

Influence of Information Scanning on Dengue-Related Health Beliefs and Adherence to Prevention Practices in At-Risk Areas of Davao City, Philippines

Nelfa M. Glova  • Maria Teresa R. Escano

University of the Philippines Mindanao, PHILIPPINES

Abstract

Individuals learn about health from different health sources. Some of these information are encountered through their routine exposure to the media and their social referents, a process called information scanning. A number of studies that trace the impact of scanned information on health behavior support this assumption. But the role of information scanning on adherence to dengue prevention has not been fully explored among individuals in at-risk communities in the Philippines. Thus, a survey was conducted with participants ($N = 404$) from dengue vulnerable areas in Davao City to assess the influence of scanned information on knowledge and adherence to dengue prevention and thus shed light into the mechanisms of health persuasion. Categorical regression found information scanning ($\beta = .292, p < .005$), knowledge on dengue risk and prevention ($\beta = .142, p < .05$), participation in community clean-ups ($\beta = .265, p < .001$), and subjective norm ($\beta = -.123, p < .05$) to have significantly contributed to participants' predicted adherence to dengue prevention practices. Likewise, age, education, income, and number of children are also significantly correlated to adherence, although the strength of correlation was low. The result points out the importance of ensuring the depth and breadth of scanned information and the need for messages that reinforce knowledge and beliefs which facilitate prevention behavior.

Keywords: dengue prevention • health communication • information scanning • perceived self-efficacy

Correspondence: NM Glova. Department of Humanities, College of Humanities and Social Sciences, University of the Philippines Mindanao, Mintal, Tugbok District, Davao City 8022, Philippines. Telephone: +63 82 293 0084. Email: nmglova@up.edu.ph

Author Contribution: NMG, MTRE: conceptualization, methodology, fund acquisition, project administration, data validation; NMG: supervision, statistical analysis, original draft preparation, revision; MTRE: original draft review

Editor: Raymundo R. Pavo, University of the Philippines Mindanao, PHILIPPINES

Received: 17 January 2019

Accepted: 26 April 2019

Published: 07 May 2019

Copyright: © 2019 Glova and Escano. This is a peer-reviewed, open-access journal article.

Funding Source: This work was supported by a grant by the University of the Philippines Center for Integrative and Development Studies (UP CIDS).

Competing Interest: The authors have declared no competing interest.

Citation: Glova, Nelfa M., and Maria Teresa R. Escano. 2019. "Influence of Information Scanning on Dengue-Related Health Beliefs and Adherence to Prevention Practices in At-Risk Areas of Davao City, Philippines." *Banwa A* 13: art041.

Influence of Information Scanning on Dengue-Related Health Beliefs and Adherence to Prevention Practices in At-Risk Areas of Davao City, Philippines

Nelfa M. Glova✉ • Maria Teresa R. Escano

University of the Philippines Mindanao, PHILIPPINES

Introduction

THERE IS A GROWING INTEREST in the critical role of health communication in the improvement of personal and public health (Dutta 2007). At the individual level, communication helps facilitate knowledge, motivation, and self-efficacy to adhere to health practices (Martin 2014; Liu and Chen 2010). Although the design of effective health messages is the central focus of most health communication efforts, Hornik (2002) opined that the success of public health campaigns depends significantly on exposure. Numerous studies demonstrated that health information exposure enables healthier behaviors (Shen et al. 2018; Bigsby and Hovick 2017; Hornik et al. 2013) by increasing health information seeking, facilitating cognitive decisions, shaping healthy normative practices, and providing constant reminders for healthy behavior (Southwell et al. 2002).

Majority of the research on information exposure are concentrated on information seeking behavior of individuals, which is understood as a more active process of information acquisition (Bright et al. 2005; Bradac 2001). Individuals who contemplate to engage in healthy behavior deliberately seek out related information. Hornik and Niederdeppe (2008) expounded that individuals who experience specific levels of uncertainty about their health are more likely to seek new information in order to deal with the noxious feeling brought about by health anxieties. These newly acquired information strengthen confidence over a health decision (Feltwell and Rees 2004).

However, uncertainty does not always guarantee active information seeking. Hornik and Niederdeppe (2008) observed that uncertainty may not always be sufficient to motivate individuals to seek information. Individuals can still be exposed to information in a non-deliberate manner through their routine encounter with media and messages (Hornik et al. 2013). People tend to observe the information that they actively sought. Yet they can also be motivated by the amount of information that they come upon through their daily exposure to media and interactions with other people, which Slater (1997) first labelled as scanning.

Almost all of the general public are engaged in information scanning related to health (Kelly et al. 2010). Information scanning includes all information that individuals non-deliberately come across and are accorded a certain level of attention sufficient enough to allow the individual a specific degree of recall at a much later time (Southwell et al. 2002) with minimal prompt (Niederdeppe et al. 2007). Hornik and Niederdeppe (2008) cautioned that although information scanning is routinary, it is characterized by an active decision to interact with information sources.

In his seminal study on information processing, McGuire (1968) underscored attention as the very foundation of all the explanatory variables to behavioral persuasion. Messages that are accorded adequate attention encourage higher learning and, eventually, persuasion (Carpenter and Boster 2013). Consequently, effortful processing, involving analysis of arguments and counterarguments, produces a higher probability of persuasion. Given that information seeking is a conscious and goal-directed manner of exposure, it can be assumed that the stimulus information is given a higher level of attention and may produce a bigger impact on behavior (Niederdeppe et al. 2007).

