These applications lengthen a product’s lifespan, improve fire safety, impart grease and stick-proof qualities, and increase the speed of electronic transmissions. As a result, PFAS are currently and have historically been implemented in the manufacturing of countless commercial and industrial products including nonstick cookware, fast food containers, electronics, firefighting foam, medical devices, rubber and plastics, and other stain- and grease-proof consumer products (ITRC, 2022; Tansel, 2022; Rapazzo et al., 2017). Since their first introduction in commercial products in the early 1950s, PFAS chemicals have been steadily accumulating in air, water, and soils across the globe (Tansel, 2022; Rapazzo et al., 2017; Temkin, 2019). These chemicals are, in fact, so ubiquitous that they have been found in the blood serum of 99% of Americans for decades (Ding et al., 2022; ITRC, 2022; Shauffler, 2022; Tansel, 2022; Temkin, 2019; Winters, 2022).

As a result of their widespread and enduring nature, PFAS exposure pathways are numerous. The two primary human exposure pathways occur through diet and drinking water (DeLuca et al., 2021; Tansel, 2022). In fact, a recent 2022 study found that over 200 million Americans are likely drinking PFAS-contaminated water (Amarelo, 2022). However, a number of PFAS exposures can also be linked to dust inhalation, dermal contact with consumer products, and indirect ingestion from food packaging (DeLuca et al., 2021; ITRC, 2022; Shauffler, 2022).

Currently, over 47,000 PFAS compounds may be present in the global market, but only a small number of them have been tested for toxicity (ITRC, 2022). Each of these compounds may vary in toxicity and thereby pose different effects upon exposure. Of the PFAS compounds that have been studied, various negative health effects are known to exist. Summarized by the Interstate Technology and Regulatory Council (ITRC), numerous human studies to date have demonstrated possible links between PFAS exposure and harmful effects to the immune, endocrine, reproductive, developmental, and cardiovascular systems (ITRC, 2022). For example, PFAS exposure has been linked to low birth weight, increased cholesterol, kidney and testicular cancer, suppressed immune response in children, among other adverse outcomes (DeLuca et al., 2021; ITRC, 2022; Liu et al., 2018; Rapazzo et al., 2017; Temkin, 2019; Temkin et al., 2020; Zodrow et al., 2022). Furthermore, recent research by Ding et al. (2022) has identified a strong connection between PFAS exposure and high blood-pressure. In their 18-year study published in 2022, the authors found in their group of over 1,000 middle-aged women that those who developed high blood pressure were more likely to have had higher blood PFAS concentrations at the start of the study (Ding et al., 2022). As a result of findings like these, in 2022, the EPA released health advisories for four PFAS substances due to numerous human study findings indicating associations between PFOA and/or PFOS exposure and “effects on the immune system, the cardiovascular system, human development (e.g., decreased birth weight), and cancer” (Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances, 2022).

Although evidence demonstrates that PFAS chemicals are likely carcinogenic to humans, the EPA has yet to release any cancer risk concentration limits for drinking water. Further, no federal standards or screening levels exist for evaluating PFAS in air, soil, surface water and groundwater. In 2021, the EPA released a timeline titled “PFAS Roadmap” which includes self-induced deadlines to set drinking water standards, wastewater treatment guidelines, and health evaluations for certain PFAS chemicals (EPA, 2022). According to a fact sheet released by the EPA, current gaps in understanding PFAS include “how to better and more efficiently detect and measure PFAS in our air, water, soil, and fish and wildlife; how much people are exposed to PFAS; how harmful PFAS are to people and the environment; how to remove PFAS from drinking water [and] how to manage and dispose of PFAS” (U.S. EPA, PFAS Explained, 2022). Because these chemicals are so stable and persistent, many common treatment technologies are ineffective and lack evidence of being protective of human and environmental health (ITRC, 2022). Other experimental techniques to treat PFAS are currently only in the development stage (McCracken, 2022). Over the course of 2023, the EPA plans on proposing a national drinking water standard for PFOA and PFOS, taking final action on the proposed CERCLA designations, improving chemical and safety data, monitoring and restricting PFAS discharge at their source, completing PFAS risk, and continuing communication efforts to communities regarding local PFAS contamination and risks (EPA, 2022). Overall, despite evidence from human studies pointing to numerous negative health effects from PFAS exposure, US regulatory agencies like the EPA currently lack sufficient precautionary action.

My research aims to synthesize a broader understanding of the history of public awareness, interest, and concern over PFAS using news media analytics. National news coverage provides a lens to better understand media representations and public perceptions of PFAS-related risks and regulations. Regulatory agencies like the EPA can utilize media analyses of PFAS news coverage to gauge Americans’ primary concerns and take necessary policy actions with awareness of the popular support in mind.

