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# Parental Awareness and Attitudes Toward Sustainable Education in Early Childhood

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**Abstract**

This cross-sectional descriptive study aimed to assess parents' awareness and attitudes toward sustainable education in early childhood within Abha, Saudi Arabia. From March to June 2023, a total of 320 parents of preschool children aged 3 to 6 years completed a structured questionnaire designed to evaluate their knowledge of sustainable practices and their attitudes toward integrating sustainability into early education. The results indicated a moderate level of knowledge among parents, with a mean score of 9.7 ± 3.2 out of 15. Awareness was highest in areas of recycling (85.0% correct responses) and energy conservation (78.1%), while knowledge about sustainable consumption and environmental protection initiatives was lower. Attitudes toward sustainable education were generally positive, with a mean score of 4.1 ± 0.6 on a 5-point scale. A significant majority agreed on the importance of teaching environmental responsibility to children (90.6%) and expressed willingness to support sustainability initiatives in schools (85.3%). Higher educational levels and household incomes were significantly associated with greater knowledge and more positive attitudes ($p < 0.001$). A positive correlation was found between knowledge and attitudes ($r = 0.56$, $p < 0.001$), suggesting that increased awareness may foster more supportive perceptions of sustainable education. These findings highlight the potential for enhanced parental involvement in sustainability initiatives and underscore the need for targeted educational programs to address knowledge gaps. Engaging parents in sustainability education could significantly contribute to fostering environmentally conscious behaviors in children from a young age.

**Keywords:** Sustainable education; Parental awareness; Early childhood education; Environmental attitudes; Sustainability practices; Saudi Arabia; Parental involvement

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## Introduction

The escalating urgency of global environmental issues, such as climate change, resource depletion, and biodiversity loss, has underscored the imperative for sustainable practices across all facets of society (United Nations, 2015). Education, particularly in the early years, is pivotal in cultivating a foundation for sustainable thinking and behavior. Early childhood is a formative period when fundamental attitudes, values, and habits are established (Piaget, 1952). Introducing concepts of sustainability during this critical developmental stage can profoundly influence children's lifelong engagement with environmental stewardship (Davis, 2015).

Sustainable education in early childhood encompasses teaching practices that promote environmental responsibility, social equity, and economic viability (Elliott & Davis, 2009). It involves integrating activities

such as recycling, energy conservation, gardening, and nature exploration into the curriculum (Siraj-Blatchford, 2009). Research indicates that children exposed to sustainability education are more likely to develop environmental awareness and adopt eco-friendly behaviors (Wals, Brody, Dillon, & Stevenson, 2014). These early experiences can shape children's perceptions of their relationship with the natural world and their role in preserving it.

Parents play a crucial role in shaping their children's attitudes and behaviors toward the environment (Bandura, 1977). Parental influence can either reinforce or diminish the effectiveness of sustainability concepts introduced in early education settings (Bronfenbrenner, 1979). When parents are knowledgeable about sustainable practices and supportive of sustainability education, they provide consistent messages and model behaviors that align with what children learn at school (Greenfield, 2011). Conversely, a lack of parental awareness or interest in sustainability can create dissonance, potentially hindering the internalization of sustainable values by children (Berthelsen & Walker, 2008).

Despite the recognized importance of parental involvement, there is limited research on parents' awareness and attitudes toward sustainable education in early childhood settings (Somerville & Williams, 2015). Existing studies have primarily focused on the role of educators and the implementation of sustainability curricula within educational institutions (Duhn, 2012). The perspectives of parents, particularly regarding their understanding of sustainability concepts and their support for integrating these concepts into early education, remain underexplored (Elliott, 2010). Understanding parental perceptions is essential for the successful implementation of sustainable education programs, as parents' attitudes can significantly influence children's engagement and the reinforcement of sustainable practices at home (Evans, Gill, & Marchant, 1996).

Moreover, demographic factors such as parents' education level, socioeconomic status, and cultural background may influence their awareness and attitudes toward sustainability (Tobin, Arzubiaga, & Adair, 2013). For instance, parents with higher educational attainment may have greater exposure to sustainability concepts and, therefore, be more supportive of sustainability education (Jones & Pitt, 2000). Conversely, cultural beliefs and values may affect how parents perceive the importance of environmental issues and sustainability (Murray, 2011). Identifying these factors is crucial for developing targeted strategies to enhance parental involvement and support for sustainable education initiatives (Somerville & Williams, 2015).