Yet even with less deliberate effort, individuals are exposed to periodic and recurrent doses of information related to specific health topics. Information scanning may often be more frequent compared to active information seeking. This constant method of exposure is theorized to produce a cumulative and substantial effect on cognitive decisions and behaviors (Hornik and

Niederdeppe, 2008). When scanned information is associated with a trusted source, it may gain credibility and, therefore, possesses a high probability for absorption with less elaboration of counterarguments because it forms part of one's habitual use of the media (Hornik and Niederdeppe 2008). Also, individuals may possess a sufficient level of knowledge and interest to attend to and retain information when it is encountered under routine exposures. These habitual exposures allow the individual to access a relatively wide range of information that can be committed to his or her stock of health knowledge and can be retrieved when confronted with a related health condition. The impact of information scanning may also manifest in the individual's interest to seek out further information and may even influence his or her willingness to adhere to recommended health behaviors.

Routes to Behavioral Persuasion

Expectancy value theories such as the health belief model (HBM) developed by Hochbaum, Rosenstock, and Kegels (Rosenstock et al., 1988) and the theory of reasoned action (TRA) advanced by Ajzen and Fishbein (Champion and Skinner 2008) may explain the mechanisms of behavioral influence through information scanning. Three general proximal factors determine health behavior: health beliefs, behavioral norms, and self-efficacy (Champion and Skinner 2008; Ajzen 2002). In the tenets of HBM, observance of health behavior is determined by perceptions of the severity of and susceptibility to a disease, perceptions of the benefits of the recommended actions against those health threats, perceptions of barriers to behavioral observation, and perceptions of self-efficacy to implement the recommended actions (Rosenstock et al. 1988).

When perceptions of severity and susceptibility are high, perceptions of the benefits of the recommended health practices are high, perceptions of the barriers to adherence is low, and perceptions of self-efficacy to carry out the recommendations are high, the likelihood of and actual observance of healthy behaviors are more likely. This process may become complete when

cues to action—mass media and other sources of information, prior experience, and other factors that facilitate the recall and retrieval of evidence-based knowledge, beliefs, and a repertoire of related actions—are available.

The TRA identifies attitude, subjective norms, perceived behavioral control, and intention as proximal determinants of health adherence (Ajzen and Albarracin 2007). Central to adherence to healthy behavior is a high level of intention. However, high intention can only be achieved if the individual possesses a positive attitude toward the recommended behavior, has stronger subjective norms—the propensity to meet one's perceptions of the expectations of his or her significant others with regards to his or her health, and has a high level of perceived behavioral control that is also based on self-efficacy (Bandura 2004).

When individuals are exposed to evidence-based information of a health threat by way of routine information scanning, positive attitudes toward the recommended health behavior, favorable subjective norms, and a stronger perceived behavioral control to implement the recommended health action are enabled (Montaño and Kasprzyk 2008). Studies tracing the effect of information exposure on health behavior and practices corroborated this assumption.

In the Philippines, initial studies on information exposure are said to have significant association with rabies prevention, leptospirosis prevention, dengue control, and intention to obtain a dengue vaccination (Monterde 2015; Yu 2015; Perez 2014; Lañada 2013). In turn, prevention was reported to be moderated by perceived severity, susceptibility, benefits, and self-efficacy (Yu 2015; Perez 2014; Lañada 2013) and subjective norms (Monterde 2015). Scanned and actively sought messages contain evidence-based information that shape people's understanding of health and diseases. It facilitates positive normative expectations on health. It also builds people's self-efficacy to address specific health conditions.

The HBM and TRA identify the proximal factors that link information scanning and behavior. Thus, it can be postulated that information scanning affects adherence to dengue prevention practices by way of mediating factors such as knowledge on dengue risk and

prevention, perception of severity, susceptibility, benefits of adherence, barriers to adherence, self-efficacy, subjective norms, and relevant personal characteristics.

This study hypothesized that information scanning on dengue influences adherence to prevention practices among residents in at-risk areas of Davao City. In turn, adherence is moderated by health beliefs such as knowledge on dengue risk and prevention, perceived severity of and susceptibility to dengue, perceived benefits of and barriers to dengue prevention, perceived subjective norms, and perceived self-efficacy to adhere to prevention, and prior engagement in related behavior such as participation in community clean-ups.

The effect of information scanning on dengue-related beliefs and adherence to prevention practices presents a sense of urgency for health communication research in the Philippines. Health and risk communication on dengue is part of the Dengue Prevention and Control Program of the Department of Health (DOH) in 1998 aimed to eradicate dengue in the country through positive health status of the population, risk reduction, and provision of better services and protection. Information drives through the mass media, community-based communication channels, and interpersonal sources form part of people's information scanning. However, though the likelihood of dengue information scanning is highly probable especially during the rainy season when the risk is higher, its effect on adherence to prevention has not been fully explored in different populations across the country such as those in at-risk areas in Davao City.

Methods

Design and Sampling

The study is a one-shot survey involving a total of 404 participants with a consideration and tolerance for a 5% margin of error at 95% confidence interval. Simple random sampling was used to draw the respondents from two *barangays* (villages) that are identified as highly at-risk to dengue in Davao City based on the data of the City Health Office (CHO) from 2014

to 2017. The focus on at-risk areas was based on the amount and salience of dengue-related health information that are available in these places and the relevance of adherence to prevention practices among participants. These are important considerations in a study that investigated the relationship between health information scanning and prevention behavior. The study also sought the informed consent of participants.

