



## Health Hazards in Preschool Children Regarding Technological Environment Pollution from Their Mothers' View

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### Abstract

Technological environmental pollution is one of the most significant challenges confronting humanity specially children so it's important to determine technological impacts on the environment and children's well-being. Assess health hazards among preschool children regarding technological environment pollution. A descriptive, cross-sectional research design was utilized. The study was conducted in four nursery schools were selected randomly in Zagazig city the capital of sharquia governorate. A simple random sample of 212 mothers had child from these settings was used. Two tools were used to carry out the present study: Tool I: Socio-demographic questionnaire about child data, tool II: Health hazards among preschool children scale. The study revealed that 56.3% of the examined children experienced severe concentration and attention difficulties. Additionally, 38.9% faced moderate social challenges, while 35.3% exhibited mild physical health issues. Overall, 49.1% of the children demonstrated severe total health hazards during the preschool stage, compared to 35.8% with moderate health hazards and 15.1% with mild health hazards. Furthermore, the findings highlighted that age, smartphone usage, smartphone usage duration, and TV-watching hours had statically significant relationship with health risks among children, whereas gender had negative relationship. Almost half of the children experienced severe health risks, over one-third faced moderate health risks, and less than one-fifth encountered mild health risks. A highly statistically significant relationship was found between the children's health hazards and factors such as their age, smartphone usage, smartphone usage duration, and TV-watching hours. While, a negative correlation was observed with gender. Health education program on health hazards of technological environmental pollution for preschool children. Additionally, repeat the study with larger samples in another setting to permit for general of the result.

**Keywords:** Preschool children, Health hazards, Technological pollution

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### 1. Introduction

The integration of technology into daily life has contributed to the rise of environmental technological pollution, posing significant risks to both the environment and human health. Moreover, technological advancements have shown various adverse effects on children's health, especially during the preschool years [1]. There are various forms of environmental pollution associated with technological advancements. Industrial pollution, for instance, emerges from industrial activities and encompasses plastic pollution, noise pollution, chemical pollution, and radioactive contamination [2]. Additionally, media pollution refers to the adverse effects of modern media production,

including the extensive using of electronic devices and improper disposal methods [3]. Children are more vulnerable to risks from exposure to chemicals or pollutants, due to their smaller size. Additionally, their developing brains and organs make them more sensitive to toxic effects. Protecting children's health is a shared responsibility. Parents play a key role, supported by communities, healthcare professionals, and local, state, and federal governments. Also many factors influence preschool children's health, including external environmental pollutants like air, water, and soil contaminants, and internal factors such as stress [4].

Technology effect on preschool- children health physical, psychological, and social. These impacts are

influenced by factors such as the type of technology, using manor, the duration of using, and the child's individual characteristics. Physically, children are likelihood of obesity, vision impairments, sleep disturbances, and musculoskeletal issues. Psychologically, such as depression, anxiety, and aggressive behaviors. It also challenges children's ability to differentiate between reality and fantasy. Socially, can disrupt family interactions, increase social isolation, and hinder the development of interpersonal skills in young children [5]. Community health nursing integrates fundamental principles to address and prevent the risks associated with technological environmental pollution. These principles include promoting healthy lifestyles, preventing diseases, providing care and rehabilitation. Additionally, community health nurses play a critical role in monitoring the environment surrounding preschool children. They are responsible for addressing the technological environmental pollution by closely observing the environmental changes that could impact the children's health [6].

### 1.1. Significance of the study

Approximately 6,000 child deaths in Egypt occur annually due to technological environmental pollution resulting from indoor air pollution. While technological advancements have undoubtedly increased convenience, they have also led to significant environmental challenges, particularly in terms of indoor pollution. Indoor air pollution, often linked to technological sources such as electronic waste, plastic use, and chemical emissions, is the primary driver of these deaths, with pneumonia being the leading cause. Respiratory disorders, exacerbated by pollutants such as fine particles and volatile organic compounds, remain main cause of death among Egyptian children under the age of five [7].

### 1.2. Aim of the study

This study aim was to assess health hazards among preschool children regarding technological environment pollution.