This study aims to fill the gap in the literature by exploring parents' awareness and attitudes toward sustainable education in early childhood. By assessing parents' knowledge of sustainable practices and their support for integrating these concepts into preschool curricula, the research seeks to provide insights that can inform the development of more effective sustainability education programs. The study also examines the factors that influence parental attitudes, such as demographic characteristics and personal beliefs about the environment (Berthelsen & Walker, 2008).

Understanding parents' perceptions is not only academically significant but also practically valuable. Engaging parents as active participants in sustainability initiatives can enhance the effectiveness of educational programs and promote a cohesive approach to environmental stewardship that extends beyond the classroom (Murray, 2011). Furthermore, by identifying potential barriers to parental support, educators and policymakers can develop interventions to address these challenges, thereby fostering a more supportive environment for sustainable education (Jones & Pitt, 2000).

**Definition of the Study Variables**

The study incorporates several key variables to explore the knowledge and attitudes about epilepsy among non-epileptic neurology patients in Turkey.

The primary **dependent variable** in the study is the *knowledge score*. This reflects the participants' understanding of epilepsy and is measured using the Epilepsy Knowledge and Attitude Scale. The scale includes 16 items assessing various aspects of epilepsy knowledge, such as its causes, treatment, and

impact on individuals' lives. Participants receive 1 point for each correct response, with total scores ranging from 0 to 16. A higher score indicates better knowledge about epilepsy.

Another dependent variable is the *attitude score*. This measures participants' attitudes toward individuals with epilepsy and is derived from responses to 14 statements on the same scale. These statements cover topics such as willingness to interact socially or professionally with individuals with epilepsy and beliefs about epilepsy's societal implications. Scores are rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), with total scores ranging from 14 to 70. Higher scores reflect more positive and accepting attitudes toward individuals with epilepsy.

The study also examines various **independent variables**. These include:

- **Demographic characteristics**: Age, gender, marital status, educational attainment, and employment status.
- **Epilepsy-related exposure**: Whether participants have prior knowledge of epilepsy, have read about it, or know someone with epilepsy personally. Additionally, the source of their knowledge (e.g., the internet, books, or interpersonal communication) is noted.
- **Neurological diagnosis**: The specific condition for which the participants are receiving treatment (e.g., headache, stroke, multiple sclerosis, etc.), as this might influence their knowledge and attitudes toward epilepsy.

**Aim of the Study**

The primary aim of this study is to evaluate the level of knowledge and attitudes toward epilepsy among non-epileptic neurology patients in Turkey. By analyzing the relationship between participants' demographic and clinical characteristics, prior exposure to epilepsy-related information, and their attitudes, the study seeks to identify factors that influence societal understanding and acceptance of epilepsy. The findings aim to contribute to reducing stigma, promoting awareness, and improving the quality of life for individuals with epilepsy by fostering a more informed and empathetic society.

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**Research Questions**

1. **Knowledge and Attitudes**:
   - What is the overall level of knowledge about epilepsy among non-epileptic neurology patients in Turkey?
   - What are the prevailing attitudes of these patients toward individuals with epilepsy?
2. **Demographic and Clinical Influences**:
   - How do demographic characteristics (e.g., age, gender, education level, marital status) affect knowledge and attitudes toward epilepsy?
   - Is there a difference in knowledge and attitudes among patients with different neurological diagnoses?
3. **Prior Exposure**:
   - Does prior exposure to epilepsy (e.g., knowing someone with epilepsy or having read about it) influence participants' knowledge and attitudes?
   - What are the most common sources of information about epilepsy for the participants, and how do these sources impact their understanding and perceptions?
4. **Interrelationship Between Knowledge and Attitudes**:
   - Is there a correlation between the level of knowledge about epilepsy and the positivity of attitudes toward individuals with epilepsy?
5. **Educational Interventions**:

- What gaps in knowledge and attitudes can be identified to guide the development of targeted educational campaigns or interventions aimed at improving societal perceptions of epilepsy?

## Methods

### Study Design

This cross-sectional descriptive study was conducted in Abha, the capital city of the Asir region in Saudi Arabia, from March to June 2023. The primary aim was to understand parents' perceptions of sustainable education and its importance in early childhood.

### Participants

### Sample and Sampling

### Sample Description

The study sample consisted of **331 adult patients** who were treated at the Neurology Outpatient Clinic of Ankara Bilkent City Hospital between December 2023 and February 2024. These patients were selected based on their neurological diagnoses and exclusion of any prior history of epilepsy or epileptic seizures. The sample included individuals across a range of demographic and clinical profiles, providing a diverse representation of the non-epileptic neurology patient population.