Measures

An interview schedule was designed to measure participants' level of information scanning related to dengue, knowledge on dengue and its prevention, health beliefs, engagement in community prevention activities, and adherence to dengue prevention practices, including relevant socio-demographic characteristics that may help classify responses. The interview schedule was pretested to 20 individuals who resided in another at-risk barangay which is not part of the survey.

Hornik and Niederdeppe (2008) operationalized information scanning in terms of the breadth (the number of sources), depth (the richness of the information acquired), and frequency of exposure. This operationalization is adopted by the current study. Thus, information scanning was measured by asking participants to answer a series of recall tasks. These questions included asking them if they have heard, seen, and read dengue-related health information from various media (i.e., radio, TV, and print), interpersonal sources, and community-based information dissemination programs in the last 12 months (e.g., *Have you heard dengue being discussed/reported in the radio in the last 12 months? What radio program have you heard it from? What was the message about?*). In this manner, the measures for encoded exposure avoided biases in recall by triangulating the type of information that the participants supplied. They did not only identify the source or channel of information, they also supplied the particular program, events, or materials and the message that they contained. In addition, by establishing a temporal reference point of 12 months recall was, theoretically, confined to a period of one year in order to help participants minimize the memory strain that comes with recall tasks.

Participants who answered in the affirmative were then asked to recall and supply the particular programs, materials, or events from which they have heard, saw, read, and derived the information. Finally, they were asked to recall the salient message(s) that they remembered from the programs or events. Affirmative answers were given one point each, recall of a program or event was also assigned one point each, and every takeaway message was assigned one point. Respondents' scores from different media and sources were summed up to get the encoded exposure index. The highest possible score was 24. The respondents' encoded exposure scores were classified as: 0 (*none*), 1 (*very low*), 2 (*low*), 3 (*moderate*), 4 (*high*), and 5 (*very high*).

Knowledge on dengue and dengue prevention was measured by constructing multiple choice items that elicit participants understanding of the nature, risk factors, and prevention of dengue. Every correct answer was given a point. Based on the highest possible score, a knowledge index was computed and respondents were categorized as: 0 (*no knowledge*), 1 (*very low*), 2 (*low*), 3 (*moderate*), 4 (*high*), and 5 (*very high*).

Health beliefs such as perceived susceptibility to and perceived severity of dengue, subjective norms, perceived benefits of dengue prevention, perceived barriers to dengue prevention, and perceived self-efficacy to adhere to dengue prevention practices were measured using 5-point Likert scales containing attitude statements that the participant weighed according to intensity of their agreement or disagreement. A set of Likert items were developed to measure each of the aforementioned behavioral constructs. Based on the highest possible score for construct, an index was computed categorizing participants' responses into: 1 (*very low*), 2 (*low*), 3 (*moderate*), 4 (*high*), and 5 (*very high*) perceived severity and susceptibility, subjective norms, and perceived benefits, barriers, and self-efficacy. Cronbach's alpha was computed to test the reliability of the scales that were developed for this study. Table 1 shows that a number of scales used to measure certain variables are quite low. In retrospect, the items contained in these scales are few. Scale reliability tests seem to be sensitive to the number of items and the distribution of positive and

TABLE 1. Cronbach's alpha reliability of the scales

Variables	No. of items	Cronbach's α
Perceived threat of dengue (Perceived severity and perceived susceptibility)	12	.529
Subjective norms	5	.635
Perceived benefits of adherence to prevention practices	5	.713
Perceived barriers to adherence to prevention practices	5	.454
Perceived self-efficacy to adhere to dengue prevention practices	7	.494
General scale	29	.776

negative positions or statements. However, the other measures are acceptable. The Cronbach's alpha of the whole Likert scales used in the study is .776, which is equal to the acceptable .7 alpha level for the social sciences.

Participation in community clean-ups was measured by asking the participants to report their participation. This variable was assumed important to adherence on dengue prevention since it exposes residents to dengue information and allows rehearsal of related prevention behaviors that they can implement in their daily lives outside of those community-imposed activities. Community clean-ups is separate from household and personal prevention in a sense that the questions only elicited those programs and activities within the public domain such as clean-up of canals and ditches, removal of old tires and other objects that are stacked in the common areas in the community, and draining of stagnant bodies of water. Each activity participated are given one point, and a mean index was computed from the total indicating 1 (*no participation*), 2 (*very low participation*), 3 (*low participation*), 4 (*moderate participation*), 5 (*high participation*), and 6 (*very high participation*).

Adherence to dengue prevention practices was measured by asking participants to identify all the behaviors that are preventive of dengue that they implement at home and in their personal

lives. Prevention practices included covering of water containers, regular emptying and scrubbing of water containers, weeding, underbrushing and cleaning the surrounding of the house, emptying the water inside flower vases as part of the 4 o'clock habit, among other practices that are aimed mainly at eliminating dengue-carrier mosquito breeding grounds and exposure to mosquito bites. Participants' answers were compared to an evidence-based list of prevention behaviors issued by the World Health Organization (WHO). Reported practices that corresponded with the list were given one point each. A mean index was computed from the total points to indicate 1 (*non-adherence*), 2 (*very low adherence*), 3 (*low adherence*), 4 (*moderate adherence*), 5 (*high adherence*), and 6 (*very high adherence*).

