Scientific Research Publishing

American Journal of Climate Change, 2024, 13, 697-719
https://www.scirp.org/journal/ajcc
ISSN Online: 2167-9509
ISSN Print: 2167-9495

IEC Materials as Tools to Induce Climate Action as Perceived by Coastal Communities in Zambales, Philippines

Roann P. Alberto[1], Anastacia S. Mendoza[2], Annie Melinda Paz-Alberto[3]

[1]College of Business Administration and Accountancy, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines
[2]Brain Juice Collective Pte. Ltd., Raeburn Park, Singapore
[3]Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines
Email: R.P.Alberto@liverpool.ac.uk; anneplaoalberto@clsu.edu.ph; anstcmndz@gmail.com; melindapaz@gmail.com

How to cite this paper: Alberto, R. P., Mendoza, A. S., & Paz-Alberto, A. M. (2024). IEC Materials as Tools to Induce Climate Action as Perceived by Coastal Communities in Zambales, Philippines. *American Journal of Climate Change, 13,* 697-719.
https://doi.org/10.4236/ajcc.2024.134032

Received: August 8, 2024
Accepted: December 1, 2024
Published: December 4, 2024

Abstract

IEC materials promote climate action and affect community behavior. The purpose of the study was to find out how local communities perceived about IEC materials on community-based adaptation techniques and ecosystem-based approaches to combating climate change. It also examined the relationship be-tween respondents' sociodemographic characteristics and the IEC materials' attributes. Forty-two (42) coastal barangays in Zambales yielded 640 responses using survey questionnaires. Data analysis included frequency, percentage, and correlation. IEC materials were effective in comprehension, relevance, content, visual appeal, acceptance, and impact. Respondents were able to swiftly understand simple statements concerning climate change. Respondents were significantly impacted by attractiveness, visually appealing and recognizable images about adaptation and mitigation strategies for climate change. Municipalities were associated with practically all IEC material attributes. Education and respondent type influenced some IEC material characteristics. Coastal municipalities had different views on IEC material attributes. Because of IEC materials' effectiveness, coastal communities are more inspired and motivated to take climate action. IEC materials give local populations useful knowledge about climate change that they may apply even in the absence of formal education.

Keywords

Perception, Coastal Communities, IEC Materials, IEC Materials Attributes, Climate Change Adaptation Strategies, Climate Action, Coastal Municipalities

1. Introduction

IEC materials serve as instruments for information transfer to the intended audience, improving learning, reiterating lessons learned from other sources, encouraging positive behavior, and acting as catalysts for action (Alberto, 2019a; Birhanu et al., 2011). Brochures, posters, flyers, booklets, billboards or murals, infographics, social media posts, radio broadcasts or TV spots, and other Information, Education, and Communication (IEC) materials are designed to draw attention and spread awareness to a specific audience in order to attain a desired positive outcome (Alberto, 2019a; Deepmala, 2019; Thorseth, 2021). These resource materials also intend to change community behavior by disseminating information via broadcast or print media. As a result, the ultimate goal of all IEC materials is to empower people to make informed decisions, change their behavior, and improve social conditions (Argyle, 2010). More than simply attracting the target audience's attention, the information being relayed assists the reader or viewer in taking action regarding an issue being addressed (Birhanu et al., 2011). The goal of IEC is to influence the receiver's cognitive, affective, and psychomotor domains, which can be accomplished when the information source is credible, and the message is understandable, appropriate, timely, practically applicable, accessible, and in line with the target audience's expectations and interests (Cherie et al., 2005).

The Philippines is being affected by climate change. Because of its geographical location, the Philippines is one of the world's most vulnerable and exposed countries to climate change impacts (PAGASA 2011, 2018; Paz-Alberto et al., 2021). Climate change is causing damage to agriculture (Gornall et al., 2010; Shankar & Shikha, 2018; Paz-Alberto et al., 2018; Cinner et al., 2022), coastal ecosystems (Paz-Alberto et al., 2021; Cinner et al., 2022), and forest ecosystems (Huber et al., 2021). Many areas in the Philippines have experienced and are experiencing the effects of climate change from extreme weather events, which cause deadly hazards and disasters such as floods, landslides, storm surges, and others, affecting the livelihood and food security of local communities (Macusi et al., 2021). Hence, this study was conducted in four municipalities of Zambales to educate coastal communities about promoting IEC materials on climate change impacts, adaptation strategies, and biodiversity conservation in coastal ecosystems.

The primary objective of this study was to ascertain local communities' perceptions of the effectiveness of IEC materials on climate change, community and ecosystem-based adaptation strategies, and other environmental issues and to examine the relationship between socio-demographic characteristics and the different attributes of the IEC materials.

2. Methodology

The study included 42 coastal barangays in four municipalities in the province of Zambales: thirteen (13) barangays in Palauig, ten (10) barangays in Masinloc, eight (8) barangays in Candelaria, and eleven (11) barangays in Sta. Cruz.

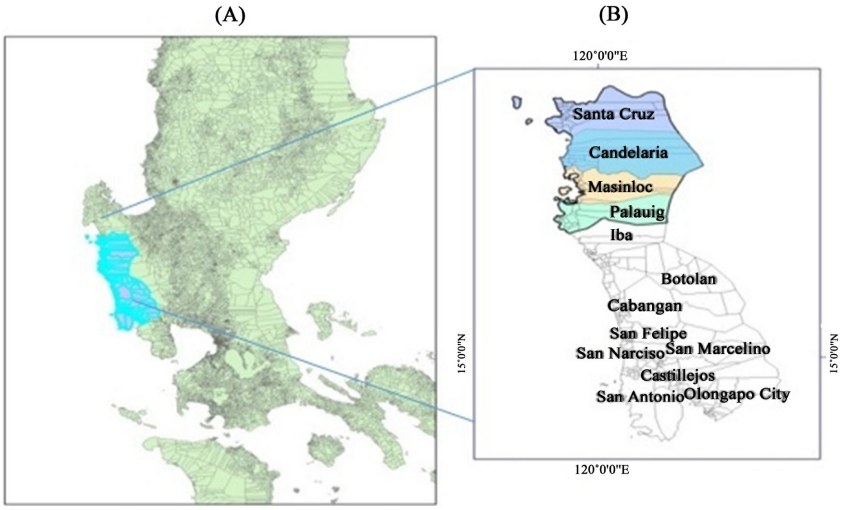

Figure 1. The maps of the study areas. (A) The image on the left depicts the province of Zambales, which is located in the northwest part of the Philippines. (B) The image on the right depicts the province's various municipalities, specifically highlighting the four study areas: Santa Cruz, Candelaria, Masinloc, and Palauig.

The three research assistants used convenience sampling to select respondents from the 42 coastal barangays of Zambales, with a sample size of 640. The respondents were barangay officials from the four municipalities' coastal barangays, representatives of fishermen, senior citizens, women, and youth groups, with 16 people per barangay from the selected coastal communities. Within the study sites, a survey was conducted to assess the effectiveness of the IEC materials distributed to the respondents. The respondents' socio-demographic information, as well as their perceptions of the contents and graphic designs of the IEC campaign materials, were determined using a survey questionnaire.

2.1. Preparation and Distribution of the IEC Materials

IEC materials, including brochures/pamphlets, posters, and leaflets on ecosystem-based and community-based adaptation strategies to climate change, biodiversity conservation, environmental issues, and coastal resource management for public education and awareness were designed, created, and produced by the research team (**Figures 2 - 4**). The coastal biodiversity conservation IEC materials were focused on the conservation of biodiversity of coral reef, mangroves, seagrass, and marine ecosystems. The ecosystem-based adaptation strategies involved different approaches to protect the coastal ecosystems from climate change's impacts. These include coastal management, safeguarding and preserving the coral reef, seagrass, and mangrove ecosystems, planting mangrove trees, and planting trees in their surroundings. On the other hand, community-based adaptation strategies are ways in which the community will work to reduce the effects of climate change. Examples of such actions include recycling waste, avoiding waste disposal (such as plastics) in the coastal ecosystem, managing disaster risk reduction in their municipalities and barangays, and developing alternate sources of income such as seaweed farming, salt

making, and food processing. The IEC materials about environmental issues comprised problems affecting coastal ecosystems, their causes, and management, such as coral bleaching, coastal erosion, flashflood, sea level rise, siltation, sedimentation, increasing temperature, dynamite fishing, land conversion, and tourism.