### 1.3. Research questions

- 1- What is the prevalence of health hazards among preschool children regarding technological environment pollution?
- 2- What are the factors effecting on preschool children health regarding technological environment pollution?

## 2. Subjects and Methods

### 2.1. Research design

A descriptive, cross-sectional design was used to conduct the present study.

### 2.2. Study setting

The current study was conducted in El. zagazig city in the capital of sharquia governorate. Four nursery schools were selected randomly.

### 2.3. Study subjects

A purposive sample consisted of 212 mothers had childe from the above mentioned settings.

### 2.4. Tools for data collection

Two tools will be used to carry out the aim of the present study

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### Tool I: An interview questionnaire

It was developed by researchers based on literature review and written in a simple clear Arabic language.

#### ➤ Part I: Socio-demographic data about child

Child data: Age, Gender, Siblings, Gender of siblings, Child order between siblings, Smartphone usage, watching TV and number of hours for watching TV.

### Tool II: Health hazards among preschool children scale

The scale used to assess health hazard among preschool children adapted from. It composed of 25 question divided into five parts:

- Physical matters (e.g. headaches, backaches, eye strain).
- Sleep matters, such as insomnia, nightmares, and disrupted sleep.
- Psychological or behavioral issues (e.g., violence, rage, or attention deficiency).
- Social problems, such as isolation & a lack of relationships.
- Problems with focus and concentration, including decreased attention and recurrent absence.

#### ➤ Scoring system for children health hazards

A scoring system was implemented, based on binary responses (Yes or No) for each question in the questionnaire. The points were assigned as follows:

- Yes = 1 point
- No = 0 points

The total points for each section were calculated separately, and then converted to a percentage to determine the severity level for each type of health issue.

#### ➤ Severity Levels

The percentage scores were categorized into three levels of severity as follows:

- Mild: 0% - 30%
- Moderate: 31% - 65%
- Severe: 66% - 100%

### 2.5. Validity & Reliability

It was checked and revised by panel of three experts from Community Health Nursing Department, Faculty of Nursing at zagazig University who reviewed the tool for clarity, relevance, comprehensiveness, understanding and applicability and the modifications were done accordingly based on their responses. The reliability of the proposed tools was assessed using Cronbach's Alpha test, yielding a score of 0.82for Tool I and 0.79for Tool II.

### 2.6. Field work

After securing all official permissions, data collection commenced in October 2023 and continued through December 2023. The investigator visited the study settings from from 8 am to 9 am and from 1 pm to 3 pm, three days/week (Sunday, Monday and Wednesday) to collect data from children's mothers.

### 2.7. Statistical analysis

Data collected from the study sample were revised, coded, and entered using a personal computer. Computerized data entry and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics, including

mean  $\pm$  SD for quantitative data while using frequencies and percentages for qualitative data. The correlation coefficient (Pearson correlation) was used to measure the Total children health hazards and identify factors effect on preschool children health hazards performance scores multiple linear regression analysis was used after testing for normality, and homoscedasticity, and analysis of variance for the full regression models were done.

Statistical Significance of the results:

- Highly significant at  $p$ -value  $< 0.01$ .
- Statistically significant at  $p$ -value  $< 0.05$ .
- Non-significant at  $p$ -value  $\geq 0.05$ .

### 3. Results and discussion

#### 3.1. Results

Table 1 demonstrates that the studied children' mean age was  $\bar{x} \pm S.D$   $4.1 \pm 0.02$  and 40.1% of them ages 5 years old and 54.7% of children were females. Moreover, 90.1% of them had siblings. Also, 59.2% of those who had brothers had both genders and 33.5% of them had the first order between their siblings. As regards smart phone usage, 92.5% of them used the smart phone and 75.5% of those who reported usage demonstrated for 2 to 3 hours daily. Concerning watching TV, all 100% of them reported watching TV and 76.9% of them watched it for 2 to three hours daily. Table 2 portrays that 88.7% of studied children had changes in child's energy and activity levels and 82.5% of children practiced wrong eating habits such as eating while using the intranet and watching TV. While 70.3% of them had trouble sleeping and 69.3% of them suffered from waking up at night because of disturbing dreams. Table 3 shows that (80.2%, 80.2%) respectively children were changes in their behavior such as aggression and Child watching inappropriate or harmful online content.

