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PLASTIC USE PRACTICES AND AWARENESS OF POTENTIAL MICROPLASTIC-RELATED RISKS DURING PREGNANCY: A CROSS-SECTIONAL SURVEY IN UZBEKISTAN

Nuriddinova Munisa Tohir qizi

Tashkent Kimyo International University, Tashkent, Uzbekistan

Abstract: Plastic products are widely used in everyday life, including food storage and drinking-water consumption. However, the possible health risks associated with microplastics have raised concerns, particularly during pregnancy. This study aimed to assess plastic-use practices and awareness of potential microplastic-related risks among women of reproductive age in Uzbekistan. A descriptive cross-sectional survey was conducted in 2026 using Google Forms, involving 101 respondents. The questionnaire covered household plastic use, drinking-water containers, food storage, awareness of possible placental transfer, perceived pregnancy-related risks, and willingness to reduce plastic use. The results showed that 55.7% of respondents used plastic bags or containers for food storage, while 45.9% used single-use plastic bottles for drinking water. Regarding the possible transfer of microplastics across the placenta, 49.0% considered it possible, 15.6% believed it could occur with certainty, and 14.6% believed that the placenta provided complete protection. Nearly half of the respondents (48.5%) considered public awareness campaigns insufficient. Furthermore, 58.2% stated that they would stop using plastic containers if scientific evidence demonstrated harmful effects, while 30.6% would reduce their use. In conclusion, the findings highlight the common use of plastic products and the need for improved public awareness of microplastics and reproductive health. However, the survey assessed self-reported practices and perceptions and did not directly measure microplastic exposure or pregnancy outcomes.

Keywords: microplastics; pregnancy; maternal health; plastic use; environmental awareness; reproductive health; cross-sectional survey.

INTRODUCTION

Plastic products have become an integral part of modern life because of their affordability, durability, and convenience. They are widely used in food packaging, drinking-water bottles, household storage, and consumer products. However, the persistence of plastic waste in the environment and the fragmentation of plastic materials into smaller particles have increased scientific interest in microplastics and nanoplastics.

Microplastics are generally defined as plastic particles smaller than 5 mm. They may enter the environment through the degradation of larger plastic items, the release of particles from consumer products, and various industrial and domestic activities. Human exposure may occur through ingestion, inhalation, and contact with contaminated environments. Research has identified microplastic particles in several human biological samples, including placental tissue, although the detection methods, sample sizes, and interpretation of findings vary between studies [1–3].

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Pregnancy is a particularly important period for environmental health research because fetal development depends on a complex interaction between maternal physiology, placental function, and environmental conditions. The placenta regulates the transfer of oxygen, nutrients, and other substances between the mother and fetus. Nevertheless, it should not be considered an absolute barrier against every environmental contaminant. Research investigating microplastics in human placental samples has raised questions about their possible transfer and biological significance [2,3].

Experimental and observational studies have explored potential mechanisms through which microplastics might affect biological systems, including oxidative stress, inflammatory responses, and endocrine-related pathways. However, the strength of evidence differs across experimental models and human populations. Systematic reviews have also emphasized that the available human evidence remains limited and that larger, well-designed studies are needed to clarify the relationship between microplastic exposure and reproductive outcomes [1,4].

Alongside scientific research, everyday behaviors may influence potential exposure to plastic-derived particles. These behaviors include the use of single-use drinking-water bottles, storage of food in plastic containers, heating food in plastic materials, and keeping plastic bottles under high-temperature conditions. Recent research has examined the release of microplastics and nanoplastics from polyethylene terephthalate (PET) bottles under different storage and handling conditions [5]. Nevertheless, self-reported household practices cannot directly quantify an individual's internal exposure.

Public awareness is therefore an important component of environmental health research. Understanding what women know about microplastics, how they use plastic products, and whether they are willing to adopt alternative materials may help identify priorities for health education and future research.

In Uzbekistan, assessing these behaviors may provide preliminary information for developing educational initiatives focused on environmental health, maternal well-being, and practical approaches to reducing unnecessary plastic use.

AIM AND OBJECTIVES

Aim

To assess household plastic-use practices, awareness of potential microplastic-related risks during pregnancy, and willingness to adopt preventive measures among women of reproductive age in Uzbekistan.

Objectives

To describe the demographic and residential characteristics reported in the survey.

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To assess the use of plastic products for food storage, drinking water, and shopping.

To evaluate respondents' perceptions of microplastic exposure pathways and possible placental transfer.

