Asian Journal of Agricultural Extension, Economics & Sociology

Volume 42, Issue 3, Page 127-133, 2024; Article no.AJAEES.113015
ISSN: 2320-7027

Assessing the Public Perceptions of Media Coverage for Pesticides Use in the Agriculture Sector of India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2024/v42i32385

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/113015

Original Research Article

Received: 22/12/2023
Accepted: 27/02/2024
Published: 01/03/2024

ABSTRACT

Present research employs a survey method to explore the intricate relationship between media exposures and public perceptions of pesticide use in agriculture. A well-structured Google questionnaire was shared for data collection from the participants belonging to the northern district of Haryana, encompassing Panchkula, Ambala, Yamunanagar, Kurukshetra, Kaithal, and Karnal. A total 350 respondents participated in the online survey. The study reveals that the respondents who perceive media coverage as balanced are more likely to express concerns about pesticide use. The study tries to find out the degree of concern, trust, accuracy, and statistical significance. In terms of the perception influenced by media portrayals on pesticide use, a significant association is observed (Chi-square = 41.029, $p < 0.0001$). The analysis of media sources accuracy reveals a statistically significant association (Chi-square = 58.156, $p < 0.0001$). Respondents who perceived media sources as "Very accurate" reported higher levels of concern about pesticide use in

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agricultural practices, emphasizing the impact of perceived media accuracy on public concerns about pesticide use. The study found a strong link between media influence and the level of concern regarding pesticide use.

Keywords: Public perception; media coverage; pesticides; agriculture.

1. INTRODUCTION

Pesticides including insecticides, herbicides, and fungicides, play a crucial role in safeguarding crops from pests and diseases [1]. The usage of pesticides has increased manifold since 1960s worldwide [2]. While pesticides have contributed to enhanced economic potential by increasing food and fibre production, their drawbacks have led to severe health implications for humans and the environment (Logesh Mohan kumar et al., 2023). Recognizing these detrimental impacts, there is a growing momentum to advocate for pesticide-free farming practices. Pesticide-free farming emphasizes sustainable and organic approaches, aiming to minimize the use of harmful chemicals and promote environmentally conscious agricultural practices [3]. Increasingly, individuals are demanding greater transparency and detailed information about the entire food supply chain, from production to distribution and consumption [4]. Media platforms play a crucial role in fulfilling this demand by disseminating information, conducting investigative reporting, and fostering public awareness about food production, distribution, and consumption. Media can shape public opinion, influence decision-making, and mould societal perceptions on a wide range of issues [5]. One such critical issue is the use of pesticides in agriculture, an area where science, environment, health, and economics intersect in complex ways. The perception of pesticides and their impact on agriculture is significantly shaped by the media, playing a pivotal role in framing public understanding and discourse surrounding their use (Tambo J. A., et al, 2023). Pesticides have been an integral part of modern agriculture, aiding in the protection of crops from pests, diseases, and other threats that can reduce yields and compromise food security [6]. While these chemical interventions have undoubtedly increased agricultural productivity, they have also sparked debates over their environmental and health consequences. The media, through its role as an intermediary between scientific research, policy decisions, and the general public, becomes a crucial factor in shaping how individuals perceive the benefits and risks associated with pesticide use in agriculture (Tambo J. A., et al, 2023). The complexities inherent in the communication of risks linked to pesticide use in agriculture are multifaceted. Bridging the gap between scientific knowledge and how the public perceives information is a challenging task, especially with the media sharing information about pesticides. The framing of pesticide-related issues, the balance between benefits and risks, the portrayal of scientific consensus, and the implications of media-driven narratives all contribute to the intricate dynamics of risk communication [7,8].

This study unravels the intricate fabric of media exposures and their impact on the public's understanding of the complex landscape of pesticide use in agriculture. By scrutinizing media portrayals, assessing their influence, and examining the challenges inherent in risk communication, this research aims to contribute to a more informed and nuanced discourse that transcends dichotomies and fosters a holistic understanding of pesticide-related risks in the agricultural domain [9]. The objectives of the study are to ascertain the association of concern on pesticide use with perception of media influence/trust/accuracy level and to determine the concern of respondents about pesticide use in agriculture practices in relation to balance factor/media report elements/denying pesticides practices [10].

2. MATERIALS AND METHODS

An online survey was conducted using a self-administered questionnaire, which included questions associated with pesticide use in agriculture practices and the role of media exposure syncing with the risk and health issues. The questionnaire was prepared using Google forms to get the responses based on a five-point Likert scale. A total of 350 respondents from northern districts of Haryana i.e. Panchkula, Yamunanagar, Ambala, Kurukshetra, Kaithal and Karnal were selected randomly. Collected data entry was made into SPSS software (IBM SPSS Statistics 21) for analysis. Variables with frequency and percentage were obtained through cross-tab analysis. Chi-Square test was applied

and results were analysed based on p-value for statistical significance [11,12].

