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Media as a Tool for Climate Change Adaptation: A Study of Radio's Role in Gaya District

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Abstract

This research delves into the use of radio as a means of climate change adaptation in the Gaya District of Bihar, India. Since climate change greatly threatens vulnerable populations, appropriate communication and education are vital in building resilience and enabling informed choices. Radio, being easily accessible and its wide coverage, is a vital platform for providing climate-related information, especially in areas where the use of digital technologies is not readily available. This study examines the demographic factors, media viewing habits, and attitudes to climate change among Gaya District inhabitants. Using a quantitative survey data analysis, the study finds that respondents have a high level of awareness of climate change, especially those who habitually listen to radio shows. There is a significant linkage between exposure to information on climate change and behavioral and practice changes towards climate adaptation, according to the findings. Moreover, the research also underscores the significance of specialized radio content which is addressing specific concerns and needs of various segments of society with a focus on the ability of radio to empower communities and influence collective action in relation to climate adversity. Finally, this study highlights the importance of radio as a viable learning tool for climate change adaptation, with useful implications for policymakers, media practitioners, and community organizations in their effort to promote climate resilience in the Gaya District and other areas of the same classification.

***Keywords*:** Awareness, Climate Change Adaptation, Community Resilience, Radio, Media Communication.

Introduction

Climate change remains one of the most significant global challenges of our time, threatening ecosystems, human health, and the socio-economic situation. Climate change effects have become increasingly visible in recent years, particularly in developing regions, where environmental hazards leave global vulnerability at its most profound and identifiable state. The Gaya District of the Indian state of Bihar, faces a multitude of climate fits, including erratic rainfall patterns, increase in extreme weather events, and increase in temperature.

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These unprecedented effects of climate change require adaptations which will prove effective at mitigating risks and increasing community resilience (Singh et al., 2014; Government of Bihar & United Nations Development Programme, 2015). As the impacts of climate change intensify, there is a growing understanding of the role media can play in educating and informing communities about climate issues and adaptation options. With more media options available, radio serves as a platform for communicating information, engaging in discussion, and raising awareness about issues relevant to climate change with the biggest advantage of being available or accessibly in regions with little or no access to digital devices while having the broadest reach across media (Michael Rubinstein, n.d.) (Ahsan & Khatun, 2020). Its capacity to engage diverse audiences, including those in remote and rural locales, makes it a powerful medium for facilitating climate change adaptation. This paper sets out to examine the role of radio as a climate change adaptation tool in the Gaya District, especially looking into how media coverage affects the public's perceptions, awareness, and behavioural change regarding climate change issues. By investigating the relationships among media consumption, levels of education, and awareness of climate change, this study aims to provide a preliminary understanding of the potential role of radio as an educational tool for climate adaptation. Effective communication about climate change can help to motivate individuals and communities to take on sustainable behaviour and engage with alternative climate change adaptation measures. Research shows that awareness and understanding of climate change issues are vital parts of this process, however, there are also issues about how much they can rely on the knowledge provided to them. If they cannot access quality information about climate change, they cannot engage sustainably. Radio programming on climate change could, in particular, address some of the information gap for the most marginalized groups who have low formal education, or limited access to other media or internet.

In the Gaya District, rich socio-cultural diversity only amplifies the need for tailored media intervention for climate education. With a population comprised of numerous ethnic groups, and spanning a range of socioeconomic strata, it is crucial to understand how different members of the population want to receive climate-related information in order to develop tailored communication strategies that connect and engage local communities (Sahadevan & Sumangala, 2021). I am employing the potential of radio as a participatory medium, to explore how radio programs can convey climate information and motivate new adaptive behaviours. This work is timely, especially as there is a growing interest in community-based approaches to climate adaptation. As local communities gain a greater voice in climate resilience decision-making, their engagement is increasingly determined by understanding how the media can empower them individually, and foster collective action. I am investigating the role of radio in climate adaptation research in the Gaya district - this contributes to a growing body of literature that recognises the integral role of communication to address climate change and develop community resilience (Mannar, 2014).

So this study intends to provide a detailed exploration of the role of radio as a form of climate change adaptation in the Gaya District. The study seeks to analyze the impact of demographic factors, media consumption, and climate change perceptions in order to then highlight the

role of radio as an effective technical service to increase awareness, enable decision making and ultimately build resilience to the climatic impacts and consequences.

