Evaluating the Iranian Women's Environmental Health Literacy

ABSTRACT

Background and Objectives: Environmental health literacy (EHL) pertains to the ability to comprehend and utilize environmental data in order to make informed choices regarding one's health. The aim of this study is to evaluate EHL, encompassing Knowledge, Attitudes, and Behaviors (KAP) regarding general environmental health (GEH) and Specific Environmental Media (air, food, and water), as well as their socio-demographic determinants.

Materials and Methods: A descriptive study was conducted to examine the EHL of 678 women who visited comprehensive health centers in Zanjan city in 2023. Data was collected through multi-stage random sampling using the validated EHL Scale, and analyzed with SPSS 23 software at a significance level below 0.05.

Results: The study found that while most women have good knowledge of GEH (80.7%), water (60.3%), and food (90.9%), only 26.7% are knowledgeable about air HL. Additionally, 33.9% had a positive attitude towards GEH, while only 13.7% felt positively about air quality. Many participants showed limited knowledge (37.5%) and a negative attitude (43.8%) towards air quality. Significant correlations exist between age, marital status, economic status, training participation, and women's EHL.

Conclusion: The level of women's GEH and specific environmental media (air, food, and water) was high. However, their level of literacy in air media was lower than the other areas. To enhance environmental health literacy, health authorities should capitalize on women's potential and introduce specific programs to boost their air literacy.

Paper Type: Research Article

Keywords: Environment, Health literacy, Water, Food, Air.

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Introduction

According to the World Health Organization (WHO), in 2016, 24% of global deaths were attributed to environmental factors such as pollution, radiation, workplace hazards, and climate change. For children under 5, this percentage rises to 28% (1). Two-thirds of environmentally linked deaths occur in developing countries from diseases caused by air and water pollution (2). Around 42% of chronic obstructive pulmonary disease (COPD) is tied to environmental factors such as occupational dust, chemicals, and indoor air pollution. Air pollution, including vehicle emissions and second-hand smoke, also plays a role in its development (3).

Pollutant concerns and exposure risks change over time and place, but societies implement strategies like sewage treatment and occupational hygiene to minimize risks and prevent diseases. Ongoing research provides insights into health protection amid environmental challenges, emphasizing the need for understanding environmental health for individuals and communities (4). The WHO calls on all countries to meet Sustainable Development Goals (SDGs) by 2030, aimed at enhancing sustainable living for future generations. Iran faces significant environmental challenges, making Environmental Health Literacy (EHL) vital. EHL integrates environmental and health literacy, equipping individuals to seek, assess, and utilize information on environmental health. This enables informed decisions, risk reduction, and improved quality of life, while also fostering environmental awareness (5).

Enhancing health literacy and comprehension of scientific evidence can empower both individuals and communities to prevent unnecessary exposures and mitigate negative health effects (4). EHL encompasses the knowledge, attitudes, and behaviors that influence how individuals and communities use environmental information in health decisions. It is a dynamic process that improves understanding of environmental health risks and ways to reduce harmful exposures while promoting health (6). The importance of improving information-seeking and decision-making skills has been emphasized in literature to increase awareness and comprehension of EH, ultimately promoting health-protective behaviors (7-10). It is acknowledged that environmental exposures often originate from sources that individuals cannot control, and that health disparities can worsen community concerns (11). Moreover, socioeconomic and contextual aspects impact EHL, encompassing language, schooling, community connections, and media coverage (12, 13).

Environmental elements such as soil, water, air, plants, and animals can contain pollutants, posing risks to people and communities. Thus, evaluating environmental health literacy (EHL) in specific media like air, food, and water is crucial (12). People with strong environmental health literacy recognize local pollutants and health risks, like air and water issues. They can lower risks by reducing exposure for themselves and their community, involving advocacy, monitoring, and protective measures (14).

Ebadi et al. (2020) detail Iran's environmental issues, noting that water pollution and waste management threaten public health. They stress the need for EHL educational programs to tackle these

problems (15). Ramírez and colleagues 2019 highlight the importance of communication strategies to enhance public understanding of air pollution and health risks (16). Particularly in Iran, engaging the public and offering educational programs are vital for enhancing environmental health literacy.