3. RESULTS OF THE STUDY

The findings and results of the study are discussed in this section. It shows the demographic profile of respondents i.e. Gender, Age, Education, Occupation and Residential Area with cross-sectional analysis between Concern on pesticide use in agriculture practices*Perception influence/Trust on Media coverage/Media Accuracy level and Concern on pesticide use in agriculture practices*Balance factor/Media report elements/Denying pesticides practices. The results are discussed as below:

The table (Table1) provides a comprehensive overview of the demographic characteristics of 350 respondents, categorized by gender, age, education, and occupation. In terms of gender distribution, the majority of respondents were male, constituting 68% of the total, while females made up the remaining 32%. Regarding age groups, the largest proportion fallen within the 20-30 years category, accounting for 43.7%, followed by the 31-40 years group at 29.4%. The distribution of educational attainment revealed that the highest percentage of respondents were graduates (40.3%), followed by post-graduates (32%). A smaller percentage holds PhD degrees (8.6%), and a few respondents have completed their education up to the metric level (5.1%) and intermediate (14%). In terms of occupation, the respondents were divided into business owners (27.4%), those in government sector jobs (34.3%), private sector employees (19.4%), and students (18.9%). The table outlines the residential distribution of 350 respondents based on the distinction between urban and rural areas. Among the surveyed population, the majority resides in urban areas, comprising 67.4% of the total. In contrast, 32.6% of the respondents lived in rural areas. The table serves as a valuable tool for understanding the diverse demographic composition of the surveyed population, providing insights into gender balance, age distribution, educational backgrounds, occupational profiles and residential area [13].

Table 2 provides the perceived reliability of various media sources for agricultural information. Social media emerges as the most frequently cited source, representing 58% of the

Table 1. Demographic profile of respondents

	Variable(s)	Frequency	Percent (%)
Gender	Male	238	68
	Female	112	32
	Total	350	100
Age	20-30 years	153	43.7
	31-40 years	103	29.4
	41-50 years	66	18.9
	More than 50 years	28	8
	Total	350	100
Education	Metric	18	5.1
	Intermediate	49	14
	Graduate	141	40.3
	Post Graduate	112	32
	PhD	30	8.6
	Total	350	100
Occupation	Business owner	96	27.4
	Public sector job	120	34.3
	Private sector job	68	19.4
	Student	66	18.9
	Total	350	100
Locality	Urban	236	67.4
	Rural	114	32.6
	Total	350	100

respondents. This underscores the increasing influence and popularity of social media platforms in disseminating agricultural information. Followed by newspapers which account for 57.71%, signifying the enduring role of traditional print media in agricultural communication. Farm magazines/journals, news portals, and TV news maintain substantial percentages, with 34.86%, 31.43%, and 25.71%, respectively, highlighting the diversified sources through which individuals seek agricultural information. Radio and other unspecified sources account for 23.71% and 6.29%, respectively. The data suggest a multifaceted media landscape for agricultural information, with social media and traditional outlets playing significant roles in shaping perceptions and disseminating knowledge.

Table 3 presents the survey responses regarding the perceived reliability of information sources. The majority of the respondents (82.57 %) considered agricultural scientists as a reliable source for understanding the risks and benefits associated with pesticides use in agriculture whereas, 41.43 % of the respondents have trust in farm magazines followed by information provided by government agencies and departments which accounts for 30.86% indicating a significant reliance on govt. A significant portion of respondents (38%), representing nearly two-fifths. While a noteworthy proportion (18%) of respondents acknowledged media outlets as a source of information, it is the least endorsed perspective among the options provided.

Table 4 presents data on respondents' concerns about pesticide use in agricultural practices, along with their perception of media influence, trust in media coverage, and media accuracy levels. The table employs a scale to measure the degree of concern, trust, and accuracy, and statistical significance is assessed through the chi-square test. In terms of the perception influenced by media portrayals on pesticide use, a significant association is observed (Chi-square = 41.029, $p < 0.0001$). Respondents who indicated being "Very Concerned" largely correlated with a high influence from media portrayals, while those who were "Not at all concerned" had minimal media influence. This suggests a strong link between media influence and the level of concern regarding pesticide use. Similarly, the respondents' trust in media coverage on the topic is statistically significant (Chi-square = 25.994, $p = 0.001$). Those with "Complete trust" tended to express higher levels of concern compared to those with "No trust at all." This underscores the influence of trust in shaping concerns related to pesticide use in agriculture. The analysis of media sources' accuracy also reveals a statistically significant association (Chi-square = 58.156, $p < 0.0001$). Respondents who perceived media sources as "Very accurately" reporting on the issue demonstrated higher levels of concern, emphasizing the impact of perceived media accuracy on public concerns about pesticide use. These findings contribute valuable information for understanding public perceptions and attitudes shaped by media portrayals in the context of agricultural practices and pesticide use.