II. Methods

Data Collection

My research methods include a combination of quantitative and qualitative analysis, focusing on American news coverage of PFAS over the course of a 10-year period. My focus rests on the period between 2012-2022 since the majority of PFAS-related interest and research has transpired throughout this 10-year timespan. I queried LexisNexis Academic, an online database of global news records, to gather all published news articles about PFAS. I retrieved all PFAS-related articles within the stated period of time using the all-encompassing keyword “PFAS.”

Quantitative Analysis

Within LexisNexis, I identified the total number of PFAS news articles in America from each year in the period 2012-2022 using the search term “PFAS”. While the class of chemicals broadly known as PFAS can fall under a litany of names (PFOA, PFOS, GenX, etc.), the overarching term ‘PFAS’ is most commonly used to refer to the entire suite of per- and polyfluoroalkyl substances both in media representations as well as in academic literature. Search results were then narrowed by the following parameters: publication type= newspapers, location= United States, language= English, group duplicates= on. Under these restrictions, I retrieved the total number of articles per year from 2012-2022 and plotted these data on a line chart to assess trends over time. The same data were used to calculate total percent increase in PFAS news media over the 10-year period (Figure 1).

$$C = \left(\frac{X_2 - X_1}{X_1} \right) * 100$$

C = % increase
X₁ = initial value
X₂ = final value

Figure 1. Percent increase equation.

Qualitative Analysis

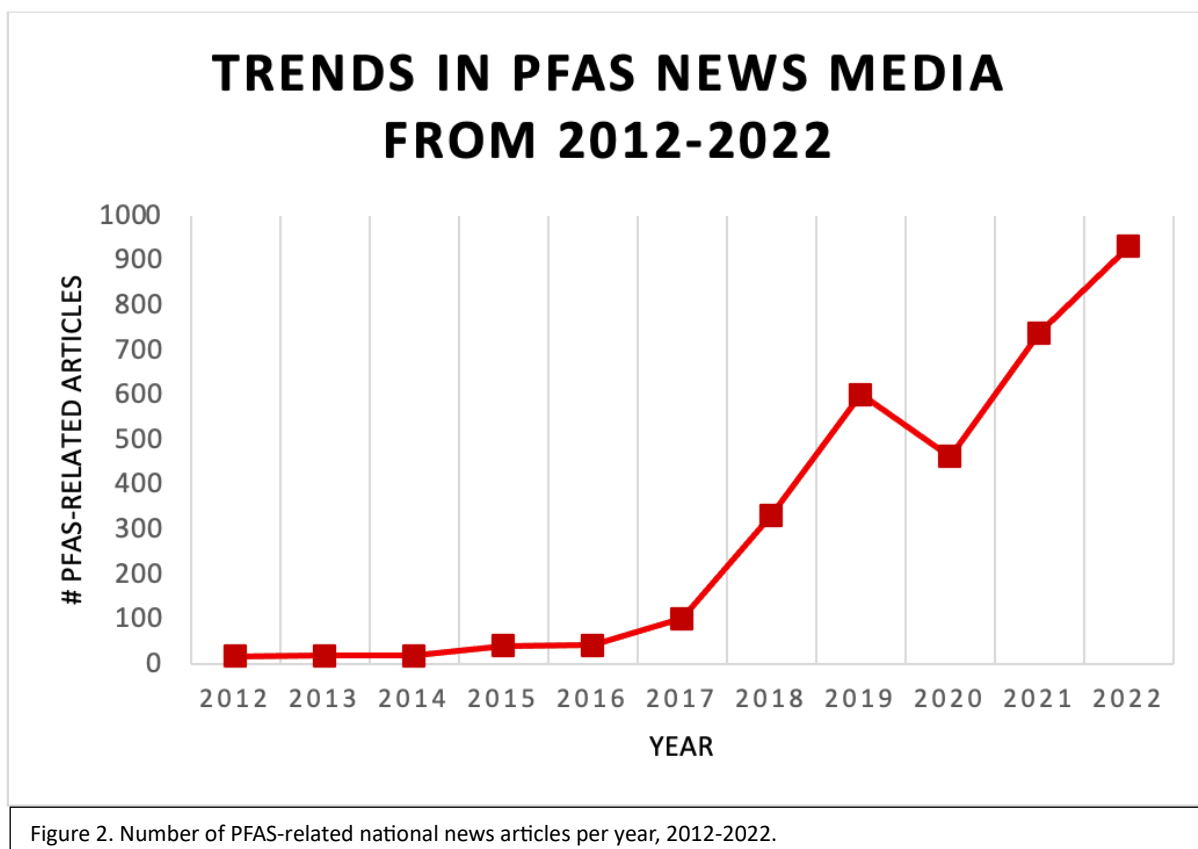
Working with the resulting articles from my original refined search, I continued to narrow results by the following parameter: sources= New York Times and USA Today. Results were narrowed to two leading high-quality newspapers for final analysis given the difficulty of assessing the vast number of articles retrieved from the unrefined search. The daily national newspapers New York Times (NYT) and USA Today were selected to serve as case studies for the current state of news across the country. Founded in 1851 and widely respected for their journalistic integrity, the New York Times remains one of the most popular news media outlets not only in the United States, but across the globe (“New York Times,” 2019). Second, USA Today, launched in 1982 as the first national daily general-interest news outlet, remains one of the most widely circulated and influential news outlets in the United States (Britannica, The Editors of Encyclopaedia, 2022). All news articles falling within these stated parameters were downloaded in full form and formatted into a single pdf file with text recognition capabilities turned on. The single file was uploaded to an online keyword analytics software (DataBasic.io) which analyzes document text and extrapolates the most common words and phrases, ignoring case and stop-words such as ‘and’, ‘if’, ‘like’, ‘but’, ‘that’, etc. The extrapolated results were converted into a csv file for further text analysis. To complete thematic analysis, the top 25 most common relevant words and phrases were selected and categorized into three representative themes. Theme categorization was based upon word relevancy and association. For example,