Assessing EHL is essential for creating interventions and applying research in communities (14, 17, 18). Numerous studies show that women are disproportionately affected by environmental health risks (19-22). Women's health literacy greatly influences family and community health, especially regarding children's well-being. This study evaluates the EHL of women at Zanjan health centers, focusing on food, water, air, and general health, while also considering socio-demographic factors. Enhancing women's EHL can guide educational interventions for better health.

Materials and Methods

Study design and participants

This cross-sectional study involved 678 women who attended comprehensive health service centers in Zanjan city in 2023. The study encompassed women aged 18 or above, capable of reading, writing, and responding to questions, and willing to participate in the research.

Sample size and sampling method

The study's sample included 678 individuals, drawn from a statistical population of women aged 18 and older receiving comprehensive health services in Zanjan city. This population was identified using the Integrated Health System (SIB), with a total of 37,887 eligible individuals in Zanjan. The sample size was calculated using Cochran's formula, assuming a 50% health literacy rate, a 0.05 margin of error, and a z-value of 1.96, resulting in an initial estimate of 384 participants. To account for a design effect of 1.5 and a 10% non-response rate, the final sample size was adjusted to 640 individuals. However, 678 individuals were ultimately included in the study. This study employed a two-stage sampling method. First, five comprehensive health service centers were randomly selected from the 22 centers in Zanjan city, representing the north, south, west, east, and central regions. Next, the population of women over 18 from each center was obtained from the apple system, and the sample size for each center was determined. Samples were then collected using the available sampling method from each center until the desired sample size was reached.

Measurements

Data was collected through a survey with two main sections. The first section gathered demographic information from participants, including age, education, occupation, marital status, educational background, and length of residence. The second section featured 42 questions assessing environmental health literacy (EHL) across four areas: general environmental health (9 items) and specific environmental media—air (10 items), food (9 items), and water (14 items). The EHL questionnaire was developed by Maureen Y. Lichtveld et al., and its reliability and validity have been established (6). The questionnaire included scales for food, air, water, and GEH, each with questions about knowledge, attitudes, and behaviors. Knowledge was defined as information acquired through experience or education, attitudes as established patterns of thinking or emotions,

and behaviors as actions taken in response to environmental issues.

The questionnaire used a five-point Likert scale for knowledge and attitude items (strongly agree to strongly disagree) and a five-point frequency scale for behavior items (always to never). It was translated from English to Farsi using the World Health Organization protocol and the backward-forward method (23). Face and content validity were assessed. Face validity was checked by the target group (n=15), and quantitative face validity was evaluated using item impact scores. All questions item impact scored higher than 1.5. Content validity was assessed both quantitatively and qualitatively by experts (n=10, an expert in health education and health promotion, environmental health engineering). The content validity ratio (CVR) for each question was higher than 0.62, and the content validity index (CVI) was satisfactory. Upon analyzing the content validity index (CVI), the validity index for each item (I-CVI) was greater than 0.79, and the scale content validity index (S-CVI/Ave) was 0.97(24) Cronbach's alpha was used to assess internal reliability (n= 30 participants from the target group), yielding coefficients between 0.74 and 0.98, demonstrating satisfactory levels (25).

Statistical analysis

The data gathered was analyzed using IBM© SPSS© Statistics version 23 (IBM© Corp., Armonk, NY, USA). Skewness and kurtosis were used to evaluate the distribution of the data for normality (26). Bloom's recommended cut-off points were used to classify individuals based on their health literacy level: good (80-100% score), moderate (60-79% score), and weak (below 60% score) (27).Descriptive statistics (mean, standard deviation, frequency, percentage frequency) were used to detail socio-demographic characteristics. One-way ANOVA and independent t-test were used to analyze the differences in EHL as a dependent variable among various demographic factors as independent variables. A significance level of 0.05 was used.

Results

This study included 678 women aged 18 or older from Zanjan city who visited comprehensive health service centers. The average age of the participants was 34.77±9.50, with ages ranging from 18 to 77. Most women were married (84%) and identified as housewives (67.1%). Table 1 provides additional demographic details.

Table 2 summarizes the mean scores for women's knowledge, attitudes, and behaviors related to general and specific environmental media (air, food, and water). Participants demonstrated strong scores in knowledge, attitudes, and behaviors related to food environmental health, with over half excelling in most areas except for air. Women generally lacked knowledge and positive attitudes regarding air environmental health, while 54.6% displayed moderate attitudes toward general environmental health.