To describe perceived pregnancy-related risks associated with microplastics.

To assess willingness to reduce plastic use and identify perceived gaps in public awareness.

MATERIALS AND METHODS

Study design and setting

A descriptive cross-sectional survey was conducted in 2026 using an online questionnaire created in Google Forms. The study focused on women's self-reported household plastic-use practices, awareness of microplastics, and perceptions of possible reproductive and pregnancy-related risks.

Study population and sample

The available summary included responses from 101 participants. The questionnaire was intended for women of reproductive age, including women who were pregnant, had recently become mothers, or were planning pregnancy.

The original summary provided age categories of 18–24, 26–34, 35–44, and 45 years or older. Because the stated eligibility criteria and the reported age categories were not fully consistent, the age distribution should be interpreted cautiously until the original questionnaire and eligibility criteria can be verified.

Data collection instrument

The questionnaire covered the following areas:

Demographic and residential characteristics.

Types of containers used for drinking water.

Practices involving plastic food-storage materials.

Use of plastic products for heating food.

Consumption of bottled water stored in hot or sunny conditions.

Use of plastic shopping bags.

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Perceived routes of microplastic exposure.

Awareness of possible placental transfer.

Perceptions of potential effects on pregnancy and fetal development.

Willingness to reduce plastic use.

Perceived adequacy of public awareness campaigns.

Use of alternative materials, including glass, ceramic, wood, bamboo, and stainless steel.

Statistical analysis

The available results were summarized descriptively using percentages. No respondent-level dataset, item-specific denominators, confidence intervals, or inferential statistical results were available for the present analysis. Therefore, no additional statistical tests were performed, and the percentages were not recalculated from individual observations.

Some reported response categories did not sum to 100%. Because the underlying responses were unavailable, these discrepancies could not be resolved reliably. The reported values are presented transparently rather than being adjusted through assumptions.

Ethical considerations

The original study summary indicated that participation was voluntary and that informed consent was obtained through the online questionnaire. Responses were described as anonymous.

The available materials did not include a verifiable ethics committee approval number or a formal exemption determination. The appropriate institutional ethics status must therefore be confirmed by the authors before journal submission. No approval number or exemption status should be reported unless it has been documented.

RESULTS

Demographic and residential characteristics

The survey included 101 respondents. The reported age distribution was as follows: 77.6% were aged 18–24 years, 15.3% were aged 26–34 years, 6.1% were aged 35–44 years, and 1.0% were aged 45 years or older.

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The predominance of respondents aged 18–24 years indicates that the sample was relatively young. However, the reported age categories and the stated eligibility range require clarification before the age distribution can be interpreted definitively.

Regarding residence, 66.3% of respondents lived in urban centers, 24.5% lived in rural areas or districts, and 9.2% lived in industrial or factory areas.

The original summary also reported that 77.1% of respondents were unmarried and that 9.4% were pregnant and/or planning pregnancy. These indicators describe different characteristics and cannot be treated as mutually exclusive marital-status categories. The exact reproductive-status distribution was not available.

Household plastic-use practices

Plastic products were commonly reported in everyday household activities.

For food storage, 55.7% of respondents reported using plastic bags or containers, while 44.3% reported using glass containers or fabric-based alternatives.

Regarding drinking-water containers, 45.9% reported using single-use plastic bottles, 36.7% used glass or metal containers, and 17.3% used reusable plastic bottles.

When asked about drinking water from plastic bottles that had been left in hot or sunny conditions, 73.5% reported never doing so, 21.4% reported doing so sometimes, and 5.1% reported doing so frequently.

For heating food, 55.7% reportedly used glass or ceramic containers, 27.8% did not pay attention to the container material, and 16.5% reported using plastic containers.

Regarding shopping bags, 44.9% reported using plastic bags during every shopping trip, 40.8% used them sometimes, and 14.3% reported using cloth bags.

These findings indicate that plastic products remained common in food storage, drinking-water consumption, and shopping practices. At the same time, a proportion of respondents reported using alternative materials such as glass, ceramic, metal, or fabric.

Awareness of microplastic exposure pathways

When asked about possible routes through which microplastics may enter the human body, 59.2% identified food and water, 15.3% identified inhalation, and 20.4% identified multiple exposure routes.

The reported values for this question totaled 94.9%. Because the original response-level data were unavailable, the reason for the difference could not be determined. The values should therefore be

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interpreted as the percentages reported in the source summary rather than as a complete distribution of all participants.