Review of Literature

Research on the role of media; especially radio, in climate change adaptation emphasizes the important and vital relationship between communication, and local, grassroots engagement. Looking at communication, Abdulai et al, (2021), identify community radio's capacity as a mechanism for reducing complex climate change information into more palatable and legible information (here). Making this communication more accessible for audiences in a rural location is clearly valuable in a district like Gaya, for example, where localized knowledge is the best way to develop adaptation responses. The participatory element of radio communication is present in Chavinda (2023), who notes the way the tool not only provides information about climate change but also involves local communities in the dialogue informally. This is strengthened by Taddicken (2013), who draw attention to the role of media in forming public perceptions of climate change, thus suggesting that clearer communication can improve public clear understanding of climate challenges. Moser (2009) provided a theory of communication relating to climate change by, providing a good and helpful picture of the historical and contemporary challenges to climate change communication. The constructs will be helpful for unpacking the unique role that radio can play in shaping narratives, and access climates that increase public reach to action. Leon et al. (2022), draw upon principles of effective social engagement using media and communication, and provide possible translations of social engagement for radio's potential use to serve diverse audience reach as a vehicle to improve social engagement. Berglez and Al-Saqaf (2020) compare social media and radio, as both can act as functions for providing information about extreme weather events. They ultimately demonstrate that radio can take similar approaches as social media so they can develop ways to engage audiences effectively during climate events. Birkmann et al (2008) provide an analysis of how extreme events and disasters can act as windows of opportunities for change, looking at media functions to activate people into action and build awareness about climate issues. This has some correspondence with an analysis by Yahaya et al (2023), study climate change adaptation work conducted by smallholder farmers in rural Ghana, and identifying the role of local communication channels as a means of passing on adaptive behaviour. Nirmala (2015) also corroborates in highlighting radio's potential as a source of empowerment for marginalized individuals such as women, by highlighting how radio in small-holder agriculture can provide access to appropriate content, climate change adaptation skills, and services conducive to their livelihoods. McComas and Shanahan (1999) argue that storytelling should be incorporated into climate change communication and provide supporting evidence that speaking in narrative, makes climate change stories more relatable and impactful when presented through radio. Over and above that, the media research (2018) on climate change examined how various forms of media, including radio, can communicate climate change issues to audiences with different positions and understandings. Additionally, Lefkowitz and Bodas (2023) examined climate change threat perception and public readiness in response to extreme weather-related events, contextualizing how the media creates public attitudes and

behaviours to adapt to climate change. Thus we can conclude that the available body of literature supports the significant role of community radio in climate change adaptation through communicative action, engagement, and empowerment. Overall, these studies support the hypotheses that radio can shape the public's understanding and actions regarding climate change can in rural contexts like Gaya District.

Objectives

1. To investigate the role of radio in raising awareness about climate change and its impacts among the residents of Gaya District.
2. To assess how radio programming influences climate change adaptation behaviors in both urban and rural areas of Gaya District.
3. To evaluate the effectiveness of radio as a medium in promoting climate adaptation strategies across different demographic groups in Gaya District.

Methodology

Research Design

This study used a descriptive survey research design to evaluate the role of radio in facilitating climate change adaptation in Gaya District. This design was suited for evaluating this type of study because it gave the researcher adequate tools in collecting descriptive information about the current behavior, attitudes, and practices in a particular population. Therefore, the researcher can collect quantifiable data in a systematic way from a large sample if needed in order to identify patterns and associations among the population and some of the key variables.

Sampling and Participants

The study involved a sample of 400 respondents, selected with care to represent urban and rural areas in Gaya District. A stratified random sampling approach was used to diversify the sample and include all sections of the Gaya District population. The population was divided into subgroups to be able to take advantage of population heterogeneity to promote diversity and direct inclusion according to age, gender, education and location/district. Once the contingents were established, we randomly selected respondents from each contingent. This stratified approach will strengthen the generalizability and representativeness of our findings.