This study investigated the relationship between general environmental health (GEH) literacy, specific environmental media (air, food, and water), and participants' demographics. Working women demonstrated significantly higher GEH knowledge and exhibited better attitudes and behaviors toward water and air health literacy.

Women's attitudes and behaviors regarding water health literacy varied significantly by education level, with university-educated women outperforming those with lower education levels. The findings are summarized in Table 3.

Table 1. Demographic characteristics of the participants

Variables		Mean and SD		
Age		34.77		9.50
Length of residence in current city (Years)		28.33		13.13
Frequency and Percentage	Level of Education	Middle And High School	200	29.8
		Diploma	181	26.9
		University	291	43.3
	Marital Status	Single	79	11.7
		Married	569	88.3
	Job	Housewife	413	66.8
		Employed	205	33.2
	Financial situation	Fairly Good	184	27.3
		Adequate Income For Basic Needs	384	57
		Difficult Financial Situation	106	15.7
	Taken an environmental health class	Yes	120	17.7
		No	557	82.3
	Interest in enrolling in an environmental health class	Yes	346	51.2
		No	330	48.8

Discussion

This study examined the GEH and specific environmental media (food, air, and water) knowledge, attitudes, and behaviors, as well as their socio-demographic determinants. Participants demonstrated the highest literacy in food hygiene, likely due to women's traditional roles in food preparation and household management, which necessitate knowledge of food safety practices. In contrast, Atai et al. found medium knowledge and above-medium attitudes and performance among women in Saveh, Iran, while our results were more favorable (28). This discrepancy may be due to our study population, which included a larger proportion of individuals with university education.The participants demonstrated the poorest understanding of air health literacy compared to other aspects of environmental health literacy, suggesting insufficient knowledge and attitudes towards air health. The study by Abu Bakkar Siddique et al. revealed that the general public in Bangladesh has a good understanding and positive attitude towards air pollution, but their actions do not align with their knowledge and attitudes (29). Bindhu Unni and colleagues examined the community's knowledge, attitudes, and behaviors concerning indoor air quality in Bangladesh. The study found low knowledge and behavior levels but moderate attitudes about indoor air quality among the participants. Improving community knowledge and encouraging positive behaviors related to indoor air quality are essential for addressing health issues linked to indoor environments (30).

We found that, although women demonstrated good knowledge and behavior regarding general environmental health, their attitude toward it was average.

Table 2. Descriptive statistics (mean scores, standard deviations, and frequency levels) for general and specific health literacy related to air, food, and water

Variable		Min-Max Score Obtainable	Min-Max Score Obtained	Mean	SD	Mean out of 100	SD	Skewness	kurtosis	Good N (%)	Moderate N (%)	Weak N (%)
GEH	Knowledge	3-15	5-15	12.72	1.81	84.87	12.11	-1.166	1.908	547(80.7)	108(15.9)	23(3.4)
	Attitude	3-15	3-15	10.84	1.94	72.28	12.98	-0.132	0.145	230(33.9)	370(54.6)	78(11.5)
	Behavior	3-15	4-15	13.14	2.35	87.60	15.7	-1.450	1.678	558(82.3)	80(11.8)	40(5.9)
AEH	Knowledge	3-15	3-15	9.74	2.33	64.96	15.55	0.247	-0.804	181(26.7)	243(35.8)	254(37.5)
	Attitude	3-15	3-15	9.26	1.89	61.74	12.65	0.304	-0.277	93(13.7)	288(42.5)	297(43.8)
	Behavior	4-20	4-17	15.73	3.24	78.67	16.21	-0.768	0.170	405(59.7)	200(29.5)	73(10.8)
FEH	Knowledge	2-10	4-10	9	1.23	90.01	12.36	-1.357	2.03	616(90.0)	52(7.7)	10(1.5)
	Attitude	5-25	12-25	21.33	2.66	85.32	10.76	-0.638	0.116	528(77.9)	136(20.1)	14(2.1)
	Behavior	2-10	2-10	8.92	1.31	89.20	13.18	-1.267	1.878	597(88.1)	69(10.2)	12(1.8)
WEH	Knowledge	4-20	8-20	16.19	2.35	80.93	11.77	-0.233	-0.205	409(60.3)	257(13.8)	13(1.9)
	Attitude	3-15	3-15	11.62	2.86	77.44	19.06	-0.807	-0.178	433(63.9)	130(19.2)	115(17)
	Behavior	7-35	9-35	29.37	4.59	83.91	13.14	-1.071	1.115	492(72.6)	151(22.3)	35(5.2)