Before the IEC materials were published and distributed, technical experts, including an ecologist and environmental management expert, evaluated and reviewed these different IEC materials. After the evaluation of the experts, the IEC materials were edited by an English critic and Marketing specialist. Then, another review was done by the research team, which was composed of the project leader and the study leader, before these IEC materials were printed and produced. These IEC materials were distributed at seminars held across four coastal municipalities in 40 barangays (Sta. Cruz, Candelaria, Masinloc, and Palauig). During promotion and distribution, each of the 42 coastal barangays received 633 copies of IEC materials (8 posters, 570 leaflets, and 55 brochures), for a total of 26,586 IEC materials distributed to the 42 barangays (Table 1).

Figure 2. Sample posters on coastal biodiversity conservation, climate change adaptation, and environmental issues were created, produced, and distributed in Zambales' four municipalities.

Figure 3. Sample leaflets about climate change adaptation and environmental issues that were created, produced, and distributed in Zambales' four municipalities.

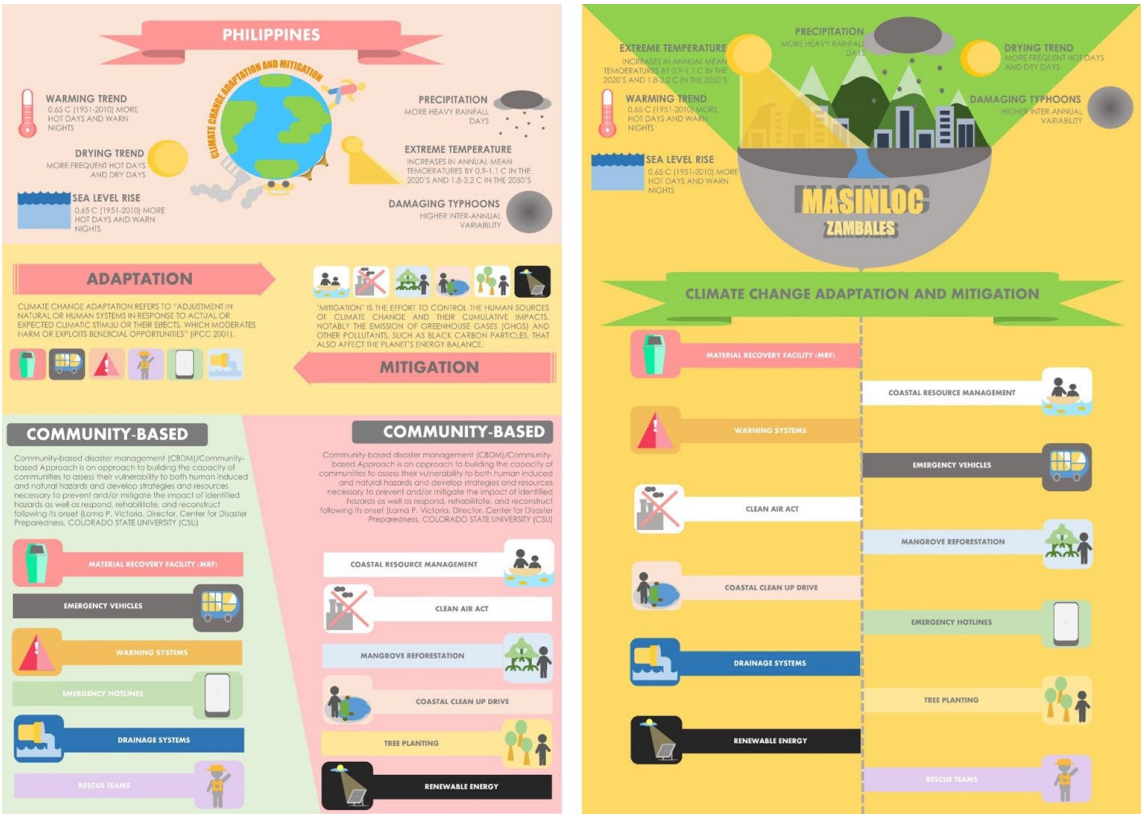

Figure 4. Sample brochures on climate change adaptation that were created, produced, and distributed in Zambales' four municipalities.

2.2. Data Collection

A two-part survey questionnaire was used to collect primary data, which measured the effectiveness of the distributed posters, leaflets, and brochures. The questionnaire was divided into two sections to collect socio-demographic data and information on respondents' perceptions of the effectiveness of IEC materials. The first section of the survey questionnaire identified the participants' socio-demographic information, such as respondent category, age, educational attainment, marital status, occupational status, and monthly income status. The second part of the survey assessed the IEC materials through six attributes: respondents' comprehension (understanding of the materials' content), visual comprehensibility (attractiveness of the materials in terms of color, etc. and preference), acceptance (how easily locals can relate to the material), inducement to action (encourage locals to take action), timing and location (e.g., suitability of materials in the location), and impact (relatability, usefulness and relevance to the environment and daily living) of the IEC materials (Alberto, 2019b).

There were 128 respondents from Candelaria's eight coastal barangays, 144 from Masinloc's ten coastal barangays, 192 from Palauig's 13 coastal barangays, and 176 from Sta. Cruz's 11 coastal barangays, for a total of 640 respondents. The respondents completed the survey after receiving the resource materials. The respondents were culturally and politically free in their selection of their answers.

Table 1. List of IEC materials produced and distributed in the four coastal areas for the enhancement of public awareness on the importance of coastal biodiversity.

TOPICS	Type of IEC	Language	Number of IEC Produced	Total Number of IEC Produced
Coastal Biodiversity Conservation	Poster/Leaflet	English	27	30
	Brochure		2	
	Book		1	
	Poster/Leaflet	Tagalog	11	11
Climate Change Ecosystem-based Adaptation Strategies	Poster/Leaflet	English	9	14
	Brochure		4	
	Handbook		1	
	Poster/Leaflet	Tagalog	2	7
	Brochure		4	
	Audio-visual Presentation		1	
Climate Change Community-based Adaptation Strategies	Poster/Leaflet	English	7	11
	Brochure		4	
	Poster/Leaflet	Tagalog	1	5
	Brochure		4	
Environmental Issues	Brochure	English	5	5
	Brochure	Tagalog	5	5
Total				**88**

2.3. Assessment of the Effectiveness of IEC Materials in the Coastal Barangays

The researchers used descriptive statistics to analyze the survey results for demographic characteristics, while contingency coefficient was used to calculate all of the correlation coefficients. The Chi-square test for independence was used to determine whether there are significant differences in the attributes of the IEC materials between municipalities. Once the Chi-square test for k-group independence was significant, a post-hoc test or pairwise comparisons were used to determine which of the respondents' characteristics differed in any attribute.

3. Results

3.1. Socio-Demographic Profile

Figure 5 shows the demographics of the 640 respondents who received and evaluated the IEC materials distributed in Zambales' four coastal municipalities (Candelaria, Masinloc, Palauig, and Sta. Cruz). Results revealed that most of the respondents were workers (60.8%; N = 389). In terms of age, the majority of respondents (40.2%; N = 257) were between the ages of 31 and 35, had lower educational attainment (45.80%; N = 293), and were single (63.4%; N = 406). Furthermore, most respondents (54.4%; N = 349) were fishermen, with 95% (95%; N = 608) earning less than P6,000 per month.