Data Collection Method

Data collection was done with a structured (closed-ended) questionnaire, which was utilized to elicit consistent, analyzable responses. The questionnaire was distributed and administered in an electronic format through email, messaging applications, and social media. This practice was efficient and cost-effective for the researcher, especially when in-person data collection was difficult. The downside was that this data collection method presented disadvantages associated with accessibility to the electronic questionnaire.

Content of the Questionnaire

The questionnaire was divided into three main sections:

1. **Demographic Information and Media Consumption Patterns**

This part provided extensive demographic information including age, sex, education, employment, and geographic area (urban or rural). It also examined each participant's media consumption habits including frequency, time, and types of radio they listen to. It was important to know all of these details in order to identify each participant's target audience for radio communication and how other demographic groups utilize media. This information provided context for the potential of radio as a tool for communicating climate change and adaptation practice information.

2. **Awareness and Attitudes Regarding Climate Change**

This section of the research analyzed respondents' awareness levels about issues related to climate change, including knowledge of the causes and consequences, and the urgency of the issue; it also assessed respondents' attitudes, such as their levels of concern, perceived personal impact, and their willingness to accept climate-friendly policies or engaging in climate-friendly;insidious. An assessment of awareness and attitudes was important in order to understand the extent to which people are informed, and the extent to which people are cognitively ready to acknowledge and respond to climate issues.

3. **Climate Adaptation Behaviors Influenced by Radio Programming**

In this section, we assessed if and how information shared through radio affected listeners' uptake of climate changes adaptation behaviours, which include behaviours such as changing farming practices, water conservation, undertaking an early warning response, or disaster preparedness. The aim was to assess the influence of radio content on actual practices, not just awareness. This showed the potential radio holds as a mode of communication, not only in raising awareness, but also in creating action among diverse populations.

Data Analysis Techniques

Data collected were entered and analyzed in Microsoft Excel. The analysis involved descriptive statistics (frequency distributions and percentage analysis) in order to summarize the characteristics of respondents and identify significant patterns. Cross tabulations were also used to analyze the association between radio listenership and climate adaptation behaviors across demographic variables.

Ethical Considerations

All ethical protocols were adhered to. Digital informed consent was obtained from all participants. The study protected confidentiality of responses and recognized the voluntary nature of participation, including the participant's right to withdraw at any time without penalty.

Study Limitation

An important limitation was that data collection for this research was solely through online means, which may have excluded individuals with unreliable access to the internet, particularly in isolated or underprivileged rural areas. This may have affected representativeness of the sample and introduced bias to the findings.