Min=Minimum;Max= Maximum;SD=Standard Deviation; GEH= General Environmental Health; AEH=Air Environmental Health; FEH=Food Environmental Health; WEH= Water Environmental Health; Good= 80-100% of Score; Medium= 60-79% of Score; Weak= Less than 60% of score

Table 3. Correlation between general and specific environmental health literacy (air, food, and water) and participants' demographic characteristics

Demographic Variables	N	GEH			WEH			FEH			AEH		
		K	A	P	K	A	P	K	A	P	K	A	P
		X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD
Age													
≥35 years	379	12.70 ±1.83	11.00 ±1.92	13.22 ±2.23	16.03 ±2.38	11.68 ±2.87	29.40 ±4.41	8.98 ±1.23	21.34 ±2.58	9.01 ±1.31	9.76 ±2.3	9.42 ±2.00	15.78 ±3.19
<35	297	12.74 ±1.80	10.64 ±1.95	13.03 ±2.51	16.37 ±2.31	11.53 ±2.84	29.34 ±4.84	9.02 ±1.24	21.33 ±2.78	8.81 ±1.31	9.73 ±2.31	9.05 ±1.74	16.67 ±3.30
T		-0.295	2.402	1.065	-1.845	0.677	0.173	0.438-	0.106	1.985	0.165	2.570	.433
p		0.768	0.017*	0.287	0.065	0.498	0.863	0.662	0.916	0.051	0.896	0.010*	0.665
Marital status													
Single	79	12.56 ±2.01	10.82 ±2.09	12.62 ±2.59	15.80 ±2.69	11.89 ±2.72	27.77 ±5.29	8.81 ±1.35	21.18 ±2.64	8.61 ±1.59	10.38 ±2.36	9.13 ±2.27	14.65 ±3.92
Married	596	12.73 ±1.79	10.84 ±1.93	13.21 ±2.32	16.23 ±2.72	11.58 ±2.87	29.56 ±4.46	9.02 ±1.22	21.34 ±2.67	8.96 ±1.27	9.67 ±2.31	9.29 ±1.84	15.87 ±3.120
T		-0.794	0.083	1.065	-1.921	-1.546	-2.873	-1.441	0.506	1.010-	2.584	0.600-	-2.659
p		0.427	0.934	0.287	0.058	0.123	0.005*	0.150	0.613	0.059	0.011*	0.550	0.009*

