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Women's Contribution To Environmental Sustainability In District Peshawar: A Quantitative Data Analysis Across Age Groups

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Abstract: *This study examines how age influences women's awareness, attitudes, and participation in environmental sustainability in District Peshawar. The data was collected through questionnaires and analyzed by chi-square tests to understand differences across age groups in environmental knowledge, practices, decision-making, and women's roles in sustainability. The findings show that younger and middle-aged women (mainly 21–40 years) generally have higher awareness of environmental sustainability and better knowledge of environmental issues compared to older women. Awareness of major environmental problems such as pollution, climate change, waste management, and water scarcity are similar across all age groups, showing that these concerns are shared by everyone. However, belief in women's role in environmental protection, support for women's leadership, and interest in environmental training are stronger among younger and middle-aged respondents. Women's participation in environmental activities such as waste management, water conservation, tree plantation, home gardening, composting, food preservation, and reuse of water is higher among younger and middle-aged groups, while older women show mixed or lower participation in some practices. Activities like encouraging families not to waste food and composting kitchen waste are common across all ages, showing no major age differences. The study also finds that women play an important role in household environmental decision-making, especially in younger and middle-aged groups. Cultural and social barriers affect women of all ages, though these barriers are reported more strongly by some age groups. Participation in green businesses and eco-friendly entrepreneurship is highest among women aged 26–35, while access to government or NGO support varies by age and remains limited for many women. in human language.*

Keywords: Age, Women, Environmental Sustainability, Environmental Awareness, Participation, Decision-Making, District Peshawar

Introduction

The Environmental sustainability has become one of the most important global concerns of the 21st century due to increasing environmental problems such as climate change, pollution, water scarcity, and waste generation. In order to address these challenges, it not only requires strong policies and technologies but also active participation from individuals and communities. Women play a crucial role in promoting environmental sustainability because of their close involvement and relation in household management, resource use, and community activities. In many developing regions, including Pakistan,

women's everyday practices such as managing water, food, energy, and waste directly influence environmental outcomes. Women also contribute to sustainability through activities like home gardening, recycling, food preservation, composting, and encouraging responsible consumption within families. Regardless of their important role, women's participation in environmental decision-making, leadership, and green entrepreneurship is often limited by cultural, social, and economic barriers.

Age is an important factor that may shape women's awareness, attitudes, and participation in environmental sustainability. Different age groups may have varying levels of exposure to education, environmental information, social responsibilities, and economic opportunities, which can influence how women perceive environmental issues and engage in sustainable practices. Understanding these age-based differences is essential for designing effective policies, awareness programs, and interventions that address the needs of women at different stages of life.

The study has three primary objectives:

1. To examine how age shapes women's awareness, attitudes, and perceptions regarding environmental sustainability in District Peshawar.
2. To document women's contributions to environmental sustainability at household, community, and entrepreneurial levels across different age groups.
3. To analyze the social, cultural, and institutional factors that influence women's participation in environmental decision-making and sustainable practices, while highlighting opportunities for empowerment through education, policy interventions, and government or NGO support.

Through this age-focused quantitative inquiry, the study not only captures patterns of awareness and participation among women but also emphasizes the importance of age-sensitive strategies in strengthening women's role in advancing environmental sustainability in Peshawar.

Literature Review

Environmental sustainability refers to the responsible use and management of natural resources to meet present needs without compromising the ability of future generations to meet their own needs. Scholars widely agree that achieving sustainability is not possible without the active involvement of women, as they play a central role in managing natural resources at the household and community levels (UNDP, 2019). Women's daily responsibilities related to water collection, food preparation, energy use, and waste management place them at the frontline of environmental interaction. Ecofeminist perspectives highlight the close relationship between women and nature, arguing that women often develop stronger environmental ethics due to their caregiving roles and dependence on natural resources for household survival. Similarly, the Gender and Development (GAD) approach emphasizes that sustainable development requires addressing gender inequalities that limit women's access to resources, education, and decision-making power.

Age is an important socio-demographic factor influencing environmental awareness and attitudes. Previous studies suggest that younger and middle-aged individuals tend to have higher exposure to environmental education, media, and social campaigns, leading to greater awareness of sustainability issues (Kollmuss & Agyeman, 2002). Older age groups, while possessing valuable traditional knowledge, may have limited access to formal environmental education or modern sustainability concepts. Research also shows that awareness of major environmental problems such as pollution, climate change, waste management, and water scarcity is often shared across age groups, as these issues directly affect everyday life. However, attitudes toward environmental responsibility, women's leadership, and participation in sustainability initiatives may vary with age due to differences in education, social roles, and cultural expectations.