Perceptions of placental transfer

Respondents were asked whether microplastics could pass through the placenta.

A total of 49.0% considered such transfer possible, 15.6% believed it could occur with certainty, 14.6% believed that the placenta fully protected the fetus, and 20.8% were unsure.

These results suggest variation in respondents' understanding of the potential relationship between environmental contaminants and placental function. The responses reflect perceptions and knowledge rather than a direct assessment of biological transfer or fetal exposure.

Perceived pregnancy-related risks

The questionnaire also explored respondents' views regarding possible effects of microplastics on pregnancy and fetal development.

In the source summary, 45.9% selected a combined category involving preterm birth, low fetal weight, and congenital anomalies. Individual categories were reported as follows: congenital anomalies, 18.4%; low fetal weight or impaired growth, 17.3%; and preterm birth, 13.3%.

The reported categories totaled 94.9%. The original questionnaire and item-level response structure were unavailable, so it was not possible to determine whether the difference reflected missing responses, a separate response option, or another reporting issue.

These findings should be interpreted as respondents' perceptions of potential risks. The survey did not measure actual pregnancy outcomes, fetal growth, congenital anomalies, or individual microplastic exposure.

Willingness to adopt preventive measures

When asked how they would respond if scientific evidence demonstrated harmful effects of plastic use, 58.2% stated that they would immediately stop using plastic containers, 30.6% would reduce their use, and 11.2% indicated that they would be unable to do so because of the lack of alternatives.

The first two categories together accounted for 88.8% of respondents, indicating a stated willingness to stop or reduce plastic-container use if convincing evidence of harm became available.

This finding suggests that many respondents expressed openness to preventive behavior. However, stated intentions do not necessarily predict subsequent behavior, and actual changes in household practices were not measured.

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Perceived adequacy of public awareness campaigns

Regarding public information about microplastics and their possible health implications, 48.5% considered existing awareness campaigns insufficient, 37.1% considered them partially adequate, and 14.4% considered them adequate.

These responses indicate that many participants perceived a need for more information about environmental exposure and potential health implications. However, the survey did not objectively assess participants' knowledge or evaluate the effectiveness of specific educational campaigns.

Use of alternative materials

Respondents also reported the use of alternative materials. Glass or ceramic products were reported by 40.9%, wood or bamboo products by 19.4%, and stainless-steel products by 17.3%. A further 18.3% reported that they had not yet adopted alternatives.

The reported categories totaled 95.9%. Because the original questionnaire and individual responses were unavailable, the difference could not be resolved. Consequently, these values are presented as reported rather than recalculated.

Overall, the findings suggest that some respondents already used alternatives to plastic products, while others had not adopted them. Availability, affordability, convenience, and access to suitable products may be relevant considerations for future research, although these factors were not directly established by the available results.

DISCUSSION

This survey provides descriptive information about household plastic-use practices and awareness of potential microplastic-related risks among women surveyed in Uzbekistan. The findings highlight three main areas: the continued use of plastic products in everyday life, variation in perceptions of possible reproductive and pregnancy-related risks, and expressed willingness to reduce plastic use if convincing evidence of harm becomes available.

Household plastic use and potential exposure

More than half of respondents reported using plastic bags or containers for food storage, while nearly half reported using single-use plastic bottles for drinking water. These findings demonstrate the practical importance of plastic products in everyday household activities.

Previous research has investigated microplastics in bottled water and examined how storage and handling conditions may influence the release of plastic particles [5,6]. Such evidence provides a scientific rationale for studying household practices. Nevertheless, the use of a plastic product does

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not establish the amount of microplastic released, the quantity ingested, or the internal exposure experienced by an individual.

The present survey did not analyze water, food, plastic containers, or biological samples. Therefore, its findings should be understood as information about reported practices rather than direct measurements of environmental contamination or human exposure.

Awareness of potential placental transfer

The responses concerning placental transfer demonstrated differences in respondents' perceptions. Nearly half considered transfer possible, while others expressed certainty, uncertainty, or the belief that the placenta provided complete protection.

Scientific literature has reported the detection of microplastic particles in human placental samples, including the study by Ragusa and colleagues [3]. More recent reviews have discussed potential reproductive and developmental implications while emphasizing limitations in the available human evidence [1,2,4].

These findings support the importance of accurate public communication. Educational materials should distinguish between the detection of particles, evidence of biological transfer, and proof that a specific exposure causes adverse pregnancy outcomes. These are separate scientific questions and should not be presented as interchangeable.