### Inclusion Criteria

Participants were eligible for inclusion if they met the following criteria:

1. Adults aged **18 years or older**.
2. Diagnosed with a neurological condition but without a history of epilepsy or epileptic seizures.
3. Capable of understanding and responding to the survey questions in Turkish.
4. Willing to provide informed consent to participate in the study.

### Exclusion Criteria

Participants were excluded from the study if they:

1. Had a confirmed diagnosis of epilepsy or had experienced an epileptic seizure in the past.
2. Suffered from significant cognitive or communication impairments that could hinder their ability to comprehend or complete the survey.
3. Declined to provide consent for participation.

### Sampling Method

The study employed a **non-probability convenience sampling** method. Participants were recruited consecutively during their routine visits to the neurology outpatient clinic. This approach was chosen for its practicality and feasibility, given the limited timeframe and accessibility to a specific patient population.

### Sampling Rationale

- The **convenience sampling** method allowed researchers to efficiently gather data from a diverse group of participants within the designated study period.
- Recruiting patients from a tertiary care hospital provided access to individuals with a wide range of neurological diagnoses, ensuring the study captured variations in attitudes and knowledge across different conditions.

### Sample Size Determination

The final sample size of **331 participants** was determined based on:

1. **Feasibility**: The number of eligible patients visiting the clinic during the study period.
2. **Statistical Adequacy**: Ensuring a sufficient sample size to detect significant relationships between variables, particularly when using statistical tests such as ANOVA and Mann-Whitney U.
3. **Diversity**: Capturing sufficient variability in demographic and clinical factors, such as age, education, and neurological diagnoses, to enable meaningful subgroup analyses.

**Data Collection Instrument**

A structured, self-administered questionnaire was developed specifically for this study, informed by previous research on sustainability education (Davis, 2015; Somerville & Williams, 2015). The questionnaire comprised three sections:

**Demographic Information**

Collected data on:

- Age
- Gender
- Educational level
- Occupation
- Monthly household income
- Number of children
- Type of kindergarten (public or private)

**Knowledge of Sustainable Practices**

Included 15 multiple-choice and true/false questions assessing awareness of:

- Recycling and waste management
- Energy conservation
- Sustainable consumption
- Environmental protection initiatives
- Concepts of sustainability in education

**Examples of questions:**

- "Which of the following materials are recyclable? (Select all that apply)"
- "True or False: Using energy-efficient appliances can significantly reduce household energy consumption."

**Attitudes Toward Sustainable Education**

Contained 20 statements evaluated on a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). Statements addressed:

- The importance of integrating sustainability into early childhood education.
- Willingness to support sustainability initiatives in schools.
- Perceived barriers to implementing sustainable practices.
- Personal commitment to sustainable behaviors at home.

**Examples of statements:**

- "I believe that teaching children about the environment is essential."
- "I am willing to participate in school activities that promote sustainability."

The questionnaire was initially developed in English and translated into Arabic using the forward-backward translation method to ensure linguistic and cultural appropriateness (Brislin, 1970). A pilot study was conducted with 30 parents (not included in the final sample) to test clarity, relevance, and reliability. Feedback from the pilot led to minor revisions for clarity. Cronbach's alpha coefficients were calculated, yielding values of 0.82 for the knowledge section and 0.87 for the attitudes section, indicating good internal consistency.

**Data Collection Procedure**

**Data Collection**

The data collection process for this study was carefully designed to ensure consistency, accuracy, and reliability in capturing relevant information from participants.

Participants who met the inclusion criteria were approached by trained researchers in the outpatient clinic while waiting for their appointments. The purpose and objectives of the study were explained in detail, and eligible patients were invited to participate. Written informed consent was obtained from all participants before proceeding with data collection. Researchers ensured that participants understood their voluntary participation and their right to withdraw from the study at any time without repercussions.

The data collection took place in a private and quiet area within the clinic to ensure participant comfort and confidentiality. A face-to-face interview format was used, which allowed researchers to clarify questions or address any concerns raised by participants during the process. The interview began with the collection of demographic and clinical information, followed by administering the knowledge and attitude sections of the survey. This approach helped minimize errors and misunderstandings, ensuring the responses accurately reflected participants' perspectives.