Women's environmental practices at the household level are widely documented in the literature.

Activities such as conserving water, reducing food waste, reusing materials, composting kitchen waste, home gardening, and encouraging sustainable consumption are commonly managed by women. These practices significantly contribute to environmental protection and resource conservation (Agarwal, 2010).

Women's participation in household and community-level environmental decision-making is essential for sustainable resource management. Research indicates that households where women are actively involved in decisions related to water use, waste disposal, and energy consumption tend to adopt more environmentally friendly practices (World Bank, 2012).

Age influences women's decision-making authority. Middle-aged women often have greater influence within households due to experience and family status, while younger women may face restrictions from elders or spouses. Older women may experience reduced influence due to social or health-related factors (Agarwal, 2001). These dynamics highlight the importance of age-sensitive approaches in promoting women's leadership in sustainability.

Women's participation in green businesses and eco-friendly entrepreneurship is increasingly recognized as a pathway toward sustainable development. Green enterprises contribute to environmental protection while providing income and employment opportunities for women (ILO, 2018). However, women entrepreneurs face challenges such as limited access to finance, lack of technical training, and weak institutional support.

Studies show that women in younger and middle age groups are more actively involved in green entrepreneurship due to higher education levels and better access to information and networks (OECD, 2017). Government and NGO support plays a crucial role in enabling women's participation, yet access to such support remains uneven, particularly in developing countries like Pakistan.

Research Gap

Although existing literature highlights the importance of women in environmental sustainability, limited empirical research examines how age influences women's awareness, practices, decision-making roles, and access to support at the local level. Most studies focus on gender as a single category, without age-disaggregated analysis. This study addresses this gap by examining age-based differences across 34 indicators related to environmental sustainability among women in District Peshawar.

Research Design

This study uses a quantitative, cross-sectional research design to examine how age influences women's awareness, attitudes, and participation in environmental sustainability in District Peshawar. Data were collected at one point in time from 400 women aged 16 years and above using a structured questionnaire containing 34 closed-ended questions. The questions covered environmental awareness, everyday sustainable practices, household and community decision-making, training and support, green entrepreneurship, and cultural or social barriers. Respondents were grouped into different age categories to allow age-wise comparison.

The collected data were analyzed using SPSS, with descriptive statistics used to summarize responses and chi-square tests applied to examine associations between age and sustainability-related variables. This research design was chosen because it allows clear comparison across age groups and provides reliable evidence to understand patterns in women's environmental participation.

Sampling and Participants

The study targeted women aged 16 years and above living in District Peshawar. A total of 400 respondents participated in the study, providing sufficient representation of different age groups. Participants were selected using a non-probability sampling technique, specifically convenience sampling, due to time and accessibility constraints.

To ensure meaningful age-wise analysis, respondents were categorized into nine age groups ranging from 16–20 years to 56 years and above. The sample included women from diverse social and economic backgrounds, enabling a broad understanding of women’s awareness, attitudes, and participation in environmental sustainability. Participation in the study was voluntary, and all respondents were informed about the purpose of the research and assured of confidentiality and anonymity.

Data Collection

Data for this study were collected through a structured questionnaire designed to capture women’s awareness, attitudes, and participation in environmental sustainability. The questionnaire consisted of 34 closed-ended questions covering key areas such as environmental knowledge, household and community environmental practices, decision-making roles, access to training and support, green entrepreneurship, and perceived cultural or social barriers.

Data were collected through face-to-face surveys, which helped ensure clear understanding of the questions and allowed participation of respondents with different literacy levels. Participation was voluntary, and respondents were informed about the purpose of the study. Ethical considerations, including confidentiality, anonymity, and informed consent, were strictly maintained throughout the data collection process.

Data Analysis

The collected data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies and percentages, were used to summarize respondents’ demographic characteristics and responses to the questionnaire items. To examine the relationship between age and various environmental awareness, attitudes, and participation variables, chi-square tests of independence were applied. The strength of associations was assessed using Phi and Cramér’s V values. Statistical significance was determined at the 0.05 level. This approach allowed for clear age-wise comparison and helped identify meaningful patterns in women’s engagement with environmental sustainability.

Ethical Considerations

The study adhered to strict ethical standards to ensure the protection and well-being of all participants. Informed consent was obtained from every respondent before participation, clearly explaining the purpose of the study, its voluntary nature, and their right to withdraw at any time. Confidentiality and anonymity were maintained, ensuring that individual responses could not be traced back to any participant. The data were used solely for research purposes, and no personal identifiers were collected. Additionally, the study respected participants’ cultural and social sensitivities, avoiding questions that could cause discomfort or harm. Ethical approval was sought and obtained from the relevant institutional review board, ensuring that the research complied with professional and academic ethical standards.