Statistical Analysis

The data was tested for normality in order to determine the appropriate statistical tests to use in the analysis. The test of normality ensured that the study did not violate the assumptions of the statistical tests that were ran on the data such as the assumption of normal distribution in parametric testing. The Shapiro-Wilks λ was used to determine the distribution of the data since the number of respondents are less than 2,000. The results show that the data are not drawn from a normal distribution. Hence, the use of parametric statistical analyses was ruled out in this study in favor of the appropriate nonparametric tests.

The data were fitted into a categorical regression (CATREG) equation in order to test how adherence to dengue prevention practices is dependent on information scanning, knowledge on dengue risk and prevention, participants' health beliefs, and specific socioeconomic characteristics that are deemed influential on health behavior. CATREG allowed for the quantification of ordinal and nominal data in the study through the assignment of numeral values to the categories giving these transformed variables an optimum linear regression equation.

Results and Discussion

Descriptive Statistics

Majority of the participants are female. They are classified into four age groups with adults comprising more than half of the population. More than half of the participants have either college education or a college degree and the same proportion are married. A major proportion of the participants have one to four children. A little more than half reported to be unemployed while more than half also reported to belong to more than PhP 400,000.00 income stratum (Table 2).

Small proportions of participants reported high to very high levels of information scanning. More than one-third of the participants demonstrated a moderate level of dengue-related knowledge. Nil proportions revealed very low and very high levels of dengue-related knowledge. The remaining proportion of participants is almost equally divided between those who showed low and high levels of knowledge. Participation in community clean-ups is reported to range from no participation to low participation. Meanwhile, adherence to dengue prevention practices is concentrated along very low, low, to moderate adherence (Table 3).

Interaction between Variables

Running a bivariate analysis to measure correlation among the variables, data shows adherence to dengue prevention practices demonstrated a highly significant relationship with information scanning ($r_s = .143, p < .005$), knowledge on dengue risk and prevention ($r_s = .180, p < .001$), and participation in community clean-ups ($r_s = .187, p < .001$). Although this result does not reveal causal relationships, these highly significant positive correlations adduced that information scanning, knowledge on risk and prevention, and participation in community clean-up drives are necessary conditions for adherence. As such, an increase in the level of information scanning, knowledge on risk and prevention, and participation also produces an increase in the level of adherence (Table 4).

TABLE 2. Sociodemographic characteristics of the sample (N = 404)

Variables	Frequency	%
Sex		
Female	318	78.7
Male	86	21.3
Age group		
Young	10	2.5
Adult	225	55.7
Middle age	118	29.2
Old age	51	12.6
Educational attainment		
Elementary	27	6.7
High school	71	17.6
College	260	64.4
Postgraduate	46	11.4
Civil status		
Single	85	21.0
Married	277	68.6
Separated	11	2.7
Widowed	31	7.7
Number of children		
None	59	14.6
1–4	283	70.0
5–8	58	14.4
9–12	4	1.0
Employment		
Not employed	233	57.7
Public employment	38	9.4
Private employment	31	7.7
Self-employment	102	25.2
Income groups (PhP)		
≤ 79,999	6	1.5
80,000 – 239,999	10	2.5
240,000 – 399,999	106	26.2
≥ 400,000	282	69.8

NOTE: Data are unweighted.**TABLE 3.** Dengue information scanning and dengue-related knowledge

Information Scanning, Beliefs, and Practices	Frequency	%
Information scanning		
None	9	22.0
Very low	106	26.2
Low	141	34.9
Moderate	99	24.5
High	33	8.2
Very high	16	4.0
Knowledge on dengue risk and prevention		
Very low	4	1.0
Low	54	13.4
Moderate	290	71.8
High	52	12.9
Very high	4	1.0
Participation in community clean-ups		
None	74	18.3
Very low	165	40.8
Low	165	40.8
Moderate	0	0
High	0	0
Very high	0	0
Adherence to dengue prevention practices		
No adherence	9	2.2
Very low adherence	106	26.2
Low adherence	141	34.9
Moderate adherence	99	24.5
High adherence	33	8.2
Very high adherence	16	4.0

TABLE 4. Spearman's rank correlation coefficient showing the relationship between scanning of dengue information, knowledge, health beliefs, and prevention practices

Variables	1	2	3	4	5	6	7	8	9	10
Information scanning	—									
Knowledge on dengue risk and prevention	.180**	—								
Perceived Susceptibility	-.010	.082	—							
Perceived severity of dengue	-.025	.022	.235**	—						
Subjective norms	-.017	.085	.225**	.334**	—					
Perceived benefits of adherence	-.014	.043	.251**	.232**	.558**	—				
Perceived barriers to adherence	-.027	.028	.152**	.023	-.078	.005	—			
Perceived self-efficacy	.022	.098*	.299**	.184**	.172**	.297**	.599**	—		
Participation in community clean-ups	.187**	.180**	.122*	.149**	.133**	.161**	.020	.133**	—	
Adherence to dengue prevention practices	.143**	.189**	.026	.037	-.037	-.037	.015	-.002	.294**	—

* Correlation is significant at $p < .05$ (2-tailed); ** Correlation is significant at $p < .005$ (2-tailed).