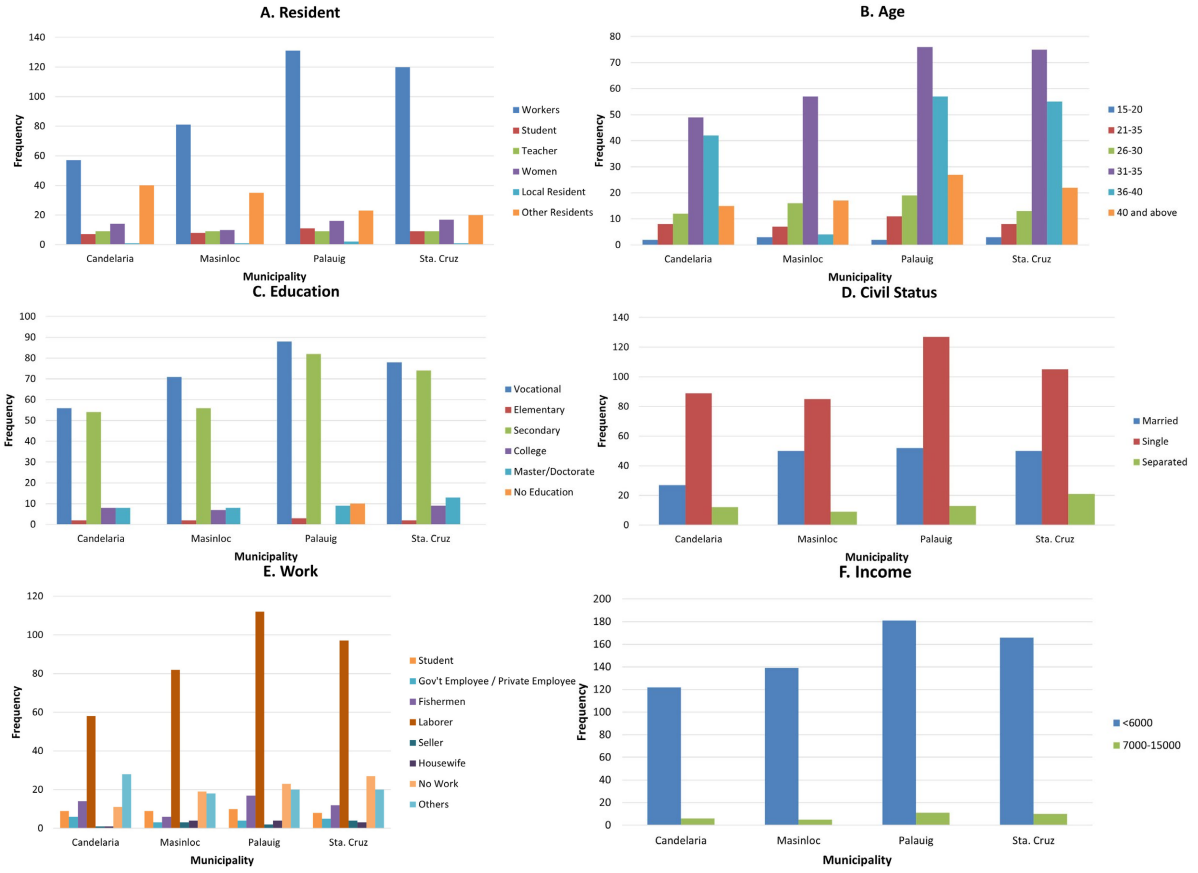

Figure 5. Frequencies (percentages) of respondents' demographic characteristics in the four municipalities of Zambales: (A) Resident/Respondent status; (B) Age; (C) Education level; (D) Civil status; (E) Occupation; and (F) Income.

3.2. Association of Demographic Variables to IEC Materials' Attributes

Table 2 shows the correlation analysis of the different attributes of the IEC materials and demographic characteristics of the respondents in Zambales' four coastal municipalities. A strong association between an attribute and a demographic characteristic is shown by significant correlation coefficients. Overall, every attribute had a high correlation with the municipality category (Table 2). Significant correlation coefficients were found for 21 attributes, including eight attributes for comprehension, five attributes for visual comprehensibility, attractiveness, and preference, two attributes for acceptance, four attributes for time and location, and two attributes for the impact of IEC materials on respondents (Table 2). In particular, comprehension, visual preference, and impact were correlated with respondent category (Table 2). Three attributes in comprehension obtained significant correlation coefficients (informativeness of the message that influenced municipality, simplicity of words which influenced age groups, and the message elements that influenced work or livelihood (Table 2A). In terms of visual comprehensibility, half of the attributes influenced municipality, three attributes influenced age, two attributes influenced education, and only one attribute influenced both civil status and work (Table 2B). In terms of acceptance, two attributes

influenced the municipality while only one attribute had a relationship to both age and work (Table 2C). Only one demographic characteristic appeared to be related to inducement to action, and that was educational attainment (Table 2D). The majority (4) of the attributes in the timing and location characteristic were correlated with the municipality while only one attribute was associated with age (Table 2E). In terms of the impact attribute of IEC materials, the relatability and usefulness of the IEC materials were correlated with the municipality, whereas relevance to socioeconomic living was associated with educational attainment (Table 2F).

Furthermore, the characteristics with the greatest number of significant correlation coefficients were respondent type and education (five and four, respectively), whereas the characteristics with the fewest significant correlation coefficients were income, work, and civil status (Table 2). These findings imply that the attributes may have an impact on how these respondents, whether students, employees, teachers, or household members, convey and interpret the content and images, as well as the usefulness of the IEC materials. Moreover, education had a strong relationship with the visual comprehensibility, attractiveness, and preference of respondents' IEC materials, particularly in their visual capacity to enhance the message and appropriate representation of the target audience, and most importantly, in terms of inducement to act, inspire, and motivate respondents, in addition to the relevance of promotional materials to social and economic living.

On the other hand, respondents' civil status, nature of work or livelihood, and income had a lesser influence on most of the attributes. For example, respondents' work type was only related to elements of proposed messages, visual appeal, familiarity, and image acceptability (Table 2). The survey's results would undoubtedly show no correlation between the characteristics and the demographics if the respondents disagreed with the description of the attributes of the IEC materials that they were provided. As a result, respondents' comprehension, visual comprehensibility, attractiveness and preference, acceptance, time and location, and impact of IEC materials were unlikely to be related to demographic characteristics (Table 2).

Table 2. Correlation analysis of the different attributes of the IEC materials and demographic characteristics of the respondents in the four coastal municipalities in Zambales.

Attribute	Demographic Characteristic						
	Municipality	Respondent	Age	Education	Civil Status	Work	Income
A. Comprehension*							
A1. Relevance of Proposed Messages	0.081 (0.250)	0.059 (0.778)	0.085 (0.420)	0.061 (0.796)	0.018 (0.907)	0.106 (0.405)	0.068 (0.083)
A2. Informativeness of proposed messages	**0.133 (0.008)***	**0.145 (0.033)***	0.039 (0.976)	0.094 (0.331)	0.065 (0.252)	0.076 (0.815)	0.037 (0.353)
A2.5 *Level of Information*	**0.203 (0.000)***	0.088 (0.426)	0.118 (0.521)	0.130 (0.360)	0.033 (0.952)	0.129 (0.694)	0.073 (0.178)
A3. Logical arrangement of proposed messages	**0.133 (0.009)***	0.052 (0.888)	0.086 (0.410)	0.058 (0.828)	0.067 (0.237)	0.083 (0.727)	0.041 (0.297)
A4. Manner of selecting information	**0.125 (0.016)***	0.084 (0.437)	0.085 (0.429)	0.074 (0.626)	0.076 (0.155)	0.086 (0.690)	0.002 (0.958)