Perceived risks and scientific uncertainty

Respondents identified several possible pregnancy-related outcomes, including preterm birth, low fetal weight, and congenital anomalies. These outcomes are clinically important, but the survey did not investigate whether they occurred among participants or whether they were associated with microplastic exposure.

Research on reproductive health and microplastics is developing, and systematic reviews have identified gaps in study quality, exposure measurement, and the interpretation of human health outcomes [1,4]. Experimental findings may help identify biological mechanisms, but their implications for real-world human exposure require careful evaluation.

Accordingly, the present findings describe public perceptions rather than confirming a causal relationship between microplastics and adverse pregnancy outcomes.

Willingness to reduce plastic use

A notable finding was that 88.8% of respondents stated that they would either stop using or reduce plastic-container use if evidence demonstrated harmful effects. This suggests that the participants expressed a favorable intention toward preventive action.

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However, behavioral intentions may differ from actual behavior. Access to alternative materials, household budgets, convenience, and the availability of reliable information could influence whether respondents subsequently change their practices. These potential determinants were not directly measured in the present survey and should be investigated in future studies.

Educational interventions could provide practical information about reducing unnecessary single-use plastic consumption, selecting appropriate food-storage materials, and following manufacturer instructions for food heating and container use. Such recommendations should be based on established safety guidance and should avoid implying that all plastic products carry the same level of risk.

Implications for public health education

Almost half of respondents considered public awareness campaigns insufficient, while more than one-third considered them only partially adequate. These perceptions suggest that participants may welcome clearer information about microplastics and environmental health.

Public education should explain the difference between established evidence and emerging hypotheses. It should also emphasize realistic preventive choices without creating unnecessary anxiety among pregnant women or those planning pregnancy.

The findings may be useful for designing future educational activities at universities, healthcare facilities, and community settings. Nevertheless, the effectiveness of such activities should be evaluated using validated knowledge assessments and follow-up measurements of behavior rather than relying solely on self-reported intentions.

STUDY LIMITATIONS

Several limitations should be considered when interpreting the findings.

First, the study used a descriptive cross-sectional design. It cannot establish temporal relationships or causal associations between plastic-use practices and health outcomes.

Second, the available dataset consisted of summarized percentages rather than respondent-level observations. Item-specific denominators, confidence intervals, and statistical tests could not be independently verified.

Third, some response categories did not sum to 100%, and the reported age categories were not fully consistent with the stated eligibility criteria. The original questionnaire and responses should be checked before publication. The discrepancies have not been corrected by inventing or redistributing responses.

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Fourth, the sampling and recruitment procedures were not fully documented in the available summary. Therefore, the representativeness of the sample and the generalizability of the findings to all women in Uzbekistan cannot be established.

Fifth, the questionnaire measured self-reported behaviors and perceptions. It did not measure microplastic concentrations in food, water, or biological samples, and it did not assess clinical pregnancy outcomes or fetal development.

Finally, the available materials did not provide verifiable documentation of formal ethics committee approval or exemption. This information must be confirmed before the manuscript is submitted to a journal.

CONCLUSION

This cross-sectional survey described household plastic-use practices, awareness of potential microplastic-related risks, and stated preventive intentions among 101 respondents in Uzbekistan.

The reported findings indicate that plastic bags and containers remained common in food storage and that single-use plastic bottles were frequently reported as a drinking-water container. Respondents varied in their perceptions of possible placental transfer and potential pregnancy-related risks. A substantial proportion expressed willingness to stop or reduce plastic-container use if convincing scientific evidence of harm became available.

The findings support the value of clear, evidence-based public education about microplastics, environmental exposure, and maternal health. However, they should not be interpreted as evidence that participants experienced harmful microplastic exposure or adverse pregnancy outcomes.

Future research should use clearly defined sampling procedures, validated questionnaires, complete respondent-level datasets, and standardized reporting of denominators. Where appropriate, studies integrating environmental measurements and clinical data may help clarify the relationship between household plastic-use practices, actual exposure, and reproductive health.

DECLARATIONS

Ethics approval: The original study summary reports voluntary participation and informed consent. Formal ethics committee approval or exemption documentation was not available in the materials used to prepare this manuscript and must be confirmed before submission.

Informed consent: The source summary indicates that participants provided consent for voluntary participation.

Data availability: The present manuscript was prepared from summarized survey percentages. The respondent-level dataset was not available for independent reanalysis.

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