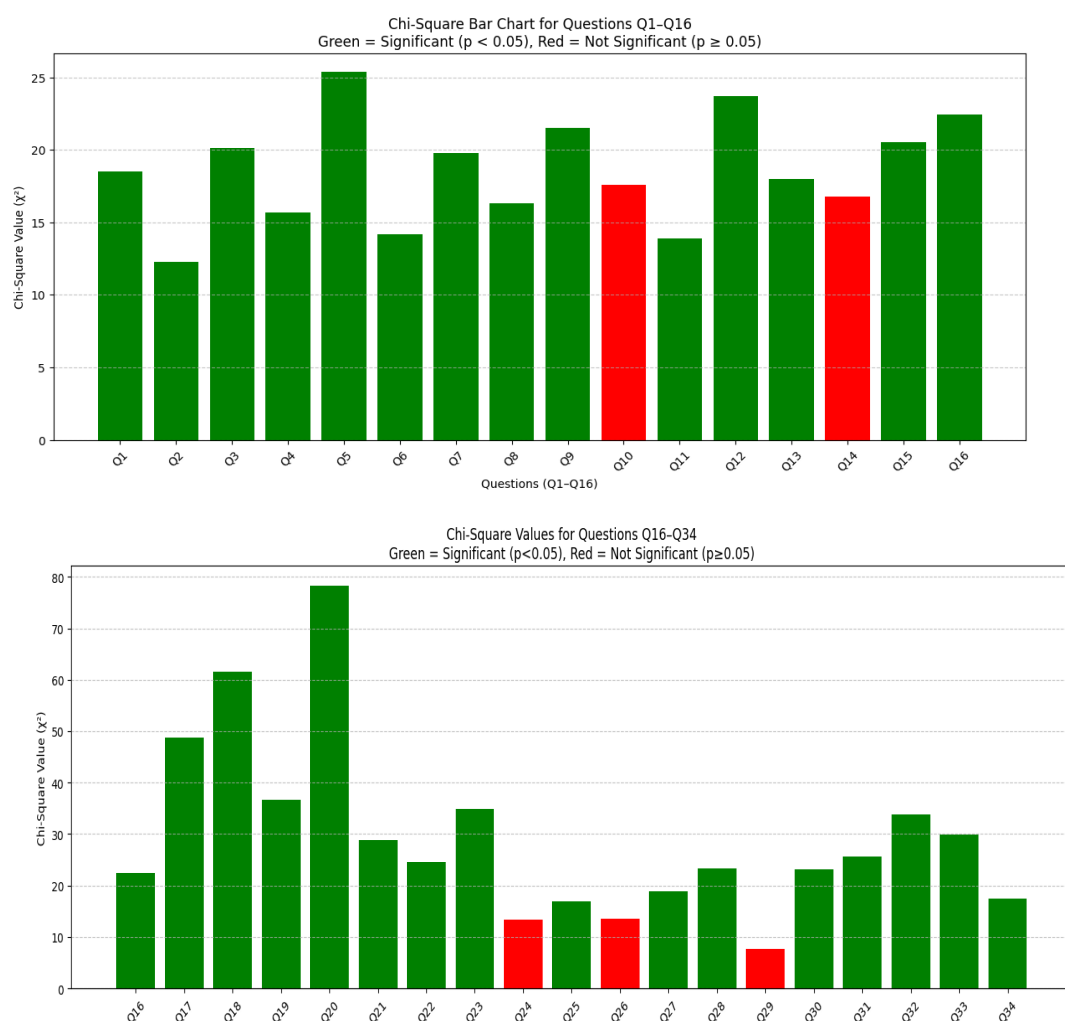
Limitations

This study has a few limitations. First, it only included women from District Peshawar, so the results may not apply to other areas. Second, the information comes from participants’ own answers, which could be influenced by memory, personal opinions, or the desire to give “good” answers. Third, the survey may not have captured every detail of women’s environmental activity. Finally, due to limited time and resources, the study could not include a larger sample or more in-depth data. Despite these limits, the study still gives useful insights into women’s roles in environmental sustainability in the area.