words like “cancer,” “toxic,” and “health” were grouped into the same category based on their association with personal health concerns.

III. Results

Quantitative Analysis

During the period 2012-2022, a total of 3,605 news articles about PFAS were published in the United States. Over this period, the number of articles published annually increased each year, representing a total increase of over 5,700% over the ten-year period (Figure 2). The only dip in coverage occurred over the year 2020, which was the first year of the global COVID-19 pandemic.



Qualitative Analysis

The NYT and USA Today published 79 articles about PFAS from 2010-2022. Top words and phrases from these articles include “chemicals,” “health,” “climate change,” “cancer,” “EPA,” and “drinking water.” The main subjects emerging from these and other keywords can be represented by the following themes: public health concerns, critique of government/industry, and environmental concerns.

Turning to the public health dimension first, this theme was prevalent in 25.6% of the 79 NYT and USA Today articles about PFAS. The public health concern theme describes the various health effects of exposure to PFAS chemicals, as well as their prevalence within drinking water, the home, and various high-contact surfaces. For example, the keywords ‘health,’ ‘cancer,’ and ‘toxic’ were mentioned in 3.5%, 1.6%, and 1.6% of articles, respectively.

Focusing next on the critique of government and industry, 19.7% of articles fall within this theme, which can be defined by keywords such as ‘DuPont,’ ‘Chemours,’ ‘EPA,’ ‘president,’ ‘officials,’ and others. Chemours, for example, is a chemical company, formally under the name DuPont, responsible for creating and profiting off of the production of a suite of PFAS chemicals for decades (Sessoms, 2022). The words DuPont and Chemours were mentioned in 4.0% of the 79 PFAS-related news articles. Similarly, the US Environmental Protection Agency (EPA), responsible for protecting American citizens and the environment from significant health risks, sponsoring and conducting scientific research, and developing and enforcing environmental regulations, was mentioned in 3.3% of articles (U.S. EPA, 2022). The keywords ‘president,’ ‘officials’ and ‘military’ were mentioned in 1.5%, 1.4% and 1.4% of articles, respectively. Each of these keywords allude to figures of authority who are either responsible for the use and contamination of PFAS, or the enforcement of laws and regulations to protect people from them. The majority of articles within this category were written through a critical lens, urging private companies and government actors to better protect citizens from PFAS exposure.

Finally, turning to the theme of environmental concerns, 16.2% of the 79 NYT and USA Today articles fall into this category, indicated by keywords such as ‘environmental,’ ‘climate change,’ ‘recycling,’ and ‘soil.’ Specifically, ‘environmental’ was introduced in 3.3% of the 79 news articles, alongside ‘climate’ which was mentioned in 2.8% of the articles. This theme represents both the known and suspected impacts that PFAS pose on all aspects of the environment, from soil and groundwater contamination to furthering the effects of climate change.