Continued

A5. Simplicity and clarity of words	**0.112 (0.043)***	**0.088 (0.396)**	**0.194 (0.001)***	**0.091 (0.372)**	**0.019 (0.886)**	**0.118 (0.246)**	**0.013 (0.739)**
A6. Appropriateness of written/spoken words	0.074 (0.317)	0.084 (0.440)	0.082 (0.502)	0.086 (0.450)	0.051 (0.439)	0.050 (0.978)	0.039 (0.323)
A7. Simplicity of proposed messages	**0.121 (0.019)***	0.047 (0.918)	0.079 (0.539)	0.107 (0.187)	0.052 (0.415)	0.094 (0.582)	0.033 (0.397)
A8. Elements of proposed messages	**0.494 (0.000)***	**0.113 (0.035)***	0.180 (0.378)	0.183 (0.338)	0.133 (0.170)	**0.262 (0.013)***	0.039 (0.915)
A9. Elements of proposed messages (if answers "No" in A7)	**0.318 (0.001)***	0.176 (0.648)	0.300 (0.854)	0.353 (0.242)	0.286 (0.142)	0.345 (0.913)	0.198 (0.234)
B. Visual Comprehensibility, Attractiveness and Preference*							
B1. Likeability of pictures/graphics presented	**0.130 (0.012)***	0.094 (0.335)	0.081 (0.511)	0.115 (0.127)	0.031 (0.740)	0.080 (0.768)	0.002 (0.959)
B2. Visual comprehensibility of pictures/graphs	0.074 (0.337)	0.079 (0.543)	0.100 (0.264)	0.096 (0.308)	0.048 (0.472)	0.049 (0.982)	0.036 (0.369)
B3. Overlapping of visuals over text/content	**0.184 (0.000)***	**0.142 (0.025)***	0.070 (0.672)	0.129 (0.054)	0.081 (0.119)	0.072 (0.856)	0.053 (0.184)
B4. Compatibility of graphic design and content	0.081 (0.249)	0.097 (0.307)	0.065 (0.746)	0.059 (0.816)	0.059 (0.331)	0.119 (0.235)	0.009 (0.815)
B5. Visuals' appeal	0.103 (0.075)	0.059 (0.818)	0.030 (0.990)	0.060 (0.803)	0.070 (0.208)	**0.148 (0.047)***	0.041 (0.297)
B6. Visuals' capacity to enhance the message	**0.288 (0.000)***	0.075 (0.610)	0.091 (0.369)	**0.152 (0.010)***	0.084 (0.101)	0.111 (0.337)	0.068 (0.082)
B7. Appropriate representation of target audience	**0.152 (0.002)***	0.038 (0.969)	0.094 (0.341)	**0.143 (0.021)***	0.073 (0.178)	0.074 (0.837)	0.052 (0.190)
B9. *Colors and images are dull and boring/are just decorations	0.138 (1.000)	0.502 (0.098)	0.448 (0.099)	0.252 (0.550)	**0.345 (0.041)***	0.328 (0.714)	-
B10. Images' capacity to convey the most important concepts	**0.132 (0.009)***	**0.141 (0.026)***	0.050 (0.901)	0.062 (0.783)	0.074 (0.175)	0.041 (0.993)	0.012 (0.764)
C. Acceptance*							
C1. Realistic representation of target audience	**0.126 (0.015)***	0.084 (0.472)	**0.133 (0.041)***	0.087 (0.432)	0.056 (0.363)	0.073 (0.846)	0.030 (0.443)
C2. Familiarity and acceptability of images	**0.115 (0.033)***	0.098 (0.298)	0.121 (0.090)	0.070 (0.683)	0.042 (0.564)	**0.163 (0.015)***	0.068 (0.083)
C3. Validity and practicality of the messages	0.094 (0.127)	0.082 (0.503)	0.071 (0.660)	0.040 (0.962)	0.047 (0.492)	0.105 (0.421)	0.029 (0.465)
D. Inducement to Action*							
D1. Capacity to inspire and motivate	0.077 (0.287)	0.096 (0.313)	0.060 (0.808)	**0.173 (0.001)***	0.033 (0.707)	0.109 (0.366)	0.022 (0.572)
E. Time and Location*							
E1. Noticeability of promotional materials	**0.154 (0.001)***	0.053 (0.877)	0.100 (0.266)	0.116 (0.118)	0.056 (0.362)	0.143 (0.063)	0.037 (0.353)
E2. Attractiveness of promotional materials	**0.157 (0.001)***	0.069 (0.692)	0.079 (0.547)	0.086 (0.446)	0.028 (0.775)	0.093 (0.590)	0.004 (0.913)
E3. Accessibility of promotional materials	**0.111 (0.045)***	0.097 (0.309)	0.072 (0.651)	0.101 (0.255)	0.015 (0.927)	0.092 (0.609)	0.039 (0.323)

Continued

E4. Suitability of promotional materials to the location	**0.188 (0.000)***	**0.060 (0.802)**	**0.107 (0.189)**	**0.084 (0.467)**	**0.020 (0.881)**	**0.144 (0.058)**	**0.012 (0.764)**
E5. Appropriateness of promotion's timing	0.076 (0.302)	0.088 (0.428)	**0.132 (0.046)***	0.037 (0.971)	0.033 (0.707)	0.111 (0.334)	0.022 (0.572)
F. Impact*							
F1. Relatability of promotional materials to everyday tasks	**0.112 (0.043)***	0.100 (0.274)	0.085 (0.456)	0.041 (0.955)	0.029 (0.762)	0.138 (0.086)	0.038 (0.338)
F2. Usefulness of promotional materials to the environment	**0.120 (0.022)***	**0.161 (0.005)***	0.082 (0.500)	0.052 (0.884)	0.036 (0.658)	0.111 (0.333)	0.029 (0.465)
F3. Relevance of promotional materials to social and economic living	0.102 (0.078)	0.099 (0.284)	0.076 (0.597)	**0.199 (0.000)***	0.049 (0.462)	0.057 (0.954)	0.029 (0.465)

Note: The correlation analysis between IEC attributes and demographic characteristics is presented in this table. * An asterisk denotes a relationship using a contingency coefficient for attributes and demographic characteristics. **- significant at 5% significance level (p-value 0.05). Superscript and highlighted values indicate significant differences between variables.

3.3. Comparative Analysis Among Municipalities and IEC Attributes

Important findings showed that there were notable variations in one particular attribute between municipalities (Table 3). Results revealed that municipalities' responses to various attributes differed significantly, implying that respondents from one municipality may have a different understanding of the attributes than respondents from other municipalities, even within the same province.

The findings of the pairwise comparisons and post-hoc tests performed on the four municipalities to ascertain which municipalities differed from the others in terms of how they responded to the characteristics of the IEC materials are displayed in Table 3. In terms of comprehension attributes, the results showed that Candelaria and Masinloc obtained the most differences in responses, followed by Masinloc and Sta. Cruz while Masinloc and Palauig had no differences in responses (Table 3A). Candelaria and Sta. Cruz appeared to differ from Masinloc and Palauig in terms of visual comprehensibility (Table 3B). In terms of acceptance, Palauig appeared to differ from Candelaria and Sta. Cruz (Table 3C). Interestingly, results indicated that every municipality that received IEC materials was motivated and inspired to take action (Table 3D). Candelaria differed from Masinloc and Palauig in terms of timing and location (Table 3E), while Sta. Cruz differed from Masinloc and Palauig in terms of impact (Table 3E and Table 3F).

In summary, two municipalities (Palauig and Masinloc) seemed to have responded differently from the other two (Candelaria and Sta. Cruz) in terms of the characteristics of the IEC materials, with Candelaria being the most distinct.

Table 3. Post-hoc analysis (Pairwise Differences) of the four municipalities with the different attributes using Chi-square Test for Independence.

Attribute	Candelaria vs. Masinloc	Candelaria vs. Palauig	Candelaria vs. Sta. Cruz	Masinloc vs. Palauig	Masinloc vs. Sta. Cruz	Palauig vs. Sta. Cruz
A. Comprehension*						
A1. Relevance of Proposed Messages	4.528 (0.062)	2.700 (0.153)	2.948 (0.141)	0.609 (0.505)	0.417 (0.736)	0.015 (1.000)
A2. Informativeness of proposed messages	**5.723 (0.021)***	0.847 (0.652)	0.096 (1.000)	3.841 (0.083)	**6.239 (0.026)***	0.513 (0.687)
A2.5 Level of Information	**31.565 (0.000)***	**20.177 (0.000)***	0.261 (0.883)	4.896 (0.083)	**30.320 (0.000)***	**19.057 (0.000)***
A3. Logical arrangement of proposed messages	**5.730 (0.022)***	0.934 (0.492)	0.816 (0.442)	3.036 (0.138)	**9.320 (0.001)***	4.077 (0.063)
A4. Manner of selecting information	1.791 (0.500)	**6.882 (0.007)***	**6.745 (0.012)***	3.486 (0.077)	3.310 (0.120)	0.002 (1.000)
A5. Simplicity and clarity of words	**6.915 (0.014)***	3.556 (0.097)	2.093 (0.172)	1.128 (0.364)	2.015 (0.237)	0.187 (0.805)
A6. Appropriateness of written/spoken words	0.698 (0.524)	0.519 (0.553)	3.647 (0.073)	0.034 (1.000)	1.160 (0.414)	1.708 (0.287)
A7. Simplicity of proposed messages	4.528 (0.062)	2.700 (0.153)	-	0.609 (0.505)	**6.208 (0.018)***	3.707 (0.124)
A8. Elements of proposed messages	**227.962 (0.000)***	**330.266 (0.000)***	**229.994 (0.000)***	7.962 (0.087)	**23.356 (0.000)***	**19.277 (0.001)***
A9. Elements of proposed messages (if answers "No" in A7)	**12.005 (0.005)***	**10.525 (0.014)***	-	2.515 (0.444)	-	-
B. Visual Comprehensibility, Attractiveness and Preference*						
B1. Likeability of pictures/graphics presented	3.098 (0.125)	**5.893 (0.018)***	0.096 (1.000)	0.704 (0.470)	2.984 (0.147)	**6.561 (0.012)***
B2. Visual comprehensibility of pictures/graphs	3.098 (0.125)	0.847 (0.652)	1.019 (0.402)	1.237 (0.336)	0.938 (0.354)	0.015 (1.000)
B3. Overlapping of visuals over text/content	**15.176 (0.000)***	**13.159 (0.000)***	**6.089 (0.020)***	0.536 (0.496)	3.167 (0.094)	1.422 (0.263)
B4. Compatibility of graphic design and content	0.789 (0.481)	0.141 (0.760)	0.816 (0.442)	0.343 (0.737)	3.287 (0.098)	2.035 (0.214)
B5. Visuals' appeal	4.309 (0.054)	1.720 (0.326)	0.029 (1.000)	1.083 (0.397)	**5.109 (0.026)***	2.474 (0.158)
B6. Visuals' capacity to enhance the message	**16.919 (0.000)***	**40.396 (0.000)***	0.334 (0.585)	**4.870 (0.050)***	**14.138 (0.000)***	**35.864 (0.000)***
B7. Appropriate representation of target audience	**7.301 (0.012)***	**11.342 (0.001)***	3.594 (0.078)	0.171 (0.729)	1.109 (0.397)	2.474 (0.158)
B9. Color and images are dull and boring/are just decorations	0.267 (1.000)	0.267 (1.000)	0.014 (1.000)	0.000 (1.000)	0.325 (1.000)	0.325 (1.000)
B10. Images capacity to convey the most important concepts	2.696 (0.250)	**6.882 (0.007)***	1.464 (0.511)	2.161 (0.164)	0.462 (0.661)	**4.827 (0.038)***
C. Acceptance*						
C1. Realistic representation of target audience	4.528 (0.062)	4.076 (0.085)	-	0.031 (1.000)	**6.208 (0.018)***	**5.591 (0.031)***
C2. Familiarity and acceptability of images	0.892 (1.000)	**5.470 (0.024)***	2.948 (0.141)	3.806 (0.084)	1.283 (0.384)	1.044 (0.385)