Concerning mental problem (67.9%, 67.9%) respectively children showed signs of stress or anxiety and they suffered from unexplained emotions such as crying and screaming for no reason. Concerning social aspects problems, 74.1% of children had difficulties in communication with peers or developing cooperation skills due to their long time on screens (Isolation).while, 76.9% of the studied children demonstrated an inability to think appropriately for their age. Table 4 reveals that 104 of the studied children had sever concentration and attention problems. While, 76 of them had moderate social aspect problems and 32 of them had mild Physical health problems. Table 5 demonstrates that, there is a highly statistically significant relation between the studied children's total health hazards and their age ( $p=0.05$ ), smartphone usage at ( $p=0.000$ ), smartphone usage hours and watching TV hours at ( $p=0.001$ ).

#### 3.2. Discussion

Technological environmental pollution refers to the negative impact caused by the excessive and often unregulated use of modern technology. This type of pollution includes the widespread reliance on electronic devices, such as mobile phones and computers, which require significant energy consumption and generate harmful electronic waste. Additionally, technological pollution contributes to air contamination through the electromagnetic radiation emitted by wireless devices [8]. This study aims to assess health

hazards in preschool children regarding technological environment pollution from their mothers' view. Demographic Characteristics of Children the current study highlighted that less than half of the kids were 5 years old, with an average age of  $4.1 \pm 0.02$  years. More than half of the members were female, and the majority had brothers. Among those with siblings, nearly two-thirds had siblings male and female, and more than one-third were the firstborn in their families. Concerning technology use, the massive majority of children reported using smartphones, though all of them watched television, with nearly two-thirds expenditure more than three hours daily in front of screens. These findings bring into line with previous studies, suggesting that television and internet usage are key tools for accessing information.

Supporting evidence from [9] in Benha City revealed that 40.1% of mothers reported their children were between 5 and 6 years old, with an average age of  $4.12 \pm 0.82$  years. Additionally, less than two-thirds of the children were female. Similarly, [10] reported that 50% of the children in their study were aged between 4 and 6 years, with a mean age of  $4.6 \pm 1.0$  years. Of these, 57% were female, 43% were male, and 48% were firstborns. All children in both studies used mobile phones and watched television. As regard physical health hazard and sleep problems among the studied preschool children, the current study portrayed that majority of studied children had changes in child's energy and activity levels and majority of children practiced wrong eating habits such as eating while using the intranet and watching TV. While three quarter of them had trouble sleeping and more than two thirds of them suffered from waking up at night because of disturbing dreams. This may due to parents' attitudes towards technologies have an important role in the strategies they adopt towards their children's use of these devices. It is therefore crucial to understand how parents perceive the use of touch screen technologies for children's learning as their perceptions may affect quality and quantity of technologies devices and apps available to their children.

The present study result supported with [11] who studied "Mothers' awareness of The Misuse of Smartphone by Their Children under Five Years" and mention that, more than half, two third, more than two third and more than half of the studied mothers reported agree regarding use of smart phones affects the child's sleep pattern, the child use of smart phones during eating, the child may go to bed late and wake up frequently at night and use of smart phones effect on child's nutritional style. The present study result in agreement with [12] studied 304 parents of children aged 6 to 36 months old in Turkey found that sleep needs are associated with the sleep patterns and screen usage of the children and parents. Another relevant study conducted by [13], who found that use of digital media by younger children is associated with an increased risk of sleep disorders and reduced sleep quality. This suggests that too much exposure to technology can hurt aspects of a child's health. Regarding the mental health and social aspect problems and concentration and attention effects among studied preschool children, showed that majority of children were changes in their behavior such as aggression & Child watching inappropriate or harmful online content and more than two-third of children showed signs of stress or anxiety and they suffered from unexplained emotions such as crying and screaming for no reason.

