

Mothers' Awareness Regarding Technological Environment Pollution and its Health Hazards on their Preschool Children

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Abstract

Background: Technological environmental pollution has become one of the biggest challenges facing humanity. This type of pollution refers to the harmful effects of technology on the environment. **Aim of the study:** Was to assess mothers' awareness regarding technological environment pollution and its health hazards on their preschool children. **Subjects and methods:** **Research design:** A descriptive design was used. **Setting:** Conducting 4 nursery schools in Zagazig city randomly selected. **Sample:** Sampling contained 212 mothers randomly selected. **Tools of data collection: Two tools were used: Tool I: An interview questionnaire** composed of two parts to collect demographic data about mother, their children and the mother awareness about technological environment pollution. **Tool II: Health hazards among preschool children scale.** **Results:** 54.3% of the studied mothers had total satisfactory awareness about technological pollution while nearly half of their children had severe concentration and attention problems. A significant negative correlation between the studied mothers' total awareness and the studied children total health hazards **Conclusion:** More than half of the studied mothers had satisfactory awareness about technological environmental pollution. Also, nearly half of preschool children had severe health hazards. Finally, a statistically negative correlation between mothers' awareness and children's health **Recommendations:** Implement health education programs for all mothers attending health care settings about technological environmental pollution and its effects on children's health. Replicate this study in other settings to permit generalization.

Key words: Mothers' awareness, Preschool children, Technological pollution.

Introduction:

Technology is now an essential aspect of our daily lives and playing a transformative role in the financial sector. The technological environment refers to the integration of technology across various fields, such as daily activities, living conditions, transportation, and industrial processes (Volti & Croissant., 2024).

Technological environmental pollution is a type of pollution caused by the excessive and unregulated use of modern technology. This pollution includes the widespread use of electronic devices such as mobile phones and computers, which consume large amounts of energy and produce harmful electronic waste. Also technological pollution contributes to air pollution due electromagnetic radiation emitted by wireless gadgets (Akram et al., 2019).

Technological environmental pollution encompasses industrial

pollution and media pollution. Industrial pollution driven by technological advancements includes the excessive use of plastics, noise pollution, and harmful chemicals. Plastics, for example, contain additives like Bisphenol A (BPA) and phthalates, which can leach into food and water Which has effect on children's health causing hormonal disruptions and developmental issues in children (Tarafdar et al., 2022). Also noise pollution, resulting from industrial machinery , transportation, and digital devices and Prolonged exposure to high noise levels has been linked to hearing impairments, sleep disturbances, and cognitive delays in children (Mohamed et al., 2021).

Moreover, use of household chemicals, such as cleaning agents and pesticides, introduces toxic substances into indoor environments, chemicals that reached exposure levels of concern were identified

carcinogens and endocrine disruptors. Too increasing the risk of respiratory illnesses and poisoning among preschool children (**Querdibitty, 2021**).

Media pollution, characterized by the excessive exposure to digital content, also contributes to both physical and psychological health issues (**Desmurget, 2022**).

Mothers play a crucial role in supporting their children's healthy development and fostering desirable behaviors. As primary caregivers, they are expected to be aware of both the risks and opportunities associated with technological environmental pollution, take necessary precautions, and raise their children's awareness. It is also essential to improve the technological environmental awareness of both mothers and children to ensure the safe use of technology (**Üstündağ, 2024**).

Community Health Nurses (CHNs) play a vital role in addressing technological environmental pollution by serving as educators, advocates, collaborator role, referral role, counselor role, and Case finder. Their responsibilities include educating mothers and families about the sources and health impacts of technological pollution, such as electronic waste, noise pollution, and exposure to hazardous chemicals (**MacDonald & Jakubec, 2021**).

Significance of the Study:

Environmental technology pollution is responsible for approximately 45,000 deaths annually among children and young adults. Children under the age of five are vulnerable group, facing severe consequences, including fatal accidents involving household chemicals. These include cleaning agents, DIY products, and garden chemicals (**Bearth et al., 2021**). Moreover, the widespread use of electronic devices such as mobile phones, laptops, and televisions has significantly increased technology accessibility and usage, particularly among preschool-aged children. This

trend contributes to 3.7% of CO₂ emissions, negatively impacting children's health (**Waziry, 2019**). Additionally, the World Health Organization has estimated that decreasing environmental risks (e.g. air pollution, unsafe water, poor sanitation, inadequate hygiene, chemical exposure, and pollution waste) could avoid 26% of childhood deaths and 25% of the disease burden among preschool children (**WHO 2016**).