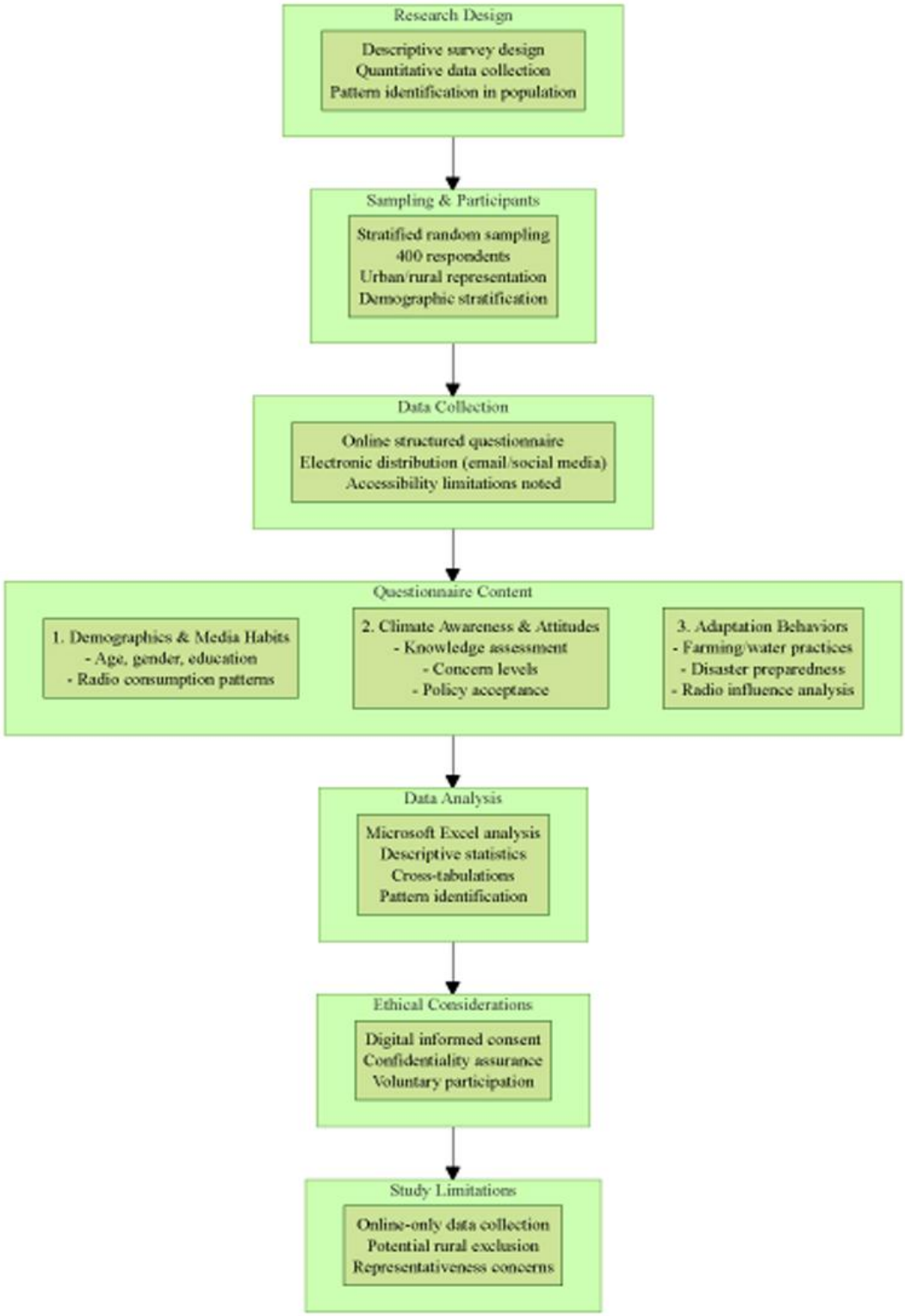

Figure 1 Flow Chart For Methodology

Findings & Discussion

Demographic Variable	Categories	Frequency	Percent
Age	18-25	150	37.5
	26-35	195	48.8
	36-45	49	12.3
	46-55	5	1.3
	56 and above	1	.3
Gender	Female	175	43.8
	Male	221	55.3
	Other	4	1.0
Education Level	Graduate	142	35.5
	Higher Secondary	27	6.8
	No formal education	3	.8
	Ph.D	5	1.3
	Postgraduate	158	39.5
	Primary school	7	1.8
	Secondary school	58	14.5
Area of Residence	Rural	146	36.5
	Urban	254	63.5

The demographic profile of respondents in this study provides valuable insights into the sample population. A majority of the participants (48.8%) fall within the age range of 26-35, followed by 37.5% in the 18-25 age group. Respondents aged 36-45 accounted for 12.3%, while a smaller percentage (1.3%) were in the 46-55 age range, and only 0.3% were aged 56 and above. Gender distribution shows a fairly balanced representation, with 55.3% of respondents identifying as male, 43.8% as female, and 1.0% identifying as other. In terms of educational qualifications, the majority of respondents had a postgraduate degree (39.5%) or were graduates (35.5%), reflecting a highly educated sample. A smaller proportion had completed secondary school (14.5%), while 6.8% had finished higher secondary education.

Those with no formal education (0.8%), a Ph.D. (1.3%), primary school (1.8%), or secondary school education constituted the remainder of the sample. The area of residence indicates that 63.5% of the respondents live in urban areas, while 36.5% reside in rural locations. This urban skew may highlight varying access to media, educational opportunities, and disaster risk reduction policies between rural and urban populations. Overall, the demographic composition reflects a diverse group of participants, which is vital for understanding the broader economic and media-related impacts on disaster risk reduction policies.