Information scanning does not reveal a significant relationship with perceived susceptibility, severity, benefits, barriers, and self-efficacy. This is also observed with subjective norms. However, a highly significant association was observed between perceived susceptibility and perceived severity ($r_s = .235, p < .001$), subjective norm ($r_s = .225, p < .001$), perceived benefits ($r_s = .251, p < .001$), barriers ($r_s = .152, p < .001$), and self-efficacy ($r_s = .143, p < .005$). A significant relationship was also observed with participation in community clean-ups ($r_s = .122, p < .05$). A highly significant relationship was likewise observed between perceived severity and subjective norm ($r_s = .334, p < .001$), perceived benefits ($r_s = .232, p < .001$), perceived self-efficacy ($r_s = .184, p < .001$), and participation in community clean-ups ($r_s = .133, p < .005$). Subjective norm also showed highly significant relationships with perceived benefits ($r_s = .558, p < .001$), perceived self-efficacy ($r_s = .172, p < .005$), and participation in community

clean-ups ($r_s = .133, p < .01$). A highly significant relationship was observed between perceived benefits and perceived self-efficacy ($r_s = .143, p < .005$) and participation in community clean-ups ($r_s = .143, p < .005$). Perceived barriers have high significant relationship with perceived self-efficacy ($r_s = .599, p < .001$). In turn, perceived self-efficacy has a highly significant relationship with participation in community clean-ups ($r_s = .133, p < .01$). Participation in community clean-ups and adherence ($r_s = .294, p < .001$) have high significant relationship.

In order to determine the strength of association among variables, the explanatory variables and the response variable were fitted into a categorical regression model. The regression of adherence to dengue prevention practices on the predictors yielded an R^2 of .214; thus, 21.4% of the variance in the adherence rankings is explained by the explanatory variables (i.e., information scanning, knowledge, health beliefs, and participation in community clean-ups) in the

categorical regression which, for the purpose of this analysis, are treated as explanatory variables to adherence.

A cursory look at Table 5 shows a larger standardized regression coefficients in variables information scanning ($\beta = .292$, $df = 2$, $p < .005$), knowledge on dengue risk and prevention ($\beta = .142$, $df = 1$, $p < .05$), participation in community clean-ups ($\beta = .265$, $df = 3$, $p < .001$), age ($\beta = .094$, $df = 4$, $p < .01$), income group ($\beta = .109$, $df = 4$, $p < .001$), number of children ($\beta = .097$, $df = 4$, $p < .01$), and education ($\beta = .109$, $df = 4$, $p < .001$). These values indicate the amount of change in the predicted adherence ranking. For example, a one-standard deviation change in information scanning corresponds to a .295 increase in the predicted adherence to dengue prevention practices. In the same manner, a one standard deviation increase in participation in community clean-ups would lead to a .265 increase in adherence.

On the other hand, a higher subjective norm ($\beta = -.123$, $df = 2$, $p < .05$) reduces the predicted adherence by .123. Subjective norms were ranked into 1 (*very low*), 2 (*low*), 3 (*moderate*), 4 (*high*), and 5 (*very high*). Adding strength to the subjective norm corresponds to a decrease in the predicted adherence. The same trend is observed in perceived severity, perceived benefits, perceived self-efficacy, and employment status. However, an increase or decrease of these variables barely produces a decrease or increase in the predicted adherence as pointed out by the non-significant relationships between these explanatory variables and the response variable.

Since coefficients are not sufficient to explain the impact of explanatory variables on adherence, the correlation (partial-, part-, and zero-order correlation) values were also inspected. A closer look at the values shows that participation in community clean-ups, knowledge on dengue risk and prevention, information scanning, education, number of children, age groups, and employment status present large correlation with adherence. Specifically, participation in community prevention has the largest correlation with adherence (.302), followed by knowledge on dengue risk and prevention (.175), and information scanning (.158). Since these values

are still confounded by the other variables in the model, the partial correlation was considered as it removes the linear effects of other variables from both the explanatory variables and the response variable.

Thus, given a partial correlation of .162, by squaring the value, information scanning explains 2.62% of the variation in the adherence ranking. Knowledge on dengue risk and prevention explains 2.95% of the variation in adherence while participation in community clean-ups accounts for 9.12% of that variance. Adding up the partial correlations of all the explanatory variables after removing the interactional effects explains the total 21.4% of the variance in adherence ranking as earlier indicated by the R^2 value.

Finally, Pratt's measure of relative importance helps explain how much the explanatory variables have contributed to the regression (Thomas et al. 2008). The three largest importance corresponds to participation in community clean-ups (.375), information scanning (.217), and knowledge of dengue (.117) (Table 5). Adding up the values for importance of the aforementioned variables equals to .709. In turn, this accounts for 70.9 or 71% of the importance for this combination of predictors. The remaining 39% is accounted by the rest of the explanatory factors in the study. Participation in community clean-ups, information scanning, and knowledge of dengue risk and prevention are the three most important explanatory variables in this study.