Aim of the study:

This study aimed to assess mothers' awareness about technological environment pollution and its health hazards on their preschool children

Research question:

1. What is the level of mother's awareness regarding technological environment pollution?
2. What are health hazards among preschool children regarding technological environment?
3. What is the relation between mothers' awareness regarding technological environment pollution and their preschool health hazards?

Subjects and Methods:

Research design:

A descriptive design was used.

Study setting:

Four nurseries were randomly selected.

A multistage cluster sampling technique was used as following:

- 1 **First stage:-** Select one zone from Zagazig city which consists of two zones (the East Zagazig Educational Administration and the west Zagazig Educational Administration).
- 2 **Second stage:-** four schools chosen randomly these schools were el malak Nasef nursery School and Al-Nizam nursery School from first zone and Al-Nasria Nursery School and Talaba Awida

nursery School From second zone.

3 **the third stage:-** it include selection of two class from each nursery school

4 **In fourth stage:-** selection of participation these were as follows:

- El malak Nasef nursery School 53.
- Al-Nizam nursery school 55.
- Al-Nasria Nursery school 51.
- Talaba Awida nursery School 53.

Study Subjects:

Sample 212 mothers had preschool children were selected randomly.

Tool for data collection:

Tool I: An interview questionnaire composed of two parts

➤ **Part I:to collect data about :**

▪ **Demographic characteristic of the study mothers** such as Age, Educational level, Working condition , type of work, Marital status, Monthly income, No of family members and rooms

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

➤ **Part II: : mother awareness about technological environment pollution** comprised 45 questions adapted from (**Osman et al., 2013**) covered concept, types, causes, effect of technological environment pollution and mothers' practices .

Scoring system

The scale of mother's awareness was for agree 2 point, Agree to some extent 1 and disagree zero.

- Satisfactory level of awareness was $\geq 80\%$ from mothers' total awareness.
- Unsatisfactory level of awareness was $\leq 80\%$ from mothers' total awareness.

Tool II: used to assess health hazard among preschool children composed of 25 question divided into four parts:

- **Physical Issues:** Includes headaches, back pain, eye strain and Sleep disturbances
- **Psychological and Behavioral Challenges:** Examples include aggression, anger, and attention deficit.
- **Social and Communication Difficulties:** As social withdrawal and a lack of friendships.
- **Attention and Concentration difficulties:** Includes focus problems and frequent absenteeism.

Scoring system:

- Yes take 1
- No take zero

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

- Child had sever level if he got 66% - 100%
- Moderate: 31% - 65%
- Mild: 0% - 30%

Content validity and reliability:

The proposed tools were reviewed and evaluated by three experts from the Community Health Nursing Department at the Faculty of Nursing, Zagazig University. They assessed the tools in terms of clarity, relevance, comprehensiveness, understanding, and applicability, and necessary modifications were made based on their suggestions.

The reliability was determined by using Cronbach's Alpha test, with Tool I achieving a score of 0.82 and Tool II a score of 0.79.

Field work:

The fieldwork was conducted as follows: The investigator began by introducing herself to each mother and explaining the study's purpose to

secure their support and cooperation. On average, completing each questionnaire required approximately 15–20 minutes. Prior to data collection, informed consent was obtained from all participants. The investigator visited the selected nurseries schools 3 days a week (Sunday, Monday, and Wednesday) during two time 8:00–9:00 AM and 1:00–3:00 PM, to gather information from the mothers. Data collection spanned from early October 2023 to the end of December 2023.

Pilot study:

A pilot study was carried out before starting data collection on 10% (21 mothers and their preschool children) from the total sample, were excluded from the total number of study sample. The aim of pilot study was to test the applicability, practicability and clarity of the tools and estimate the time for tool data collection.