Reliability Statistics	
Cronbach's Alpha	N of Items
.807	7

The reliability statistics for the survey indicate a Cronbach's Alpha of .807 for the seven items included (Demographic distribution is not included). This value suggests a high level of internal consistency among the items, indicating that they reliably measure the same underlying construct. A Cronbach's Alpha value above .7 is generally considered acceptable, with values above .8 indicating good reliability. Thus, the results support the robustness of the scale used in this study, affirming its effectiveness in capturing respondents' perceptions related to climate change and media influence.

Age * Gender					
		Gender			Total
		Female	Male	Other	
Age	18-25	58	90	2	150
	26-35	95	98	2	195
	36-45	22	27	0	49
	46-55	0	5	0	5
	56 and above	0	1	0	1
Total		175	221	4	400

The cross-tabulation of age and gender offers a detailed view of the demographic distribution of the 400 respondents in this study. Among those aged 18-25, 58 respondents were female, 90 were male, and 2 identified as other, making this group 150 participants in total. In the 26-35 age group, the largest cohort, there were 95 females, 98 males, and 2 others, contributing to a total of 195 individuals. For the 36-45 age group, 22 respondents were female and 27 were male, with no respondents identifying as other. The 46-55 age range had only 5

participants, all male, while the 56 and above category had just one male respondent. Overall, the gender distribution across all age groups consisted of 175 females (43.8%), 221 males (55.3%), and 4 respondents identifying as other (1.0%). This distribution indicates that males were slightly more represented across most age groups, particularly in the 46-55 and 56 and above ranges. However, the gender balance in the younger age groups (18-25 and 26-35) is relatively close, reflecting a more balanced gender representation among younger participants. Understanding the interaction between age and gender is crucial for interpreting the varying perceptions and media consumption habits in relation to disaster risk reduction policies.

Education Level * Gender

		Gender			
		Female	Male	Other	Total
Education Level	Graduate	58	80	4	142
	Higher Secondary	15	12	0	27
	No formal education	0	3	0	3
	Ph.D	1	4	0	5
	Postgraduate	74	84	0	158
	Primary school	2	5	0	7
	Secondary school	25	33	0	58
Total		175	221	4	400

The cross-tabulation of gender and education level reveals that most respondents, regardless of gender, were highly educated. Among the 175 females, the majority were either graduates (58) or postgraduates (74), with smaller numbers having secondary (25) or higher secondary education (15), while 2 had primary education and 1 held a Ph.D. **None of the females had no formal education**. Similarly, the 221 male respondents were predominantly graduates (80) or postgraduates (84), with 33 having secondary education, 12 higher secondary, 5 with primary schooling, 5 holding Ph.D.s, and 3 with no formal education. **The 4 respondents identifying as "Other" were all graduates**. In total, a significant proportion of the respondents had postgraduate (39.5%) or graduate degrees (35.5%), highlighting a well-educated sample, which is crucial for understanding their perspectives on the media's role in disaster risk reduction policies.

Gender * Area of Residence				
		Area of Residence		Total
		Rural	Urban	
Gender	Female	58	117	175
	Male	88	133	221
	Other	0	4	4
Total		146	254	400

The cross-tabulation of gender and area of residence shows that a larger portion of respondents, both male and female, reside in urban areas. Among the 175 female respondents, 117 live in urban areas and 58 in rural areas. For the 221 male respondents, 133 reside in urban areas, while 88 are from rural areas. Of the 4 respondents identifying as "Other," all reside in urban areas. Overall, 63.5% of the total sample live in urban areas, while 36.5% are from rural areas, highlighting an urban skew in the respondent base, which may influence their access to media and disaster risk reduction information.

How aware are you of climate change and its impacts * Area of Residence				
		Area of Residence		Total
		Rural	Urban	
How aware are you of climate change and its impacts	Not at all aware	4	12	16
	Not very aware	45	26	71
	Somewhat aware	34	117	151
	Very aware	63	99	162
Total		146	254	400

The cross-tabulation of climate change awareness and area of residence highlights varying levels of awareness between rural and urban respondents. Among those living in rural areas, 63 are "very aware" and 34 are "somewhat aware" of climate change and its impacts. A smaller portion of rural respondents are "not very aware" (45) or "not at all aware" (4). In urban areas, 99 respondents are "very aware," and a significant number (117) are "somewhat aware." Urban areas also have fewer respondents who are "not very aware" (26) or "not at all aware" (12). Overall, urban respondents tend to show higher levels of awareness, with 216 respondents being either "somewhat aware" or "very aware," compared to 97 rural respondents in these categories. This suggests that urban residents may have greater exposure

to climate change information, potentially due to better access to education and media resources.