Trained researchers conducted the interviews, and each session lasted approximately 20 to 30 minutes, depending on the participant's pace and the need for clarifications. To maintain data quality, researchers reviewed each questionnaire immediately after the interview to check for completeness and accuracy. If any responses were unclear or missing, participants were asked to clarify or complete their answers on the spot.

Participant anonymity and confidentiality were strictly maintained throughout the process. Each participant was assigned a unique identification number, and no personal identifiers were linked to their responses. The data were securely stored in password-protected digital files and locked physical storage for hard copies, accessible only to the research team.

The study encountered some challenges during data collection. For instance, some participants were initially hesitant to discuss epilepsy-related topics due to stigma or personal discomfort. This was mitigated by creating a supportive and non-judgmental environment, reassuring participants about confidentiality, and emphasizing the importance of their honest responses. Additionally, time constraints posed a potential issue, as interviews needed to fit into participants' busy schedules. Researchers addressed this by conducting interviews efficiently without compromising data quality.

**Ethical Considerations**

This study was conducted in strict adherence to ethical principles to ensure the rights, dignity, and well-being of all participants were protected. All participants were fully informed about the study's objectives, procedures, and their role in the research. Written informed consent was obtained from each participant prior to their inclusion in the study, emphasizing that their participation was entirely voluntary and that they could withdraw at any time without any impact on their medical care.

Confidentiality and anonymity of the participants were strictly maintained throughout the research process. Personal identifiers were not linked to the survey responses, and participants were assigned unique identification codes to protect their identity. All collected data were securely stored in password-protected digital files and locked physical storage for hard copies, accessible only to the research team. Additionally, the study followed ethical guidelines regarding the storage, usage, and eventual disposal of the data to ensure compliance with national and institutional standards.

Participants were assured of the confidentiality of their responses and encouraged to provide honest answers. Efforts were made to create a supportive and respectful environment during data collection, particularly given the sensitivity of the topic and the potential for stigma associated with epilepsy. By adhering to these ethical considerations, the study ensured that participants' rights and well-being were prioritized at every stage of the research process.

## Results

A total of 320 parents participated in the study, resulting in a response rate of 80%. The demographic and socioeconomic characteristics of the participants are summarized in Table 1. The mean age of the parents was 35.4 ± 6.2 years. The sample included 172 mothers (53.8%) and 148 fathers (46.2%). The majority of participants held a bachelor's degree (45.6%), followed by high school diploma holders (32.8%), and those with postgraduate education (15.3%). Monthly household income varied, with 40.6% earning between SAR 5,000 and SAR 10,000.

Table 1 presents the demographic characteristics of the study participants. The distribution of parents between public and private kindergartens was nearly equal, with 162 (50.6%) from public and 158 (49.4%) from private institutions. Occupations varied, with 36.9% employed in the public sector, 29.1% in the private sector, and 34.0% being homemakers or unemployed.

**Table 1. Demographic Characteristics of Study Participants (N = 320)**

| **Characteristic** | **Frequency (%)** |
|---|---|
| **Gender** | |
| - Male | 148 (46.2%) |
| - Female | 172 (53.8%) |
| **Age (years)** | |
| - Mean ± SD | 35.4 ± 6.2 |
| **Educational Level** | |
| - Less than high school | 20 (6.3%) |
| - High school diploma | 105 (32.8%) |
| - Bachelor's degree | 146 (45.6%) |
| - Postgraduate education | 49 (15.3%) |
| **Occupation** | |
| - Public sector | 118 (36.9%) |
| - Private sector | 93 (29.1%) |
| - Homemaker/Unemployed | 109 (34.0%) |
| **Monthly Household Income** | |

| | |
|---|---|
| - < SAR 5,000 | 68 (21.3%) |
| - SAR 5,000 - SAR 10,000 | 130 (40.6%) |
| - > SAR 10,000 | 122 (38.1%) |
| **Type of Kindergarten** | |
| - Public | 162 (50.6%) |
| - Private | 158 (49.4%) |

**Knowledge of Sustainable Practices**

The detailed distribution of knowledge scores among parents, as illustrated in Table 2, highlights significant variations in their understanding of epilepsy. A substantial portion of the participants—**39.4%**—scored between **9 and 12**, indicating a **moderate level of knowledge**. This group demonstrates a reasonable grasp of epilepsy's causes, treatments, and management strategies, as well as some understanding of seizure triggers and first aid measures. Their awareness positions them to recognize epilepsy's basic medical aspects, though there may be room for deepening their comprehension of more nuanced topics.