Administration and ethical considerations:

The ethical matters were taken into consideration during all stages of the study. Initially, An ethical approval from Zagazig university committee was obtained to conduct the study and gave the study code M.D.ZU.NUR/192/1318/2023. Then, accepted was taken by Directorate of Education in Sharqi, East Zagazig Educational Administration and West Zagazig Educational Administration. Finally, a verbal agreement for participation of the informants was taken after fully explanation of the aim of the study. Participants was given the chance to refuse the participation, and they was notified that they could withdraw at any stage of the data collection interviews; also they was assured that the information would be confidential and used for the research purpose only. The researcher assured maintaining anonymity and confidentiality of subjects' data.

Statistical analysis:

Data were analyzed using SPSS with descriptive statistics. Pearson's correlation assessed

relationships, and multiple regression identified dependent variables after testing assumptions. Statistical Significance when the p-value is less than 0.05.

Results:

Table 1 shows that 62.3% of the studied mothers had ages ranging between 26 to 40 years old with mean age was 33.64 ± 4.23 years and 86.3% of mothers were married. As regards their educational level, 41% of them had secondary-level education. Also, 60.8% of them were working and 64.3% of who reported working mentioned it was a private work. Concerning monthly income, 63.2% of them reported it was not enough. Additionally, 51.4% of them had house crowding index more than two rooms.

Table 2 demonstrates that 40.1% of the studied children ages 5 years old and children mean age was $\bar{x} \pm S.D$ 4.1 ± 0.02 year and 54.7% of them were females. Moreover, 90.1% of them had siblings. Also, 59.2% of those who had siblings in both genders and 33.5% ranked first order. As regards smart phone usage, 92.5% of them used the smart phone. Concerning watching TV, 100% of them reported watching TV and 59% of them watched it for more than three hours daily.

Table 3 reveals that 65.6%, 65.3% respectively mother had total unsatisfactory awareness regarding industrial and radiation pollution and 55% of mother had total unsatisfactory awareness regarding media technological pollution.

Figure 1 reveals that 54.3% of the studied mothers had total satisfactory awareness about technological pollution while, 45.7% of them had total unsatisfactory awareness.

Table 4 reveals that 56.3% of the studied children had severe concentration and attention problems. While, 38.9% of them had moderate social aspect problems and 35.3% of them had mild Physical health problems.

Figure 2 reveals that 49.1% of the studied children had total severe health hazards in preschool age while, 35.8% of them had total moderate health hazards and 15.1% of them had total mild health hazards.

Table 5 shows that there is a highly significant statistically negative correlation between the studied mothers' total awareness and the studied children total health hazards at ($p = 0.000$).

Table 6 detects best fitting multiple linear regression for mother awareness in the sample of 212 mothers. It indicates that education level, working and income were significant positive predictors of higher mother awareness .while age were negative predictor of mother awareness. The model explains 0.176% of the variation in this score as the value r- Square.

Table 7 displays best fitting multiple linear regression for children health hazards in the sample of 212 children. It indicates that both smart phone use and watching T.V hours were significant positive predictors of higher children health hazards while age negative predictors of higher children health. The model explains 0.279% of the variation in this score as the value r -Square.

Discussion:

Technological environmental pollution has become one of the biggest challenges facing humanity. This type of pollution refers to the harmful effects of technology on the environment, encompassing various aspects such as radiation from electronic devices like phones and computers. Additionally, the excessive use of technological devices poses significant health hazards. Therefore, raising awareness about the dangers of technological pollution and promoting sustainable practices in technology use and safe disposal of technological waste is essential (Mir et al., 2023).

Additionally Mothers play a pivotal role in shielding their children from technological environmental pollution. Their awareness and knowledge about the sources of this pollution and its mitigation strategies are essential. As primary caregivers, mothers have a significant influence in educating and guiding their children toward healthy practices that minimize exposure to these hazards (Yalçın et al., 2023). The study aims to assess mothers' awareness of technological environmental pollution and its health hazards on their preschool children.

Regarding demographic characteristics of mothers, the present study showed that more than half of the studied mothers had ages ranging between 26 to 40 years old and majority of mothers were married. As regards their educational level, less than half of mothers had diploma or secondary-level education. Also, more than half of them were working and reported working mentioned it was a private work.

Concerning monthly income, more half of them reported it was not enough. Additionally, half of them had house with crowding index more than two. The results could be attributed that young and married mothers often face multiple responsibilities, such as balancing work, home, and children, which may limit their time and capacity to focus on environmental issues. Additionally, moderate education levels and low income may delay their access to information and resources needed to address technological environmental pollution effectively.