**Table 1:** Children’s demographic characteristics of (n=212).

Demographic characteristics		N	%
<b>Age</b>			
3<4		59	27.8%
4<5		68	32.1%
5<6		85	40.1%
<b>Gender</b>			
Male		96	45.3%
Female		116	54.7%
<b>Siblings</b>			
Yes		191	90.1%
No		21	9.9%
<b>Gender of siblings (no = 191)</b>			
Male		47	24.6%
Female		31	16.2%
Both gender		113	59.2%
<b>Child order between siblings</b>			
First		71	33.5%
Second		62	29.2%
Third		56	26.5%
Fourth		23	10.8%
<b>Smartphone usage</b>			
Yes		196	92.5%
No		16	7.5%
<b>Watching TV</b>			
Yes		212	100.0%
No		0	0.0%
<b>Watching TV hours</b>			
≤1		24	11.3%
2≤3		63	29.7%
>3		125	59%

**Table 2:** The physical health hazard and sleep problems among the studied preschool children (n=212).

Items	Yes		No	
	No	%	No	%
<b>Physical health</b>				
There are changes in baby's growth and development	44	20.8%	168	79.2%
There is an increase in the incidence of child complaining of headaches	157	74.1%	55	25.9%
Child complained of any hearing problems	49	23.1%	163	76.9%
Child complained of any respiratory problems or asthma	39	18.4%	173	81.6%
There is an effect on baby's eyes, such as eye irritation or a change in the vision of objects	100	47.2%	112	52.8%
Your child is thin	85	40.1%	127	59.9%
Child is obese	99	46.7%	113	53.3%
Child practices wrong eating habits such as eating while using the intranet and watching TV	175	82.5%	37	17.5%
There are changes in child's energy and activity levels	188	88.7%	24	11.3%
<b>Sleep problems</b>				
The baby has trouble sleeping	149	70.3%	63	29.7%
The child suffers from waking up at night because of disturbing dreams	147	69.3%	65	30.7%
The child suffers from wrong sleep habits, for example, sleeping late at night after using the mobile phone or watching TV and YouTube	145	68.4%	67	31.6%

**Table 3:** The mental health and social aspect problems and concentration and attention effects among the studied preschool children (n=212).

Items	Yes		No	
	No	%	No	%
<b>Mental health problems</b>				
There are changes in child's mood between happiness and sadness	145	68.4%	67	31.6%
There are changes in child's behavior such as aggression	170	80.2%	42	19.8%
The child shows signs of stress or anxiety	144	67.9%	68	32.1%
The child suffers from unexplained emotions such as crying and screaming for no reason	144	67.9%	68	32.1%
Child watching inappropriate or harmful online content	170	80.2%	42	19.8%
<b>The social aspect problems</b>				
There are changes in child's relationships with siblings or friends due to his use of technological devices	151	71.2%	61	28.8%
Your child tends to spend more time on screens instead of participating in social activities	146	68.9%	66	31.1%
Less participation of child in group activities or sports	150	70.8%	62	29.2%
There are difficulties in child's communication with peers or developing cooperation skills due to their long time on screens. (Isolation)	157	74.1%	55	25.9%
<b>Effect on concentration and attention of the child</b>				
Child's level of concentration or attention has decreased due to technological pollution	154	72.6%	58	27.4%
The child's absenteeism rate has increased from kindergarten	153	72.2%	59	27.8%
The child's inability to think appropriately for the year	163	76.9%	49	23.1%
Low rate of educational and cognitive achievement in the child	152	71.7%	60	28.3%

**Table (4):** Percentage distribution of the studied children according to their total health hazards in preschool age (n=212).

Total health hazards in preschool age	Sever		Moderate		Mild	
	N	%	N	%	N	%
Physical health	71	33.4%	66	31.3%	75	35.3%
Sleep problems	105	49.7%	79	37.2%	28	13.1%
Mental health problems	116	54.7%	77	36.4%	19	8.9%
the social aspect problems	110	51.8%	83	38.9%	20	9.3%
Effect on concentration and attention of the child	119	56.3%	73	34.2%	20	9.6%
<b>Total</b>	104	49.1%	76	35.8%	32	15.1%

**Table 5:** Relationship between demographic characteristics of studied children and their total health hazards (n=212).