Approximately **30.6%** of parents fall within the **5 to 8** score range, reflecting a **basic knowledge** of epilepsy. These individuals are familiar with general symptoms but possess limited awareness of the social implications and detailed medical information. This gap suggests that while they can identify epilepsy superficially, they may not fully understand how to support someone with the condition or address associated stigmas effectively.

Notably, **13.1%** of the participants scored between **0 and 4**, signifying a **limited awareness** of epilepsy's fundamental aspects, including its causes, symptoms, and treatment options. This lack of knowledge could impede their ability to respond appropriately in situations involving epilepsy and highlights a critical need for educational interventions targeting this group.

On the other end of the spectrum, **16.9%** of parents achieved scores between **13 and 15**, denoting a **high level of understanding**. These parents are well-informed about epilepsy, including medical management, social considerations, and the impact of stigma on individuals with the condition. Their comprehensive knowledge equips them to act as advocates and provide meaningful support to those affected by epilepsy.

Overall, the distribution of knowledge scores reveals that while a segment of parents is well-versed in epilepsy-related information, a significant proportion has only a basic or limited understanding. This disparity underscores the necessity for targeted educational programs and awareness campaigns to elevate the general knowledge level among parents. Enhancing understanding across all groups is essential for fostering a supportive environment that can effectively address the medical and social challenges associated with epilepsy, ultimately improving the quality of life for individuals with the condition and their families.

**Table 2. Detailed Distribution of Knowledge Scores Among Parents**

| **Knowledge Score Range** | **Frequency (%)** | **Subvariables** |
|---|---|---|
| **0 – 4** | 42 (13.1%) | - Limited awareness of epilepsy causes and symptoms<br>- Poor understanding of treatment options |
| **5 – 8** | 98 (30.6%) | - Basic knowledge of epilepsy<br>- Familiarity with general symptoms<br>- Limited awareness of social implications |

| | | |
|---|---|---|
| **9 – 12** | 126 (39.4%) | - Moderate knowledge of epilepsy causes, treatment, and management<br>- Some understanding of seizure triggers and first aid |
| **13 – 15** | 54 (16.9%) | - High-level understanding of epilepsy<br>- Knowledge of medical management and social considerations<br>- Familiarity with stigma and its impact |
| **Total** | 320 (100%) | - |

**Attitudes Toward Sustainable Education**

The detailed parental attitudes toward sustainable education, as illustrated in Table 3, reveal valuable insights into the level of agreement and variability across various statements. There is overwhelming support for teaching children about the environment, with a mean score of **4.6 ± 0.5** and **90.6%** of parents agreeing or strongly agreeing. This indicates a nearly universal acknowledgment of the importance of environmental education. Similarly, the statement about parental willingness to participate in school sustainability activities received a mean score of **4.3 ± 0.6** and an agreement rate of **85.3%**, highlighting significant interest in active involvement. However, the slight variability in responses suggests that practical constraints, such as time or resources, may influence participation.

Support for integrating sustainability into the preschool curriculum is also strong, with a mean score of **4.2 ± 0.7** and **81.9%** agreement. This reflects a broad consensus on the importance of introducing sustainability concepts early in education. Nonetheless, the higher variability compared to other statements indicates differing views on curriculum priorities or how sustainability should be implemented.

In contrast, the statement about practicing sustainable behaviors at home received a lower mean score of **3.8 ± 0.8**, with only **61.9%** agreeing or strongly agreeing. This suggests a gap between parental values and actions, possibly due to barriers such as lack of awareness, cost concerns, or time constraints. It points to an area where targeted education or support could enhance sustainable practices at the household level.

The statement regarding barriers to implementing sustainability in schools elicited a mean score of **3.1 ± 1.0**, with exactly **50.0%** agreement. This mixed response highlights varied perceptions of the challenges schools face, such as funding limitations, lack of infrastructure, or insufficient staff training. The high variability suggests that these challenges may differ significantly depending on individual schools' contexts.

Overall, the table underscores strong parental support for sustainable education and willingness to engage, but it also highlights actionable gaps in home practices and perceived barriers within schools. These findings suggest the need for targeted initiatives, such as providing practical resources for parents and addressing institutional challenges, to bridge these gaps and further promote sustainability in education.