Continued

C3. Validity and practicality of the messages	**4.528 (0.062)**	**2.019 (0.278)**	**1.464 (0.511)**	**1.291 (0.295)**	**2.020 (0.250)**	**0.124 (1.000)**
D. Inducement to Action						
D1. Capacity to inspire and motivate	0.793 (0.625)	0.056 (1.000)	1.380 (0.421)	0.609 (0.655)	3.701 (0.090)	1.843 (0.500)
E. Time and Location*						
E1. Noticeability of promotional materials	**6.633 (0.012)***	0.380 (0.652)	0.096 (1.000)	**6.408 (0.019)***	**7.402 (0.008)***	0.124 (1.000)
E2. Attractiveness of promotional materials	0.229 (1.000)	**6.586 (0.010)***	0.096 (1.000)	**5.588 (0.029)***	0.041 (1.000)	**7.456 (0.007)***
E3. Accessibility of promotional materials	1.937 (0.237)	**6.882 (0.017)***	3.092 (0.133)	1.414 (0.408)	0.083 (1.000)	0.868 (0.432)
E4. Suitability of promotional materials to the location	**11.679 (0.000)***	**6.026 (0.023)***	**11.151 (0.001)***	3.036 (0.138)	0.821 (1.000)	1.573 (0.374)
E5. Appropriateness of promotion's timing	2.696 (0.250)	0.669 (1.000)	1.464 (0.511)	1.708 (0.318)	0.462 (0.661)	0.430 (0.608)
F. Impact*						
F1. Relatability of promotional materials to everyday tasks	0.949 (0.387)	0.342 (0.718)	2.995 (0.166)	2.881 (0.135)	**7.207 (0.012)***	1.573 (0.374)
F2. Usefulness of promotional materials to the environment	3.609 (0.125)	4.076 (0.085)	-	0.034 (1.000)	**4.951 (0.040)***	**5.591 (0.031)***
F3. Relevance of promotional materials to social and economic living	0.793 (0.625)	1.972 (0.250)	1.380 (0.421)	0.343 (0.737)	3.701 (0.090)	**5.591 (0.031)***

Note: This table shows the pairwise or comparison analysis of the four municipalities with different IEC attributes. The majority of the demographic characteristics were found to be significantly related to municipality, so this test was conducted. * Since the Chi-square test for k-group independence was significant, the attributes and highlighted attributes within the municipality represent the distinct differences between the four coastal municipalities. *- significant at 5% level of significance (p-value < 0.05). Superscript and highlighted values indicate significant differences between variables.

4. Discussion

According to the study's findings, the IEC materials that were disseminated and promoted in the local communities were very successful in raising public awareness and causing a shift in attitudes that led to climate action. This study's results support numerous groups such as national agencies (Department of Interior and Local Government, Department of Science And Technology, and Department of Environment and Natural Resources), local government units, and non-government organizations encouraging people to take responsibility for their acts through their efforts, which has expanded awareness, changed attitudes, and improved communities (Gifford, 2011; World Health Organization, 2000; Tanggol Kalikasan, 2004; IPM-CRSP, 2002). The findings of this study were further supported by another study in which IEC materials generated, produced, and disseminated bridged the knowledge gap on the lack of awareness of the local communities and other stakeholders on the biodiversity state of forest ecosystems (Paz-

Alberto et al., 2017). IEC materials should not only draw attention to specific issues but must also be able to provide helpful information that would encourage the reader to take action (Alberto, 2019a; Birhanu et al., 2011).

IEC interventions should involve the target audience's active participation and use channels, methods, and familiar techniques. The findings of this study show that the IEC materials are effective and practical tools for increasing public awareness of available climate change adaptation options and supportive community responses. These materials may also help change attitudes at coastal municipalities' individual, household, and community levels. These approaches validated the findings of the study conducted by Alberto (2019a) on the effectiveness of IEC materials, establishing impact and significance to the various stakeholders (indigenous people, students, teachers, and local government employees) and motivating them to take action to preserve the forest ecosystem and its biodiversity.

The correlation analysis results revealed that only the municipality category from the demographic profile was significantly associated with almost all of the IEC materials' attributes, precisely 21 attributes with significant correlation coefficients.

4.1. Comprehension

In terms of the informativeness of IEC materials' proposed messages, the assessment of the respondents on the level of information delivered by the proposed messages of IEC materials revealed that 77.08% from Masinloc, 73.96% from Palauig, 56.25% from Sta. Cruz and 55.47% of Candelaria residents said the level of information was highly informative. As a result, relatively high percentages of Masinloc (77.08%) and Palauig (73.96%) respondents replied that the information they learned was very educational and enlightening. Based on the findings, the majority of respondents from the Masinloc and Palauig municipalities rated the level of information delivered by the proposed messages in the IEC materials as very informative; hence, these two municipalities obtained significant differences compared to the other two municipalities (**Table 3a**). Survey results also indicated that 97.50% of respondents assessed that the proposed messages delivered by the IEC materials were informative, which is why the respondents had significant correlation analysis results (**Table 2**). The information delivered by the IEC materials contributes to the knowledge of climate change adaptation strategies, coastal biodiversity conservation, and other environmental issues the target audience will acquire from the resource materials. These results indicated that most respondents believed the information presented was carefully selected to convey only the most essential information. The effectiveness of an IEC material largely depends on the accuracy of information. Careful selection of information means that the content is accurate and credible (Adebimpe, 2024). Gaining the audience's trust also hinges on the IEC materials' authenticity, which entails that the data is properly chosen and technically accurate (Swann, 2022). Moreover, trust is generated by a solid information foundation. Therefore, the content becomes one of

the most crucial message components when developing IEC material (Ali, 2011).

One of the guidelines for developing new IEC materials is to examine the draft key message or advice, which includes the logical presentation or arrangement of the proposed messages (Swann, 2022). With 97.92% and 97.22%, respectively, Masinloc and Palauig got the highest percentage of respondents who answered absolutely about the proper logical arrangement of the IEC materials' proposed messages, followed by Candelaria (96.09%) and Sta. Cruz (93.75%). According to the findings of this study, the proposed messages are logically organized. Documents with no apparent order receive a poor rating, whereas documents with identified topics and discussions in a logical sequence obtain an excellent rating (Program for Appropriate Technology in Health, 2004).

The percentage of respondents who rated the simplicity and clarity of words and the simplicity of proposed messages revealed that Candelaria and Sta. Cruz had the highest positive response percentage (100%) among the four municipalities. The positive response was followed by Palauig (97.92%) and Masinloc (96.53%). These findings validated the pairwise comparison results among the four municipalities (**Table 3a**). The findings revealed that most respondents thought the words used in the proposed information were simple and clear, which is an essential aspect of effective IEC material (Adebimpe, 2024). Simple content and language make it easier for the intended audience to understand the message. Furthermore, when developing new IEC materials or selecting/adapting existing IEC materials, keeping the texts simple and understandable should be considered (Swann, 2022).