These findings were contrasting by Galal, (2019). 'Mothers' Awareness Regarding the Use of Technological Devices by their Preschool Children' A study conducted in Alexandria reported that 33% of mothers were aged 25 to less than 30 years, and 31% were aged 30 to less than 35 years. Regarding education level, 34% of mothers had completed secondary education, while 28% had a university degree. Slightly more than half of the mothers were employed, with two-

thirds of working mothers having daily working hours ranging from 6 to 8 hours. In terms of marital status, 96% of mothers were married. Additionally, 43% of the mothers had two children, and only 11% had four children. Furthermore, half of the mothers lived in homes with two rooms.

Regarding demographic characteristics of children, the current study demonstrated that less than half of the studied ages 5 years old and children mean age was 4.1 ± 0.02 and more than half of them were females. Moreover, the majority of them had siblings. Also, around two-third of those who had siblings had both genders and more than one third of them had the first order between their siblings. As regards smart phone usage, the majority of them used the smart phone. All of them reported watching TV and around two-third of them watched it for more than three hours daily. The results of the current study explain that the internet and television are key tools for accessing information.

This finding was supported with that of **Nassar et al., (2021)** who revealed that 40.1% of the studied mothers specified that their children aged $5 < 6$ years old with mean and standard deviation 4.12 ± 0.82 years old, while less than two thirds of studied mothers specified that their children were female. Also, this finding is congruent with **Galal., (2019)** The study reported that 50% of the children were between 4 to 6 years old, with a mean age of 4.6 ± 1.0 . Females made up 57% of the children, while 43% were males. Additionally, 48% of the children were the firstborn, and all of them (100%) used mobile phones and televisions.

The current study results revealed that more than half of the studied mothers had total unsatisfactory knowledge about technological environmental pollution. This might be due to the complexity of the concept of technological environment pollution. This finding aligns with the study conducted by **Waziry, (2019)** in

Alexandria, Egypt, found that 83% of mothers were unaware of bad effects of technological pollution, while only 2% were fully aware, and 15% had partial awareness of these effects.

Considering mothers awareness about industrial technological and plastic pollution, the present study demonstrated that around one quarter of the studied mothers agreed that Industrial and plastic is considered forms of technological environmental pollution. While less than half of them demonstrated agreement to some extent to mothers' awareness regarding presence types of technological environmental pollution. Also the majority of mothers agreed that chemicals are used in the manufacture of plastics . While, around two third of studied sample disagreed with reducing the use of plastic food containers or cans for child and replace them with astelastin and glass cans. This might be due to a lack of environmental awareness regarding technological environment pollution, either through media or educational programs targeting to mothers.

These finding agreed with the results of the study conducted at India by **Vigneshwaran and Arun, (2014)** found that, 48% of the respondents with high-level knowledge, attitude and practice on plastic usage, 75% perceived high level on plastic usage in the dimension of knowledge and 56% with high level on plastic usage in the dimension of attitude finally the majority of the respondents represented high level on plastic usage in the dimension of practice.

The current study disagrees with a study conducted in Egypt by **El-Sayed et al., (2019)**, the study found that 90.8% of mothers lacked sufficient knowledge about the safe use of plastic containers and displayed incorrect usage practices. Moreover, 45% of these mothers showed a negative attitude toward the safe use of plastic containers. Similarly, a study conducted in Himachal Pradesh by **Kaur et al., (2019)** It was reported

that, in the pre-test, 56.7% of participants had inadequate knowledge, and none demonstrated a good understanding of the safe use of plastics. In contrast, a study conducted in Thailand by **Kasemsup and Neesanan., (2011)** found that 100% of participants lacked adequate knowledge about the proper use of plastics.

Concerning mothers' awareness about noise pollution, the current study found that all of the mothers involved agreed with stopping using loud electrical appliances while baby sleeps as its Noise sources. Moreover, around two fifths of them demonstrated agreement to some extent about permanent and continuous exposure to one or more noise sources affects child's health While one-third of mothers' awareness disagreed with Watching TV or listening to the radio at a low sound. These results might be due to most studied mother living in crowded area and there is a permanent and continuous exposure to noise and recognizing watching television is the only means of entertainment.