IV. Discussion

National news coverage provides a lens to better understand public interest and perceptions of current issues. Through the analysis of the total number of American news articles about PFAS published each year over the course of a 10-year period, my results reveal that PFAS news coverage has increased by over 5700% from 2012 to 2022. Aside from a slight dip in articles in 2020, likely due to the introduction of the COVID-19 pandemic and its subsequent takeover of global news media coverage, the number of PFAS-related articles continues to increase over the 10-year period. This exponential rise in frequency and visibility of PFAS news articles across local and national news platforms suggest an increasing public interest in PFAS-related information. Several different themes and points of view are expressed within these news articles, so understanding which themes are used most frequently and thereby viewed by the public most frequently, can help provide insight into public understanding and perception of PFAS-related information.

Public Health Concerns

My analysis revealed that many news articles described PFAS as an emerging and increasingly worrisome public health concern. As the number of people exposed to PFAS news media and affected by PFAS contamination grows, there is an intensified sense of urgency to understand the potential health effects associated with PFAS exposure. This urgency is illustrated via the public health concern theme identified through my research. As the most common theme throughout the 79 New York Times and USA Today articles about PFAS, my findings confirm that news media is a well-established pathway used to disseminate information about public health. Many of the articles discuss the prevalence of PFAS in the household, wherein everyday people are exposed to these chemicals daily through a litany of sources. Articles concerning public health risks also discuss PFAS links to cancer and other diseases, amplifying the public's fear of exposure.

The pervasiveness of the public health concern theme across news media indicates a widespread fear surrounding the potential effects of PFAS exposure. News media outlets are responsible for disseminating PFAS-related health information to the public as a means of promoting awareness and caution when it comes to PFAS chemical exposure.

Critique of Government/Industry

The American public, in part due to increasing news coverage of the health effects related to PFAS exposure, is showing a growing interest in understanding the role that major corporations and government agencies play in preventing PFAS exposure, cleaning up contamination, and generating new scientific discoveries. My findings indicate a need for clarification on who is leading this charge to protect the public from PFAS. Given the prevalence of the critique of government/industry theme within major national news media outlets, government agencies and other corporations have an opportunity to combat public distrust by distributing clear and accurate information about the state of current PFAS knowledge, as well as their role in protecting the public and preventing PFAS contamination. Chemical companies and major polluters such as Chemours and the U.S. military can also use the results from this news media analysis as an opportunity to listen to public discourse and respond by improving their policies to better reflect American citizens' concerns surrounding PFAS chemical production and contamination.

Environmental Concerns

My results indicate that many of the PFAS-related NYT and USA Today articles within the 10-year period have focused on the threats these chemicals pose to the environment. The articles falling under the environmental concerns theme focused on PFAS and climate change, their long persistence in the environment, their potential contamination in soil and water, and bioaccumulation effects in fish and other wildlife. Given the environmental concerns theme is the third-most prevalent theme presented in these articles, my results suggest that the public's concern surrounding personal health trumps their fears surrounding environmental impacts. Government agencies and other private companies who specialize in PFAS production or clean-up can use this information to not only understand but respond to public concerns in order of

significance. For example, tackling public concerns about PFAS and health prior to addressing concerns about the environment might be more impactful to those Americans concerned about PFAS. Any government-issued response to preventing PFAS production and contamination will benefit both humans and the environment, so understanding which angle to approach the situation from may help regulatory agencies gain a greater level of the public's trust.

V. Conclusion

Overall, my analyses have revealed that PFAS news coverage is most often written through lenses that touch on public fear. Whether these fears concern personal health, government and industry negligence, or the condition of the global environment, PFAS-related news over the 10-year period from 2012-2022 has spoken directly to them. Revealing these three main themes under which PFAS news falls, my findings illuminate the public's overall perceptions of PFAS-associated risks and regulations.

Similarly, in a study of PFAS-related activity across several social media platforms, Hao et al. (2022) found that PFAS-related social media posts increased by 670% from 2017 to 2019, indicating a substantial increase in social media users' interest in and awareness of PFAS chemicals. The authors justify their work by explaining that understanding Americans' engagement with PFAS information across social media can inform government action in preventing and addressing misinformation, responding to new PFAS-related incidents, and developing communication and outreach efforts. Likewise, understanding the main thematic trends in PFAS-related national news articles can enlighten government authorities about the state of current PFAS knowledge across America. Given that the presence of PFAS news media is continuing to increase with no plateau in sight, the U.S. government can assume that public concern regarding PFAS chemicals is at its highest level in history. With such prominent rates of concern, government agencies have a responsibility to use these data to inform their public education and outreach efforts, create PFAS prevention initiatives, and actively respond to PFAS incidents and crises.

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Appendix A.