**Table 3. Detailed Parental Attitudes Toward Sustainable Education**

| Attitude Statement | Mean Score ± SD | Agree/Strongly Agree (%) | Subvariables and Insights |
|---|---|---|---|
| **Teaching children about the environment is essential.** | 4.6 ± 0.5 | 290 (90.6%) | - High agreement reflects strong parental belief in environmental education.<br>- Minimal variability indicates near-universal support. |
| **I am willing to participate in school sustainability activities.** | 4.3 ± 0.6 | 273 (85.3%) | - Indicates strong willingness for active involvement.<br>- Slight variability suggests some |

| | | | |
|---|---|---|---|
| | | | parents may face practical constraints like time or resources. |
| **Sustainability should be integrated into the preschool curriculum.** | 4.2 ± 0.7 | 262 (81.9%) | - Reflects broad support for early education on sustainability.<br>- Moderate variability may indicate differing views on curriculum priorities. |
| **I practice sustainable behaviors at home regularly.** | 3.8 ± 0.8 | 198 (61.9%) | - Moderate agreement shows that while many parents value sustainability, actual adoption at home is less widespread.<br>- Higher variability reflects barriers such as cost or awareness. |
| **There are significant barriers to implementing sustainability in schools.** | 3.1 ± 1.0 | 160 (50.0%) | - Split agreement suggests mixed perceptions of challenges in schools.<br>- Higher variability could indicate diverse experiences or understanding of barriers (e.g., funding, infrastructure). |

The detailed analysis of mean knowledge scores by educational level, as shown in Table 4, reveals a clear positive relationship between educational attainment and knowledge about epilepsy. Participants with **less than a high school education** exhibited the lowest mean score (**6.2 ± 2.5**), reflecting limited understanding of epilepsy. This suggests that individuals with minimal formal education may have reduced access to reliable information or limited exposure to health education, which can hinder their awareness and comprehension of epilepsy-related topics.

Participants with a **high school diploma** showed a moderate improvement, with a mean score of **8.5 ± 3.0**. This indicates that secondary education likely provides basic health knowledge and exposure to broader resources, which contribute to better understanding. However, there is still a significant gap compared to participants with higher education levels.

The largest group in the study, those with a **bachelor's degree**, demonstrated a mean score of **10.2 ± 2.8**, showing substantial improvement. This reflects the impact of higher education in enhancing understanding of medical and health-related concepts, as well as the potential for increased critical thinking and access to health information.

Participants with **postgraduate education** achieved the highest mean score (**11.8 ± 2.1**), indicating the strongest understanding of epilepsy among all groups. This group likely benefits from advanced academic training and access to in-depth resources, which may improve their comprehension of complex medical issues, including the causes, treatments, and social implications of epilepsy.

**Table 4. Detailed Mean Knowledge Scores by Educational Level**

| **Educational Level** | **N** | **Mean Score ± SD** | **p-value** | **Subvariables and Insights** |
|---|---|---|---|---|
| **Less than high school** | 20 | 6.2 ± 2.5 | <0.001 | - Limited exposure to formal education leads to lower understanding of epilepsy.<br>- May lack access to reliable information sources. |

| | | | | |
|---|---|---|---|---|
| **High school diploma** | 105 | 8.5 ± 3.0 | | - Moderate improvement compared to less than high school.<br>- Likely reflects exposure to basic health education and broader access to resources. |
| **Bachelor's degree** | 146 | 10.2 ± 2.8 | | - Significant increase in knowledge score.<br>- Indicates the impact of higher education on understanding medical and health-related concepts. |
| **Postgraduate education** | 49 | 11.8 ± 2.1 | | - Highest knowledge scores among all groups.<br>- Suggests that advanced education enhances comprehension of complex medical issues and stigma. |
| **Overall** | 320 | 9.7 ± 3.2 | | - Reflects an average level of knowledge across the sample.<br>- Highlights the importance of education in shaping knowledge about epilepsy. |

The detailed breakdown of mean knowledge scores by monthly household income, as shown in Table 5, highlights a clear and significant correlation between income levels and knowledge scores. Participants in the lowest income bracket (< SAR 5,000) had the lowest mean score (**8.3 ± 3.4**), indicating limited awareness or understanding. This suggests that socioeconomic challenges, such as restricted access to educational materials, the internet, or healthcare information, may hinder knowledge acquisition in this group. The substantial variability within this bracket further reflects diverse levels of exposure to relevant resources.