Table 2. Differential media reliability for agricultural information

Media	Frequency	Percentage (%)
Social Media	203	58
Newspapers	202	57.71
Farm Magazines/Journals	122	34.86
News Portals	110	31.43
TV News	90	25.71
Radio	83	23.71
Other	22	6.29

Table 3. Information sources reliability pattern for understanding the risks and benefits

Information Source	Frequency	Percentage (%)
Agriculture scientists	289	82.57
Government agencies/Departments	108	30.86
Farm Magazines	145	41.43
Media outlets	63	18
Any other	21	6

Table 4. Differential association of concern on pesticide use with perception of media influence/trust/accuracy level

	Scale	Concern Level (%)			Chi-square	p-value
		Very Concerned	Concerned	Neutral		
Perception influenced by media portrayals	A great deal	35.2	13	10	41.029	.0001
	Quite a bit	23.5	47.3	30		
	Somewhat	17.9	23.7	27.5		
	Very little	19.6	13.7	22.5		
	Not at all	3.9	2.3	10		
	Total	100	100.0	100.0		
Trust on media coverage	Complete trust	4.5	5.3	10	25.994	.001
	High trust	37.4	30.5	30		
	Neutral	33	51.9	27.5		
	Low trust	21.2	12.2	22.5		
	No trust at all	3.9	0	10		
	Total	100.0	100.0	100.0		
Media sources accuracy	Very accurate	25.7	7.6	0	58.156	.0001
	Somewhat accurate	26.8	40.5	20		
	Neutral	25.1	16.8	52.5		
	Not very accurate	20.7	32.8	17.5		
	Not accurate at all	1.7	2.3	10		
	Total	100.0	100.0	100.0		

Table 5. Concern pattern on pesticide use in agriculture practices in relation with balance factor/media report elements/denying pesticides practices

	Scale	Concern level (%)			*Chi-square*	*p-value*
		Very Concerned	Concerned	Neutral		
Balanced factor of media coverage.	Always	17.3	3.1	0	61.116	.0001
	Most of the time	20.1	38.2	32.5		
	Neutral	31.8	17.6	40		
	No rarely	19.6	38.2	10		
	Never	11.2	3.1	17.5		
	Total	100.0	100.0	100.0		
Media reports should consist risk and benefits of pesticides use	Always	65.4	58.8	37.5	21.981	.0001
	To some extent	25.7	31.3	62.5		
	No, it is not Necessary	8.9	9.9	0		
	Total	100.0	100.0	100.0		
Support for agriculture practices without pesticides.	Yes	88.3	91.6	65	66.070	.0001
	No	0	0	20		
	Not sure	11.7	8.4	15		
	Total	100.0	100.0	100.0		

Table 5 provides insights into respondents' concerns about pesticide use in agriculture by examining factors such as the balance of media coverage, the inclusion of risks and benefits in media reports, and support for agricultural practices without pesticides. The table employs a scale to measure concern levels, and statistical significance is assessed through the chi-square test. Concerns regarding the balance of media coverage on pesticide use show a statistically significant relationship (Chi-square = 61.116, $p < 0.0001$). Respondents who felt media coverage

was balanced, especially those who indicated "Yes, always" or "Yes, most of the time," demonstrated higher levels of concern compared to those who perceived media coverage as biased or neutral. This suggests that respondents who perceive media coverage as balanced are more likely to express concerns about pesticide use. The inclusion of risk and benefits in media reports on pesticides is also statistically significant (Chi-square = 21.981, $p < 0.0001$). Respondents who believed that media reports should always include both the risks and benefits of pesticide use exhibited higher levels of concern. This emphasizes the importance of comprehensive media coverage in shaping public concerns about agricultural practices involving pesticides.

Furthermore, respondents' support for agricultural practices without pesticides is highly significant (Chi-square = 66.070, $p < 0.0001$). Those who expressed support for pesticide-free agriculture showed markedly higher levels of concern, underlining a strong association between support for pesticide-free practices and increased concern about the use of pesticides in agriculture. The study findings contribute to understanding the nuanced perspectives and influences that shape public concerns regarding pesticide use in agriculture.

4. DISCUSSION AND CONCLUSION

The study provides valuable insights into the multifaceted dynamics of public perceptions and concerns regarding pesticide use in agriculture in the form of significant associations which emphasize the responsibility of media outlets in shaping public awareness and concern on critical issues. The findings also portray the importance of balanced media coverage that includes both risks and benefits in influencing public opinion. Additionally, the strong link between support for pesticide-free agriculture and increased concern about pesticide use suggests a growing awareness and preference for sustainable and eco-friendly agricultural practices among the public. Media professionals should strive for accuracy, balance, and comprehensiveness in their coverage of agricultural practices to foster informed public discourse. Furthermore, stakeholders in agriculture should recognize the public preference for sustainable practices and work aligned with these expectations.

In summary, the study contributes to the understanding of the complex interplay between demographics, media influence, and public concerns about pesticide use, paving the way for informed decision-making and communication strategies in the realm of agricultural practices.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/113015