Demographic Variables	N	GEH			WEH			FEH			AEH		
		K	A	P	K	A	P	K	A	P	K	A	P
		X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD	X±SD
Educational status													
Middle And High School	20	12.33 ±1.81	10.50 ±2.10	12.83 ±2.79	16.21 ±2.34	10.98 ±2.93	28.94 ±5.14	8.86 ±1.22	21.18 ±2.89	8.78 ±1.45	9.02 ±1.99	9.26 ±1.96	15.43 ±3.62
Diploma	181	12.64 ±1.73	11.01 ±1.87	12.98 ±2.45	16.10 ±2.35	11.75 ±2.74	29.09 ±4.67	8.94 ±1.21	21.46 ±2.44	8.89 ±1.28	9.71 ±2.32	9.42 ±2.03	15.60 ±3.19
University	291	13.06 ±1.78	10.98 ±1.86	13.45 ±1.91	16.25 ±2.38	11.99 ±2.82	29.94 ±3.98	9.15 ±1.24	21.41 ±2.60	9.04 ±1.23	10.25 ±2.43	9.16 ±1.76	16.07 ±2.97
Fp		10.328 0.0001*	4.582 0.011*	4.759 0.009*	0.241 0.786	7.805 0.001*	3.325 0.03*	3.662 0.026*	0.626 0.535	2.423 0.089	17.407 0.0001*	1.030 0.358	2.595 0.075
Income status													
Low	184	12.62 ±1.96	11.02 ±1.94	13.47 ±2.16	16.42 ±2.54	10.98 ±2.81	28.94 ±4.16	9.01 ±1.30	21.79 ±2.49	9.09 ±1.45	9.76 ±2.40	9.18 ±1.92	16.03 ±3.02
Middle	384	12.82 ±1.69	10.89 ±1.92	13.18 ±2.21	16.20 ±2.23	11.75 ±2.84	29.09 ±4.59	9.05 ±1.17	21.42 ±2.53	8.91 ±1.28	9.75 ±2.35	9.31 ±1.91	15.86 ±3.21
Relatively good	10	12.51 ±1.96	10.31 ±1.93	12.37 ±2.98	15.73 ±2.40	11.99 ±2.95	29.94 ±5.27	8.83 ±1.27	20.16 ±3.12	8.66 ±1.52	9.69 ±2.17	9.27 ±1.83	14.76 ±3.56
F;p		1.510 0.222	4.886 0.008*	7.712 0.001*	2.983 0.051	2.064 0.128	1.521 0.219	1.388 0.250	13.546 0.0001*	3.566 0.029*	0.031 0.969	0.258 0.773	5.846 0.003*
Taken an environmental health class													
Yes	120	12.73 ±1.83	11.34 ±2.09	13.78 ±1.61	17.15 ±2.48	12.35 ±2.44	30.75 ±3.99	8.94 ±1.36	22.14 ±2.59	9.30 ±1.17	9.90 ±2.34	9.13 ±1.79	16.51 ±2.71
No	557	12.71 ±1.81	10.73 ±1.93	13.00 ±2.46	15.99 ±2.27	11.46 ±2.92	29.07 ±4.67	9.01 ±1.20	21.16 ±2.65	8.84 ±1.33	9.71 ±2.33	9.29 ±1.92	15.56 ±3.32
t;p		0.103 0.918	0.083 0.934	4.344 0.001*	4.723 0.001	3.496 0.001*	3.660 0.001*	-0.583 0.560	3.701 0.001*	3.831 0.001*	0.812 0.420	0.796 0.426	3.331 0.001*
Employment													
House wife	413	12.54 ±1.80	10.90 ±2.05	13.07 ±2.54	16.32 ±2.34	11.28 ±2.98	29.01 ±4.91	8.96 ±1.21	21.24 ±2.79	8.98 ±1.39	9.80 ±2.23	9.52 ±1.94	15.40 ±3.40
Employed	205	13.02 ±1.76	10.81 ±1.88	13.24 ±2.07	16.00 ±2.40	11.98 ±2.65	30.01 ±3.89	9.09 ±1.28	21.47 ±2.39	8.91 ±1.15	9.94 ±2.58	8.99 ±1.79	16.15 ±2.58
t;p		3.199- 0.001*	0.548 0.584	0.870- 0.385	1.592 0.112	-2.959 0.003*	-2.742 0.006*	-1.194 0.233	1.045- 0.296	0.646 0.519	0.662- 0.509	3.246 0.001*	2.858- 0.004*

K= Knowledge;A= Attitude;p= Behavior; GEH= General Environmental Health; AEH=Air Environmental Health; FEH=Food Environmental Health; WEH= Water Environmental Health

Demographic factors, including age, gender, education, income, and cultural background, can shape attitudes, as indicated by this study's findings.

Notably, individuals over 35 with less than a diploma and a decent income exhibited significantly lower mean attitude scores. While the overall average attitude may be neutral, some subgroups may express strong positive or negative attitudes, impacting the overall average.

This study's results reveal insights into health literacy related to water. Despite weak knowledge and attitudes regarding water hygiene among most participants, over half exhibited acceptable behavior. Participants may adopt acceptable behaviors based on ingrained habits or social norms rather than conscious knowledge or positive attitudes (31, 32). Additionally, people often learn and apply behaviors through observation without fully understanding the reasons behind them. People often develop attitudes towards various topics and objects through exposure to advertising, where they see "people like us" or "people we aspire to be" reacting positively or negatively towards different things. Much of our learning comes from observing what we see on television (33). On the other hand, certain subgroups, influenced by factors like age, gender, or socioeconomic status, may exhibit higher levels of acceptable behavior. This study's results showed notably those married individuals, those with a university education, participants in training courses, and employed individuals scored significantly higher in these behaviors. Furthermore, both intrinsic motivations and extrinsic rewards, such as the cost of water, can also influence behavior independent of knowledge and attitude (33).