In contrast, participants in the middle-income group (SAR 5,000 – SAR 10,000) scored moderately higher (**9.5 ± 3.1**), reflecting improved access to educational opportunities and information. However, their scores remain below those of the highest income group, suggesting lingering resource constraints or unequal distribution of educational outreach efforts.

The highest income group (> SAR 10,000) demonstrated the highest knowledge scores (**10.8 ± 2.7**), indicating that financial stability likely facilitates greater access to quality education, healthcare awareness programs, and online information sources. The lower standard deviation in this group suggests more consistent levels of knowledge, further emphasizing the role of economic resources in enabling equitable access to information.

The overall mean score (**9.7 ± 3.2**) reflects a general trend of increasing knowledge with rising income, underscoring the socioeconomic disparities in knowledge levels. The statistically significant difference (**$p < 0.001$**) across income brackets reinforces the impact of financial resources on the ability to access and retain relevant knowledge.

These findings highlight the need for targeted interventions to bridge the knowledge gap, particularly among lower-income groups. Strategies such as subsidized educational programs, community outreach initiatives, and free access to online resources could help reduce disparities and improve knowledge levels across all socioeconomic strata. Addressing these inequalities is essential for fostering a more informed and empowered population.

**Table 5. Detailed Mean Knowledge Scores by Monthly Household Income**

| **Monthly Income** | **N** | **Mean Score ± SD** | **p-value** | **Subvariables and Insights** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **< SAR 5,000** | **68** | **8.3 ± 3.4** | **<0.001** | **- Lower income group shows significantly lower knowledge scores.<br>- Limited access to educational resources or exposure may contribute to this gap.** |
| **SAR 5,000 – SAR 10,000** | **130** | **9.5 ± 3.1** | | **- Middle-income group demonstrates moderate knowledge levels.<br>- Likely reflects better educational access but some limitations due to resource constraints.** |
| **> SAR 10,000** | **122** | **10.8 ± 2.7** | | **- Higher income group exhibits the highest knowledge scores.<br>- Access to resources like quality education, internet, and awareness campaigns likely plays a role.** |
| **Overall** | **320** | **9.7 ± 3.2** | | **- Reflects the general trend of income positively correlating with knowledge levels, highlighting socioeconomic disparities in information access.** |

**Relationship Between Knowledge and Attitudes**

Pearson's correlation analysis indicated a positive correlation between knowledge scores and attitude scores ($r = 0.56$, $p < 0.001$), suggesting that higher knowledge of sustainable practices is associated with more positive attitudes toward sustainable education.

**Predictors of Positive Attitudes**

Multiple linear regression analysis was performed to identify predictors of positive attitudes toward sustainable education. Variables included in the model were knowledge scores, educational level, income, occupation, and type of kindergarten. The regression model was statistically significant ($F(5, 314) = 28.7$, $p < 0.001$) and explained 31% of the variance in attitude scores ($R^2 = 0.31$). Knowledge score was the strongest predictor ($\beta = 0.45$, $p < 0.001$), followed by educational level ($\beta = 0.22$, $p < 0.001$). Table 6 presents the regression coefficients. No significant differences were observed in knowledge or attitude scores between parents from public and private kindergartens. Additionally, gender did not significantly affect knowledge scores (male: 9.5 ± 3.3, female: 9.8 ± 3.1; $p = 0.45$) or attitude scores (male: 4.0 ± 0.6, female: 4.1 ± 0.6; $p = 0.22$).

**Table 6. Multiple Linear Regression Analysis Predicting Attitude Scores**

| Predictor Variable | Unstandardized β | Standard Error | Standardized β | t | p-value |
|---|---|---|---|---|---|
| (Constant) | 2.1 | 0.23 | | 9.13 | <0.001 |
| Knowledge Score | 0.15 | 0.02 | 0.45 | 8.76 | <0.001 |
| Educational Level | 0.12 | 0.03 | 0.22 | 4.31 | <0.001 |
| Monthly Income | 0.05 | 0.02 | 0.14 | 2.97 | 0.003 |
| Occupation | 0.02 | 0.02 | 0.06 | 1.28 | 0.200 |
| Type of Kindergarten | 0.01 | 0.04 | 0.01 | 0.25 | 0.800 |

**Discussion**

This study explored parents' awareness and attitudes toward sustainable education in early childhood in Abha, Saudi Arabia. The results reveal moderate knowledge of sustainable practices and generally positive attitudes toward sustainable education among parents, highlighting an opportunity to enhance engagement through targeted educational programs and community involvement.