Education Level * Do you believe that radio plays a significant role in educating people about climate change

		Do you believe that radio plays a significant role in educating people about climate change					
		Agree	Disagree	Neutral	Strongly agree	Strongly disagree	Total
Education Level	Graduate	24	16	31	64	7	142
	Higher Secondary	11	0	10	3	3	27
	No formal education	3	0	0	0	0	3
	Ph.D	2	0	1	2	0	5
	Postgraduate	66	1	53	38	0	158
	Primary school	4	0	1	2	0	7
	Secondary school	9	1	38	7	3	58
Total		119	18	134	116	13	400

The cross-tabulation of education level and beliefs about the role of radio in educating people about climate change shows diverse opinions across different educational backgrounds. Among graduates, 64 "strongly agree" and 24 "agree" that radio plays a significant role, while 31 are "neutral," 16 "disagree," and 7 "strongly disagree." Postgraduates exhibit a similar trend, with 66 agreeing, 38 strongly agreeing, 53 neutral, and just 1 disagreeing. Respondents with secondary education are mostly neutral (38), while 9 agree, 7 strongly agree, and 3 strongly disagree. Those with higher secondary education tend to agree (11) or remain neutral (10), while smaller groups "strongly agree" (3) or "strongly disagree" (3). Among respondents with no formal education, all 3 agree, while those with Ph.D.s are divided, with 2 strongly agreeing and 2 agreeing. Overall, the majority of respondents either agree (119) or strongly agree (116) with radio's educational role, with a substantial portion remaining neutral (134), suggesting mixed perceptions of radio's impact based on education levels.

How often do you listen to the radio * Have you heard any radio programs

specifically addressing climate change issues in the last month				
		Have you heard any radio programs specifically addressing climate change issues in the last month		
		No	Yes	Total
How often do you listen to the radio	Daily	14	111	125
	Monthly	24	105	129
	Never	13	4	17
	Rarely	39	36	75
	Weekly	3	51	54
Total		93	307	400

The cross-tabulation of radio listening frequency and exposure to climate change programs on the radio in the last month reveals interesting patterns. Among those who listen to the radio daily, the vast majority (111) have heard climate change programs, while only 14 have not. Similarly, of the respondents who listen monthly, 105 have heard such programs, compared to 24 who have not. Those who rarely listen to the radio show a more balanced split, with 39 not hearing any climate change programs and 36 reporting they have. Weekly listeners also show strong exposure, with 51 having heard climate-related content, while just 3 have not. Notably, among those who never listen to the radio, only 4 have come across climate change programs, while 13 have not. Overall, 307 respondents have heard radio programs addressing climate change in the past month, indicating a strong correlation between regular radio listening and exposure to climate-related content.

changed practices about climate change * Have you heard any radio program				
		Have you heard any radio programs specifically addressing climate change issues in the last month		
		No	Yes	Total
Have you changed any of your practices based on information received from radio programs about	No	69	29	98
	Yes	24	278	302

climate change				
Total		93	307	400

The cross-tabulation between hearing climate change programs on the radio and changing practices based on this information reveals a significant relationship. Among the 307 respondents who have heard radio programs addressing climate change in the last month, a large majority (278) have changed their practices, while only 29 have not. In contrast, of the 93 respondents who did not hear any such programs, most (69) reported no changes in their practices, with only 24 indicating they had made changes. Overall, 302 respondents have adjusted their practices based on information from climate-related radio programs, suggesting that exposure to this content strongly influences behavioral change.