Discussion

Consistent with what has been hypothesized in the study, information scanning is significantly associated with adherence to dengue risk prevention practices. It also presented a significant relationship with two mediating variables, knowledge on dengue risk and prevention and participation in community clean-ups. It can be noted that the strength of association between information scanning and adherence is rather low compared to that of knowledge and participation in community clean-up drives. As stated earlier, these associations should not be mistaken as causal relationships. It cannot be ascertained

TABLE 5. Categorical regression (optimal scaling) of adherence to dengue prevention as a function of information scanning, knowledge, participation in community clean-ups, health beliefs, and sociodemographic characteristics (N=404)

Predictor variables	Coefficients			Correlations				Tolerance (after transformation)
	β	F	p	Zero-order	Partial	Part	Importance	
Information scanning	.292	7.201	.001**	.158	.162	.146	.217	.250
Knowledge on dengue	.142	4.042	.045*	.175	.151	.135	.117	.907
Participation in community clean-ups	.265	22.668	.000**	.302	.269	.248	.375	.877
Perceived susceptibility	-.038	.153	.696	.863	-.040	-.035	.000	.863
Perceived severity	.069	.503	.479	.830	.070	.063	.022	.830
Subjective norms	-.123	3.070	.048*	.773	-.121	-.108	.046	.773
Perceived benefits	-.042	.250	.617	.876	-.044	-.039	.016	.876
Perceived barriers	.062	.556	.574	.577	.053	.047	.003	.577
Perceived self-efficacy	-.084	1.138	.322	.555	-.070	-.062	.007	.555
Sex	.056	1.257	.286	.076	.061	.054	.020	.924
Age group	.094	3.683	.006*	.109	.102	.091	.048	.943
Civil status	.040	.627	.644	.075	.043	.038	.014	.889
Education	.109	5.963	.000**	.141	.117	.104	.072	.923
Income group	.109	5.337	.000**	.077	.118	.105	.039	.923
Number of children	.097	3.717	.006*	.119	.101	.090	.054	.875

* Correlation is significant at $p < .05$; ** Correlation is significant at $p < .005$

whether information scanning precipitates knowledge, participation, and further scanning or the other way around. However, this is a probable reason to posit that information scanning along with knowledge on dengue risk and prevention and participation in community clean-ups are important conditions that reinforce adherence. Scanning may make information available to people and strengthen knowledge. Meanwhile, participation in community clean-ups, accordant to HBM, may serve as cues to action, priming the individual to adhere to dengue prevention. In addition, participation in community clean-ups may be encoded as part of the individual's tacit knowledge, which, in turn, aids adherence.

Information scanning, however, failed to produce a significant relationship with health beliefs that the study conceived of as mediating factors to adherence. There are a number of possible explanations for this. Meyerowitz and Chaiken (1987) reported that health communication may affect behavior through one or a combination of these four possible means: delivery of information on the effect of habits on health, heightening fear of the disease, strengthening perceptions of susceptibility, or by reinforcing perceptions of self-efficacy to modify behavior. However, information alone does not beget a high level of self-efficacy, for example. In his ground-breaking work social cognitive theory, Bandura (1986, 18-29) elucidated the four bases of self-efficacy information: performance accomplishments, vicarious experiences, verbal persuasion or exhortations, and physiological states. Performance accomplishments derive information from experience while the use of character exemplars provides vicarious learning. Persuasive messages may be most common in health education but they are less potent compared to the first two factors. Given the complexity of self-efficacy, informative messages alone may not be sufficient to motivate adherence. Health beliefs are stable dispositions that need a combination of all the aforementioned factors as communication intervention.

Another possible explanation has something to do with information processing. As Niederdeppe and colleagues (2007) posited actively sought messages that are accorded

adequate attention may produce stronger effect on related health dispositions and behaviors. Dual information processing models like the elaboration likelihood model (ELM) (Cacioppo and Petty 1989) explicated that goal-oriented processing, involving analysis of arguments and counterarguments, produces a higher probability of persuasion compared to scanned messages. On the other hand, the influence of scanned information depends on depth, variety, and frequency (Hornik and Niederdeppe, 2008) such that when higher levels of these are satisfied, an effect, although less strong, can be observed. Yet participants' information scanning ranged from no scanning to moderate. Nevertheless, consistent with the assumptions of HBM and TRA, the factors perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, and subjective norms are significantly correlated.

These results have implications to dengue communication and persuasion. To strengthen knowledge and adherence, there is a need to increase the depth, breadth, and frequency of scanned information related to dengue. More than that, health education on dengue should put primacy on strategic communication interventions that make effective use of local communication networks and alternative channels of information where exposure to health messages from mainstream media appears to be affected by lack of health programming, high cost, and limited access, among other factors. A well planned communication intervention would allow for wider exposure and deliberate processing of messages at the household and community levels where the signification of health information is magnified compared to what mere information scanning can achieve at the level of individual behavior. This brings to mind the importance of building not only individual health behaviors but also of collective efficacy towards dengue prevention. Dengue is not a disease that selectively affects individuals. It is infectious and is easily spread across communities as long as the risk factors are present. It behooves upon the whole community to mobilize actions ranging from health education to community risk surveillance and risk reduction in order to strategically eliminate dengue. This is

where our communication strategies are lacking; equal emphasis in strengthening collective behaviors that allow members of communities to significantly reduce the risk through concerted efforts instead of focusing only on individual behavior change.