According to the respondents' perceptions regarding the elements of the proposed messages, 100% of Candelaria participants, 97.92% of Palauig participants, 96.53% of Masinloc participants, and 95% of Sta. Cruz's participants responded absolutely about the proposed message elements of the IEC materials. According to the survey results, most respondents believed the proposed messages were simple and easy to understand. An effective and practical message easily captures an audience's attention when it is simple, relevant, and meaningful (Swann, 2022; Raab & Rocha, 2011). For an IEC material to be effective, the text written or narrated in it must be easy to read and understand (Swann, 2022; Raab & Rocha, 2011). Results revealed that most respondents agreed that the written/spoken words were appropriate, and the proposed message elements were straightforward and easy to understand; thus, the respondents had a significant correlation with this attribute (**Table 2**).

Ultimately, one possible reason that Masinloc and Palauig differed from Candelaria and Sta. Cruz is the number of schools in each municipality. Masinloc and Palauig have more schools with complete resources such as more teachers, classrooms, and books, compared to the other two municipalities. As a result, this may explain why the comprehension of respondents appeared to differ between municipalities in terms of the acquired learning and education of the respondents.

4.2. Visual Comprehensibility, Attractiveness and Preference

Based on their assessment of the likeability of the images/graphics presented, 99.22% of Candelaria respondents, 98.86% of Sta. Cruz respondents, 95.83% of Masinloc respondents, and 93.75% of Palauig respondents replied optimistically. The results showed that almost all of the Candelaria and Sta. Cruz's participants liked the pictures/graphics in the resource materials. In terms of this attribute, pairwise comparisons between municipalities revealed significant differences when comparing Candelaria to Palauig and Sta. Cruz to Palauig (**Table 3b**). The likeability of the graphics that attract the client's attention is one of the strengths of IEC material (Swann, 2022). As a result, the graphics must capture the attention of the viewers at first glance to entice them to read the entire content. Posters, for example, are highly appealing, visible, and appealing due to their vibrant colors and adaptable theme alignment (Alberto, 2019b). In addition, Alberto's (Alberto, 2019b) study found that IEC materials, such as posters and brochures, were deemed the most likable, desirable, eye-catching, and easily remembered by respondents. Combining colored photos and text is a very effective tool for retaining these materials in the respondents' minds. Posters are also crucial for a municipality's life and culture. These can represent openness, directness, simplicity, and action. Posters also promote a more profound civic culture, such as creativity, enthusiasm, advocacy, ideas, entrepreneurship, and community political ideals. According to these findings, most respondents understood the images/graphics, promoting appeal, visibility, and retention.

Masinloc had the highest percentage (95.14%) of no graphics that overlapped letters or content; followed by Palauig (93.23%), Sta. Cruz (89.77%), and Candelaria (78.91%). As a result, the pairwise comparison of Candelaria to the other three municipalities revealed significant differences due to the lowest percentage it obtained (**Table 3b**). The findings indicated that most participants believed visuals did not overlap the texts or content, which is why respondents obtained a significant correlation with this attribute (**Table 2**). It is critical to use clear, easy-to-read fonts. If the resource material contains text and visuals, this IEC material must have simple text as well as attractive and appealing visuals for easy comprehension of the readers. Allowing space between texts and visuals allows readers' eyes to transition easily from one to the other. Furthermore, when an IEC material contains sufficient and compatible text and image content, it attracts onlookers from afar (Alberto, 2019b).

According to the results of the visual appeal, Masinloc had the highest percentage of respondents who answered positively (99.31%), followed by Palauig (97.92%), Candelaria (95.31%), and Sta. Cruz (94.89%). The results of the pairwise comparison revealed that Masinloc differed significantly from Sta. Cruz, due to a lower percentage of Sta. Cruz respondents who answered positively to visual appeal (**Table 3**). This could be because Sta.Cruz had a higher proportion of working respondents (120) than Masinloc, which had only 81 working respondents (**Figure 2**). As a result, work had a significant relationship with this attribute (**Table**

2b). The majority of these workers are between the ages of 31 and 50. Print advertising, such as brochures, is more appealing to older and middle-aged people than to young adults who are uninterested in the content (Hunt, 2011). People in their forties and fifties enjoy reading to learn more and are more likely to share what they have read. They also have a disruption in their episodic (experienced events in a specific time and setting) and semantic memory, which explains why they tend to read print materials and still recall relevant facts (Glisky, 2007).

However, most participants in the four municipalities answered that the visuals are appealing and not abstract or cluttered, enhancing the message being delivered. Furthermore, visually appealing print materials are more noticeable and desirable to the target audience (Alberto, 2019a, 2019b). The text or narrative must be able to describe what happens in the visual through visuals that reinforce the text or narrative (Swann, 2022).

The capacity of visuals to enhance the message was rated highly by a high percentage of respondents across the four coastal municipalities. According to the results, Palauig had the highest percentage among the four municipalities, with 97.92% responding positively. Masinloc came in second with 93.06%, followed by Sta. Cruz with 77.84%, and Candelaria with 74.22%. According to the findings, the majority of participants in the four municipalities believe that visuals have the potential to enhance messages. As a result, as shown in Table 3, there were significant differences in pairwise comparison results when comparing Candelaria and Sta. Cruz to the other municipalities. However, a few respondents felt that the visuals could have been clearer and better-enhanced messages, as evidenced by Candelaria and Sta. Cruz percentages of 25.78% and 22.16%, respectively. Concerning this, some respondents from Candelaria, 21.09%, and Sta. Cruz, 10.23%, also evaluated that the visuals take over the texts or content. This factor may have affected their assessment of the visual's capacity to enhance the message. According to Alberto (2019a), print materials are highly effective in terms of clarity when the font style and text size are easy to read. She also stated that IEC materials are more effective when accompanied by informative images or visuals that enhance the message.

According to the results on the appropriateness of representation of the target audience in the graphics of the IEC materials, Palauig had the highest percentage, with 97.92% answering positively among the four municipalities. Masinloc came in second with 97.22%; Sta. Cruz had 94.89%, and Candelaria had 89.06%. The results showed that most participants thought the graphics accurately represented the target audience. Members of the target audience must be appropriately represented in the IEC materials to have a more significant impact. Illustrations and symbols should reflect the target audience's ethnic and cultural background. Members of the target audience should be able to identify with the message for it to have a greater impact. This approach can be accomplished by depicting the people's culture and ethnicity in the illustrations and symbols by placing them in familiar settings or using familiar belongings (Swann, 2022).

Results indicated that the images conveyed the most important concepts by most participants in the four municipalities. Candelaria had the highest percentage among the four municipalities, with 100% responding positively to the images' ability to convey the most important concepts, followed by Sta. Cruz (98.86%), Masinloc (97.92%), and Palauig (94.79%). Highlighting the essential concepts in the visuals helps readers and viewers avoid confusion. The visuals' logical sequence also emphasizes the most vital ideas, assisting in delivering a clear message.

4.3. Acceptance

According to the respondents' assessment of the realistic representation of the target audience, results showed that 100% of participants were from Candelaria and Sta. Cruz agreed that the IEC materials represented the target audience genuinely, while 96.88% from Palauig and 96.53% from Masinloc also agreed. According to the findings, most respondents from Zambales' coastal municipalities thought the people in the images accurately represented the target audience. The resource materials become more inviting, visually appealing, and easy to follow when the target audience realistically represents people, places, and situations. The realistic portrayal of the target audience also makes the IEC materials more relatable, piquing their interest in reading and comprehending the information presented.

Candelaria had the highest percentage of respondents who answered that there was familiarity and acceptability of images of IEC materials among the four municipalities, with 100% responding positively. Masinloc came in second with 99.31%, Sta. Cruz placed third with 97.73%, and Palauig ranked last with 95.83%. According to the findings, most participants in the four municipalities agreed that the images are familiar and acceptable to members of the target audience. Acceptance and participation of the target population are required for the success of IEC materials (Adebimpe, 2024). As a result, the images in the materials must include illustrations that use familiar things and belongings, as well as acceptable clothing. This way, the audience will accept the information more readily because they can relate to the situations depicted.