These results come in agreement with a study done in the city center of a city in the Marmara Region in turkey by **Bulunuz and Özgür, (2021)** revealed that 14.7% of parents do not keep the environment quiet for children during studying and almost 40% of them find noisy behaviors of children during school break appropriate.

Moreover, these findings align with **Owoseni et al., (2017)**, it was reported 34% of the respondents strongly agreed that environmental noise can lead to hearing impairment. Also, this result is in agreement with a Germany study conducted by **Hoffmann et al., (2016)** asserted that noise cause psychological problem as hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other health problems.

Concerning mothers' awareness about chemical pollution, the

present study demonstrated that all of the studied mothers agreed that food additives, taste and color additives, household pesticides and household cleaners are sources of chemical pollution and more than two fifths of them portrayed agreement to some extent about chemicals may be deliberately added to processed foods in order to improve production or acquire food color or taste. Moreover more than two-third of studied mothers disagreed with preparing food at home and avoid buying canned/processed foods. The result might due to mothers unknowing that chemicals and flavors are a source of technological environmental pollution and it had negative effect on children health.

On the other hand in the study conducted at Al-Sharqia governorate in Egypt by **Hamed et al., (2021)** found that 28% of the mothers had satisfactory knowledge about food additives, while 34% gave incorrect answers, and 38% were unaware of food additives. Additionally, 50.1% of the mothers agreed that food packaging and additives are harmful. They also believed that foods containing artificial colors were not useful, that food additives were added to make products more attractive, and that reading nutrition facts labels was important for understanding food content. While in the study conducted in Canada by **Mackendrick, (2014)** It was reported that all respondents (100%) acknowledged that environmental chemicals in food and consumer products posed a potential threat to the health of mothers and children.

Regarding mothers awareness about radiation pollution, the present study showed that around one-quarter of mothers agreed with avoiding putting the mobile phone next to baby while he or she is sleeping .Moreover, more than two fifth of them showed agreement to some extent that photocopiers, laser printer and mobile phone are sources of radiation pollution. Additionally, more than two-thirds of mothers disagreed with being

in front of photocopiers, laser printing, and computers in small and not airy rooms damaging their health. The results might be due to lack of mothers' awareness regarding sources of radiation pollution caused by technological devices and its effect on children's health.

The present study result supported with study at Egypt by **Mostafa et al., (2024)** which reported that 54.9% of the studied mothers acknowledged the negative effects of smartphones on children's sleep patterns. These effects included disruptions delayed bedtime, frequent waking during the night and the influence of smartphone use during meals, which could also impact the child's nutritional habits.

On the other hand study in the city of Coimbra by **Rainha et al., (2013)** showed that 96% of the studied population were unaware of electromagnetic pollution and either did not know or expressed no concern about the potential health effects of using equipment that emits electromagnetic radiation. As for adopting protective measures against electromagnetic radiation, only 12% of the respondents with knowledge of electromagnetic pollution took any protective actions.

Concerning Mothers awareness about media technological pollution, the study illustrated that more than half of mother agreed that using of tablets - mobile for long periods affects the child's concentration and attention. Moreover, around two-third of them agree to some extent with trying to reduce the use of mobile phones and social media in the present of the child. Also more than half of the mothers in the current study disagreed with the idea that spending long periods in front of the computer and internet negatively affects children's motor development. This might be when the mothers are doing housework, they give the mobile phone to their child for long periods of time, so the children stay on his place not move.

In the same context, a study in USA done by **Pempek, & McDaniel, (2016)** reported that approximately 30% of mothers stated that their child uses a touchscreen device on a typical day. Almost 50% of families owned a tablet. In these tablet-owning households, (44%) of children might use the device for 1-15 minutes per day, while 27% used it for 15-30 minutes.

Similarly, a study done **Kabali et al., (2015)** at a pediatric clinic in Philadelphia, Pennsylvania, USA, found that 96.6% of children had used a mobile device. Moreover, 70% of parents allowed their children to use mobile devices while performing household chores, calming them in public places, or helping them fall asleep. Parents often rely on phones as a "digital pacifier" to manage their behavior. Consistent with the present study, research conducted in the United States by **Wartella et al., (2013)** and **Genc., (2014)** highlighted that television and mobile devices continue to dominate media consumption among children, with preschool-aged children spending approximately three hours a day on screen media. In another hand a study placed in Austria by **Ohmann et al., (2018)** found that 80% of mothers had unsatisfactory practices regarding the prevention of technology-related problems. Also **Mohamed, Abd-El-Gawad and Ata, (2021)**, who reported that less than 20% of the studied mothers, had good knowledge about technology that effect on preschool children.