Items		Total health hazards						X <sup>2</sup>	P-Value
		Sever N= 104		Moderate N= 76		Mild N= 32			
		N	%	N	%	N	%		
Age	3<4	34	32.7%	17	22.4%	5	15.6%	4.325	.05*
	4<5	36	34.6%	23	30.3%	9	28.1%		
	5<6	34	32.7%	36	47.4%	18	56.3%		
Gender	Male	46	44.2%	36	47.4%	14	43.8%	.975	.231
	Female	58	55.8%	40	52.6%	18	56.2%		
Smartphone usage	Yes	102	98.1%	72	94.7%	22	68.8%	9.452	.000**
	No	2	1.9%	4	5.3%	10	31.2%		
Smartphone usage hours (no= 196)	≤1	4	3.8%	16	26.2%	15	48.4%	8.568	.001**
	2≤3	33	31.8%	22	36.1%	8	25.8%		
	>3	67	64.4%	23	37.7%	8	25.8%		
Watching TV hours	≤1	3	2.9%	20	26.3%	1	3.1%	8.976	.001**
	2≤3	33	31.7%	21	27.6%	9	28.1%		
	>3	68	65.4%	35	46.1%	22	68.8%		

Concerning social aspects problems, more than three quarter of children had difficulties in communication with peers or developing cooperation skills due to their long time on screens (Isolation), while, more than three quarter of the studied children demonstrated an inability to think appropriately for their age. This finding agreed with [11] who concluded that, less than three quarter and more than half of the studied mothers reported agree regarding the following statement; the child wants to be alone while using the smartphone and the child shows less interest in school and school activities respectively. Also, more than half of the studied mothers reported agree regarding both the child has become more aggressive as a result of frequent use of the smartphone and the child does not seem to feel remorse after misbehaving. The present study result agrees with [14] who studied 300 mothers in Egypt reported that, less than half of studied mothers specified that their children suffered from anxiety and tension when using electronic devices for long periods and less than half of the studied mothers specified inability of their children to wake up early.

Additionally, this result was confirmed with [15] who studied 120 parents in Kuwait about Parents' Attitudes toward School Students' Overuse of Smartphones and its Detrimental Health Impacts and found that, almost all of the parents were aware that the overuse of Smartphones devices could lead to addiction and other detrimental effects, including side effects related to physical and mental health problems, they also acknowledged that their children still used SPs heavily. On the same hand these result agree with [16] reported that most of the mother stated that the use of technology caused some problem in their children. Mother insufficient to cope with these problem and that they exhibit inconsistent behavior in coping with behavior problem. Additionally, a study done by [17] Problematic internet use (PIU) is associated with less openness and agreeableness, as children with higher levels of PIU end up with a deficit in social skills and difficulties in establishing interpersonal relationships, which can lead to being less open and visible, or less friendly externally.

It was also found that these children tend to experience negative emotions and use the internet as a means of feeling better about their everyday problems or unpleasant feelings. Relationships were also between problematic video game use and behavior problems, specifically related to thoughts, attention, and aggressive behavior. Also, the current study result similar with [18] studied 275 mothers in Korea and found that children with high levels of smartphone addiction or dependence tend to show negative developmental tendencies, such as impaired self-expression and self-regulation skills and increased aggression. As regard relationship between socio-demographic characteristics of studied children and their total health hazards, the present study demonstrated that, there is a highly statistically significant relation between the studied children's total health hazards and their age, smartphone usage, smartphone usage hours and watching TV hours. In the same line the study was done in America by [18] demonstrated that the child's age had a significant effect on the kids' technology usage and duration. In contrast, the gender of a child, primary language spoken at home, and parent's occupation had less influence on kids' media behavior. Significantly the parents' income did not affect media use in children [19-23].

#### 4. Conclusion

Based on the study's findings, almost half of the children experienced severe health risks, over one-third faced moderate health risks, and less than one-fifth encountered mild health risks. A highly statistically significant relationship was found between the children's health hazards and factors such as their age, smartphone usage, smartphone usage duration, and TV-watching hours. While, a negative correlation was observed with gender.

#### 5. Recommendation

Based on the study's findings, the following recommendations are advocated:

- 1 Establishing health education program on health hazards of technological environmental pollution for preschool children.
- 2 Repeat the study with a larger sample size in different settings to allow for greater generalizability of the results.

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