4.4. Inducement to Action

The evaluation of the respondents of the coastal municipalities of Zambales on the promotional materials' capacity to inspire and motivate the target audience to take climate actions, become resilient against climate change, and cope with climate change impacts through adapting climate change adaptation strategies revealed that Sta. Cruz had the highest rating among the four municipalities. Candelaria came in second with 99.22%, Palauig with 98.96%, and Masinloc with 97.92%. The findings revealed that most participants in the four municipalities felt that the promotional materials compelled them to act. The reasons for most respondents' positive attitudes could be attributed to the IEC materials, which contain relevant, informative, and clear messages with attractive, appealing, and

easy-to-understand graphic designs that encourage them to modify their practices and behavior and entice them to take climate action. As a result, even those with no education can understand the IEC materials distributed to them, indicating a significant relationship with this attribute, as shown in **Table 2**. Paz-Alberto et al. (2017) stated in a previous study that IEC materials improve the general well-being of individuals and communities by encouraging them to be responsible for their actions through their efforts.

Due to the increased awareness provided by the IEC materials' effective characteristics, coastal communities are more inspired and motivated to take climate action. Another study validated the findings of this study, which found that communicating about climate change to social-political groups mobilized climate change actions (Luo & Zhao, 2019). Paz-Alberto et al. (2017) and Alberto (2019a, b) supported this with research showing that IEC materials and promotional/campaign materials are educational due to the information they contain, which aids in educating the target audience about the importance of protecting and conserving biodiversity in forest ecosystems. Mishra et al. (2020) agreed that IEC is a strategy for dealing with change or strengthening the behavior of a target audience concerning a specific issue over time.

Furthermore, IEC seeks to raise awareness, knowledge, and overall well-being in individuals and communities by encouraging people to take responsibility for their actions through their efforts. This strategy can change their attitudes to induce climate actions and implement adaptation measures for their resiliency. Hence, IEC utilization ensures that people have the appropriate knowledge to change their practices by focusing on modifying behaviors through environmental interventions (World Health Organization, 2000). Raising awareness through effective communication is critical for increasing enthusiasm, self-mobilization, and action to change the behavior of various stakeholders (Climate-ADAPT, 2015).

4.5. Impact

The perception of respondents on the impact of IEC materials on the relationship of promotional materials to the target audience's everyday tasks revealed that 99.43% of respondents from Sta. Cruz, 97.92% from Palauig, 96.88% from Candelaria, and 94.44% from Masinloc answered positively. The findings revealed that most participants believed the IEC materials could relate to the target audience's daily tasks. These findings are consistent with Paz-Alberto et al. (2017), who found that respondents who received copies of IEC materials on biodiversity conservation believed the materials were relevant to their daily activities and valuable in the environment. Because not everyone in the target audience received a formal education or a high level of education, they rely on personal experiences and encounters to get by. As a result of the information disseminated through various promotional materials, they can apply the knowledge they have gained in their daily activities, thereby improving their quality of life.

According to survey results on the usefulness of promotional materials to the environment among the four municipalities, Candelaria and Sta. Cruz both had the highest percentages, with 100% answered positively, followed by Masinloc (97.22%) and Palauig (96.88%). The findings mean that most of the participants in the four municipalities assessed that the promotional materials are valuable, helpful, and very important in protecting and conserving the environment, as well as inducing climate action to become resilient communities. Various IEC materials (such as posters, brochures, pamphlets, comics, and others) help fill in the general lack of campaigns about the importance of climate change awareness and biodiversity conservation in different ecosystems. Paz-Alberto et al. (2017) and Alberto (2019a, 2019b) also highlighted that campaigns in the form of IEC materials distribution and other promotional activities are necessary to address the biodiversity crisis as this campaign strategy is an effective promotional vehicle and raising awareness and information dissemination. Previous studies' findings corroborate this finding on the efficiency and adeptness of IEC materials as an effective tool for climate change awareness and action, which is also supported by Luo and Zhao's study (Luo & Zhao, 2019).

Local communities gain valuable information from various IEC materials and media that they can apply in their lives when they do not have access to formal education. According to a study, respondents who evaluated campaign materials perceived these IEC materials to be beneficial to their social and economic lives (Paz-Alberto et al., 2017). According to the findings, most participants in the four municipalities rated the promotional materials as relevant and vital to their social and economic well-being. Among the four municipalities, Sta. Cruz had the highest percentage, with 100% responding positively to the relevance of the promotional materials to the target audience's social and economic well-being. Candelaria ranked second with 99.22%, Masinloc ranked third with 97.92%, and Palauig was last with 96.88%.

The results of the impacts of IEC materials on the three attributes revealed that Sta. Cruz had the highest percentage of respondents who answered positively, ranging from 99.42% to 100%; thus, Sta. Cruz respondents had significant differences with Masinloc and Palauig respondents' perceptions of the relevance, relationship, and usefulness of IEC materials in their environment, particularly climate actions and coastal resources conservation, everyday tasks, social interactions, and economic living conditions. The findings of this study validate the findings of other studies on the efficacy and adaptability of IEC materials as a tool for climate change awareness and action (Ramirez, 2018; Climate Change Secretariat, Ministry of Environment, 2010).

The IEC materials developed and produced by this study must be distributed to other coastal communities in the Philippines to contribute to SDG 13 on Climate Action, specifically strengthening climate resilience and reducing disaster impacts in coastal communities. Furthermore, policymakers may consider producing and distributing IEC materials about climate change awareness and adaptation

strategies in their policy formulations and local ordinances. Dissemination of IEC materials is an effective and practical approach to induce climate action, which may change the attitudes of local communities toward their resiliency and help in realizing the sustainability of their municipalities on disaster risks and climate change impacts.

5. Conclusion

Results of this study demonstrated that the various IEC materials on climate change ecosystem-based and community-based adaptation strategies, and other environmental issues developed, produced, and disseminated in the four municipalities, were highly influential in public education and awareness of the coastal communities. The IEC materials were relevant, informative, and easy to understand. The clear and appropriate language helped them understand the messages and content quickly and thoroughly. Attractive, appealing, and simple graphic designs as well as familiar and acceptable visuals had more significant impacts, inducing them to act responsibly.

However, the correlation analysis results show that the municipality category is significantly associated with almost all attributes. Specifically, the 21 attributes with a significant relationship with the municipality category include eight in comprehension attributes, five in visual comprehensibility, attractiveness, and preference, two in acceptance, four in time and location, and two in the impact of IEC materials on the respondents. The findings revealed that municipalities differ significantly in respondents' responses to various attributes, implying that respondents from one municipality may have a different understanding of the attributes than respondents from other municipalities. Only the respondents' type and education received five or four significant correlation coefficients in terms of demographic characteristics. It is worth noting that education plays a role in the respondents' visual comprehension, attractiveness, and preference for IEC materials. There were significant findings regarding pairwise differences in the different attributes of IEC materials in the various coastal municipalities.

Thus, with the information disseminated through the various IEC materials, the local communities can apply the knowledge they gained in their daily activities, which could help them achieve climate change resilience and food security and improve their quality of life. Furthermore, by utilizing various IEC materials and media, local communities may obtain valuable information that they can apply in their daily lives when they cannot access formal education. Furthermore, coastal communities are encouraged to take more climate actions to become more resilient, cope with climate change impacts through ecosystem-based and community-based adaptation strategies, and conserve and manage coastal ecosystems and biodiversity.

Additionally, it is strongly encouraged that local knowledge be taken into account in future research when creating IEC materials. Moreover, the role of digital and social media IEC materials in climate action awareness should also be

considered for future studies. A follow-up survey five years or more later is also recommended to assess the effectiveness of the IEC materials. Likewise, it is also recommended to evaluate and assess if the respondents in the four municipalities implemented climate actions and whether their behavior changed towards mitigating and adapting to climate change impacts. Future research should take into account an ex-post analysis of the study.