The study produced valuable insights into the link between socio-demographic factors and environmental health literacy across multiple domains. This study found that women under 35 years old exhibited a more positive attitude toward general environmental and air health than those over 35. However, age did not significantly impact EHL in other areas. Zhao et al. also noted that individuals aged 25 to 34 had higher EHL than other groups. In their study, environmental health literacy was significantly associated with age, education, and occupation (34). Increased access to educational media among this young age group may contribute to the issue. Research indicates that access to environmental education enhances knowledge, attitudes, and behaviors (35, 36). This improvement likely stems from learning within a specific context, which empowers learners to engage in environmental decision-making and take action (37).

Our analysis of socio-demographic factors in EHL showed that marital status, like age, affects the EHL of the women studied. Married women exhibited significantly better behaviors regarding water and air health literacy compared to single women. However, single women had significantly higher average scores in air health knowledge than married women. Previous studies found no correlation between environmental health literacy scores and marital status, and no differences in willingness to engage in protective behaviors based on marital status or other socioeconomic factors, with the observed differences mainly related to race/ethnicity (34, 38).

Education is crucial in developing individuals' environmental health literacy, as demonstrated by this study and supported by existing literature.The current study finds that women with a university education possess significantly higher general health literacy, as well as greater knowledge of food and air health literacy, compared to other groups. Previous research indicates that individuals with higher education are more concerned about their ecological footprint and that environmental health literacy is generally positively correlated with education level (38, 39), although Binder et al.'s study did not support this relationship (40).

The study found that women with higher incomes had significantly more positive attitudes and behaviors toward general environmental and air health, as well as higher air health literacy, compared to other income groups. Previous studies have shown that individuals with higher social status, education, and financial means tend to have better health literacy (41-44).

Women who attended the training courses demonstrated significantly higher environmental health literacy scores in general, as well as in the water, air, and food domains. This finding aligns with the expectation that educational interventions can effectively improve health behaviors. Previous studies have also shown that developing health literacy programs can reduce exposure to indoor air pollutants and increase environmental health knowledge (45, 46).

The relationship between employment status and EHL reveals significant differences in knowledge, attitudes, and behaviors between working women and housewives. The study revealed that working women possess significantly greater knowledge of GEH literacy compared to housewives. Additionally, they exhibit a better attitude and behavior regarding water health literacy. Conversely, housewives display a more positive attitude toward air health literacy, albeit scoring lower in behavior. These findings align with expectations, as working women typically have access to better education and economic resources. Research indicates that factors such as age, education, job type, and family structure influence the level of environmental health literacy among working women. Those with higher literacy levels are more likely to make informed health and environmental decisions (47). Furthermore, working women with elevated environmental health literacy are better equipped to recognize the risks posed by chemicals and pollutants, enabling them to take preventive measures for themselves and their families (48).

Study Limitations and Strengths: This study has several limitations common to cross-sectional research, such as an inability to establish causal relationships or assess temporal links between outcomes and risk factors. Additionally, the reliance on self-reported data may introduce response bias, especially in behavioral reporting. Conducted in health centers in Zanjan, the findings may not be generalizable to other regions or populations. Nonetheless, this research is a pioneering effort in evaluating general environmental health literacy and specific environmental media like food, air, and water among women in Iran. It underscores the scarcity of studies on environmental health literacy in the country and contributes

valuable insights to the existing knowledge base.

Conclusion

The study reveals that women's health literacy regarding air quality is lower than in other health areas. Policymakers should adopt a comprehensive approach to environmental health education, addressing both major and overlooked issues like air quality. It's important to tackle behavioral and socio-cultural factors contributing to this gap, such as cultural perceptions, access to information, and daily exposure to environmental hazards. Utilizing trained health ambassadors for peer education and community-based approaches can empower women effectively. Additionally, employing digital tools, such as mobile apps and online courses, to boost environmental health literacy among housewives could be beneficial for population health researchers. Governmental and institutional policies significantly influence public awareness and literacy regarding air quality. Future studies should examine how local environmental regulations and public campaigns impact these levels of environmental literacy.

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