In addition, health communication on dengue need to explore different messaging strategies and treatments to raise awareness of risk (severity and susceptibility), to underscore the immediacy of risk prevention and strengthen self-efficacy thus enabling the performance of risk prevention practices that are needed to avert the risk (Bandura 2004). Bandura added that stronger efficacy beliefs enable better health goals and more stable determination to achieve them and to overcome the obstacles to health behavior while weaker self-efficacy results in poor health. A review of the dengue communication (not covered by this paper but part of the study) revealed that message treatments are purely informational. Although there is an emphasis on the nature, risk, signs and symptoms, and treatment of dengue in those messages, the persuasive messages that aims to moderate negative beliefs and build self- and community efficacy to overcome the barriers to dengue prevention were absent.

Conclusion

The literature is replete with evidence that points to the importance of information exposure in the formation of related beliefs, attitudes, and practices. There is a growing body of studies that trace the influence of information scanning on different health behaviors. This study substantiates the importance of health information scanning, knowledge, and task exposure through participation in community programs in adherence to dengue prevention. This study also reveals that despite long-running programs on dengue surveillance and control, the disease is still widely misunderstood and this may have contributed to high incidence during outbreaks. Above all, the study established that women who are stay-at-home mothers with younger children take the main responsibility in ensuring family health. This underscores the importance of recognizing the role of women in

dengue health promotion in the household and in the community. Communication programs may channel resources to tailor messages for and capacitate women's health leadership in community dengue prevention.

Acknowledgment

The authors are grateful to Virgil P. Relator for facilitating partnership with concerned local government units and offices in Davao City and for data processing; to Janica Jane Puno, Mary Shelley Tiu, Sizzle Marl Ledres, Charlotte Dominique Cubero, Prince Harvey Arellano, and Nicole T. Revisa for collecting the data.

References

- AJZEN, ICEK, and DOLORES ALBARRACIN. 2007. "Predicting and Changing Behavior: A Reasoned Action Approach". In *Prediction and Change of Health Behavior, Applying the Reasoned Action Approach*, edited by Icek Ajzen, Dolores Albarracin, and Robert Hornik, 3-21. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- AJZEN, ICEK. 2002. "Perceived Behavioral Control, Self-efficacy, Locus of Control, and the Theory of Planned Behavior." *Journal of Applied Social Psychology* 32, no. 4: 665-683. <https://doi/abs/10.1111/j.1559-1816.2002.tb00236.x>
- BANDURA, ALBERT. 2004. "Health Promotion by Social Cognitive Means." *Health Education Behavior* 31, no. 2: 143-164. <https://doi:10.1177/1090198104263660>
- _____. 1986. *Social Foundations of Thought and Action*. Englewood Cliffs, NJ: Prentice Hall, Inc.
- BIGSBY, ELISABETH, and SHELLY R. HOVICK. 2018. "Understanding Associations between Information Seeking and Information Scanning and Health Risk Behaviors: An Early Test of the Structural Influence Model." *Health Communication* 33, no. 3: 1-11. <https://doi:10.1080/10410236.2016.1266575>
- BRADAC, JAMES J. 2001. "Theory Comparison: Uncertainty Reduction, Problematic Integration, Uncertainty Management and Other Curious Constructs." *Journal of Communication* 51, no. 3: 456-476. <https://10.1111/j.1460-2.466.2001.tb02891.x>