Acknowledgements

The authors express their sincere gratitude to the Commission on Higher Education (CHED) and the CHED-DARE-TO K12 Program for their funding and trust in the authors' ability to achieve the project's goals and deliver significant results. They also wish to thank the Philippine Red Cross of Zambales, the Provincial Agricultural Office (PAO), the Coastal Resource Management/Environment and Natural Resources Office, the Disaster Risk Reduction Management Office, the local government units (LGUs), the coastal barangays, and the coastal communities of the four municipalities of Zambales—Candelaria, Masinloc, Palauig, and Sta. Cruz—for their invaluable assistance.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Adebimpe, W.O. (2024). *IEC Materials Development and Adaptation Including Fieldwork and Group Practical Sessions.* Open Educational Resources. University of Medical Sciences. https://oer.unimed.edu.ng/LECTURE%20NOTES/1/1/Dr-Adebimpe-IEC-MATERIALS-DEVELOPMENT-AND-ADAPTATION-INCLUDING-FIELDWORK-AND-GROUP-PRACTICAL-SESSIONS.pdf

Alberto, R. P. (2019a). Effectiveness of Biodiversity Conservation Campaign Materials and Strategies in the Forest Ecosystem of Carranglan, Nueva Ecija, Philippines. *Silliman Journal, 60,* 141-174. https://sillimanjournal.su.edu.ph/index.php/sj/article/view/35

Alberto, R. P. (2019b). Correlation Analysis of Campaign Materials' Mode and Attributes Towards the Retention of the Respondents on Biodiversity Conservation in Carranglan, Nueva Ecija, Philippines. *Liceo Journal of Higher Education Research, 15,* 54-81. https://doi.org/10.7828/ljher.v15i1.1290

Ali, A. (2011). *IEC Material Development.* https://www.slideshare.net/thinktank1987/iec-material-development

Argyle, J. (2010). *Fiji Red Cross Society's HIV and Blood Advocacy IEC Materials Evaluation: An Analysis of Quality and Effectiveness.* Fiji Red Cross.

Birhanu, Z., Godesso, A., Jira, C., & Morankar, S. (2011). Assessment of Production and Distribution of Printed Information Education Communication (IEC) Materials in Ethiopia and Utilization in the Case of Jimma Zone, Oromiya National Regional State: A Cross-Sectional Study. *Ethiopian Journal of Health Sciences, 21,* 77-83.

Cherie, A., Mitkie, G., Ismail, S., & Berhane, Y. (2005). Perceived Sufficiency and Usefulness of IEC Materials and Methods Related to HIV/AIDS among High School Youth in Addis Ababa, Ethiopia. *African Journal of Reproductive Health, 9,* 66-77.

https://doi.org/10.2307/3583161

Cinner, J. E., Caldwell, I. R., Thiault, L., Ben, J., Blanchard, J. L., Coll, M. et al. (2022). Potential Impacts of Climate Change on Agriculture and Fisheries Production in 72 Tropical Coastal Communities. *Nature Communications, 13,* Article No. 3530. https://doi.org/10.1038/s41467-022-30991-4

Climate Change Secretariat, Ministry of Environment, Sri Lanka (2010). *Strengthening Capacity for Climate Change Adaptation.* http://www.climatechange.lk/adaptation/Files/IEC_Strategy.pdf

Climate-ADAPT (2015). *Awareness Campaigns for Behavioural Change.* The European Commission and European Environment Agency. https://climate-adapt.eea.europa.eu/en/metadata/adaptation-options/awareness-campaigns-for-behavioural-change

Deepmala (2019). *Role of Information Education & Communication (IEC) in Rural Development.* LinkedIn. https://www.linkedin.com/pulse/role-information-education-communication-iec-rural-deveRlopment-mala

Gifford, R. (2011). The Dragons of Inaction: Psychological Barriers That Limit Climate Change Mitigation and Adaptation. *American Psychologist, 66,* 290-302. https://doi.org/10.1037/a0023566

Glisky, E. L. (2007). Changes in Cognitive Function in Human Aging. In D.R. Riddle (Ed.), *Brain Aging: Models, Methods, and Mechanisms* (pp. 3-20). CRC Press. https://doi.org/10.1201/9781420005523-1

Gornall, J., Betts, R., Burke, E., Clark, R., Camp, J., Willett, K. et al. (2010). Implications of Climate Change for Agricultural Productivity in the Early Twenty-First Century. *Philosophical Transactions of the Royal Society B: Biological Sciences, 365,* 2973-2989. https://doi.org/10.1098/rstb.2010.0158

Huber, N., Bugmann, H., Cailleret, M., Bircher, N., & Lafond, V. (2021). Stand-Scale Climate Change Impacts on Forests over Large Areas: Transient Responses and Projection Uncertainties. *Ecological Applications, 31,* e02313. https://doi.org/10.1002/eap.2313

Hunt, D. (2011). *Marketing Research.* McDonald and Evans Ltd.

IPM-CRSP (2002). *9th Annual Report of Integrated Pest Management Collaborative Research Support Program.* PHILRICE.

Luo, Y., & Zhao, J. (2019). Motivated Attention in Climate Change Perception and Action. *Frontiers in Psychology, 10,* Article 1541. https://doi.org/10.3389/fpsyg.2019.01541

Macusi, E. D., Camaso, K. L., Barboza, A., & Macusi, E. S. (2021). Perceived Vulnerability and Climate Change Impacts on Small-Scale Fisheries in Davao Gulf, Philippines. *Frontiers in Marine Science, 8,* Article 597385. https://doi.org/10.3389/fmars.2021.597385

Mishra, P., Gupta, P., & Tyagi, P. (2020). Impact of HIV/AIDS Information Education and Communication Material on Population. *International Research Journal of Engineering and Technology, 7,* 789-795.

PAGASA (2011). *Climate Change in the Philippines.* Department of Science and Technology. http://www.pagasa.dost.gov.ph

PAGASA (2018). *Observed and Projected Climate Change in the Philippine* (pp. 1-36). Philippines Atmospheric, Geophysical and Astronomical Services Administration, Department of Science and Technology.

Paz-Alberto, A. M., Camaso, E., Alberto, R. P., Juganas, D. A., Mapanao, K. M., B. Ponce, C. D. et al. (2021). Climate Change Vulnerability and Disaster Risk Assessment Using Remote Sensing Technology and Adaptation Strategies for Resiliency and Disaster Risk

Management in Selected Coastal Municipalities of Zambales, Philippines. *American Journal of Climate Change, 10,* 85-133. https://doi.org/10.4236/ajcc.2021.101005

Paz-Alberto, A. M., Dios, M. J. J. d., Alberto, R. P., & De Guzman, C. H. E. A. (2018). Climate Change Impacts and Vulnerability Assessment of Selected Municipalities and Agroecosystems to Support Development of Resilient Communities and Livelihoods in Nueva Ecija, Philippines. *American Journal of Climate Change, 7,* 295-335. https://doi.org/10.4236/ajcc.2018.72019

Paz-Alberto, A.M., Serrano, S.C., Alberto, R.P., Ang, J.F.A., Juganas, D.A., Mapanao, K.M., & Hernando, P.J.C. (2017). IEC and Technology Transfer for Biodiversity Conservation and Utilization in Central Luzon. *Silliman Journal, 58,* 149-167.

Program for Appropriate Technology in Health (2004). *Information, Education, and Communication Materials and Caring for People Living with HIV/AIDS.* https://media.path.org/documents/CP_vietnam_iec_mat_caring_plwh.pdf

Raab, M., & Rocha, J. (2011). *Campaigns to End Violence against Women and Girls.* https://www.endvawnow.org/uploads/modules/pdf/1342724232.pdf

Ramirez, R. I. S. (2018). Acceptability and Efficacy of IEC Materials Integrated with CCA and DRR Concepts in Science Teaching. *International Journal of Scientific & Engineering Research, 9,* 1610-1619. https://www.ijser.org/researchpaper/Acceptability-and-efficacy-of-IEC-materials-integrated-with-CCA-and-DRR-concepts-in-science-teaching.pdf

Shankar, S., & Shikha (2018). Impacts of Climate Change on Agriculture and Food Security. In R. L. Singh, & S. Mondal (Eds.), *Biotechnology for Sustainable Agriculture* (pp. 207-234). Elsevier. https://doi.org/10.1016/b978-0-12-812160-3.00007-6

Swann, K (2022). *IEC Material Production Guidelines.* https://www.behaviourchange.net/docs/iec-production-guidelines.pdf

Tanggol Kalikasan (2004). Institute of Environmental Governance (IEG) Brochure. http://www.psdn.org.ph

Thorseth, A. H. (2021). *What Are Information, Education and Communication Materials?* COVID-19 Hygiene Hub Resources. https://resources.hygienehub.info/en/articles/4228335-what-are-information-education-and-communication-materials

World Health Organization (2000). *Information, Education and Communication: A Guide for AIDS Programme Managers.* WHO Project No.: ICP GPA 001. https://iris.who.int/bitstream/handle/10665/205344/B0224.pdf