How effective do you think radio is in promoting climate adaptation measures in your community * Have you heard any radio programs specifically addressing climate change issues in the last month

		Have you heard any radio programs specifically addressing climate change issues in the last month		
		No	Yes	Total
How effective do you think radio is in promoting climate adaptation measures in your community	Effective	8	88	96
	Ineffective	6	11	17
	Neutral	56	78	134
	Very effective	10	124	134
	Very ineffective	13	6	19
Total		93	307	400

The cross-tabulation of perceived effectiveness of radio in promoting climate adaptation measures and exposure to climate change programs indicates a strong correlation. Among the 307 respondents who have heard climate change programs in the last month, 88 view radio as "effective," and 124 consider it "very effective." In contrast, only 8 respondents who have not heard such programs deem radio effective, with 10 rating it as "very effective." Notably, 56 respondents who did not hear climate-related content rated radio as "neutral," compared to 78 among those who did. A small number found radio "ineffective" or "very ineffective," with 6 and 13, respectively, in the group that had not heard programs. Overall, these findings suggest that exposure to climate change content significantly enhances perceptions of radio's effectiveness in promoting climate adaptation within communities.

Would you like to hear more programs related to climate change and adaptation on

the radio * How often do you listen to the radio							
		How often do you listen to the radio					Total
		Daily	Monthly	Never	Rarely	Weekly	
Would you like to hear more programs related to climate change and adaptation on the radio	No	12	21	11	25	4	73
	Yes	113	108	6	50	50	327
Total		125	129	17	75	54	400

The cross-tabulation of interest in hearing more radio programs about climate change and adaptation, alongside listening frequency, reveals significant trends. Among the 327 respondents who expressed interest in more programs, the majority are daily listeners (113) and monthly listeners (108), indicating a strong demand for climate-related content among regular radio audiences. Also, 50 respondents who listen weekly also want to hear more programs, while 25 rarely listen and 4 never listen but still desire additional content. Conversely, among the 73 respondents who do not wish to hear more programs, 12 listen daily, 21 monthly, 11 never, and 25 rarely. This data suggests that while a substantial majority of respondents are interested in more climate change programming, even those who listen infrequently still express a desire for increased coverage, highlighting the potential for radio to play a crucial role in climate education and adaptation outreach.

Conclusion

This research examines the important role of radio as an educational medium to help improve awareness and strategies for adaptation related to climate change. The results offer a nuanced understanding of the demographics, levels of awareness, and perceptions of Gaya respondents and illustrate the important role that media plays in shaping people's understanding and action related to climate change. The demographic profile of the participants indicates they are well-educated, living mostly in urban areas (Kumar et al. 2023). This trend toward urban representation represents possible differences in media access and education opportunities compared to rural residents in Gaya. The significant levels of awareness about climate change identified by urban respondents highlight that media (particularly radio) plays a significant role in disseminating valuable information. The number of participants who classified themselves as "somewhat aware" or "very aware"

demonstrates that engagement of the public through different forms of media can facilitate awareness and action. The reliability of the survey instrument, supported by a Cronbach's Alpha value of .807, supports the internal consistency of the items used to ask about respondents' perceptions. This reliability supports the validity of the conclusions made, supporting that the survey captures to some degree the complex relationship between media consumption, education, and climate change awareness in the Gaya District.

The examination of the cross tabulations presented provides new insights regarding the influence of age group, gender, education level, and rural or urban residence on the respondents' beliefs about the role of radio in climate education. The relationship between frequency of listening to the radio and listening to climate change programs is strong and further reinforces radio as an effective medium to increase awareness and encourage behavioral change. The findings indicate that a large majority of the respondents who have heard climate-related content on the radio reported that they made a change in their practices as a result of the information heard; a clear demonstration of how media engagement can contribute toward climate adaptation. Furthermore, most of the respondents recognize radio as a valid mechanism to promote awareness for climate adaptation measures. The request from radio listeners for more climate-related programming, even from those who have lower levels of radio consumption, demonstrates a clear demand for radios and media alike to provide more coverage of climate issues. Therefore, it is presented that radio stations in the Gaya district can capitalize on the spot between gaps in climate education and outreach - particularly for rural audiences who have limited access to this information.

This study promotes the media, particularly radio, as an important mechanism for climate change adaptation in the Gaya District, as demonstrated by the data collected from both community members and climate experts. The recommendations point toward increasing climate investment in climate education and radio channels, and customized programming for different groups, and also highlight an opportunity to harness the reach, immediacy, and access of radio to strengthen resilience from climate and encourage listeners to develop into more informed and adaptive citizens. Future research should focus on the most effective content and formats of the radio programs that engage listeners and then move them toward dealing with climate adaptation in practice in the Gaya District.

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