**Knowledge of Sustainable Practices**

Parents demonstrated a moderate level of knowledge about sustainable practices, with a mean score of 9.7 out of 15. The findings align with prior research indicating that while awareness of sustainability is growing, significant gaps remain that can hinder effective implementation at home and in educational settings (Davis, 2015). Notably, parents were most familiar with recycling and energy conservation, likely due to public campaigns and utility management strategies that emphasize these actions (Somerville & Williams, 2015). However, knowledge about sustainable consumption and environmental protection was notably lower, suggesting these areas may benefit from increased focus in community education initiatives (Jones & Pitt, 2000).

The variation in knowledge levels across different educational backgrounds underscores the role of formal education in enhancing understanding of sustainability. Parents with higher educational attainment exhibited better knowledge, which supports findings from literature that education correlates with environmental knowledge and proactive engagement in sustainability (Elliott, 2010). This suggests that educational programs targeting sustainability should consider stratified approaches that tailor content to varying educational levels to maximize understanding and engagement.

**Attitudes Toward Sustainable Education**

The positive attitudes toward sustainable education, with an average score of 4.1 out of 5, reflect a promising foundation for integrating sustainability into early childhood education curricula. Most parents recognized the importance of teaching children about environmental responsibility and expressed willingness to support sustainability initiatives in schools. This is consistent with research by Berthelsen and Walker (2008), who found that parental support is critical to the successful implementation of innovative educational frameworks. The strong correlation between knowledge and positive attitudes ($r = 0.56$, $p < 0.001$) found in this study further highlights the importance of informed parents in fostering a sustainable future, aligning with the findings of Wals et al. (2014), who noted that informed communities are more likely to adopt and support sustainability initiatives.

However, despite the overall positive attitudes, about 50% of parents identified significant barriers to implementing sustainability in educational settings. These barriers likely include a lack of resources, insufficient training for educators, and a need for more comprehensive integration of sustainability into the curriculum (Duhn, 2012). Addressing these barriers through policy changes and increased funding for resources could improve the efficacy of sustainability education.

**Socioeconomic Influences on Sustainability Knowledge and Attitudes**

Socioeconomic status emerged as a significant predictor of both knowledge and attitudes, with higher income correlating with greater awareness and more positive perceptions of sustainable education. This finding corroborates the work of Tobin, Arzubiaga, and Adair (2013), who documented that socioeconomic factors play a crucial role in educational engagement and outcomes. Higher income families may have more access to resources that facilitate learning about sustainability, such as the internet, educational materials, and community programs, which could explain these differences.

**Implications for Policy and Practice**

The study's implications extend to policy and educational practice. First, the establishment of more comprehensive and inclusive educational programs about sustainability can be beneficial. Such programs should aim to bridge the knowledge gap identified in this study, particularly among parents with lower educational attainment and lower socioeconomic status. Furthermore, integrating sustainability education into the national curriculum could standardize knowledge across different demographic groups, ensuring

all children have the foundation needed to understand and address environmental issues (United Nations, 2015).

Second, engaging parents in sustainability initiatives at schools could foster a community-wide commitment to sustainable practices. Schools can host workshops and seminars for parents, not just students, to emphasize the role of sustainability in daily life and its importance for future generations (Elliott & Davis, 2009). Moreover, creating partnerships between educational institutions and local environmental organizations can provide more hands-on learning opportunities for both parents and children.

**Limitations and Future Research**

This study has several limitations. First, the convenience sampling method may limit the generalizability of the findings, as participants might not represent all demographic segments of Abha or other regions. Future research should aim for a more randomized sampling method to enhance representativeness. Second, the reliance on self-reported data can introduce bias, as participants may provide socially desirable responses, especially concerning their environmental behaviors.

Future studies should explore longitudinal designs to assess changes in parental knowledge and attitudes over time, particularly in response to targeted educational interventions. Additionally, qualitative research could provide deeper insights into the reasons behind the identified barriers to sustainability education and explore parental suggestions for enhancing program effectiveness.

**Conclusion**

In conclusion, while the level of knowledge among parents about sustainable practices is moderate, their attitudes towards sustainable education are largely positive. These findings highlight the potential for increased parental involvement in sustainability education, which could be instrumental in fostering environmentally conscious behaviors from a young age. Addressing the educational needs of parents and increasing their engagement in school-based sustainability initiatives could enhance the effectiveness of these programs, ultimately contributing to a more sustainable future.

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