- BRIGHT, MARY ANN, FLEISHER, LINDA, THOMSEN, CHRIS, MARION E. MORRA, AL MARCUS, and WENDY GERNIG. 2005. "Exploring e-Health Usage and Interest among Cancer Information Service Users: The Need for Personalized Interactions and Multiple Channels Remains." *Journal of Health Communication* 10, suppl. 1: 35-52. <https://doi:10.1080/10810730500265609>
- CARPENTER, CHRISTOPHER J., and FRANKLIN J. BOSTER. 2013. "The Relationship between Message Recall and Persuasion: More Complex Than It Seems." *Journal of Communication* 63, no. 4: 661-681. <https://doi:10.1111/jcom.12042>
- CACIOPPO, JOHN T., and RICHARD E. PETTY. 1989. "Effects of Message Repetition on Argument Processing, Recall, and Persuasion." *Basic and Applied Social Psychology* 10: 3-12. <https://doi:10.1207/S15324834basp1001-2>
- CHAMPION, VICTORIA L., and CELETTE S. SKINNER. 2008. "The Health Belief Model." In *Health Behavior and Health Education*, edited by Karen Glanz, Barbara K. Rimer, and Kasisomayajula Viswanath, 4th ed, 45-62. San Francisco, CA: Jossey-Bass.
- DUTTA, MOHAN J. 2007. "Communicating about Culture and Health: Theorizing Culture-centered and Cultural Sensitivity Approaches." *Communication Theory* 17, no. 3: 304-328. <https://doi:10.1111/j.1468-2885.2007.00297.x>
- FELTWELL, ANNIE K., and CHARLOTTE E. REES. 2004. The Information-Seeking Behaviors of Partners of Men with Prostate Cancer: A Qualitative Pilot Study. *Patient Education and Counseling* 54, no. 2: 179-185. [https://doi:10.1016/S0738-3991\(03\)00212-x](https://doi:10.1016/S0738-3991(03)00212-x)
- HORNİK, ROBERT C. 2002. "Exposure Theory and Evidence about All the Ways It Matters." Annenberg School of Communication Department Papers (ASC), 31-37.
- HORNİK, ROBERT, and JEFF NIEDERDEPPE. 2008. "Information Scanning." In *International Encyclopedia of Communication*, edited by Wolfgang Donsbach, 2257-2261. Oxford, UK: Wiley-Blackwell.
- HORNİK, ROBERT, SARAH PARVANTA, SUSAN MELLO, DEREK FRERES, BRIDGET KELLY, and SANFORD J. SCHWARTZ. 2013. "Effects of Scanning (Routine Health Information Exposure) on Cancer Screening and Prevention Behaviors in the General Population." *Journal of Health Communication* 0:1-14. <https://doi:10.1080/10810730.2013.798381>
- KELLY, BRIDGET, ROBERT HORNİK, ANCA ROMANTAN, J. SANFORD SCHWARTZ, KATRINA ARMSTRONG, ANGELA DiMICHELE . . . and NORMAN WONG. 2010. "Cancer Information Scanning and Seeking in General Population." *Journal of Health Communication* 15, no. 7: 734-753. <https://doi:10.1080/10810730.2010.514029>
- LAÑADA, EULA DEE A. 2013. "Communication Environment and Risk Perceptions of Dog-Borne Zoonotic Diseases among Baybay, Leyte Residents." Undergraduate thesis, Visayas State University.
- LIU, SHUANG, and CHEN, GOU-MING. 2010. "Communicating Health: People, Culture and Context." *China Media Research* 6, no. 4: 1-2.
- MARTIN, LESLIE R. 2014. "Behaviors and Keys to Treatment Adherence and Health Behavior Change." In *The Oxford Handbook of Health Communication, Behavior Change, and Treatment Adherence*, edited by Leslie R. Martin and M. Robin DiMatteo, 9-20. Madison Ave., NY: Oxford University Press.
- MCGUIRE, WILLIAM J. 1968. "Personality and Susceptibility to Social Influence." In *Handbook of Personality Theory and Research*, edited by Edgar F. Borgatta and William W. Lambert, 1130-1187. Chicago, IL: Rand McNally.
- MEYEROWITZ, BETH E., and SHELLY CHAIKEN. 1987. "The Effect of Message Framing on Breast Self-Examination Attitudes, Intentions, and Behavior." *Journal of Personality and Social Psychology* 52: 500-510. <https://doi:10.1.1.462.677>
- MONTAÑO, DANIEL E., and DANUTA KASPRZYK. 2008. "Theory of Reasoned Action, Theory of Planned Behavior, and the Integrated Behavioral Model." In *Health Behavior and Health Education*, edited by Karen Glanz, Barbara K. Rimer, and Kasisomayajula Viswanath, 4th ed, 67-92. San Francisco, CA: Jossey-Bass.
- MONTERDE, CHRISTINE GRACE D. 2015. "Information Environment and Risk Perceptions of Dengue Vaccine Among Davao City Residents." Undergraduate thesis, University of the Philippines Mindanao.
- NIEDERDEPPE, JEFF., DOMINICK L. FROSCHE, and ROBERT C. HORNİK. 2008. "Cancer News Coverage and Information Seeking." *Journal of Health Communication* 13, no. 2: 181-199.

- NIEDERDEPPE, JEFF, ROBERT C. HORNIK, BRIDGET J. KELLY, DOMINICK L. FROSC, ANCA ROMANTAN, ROBIN STEVENS, FRANCES K. BARG, JEFFREY L. WEINER, and J. SANFORD SCHWARTZ. 2007. "Examining the Dimensions of Cancer-Related Information Seeking and Scanning Behavior." *Health Communication* 22, no. 2: 153–167.
- PEREZ, SIGRID M. 2014. "Influence of Information Environment on Risk Perceptions of Leptospirosis in New Matina Gravahan, Davao City." Undergraduate thesis, University of the Philippines Mindanao.
- ROSENSTOCK, IRWIN M., VICTOR J. STRECHER, and MARSHALL H. BECKER. 1988. "Social Learning Theory and Health Belief Model." *Health Education Quarterly* 15, no. 2: 175–183.
- SHEN, CHEN, MAN PING WANG, ALIC WAN, KASISOMAYAJULA VISWANATH, SOPHIA SIU CHEE CHAN, and TAI HING LAM. 2018. "Health Information Exposure from Information and Communication Technologies and Its Associations with Health Behaviors: Population-based Survey." *Preventive Medicine* 113: 140–146.
- SLATER, MICHAEL D. 1997. "Persuasion Processes across Receiver Goals and Message Genres." *Communication Theory* 7, no. 2: 125–148. <https://doi/abs/10.1111/j.1468-2885.1997.tb00145.x>
- SOUTHWELL, BRIAN G., CARLIN HENRY BARMADA, ROBERT C. HORNIK, and DAVID M. MAKLAN. 2002. "Can We Measure Encoded Exposure? Validation Evidence from a National Campaign." *Journal of Health Communication* 7, no. 5: 445–453. <https://doi:10.1080/10810730290001800>
- THOMAS, D. ROLAND, PENG CHENG ZHU, BRUNO D. ZUMBO, and SHANTANU DUTTA. 2008. "On Measuring the Relative Importance of Explanatory Variables in a Logistic Regression." *Journal of Modern Applied Statistical Methods* 7, no. 1: 21–38. <https://doi:10.22237/jmasm/1209614580>
- YU, MARIA JESSA S. 2015. "Effectiveness of IEC Campaign on Dengue Prevention in Selected Dengue Hotspots in Buhangin Proper, Davao City." Undergraduate thesis, University of the Philippines Mindanao.