The current study results revealed that around half of the studied children had severe health hazards, while more than two-thirds had moderate health hazards. This result might be attributed to children being addicted to technology and using phones for long hours. These findings agreed with a study conducted at Benha city by **Nassar et al., (2021)** the study revealed that 40.3% of mothers reported their children struggled to

wake up early as a physiological complaint, while 69.0% of the children exhibited reduced attention and concentration in kindergarten.

The current study results reveal that there is a highly significant statistically negative correlation between total mothers' awareness about technological environment pollution and children health hazards. This result might be attributed to when the mother's awareness of technological environment increases, the children's health is less affected so it's important to raise maternal awareness to reduce the health risks of technological environmental pollution on children.

These findings of the present study are similar to a study conducted by **Chang et al., (2019)** in Taiwan, which reported a highly positive perception among parents regarding effects of technological forms, industrial and digital media, on early development such as language and social skills.

The present study clarified that education level, working status, and income were significant positive predictors of higher mother awareness, while age was a negative predictor of mothers' awareness. This might be explained by the higher the mother's education, the more chance and ease to reach knowledge and facilitate learning. These findings agreed with the study conducted in Turkey by **Yalçın et al., (2023)** which showed that education level, working status and type and number of family were statistically significant factors in shaping maternal awareness of technological environmental pollution.

The study indicated that smartphone use and watching TV hours were significant positive predictors of higher children health hazards, while age was a negative

predictor. This may be explained by the exposure to radiations from smartphones and TV that negatively affect children's health. Similarly, a study in Turkey by **Varga et al., (2023)** presented that increased use of smartphones for entertainment was associated with higher levels of negative impacts on children.

Conclusion:

Based on the findings concluded that more than two-fifths of the studied mothers had satisfactory awareness of technological environmental pollution, while more than half had unsatisfactory awareness. On another hand children's health, nearly half experienced severe health hazards, more than one-third had moderate health hazards, and less than one-fifth had mild health hazards. Finally, a highly significant negative correlation was found between mothers' awareness and children's health.

Recommendation:

The study's recommended that:

- Organizing health education programs for mothers in nurseries and daycare centers to enhance their awareness about technological environmental pollution, its effects on children's health, and their preventive roles.
- Further research is needed to explore the risk factors influencing mothers' awareness and investigate factors contributing to children's health hazards.
- Replicate the study with larger samples in another setting to permit for general of the result.

Table 1: Demographic characteristics of mothers (n=212).

Demographic characteristics	N	%
Age		
≤25	44	20.7%
26≥40	132	62.3%
≥40	36	17.0%
Mean ± S.D	33.64±4.23	
Educational level		
Illiterate	16	7.5%
Read and write	34	16.0%
secondary-level education	87	41.0%
Bachelor degree	75	35.5%
Working condition		
Housewife	83	39.2%
Work	129	60.8%
In case of working, type of work (no= 129)		
Governmental work	46	35.7%
Private work	83	64.3%
Marital status		
Married	183	86.3%
Divorced	21	9.9%
Widow	8	3.8%
Monthly income		
Not enough	134	63.2%
Enough	62	29.3%
Enough and reserve	16	7.5%
Crowding index		
≤2	103	48.6%
>2	109	51.4%

Table 2: Demographic characteristics of children (n=212).

Demographic characteristics	N	%
Age		
3<4	59	27.8%
4<5	68	32.1%
5<6	85	40.1%
Mean ± S.D	4.1±0.02	
Gender		
Male	96	45.3%
Female	116	54.7%
Siblings		
Yes	191	90.1%
No	21	9.9%
Gender of siblings (no = 191)		
Male	47	24.6%
Female	31	16.2%
Both male and females	113	59.2%
Child order between siblings		
First	71	33.5%
Second	62	29.2%

Third	56	26.5%
Fourth	23	10.8%
Smartphone usage		
Yes	196	92.5%
No	16	7.5%
Watching TV		
Yes	212	100.0%
No	0	0.0%
Watching TV hours		
≤1	24	11.3%
2≤3	63	29.7%
>3	125	59%

Table 3: Total mothers awareness about technological environmental pollution (n=212).

Total awareness about technological environmental pollution	Satisfactory		Unsatisfactory	
	N	%	N	%
Industrial Technological Pollution	73	34.4%	139	65.6%
Plastic Pollution	128	60.1%	84	39.9%
Noise Pollution	167	78.7%	45	21.3%
Chemical Pollution	155	72.9%	57	27.1%
Radiation Pollution	74	34.7%	138	65.3%
Media Technological Pollution	95	45.0%	117	55.0%

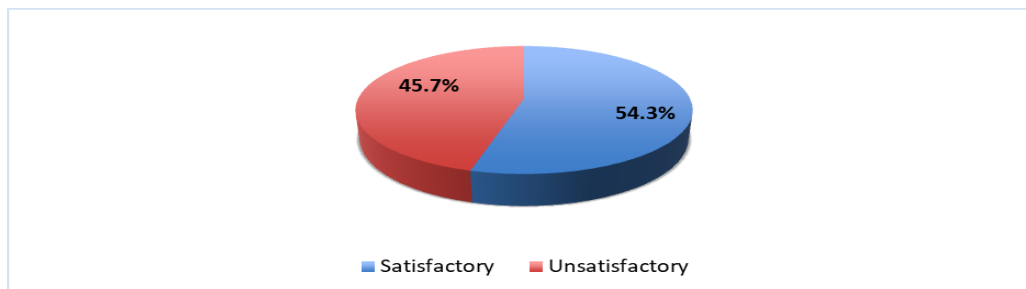


Figure 1: percentage of mother's total awareness about technological environmental pollution (n=212).

Table 4: Total children 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%	82	38.9	20	9.3%
Effect on concentration and attention of the child	119	56.3%	73	34.2%	20	9.6%

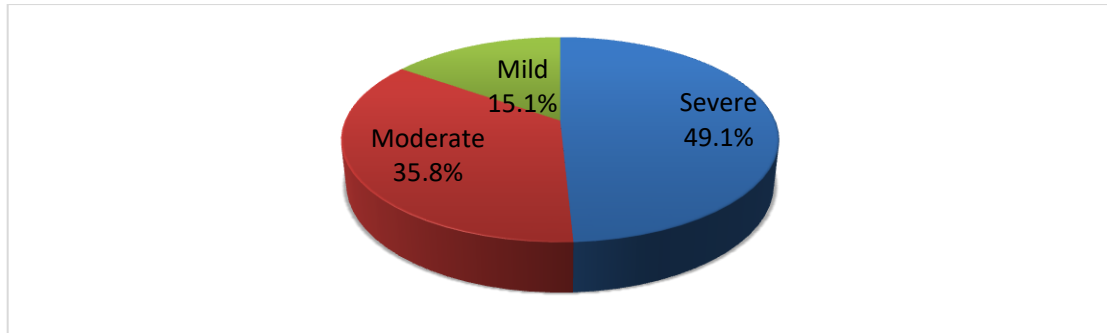


Figure 2: Total health hazards in preschool age (n=212).

Table 5: Correlation between mother awareness about technological environment pollution and Total children health hazards (n=212).

Items	Total mother awareness about technological	Total children health hazards
Total mother awareness about technological	R p	
Total children health hazards	R p	- .889 .000**

(**) Statistically significant at p < 0.01. r Pearson correlation

Table 6: Best fitting multiple linear regression for mother awareness

Items	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Age	-.199	.071	.112	2.991	.026*
Education level	.391	.097	.230	4.718	.002**
Working	.210	.062	.144	3.711	.013*
Monthly income and reserve)	.181	.054	.129	2.888	.039*
Model	R	R Square	Adjusted Square	R F	Sig.
	.420	.176	.153	8.012	.000

Table 7: Best fitting multiple linear regression for children health hazards

Items	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Age	-.140	.032	.098	2.654	.041*
Smartphone usage	.402	.178	.360	7.500	.001**
Watching TV hours	.260	.090	.187	4.987	.008**
Model	R	R Square	Adjusted Square	R F	Sig.
	.529	.279	.187	10.987	.000

(*) Statistically significant at p < 0.05. (**) Statistically significant at p < 0.01.

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