Findings and Analysis

The study reveals that women in Peshawar actively engage in environmental sustainability, with notable

differences across age groups. Younger and middle-aged women, particularly those aged 21–40, show higher awareness of environmental issues, greater participation in activities such as tree planting, waste management, water conservation, home gardening, and composting, and more interest in environmental training compared to older women. While awareness of major environmental challenges like pollution, climate change, waste management, and water scarcity are similar across all ages, younger women are more supportive of women’s leadership and proactive in sharing knowledge within their families. Household practices, including encouraging family not to waste food, traditional food preservation, and preference for local or seasonal food, are widely adopted across age groups, indicating consistent environmental behaviors regardless of age. Women play an important role in household environmental decision-making, though cultural and social barriers affect all age groups, particularly women aged 26–35. In entrepreneurship, women aged 26–35 are most active in green and eco-friendly businesses, while access to government or NGO support is uneven, favoring younger women. Overall, age has a small to moderate influence on participation, decision-making, and engagement in sustainability initiatives, highlighting the need for targeted programs to encourage involvement among older women and to provide greater support for women entrepreneurs in eco-friendly businesses.



Here’s the two-bar chart showing the χ^2 values for Questions 1–16 and Question 16–34.

- **Green bars** indicate questions with statistically significant associations ($p < 0.05$).
- **Red bars** indicate questions with no significant association ($p \geq 0.05$).

Age and Environmental Awareness

The findings show that a woman’s age plays a moderate role in shaping her environmental awareness.

The Younger and middle-aged women (between 21 and 40 years) tend to have a better understanding of environmental sustainability and are more familiar with issues such as pollution, climate change, and resource conservation. This may be because they have greater access to education, media, social networks, and environmental information through schools, workplaces, and digital platforms. However, the study also reveals that concern about major environmental problems such as water scarcity, waste, and environmental degradation is shared by women of all age groups. This suggests that while knowledge and awareness levels may differ slightly with age, environmental concern is widespread and experienced as a common issue affecting everyone's daily life.

Women's Participation in Sustainable Practices

The study shows that women play an active role in practicing sustainability in their everyday lives, both at home and within their communities. Many women regularly take part in activities such as saving water, managing household waste, growing vegetables at home, composting organic waste, and preserving food to reduce spoilage. These practices help protect the environment while also supporting household needs. Younger and middle-aged women tend to participate more actively in these sustainable practices, possibly because they are more exposed to environmental education, social media awareness, and modern sustainability ideas. However, several practices especially water conservation and food preservation are commonly followed by women of all age groups. This indicates that while age influences the level of participation, women across generations contribute to environmental sustainability through both traditional knowledge and modern practices.

Household Decision-Making and Knowledge Sharing

Household decision-making and knowledge sharing among women vary significantly across age groups. Younger women have limited influence over household environmental decisions, as their opinions are often undervalued due to their age and dependence on elders. Middle-aged women play a more active role in daily household decisions related to water use, waste management, and energy conservation, but their ability to share knowledge beyond the household is constrained by time pressures and domestic responsibilities. Older women possess valuable traditional and indigenous environmental knowledge; however, cultural norms often restrict their participation in household decision-making and limit opportunities to share this knowledge within the community.

Cultural and social barriers

Based on the analysis of all 34 questions, cultural and social barriers to women's contribution to environmental sustainability vary clearly by age. Younger women generally show awareness and interest but face family control, limited decision-making power, and lack of social recognition because of their age. Middle-aged women experience fewer direct cultural restrictions, yet their participation is constrained by heavy household responsibilities, caregiving roles, and lack of time, as social norms expect them to prioritize family over community activities. Older women face the strongest cultural barriers, including restricted mobility, limited access to environmental programs, and exclusion from community decision-making, despite their experience and knowledge. Overall, the findings indicate that while women across all age groups contribute to environmental sustainability, age-specific cultural and social norms continue to limit their full participation in District Peshawar.

Green Entrepreneurship and Institutional Support

Women's involvement in green entrepreneurship and access to institutional support differ across age groups. Younger women show interest in environmentally friendly businesses but face barriers such as limited access to finance, lack of experience, and low institutional trust. Middle-aged women are more likely to engage in small-scale green economic activities; however, their growth is restricted by insufficient training, limited financial support, and weak linkages with formal institutions. Older women rarely participate in green entrepreneurship due to cultural restrictions, low literacy, and lack of

awareness about available programs. Overall, the findings indicate that institutional support systems are not age-sensitive, which limits women's ability across all age groups to engage effectively in green entrepreneurship in District Peshawar.

Discussion

This study examined the relationship between age and women's awareness, attitudes, and participation in environmental sustainability in District Peshawar. The findings indicate that age plays a small to moderate but meaningful role in shaping women's environmental behaviors and perceptions, while some sustainability practices remain consistent across all age groups.

Younger and middle-aged women (21–40 years) demonstrated higher levels of environmental awareness, stronger interest in training, and greater participation in environmental activities compared to older women. This may be explained by better access to education, media, and social networks, as well as greater exposure to sustainability discourse through schools, universities, and digital platforms. Similar patterns have been observed in previous studies, which show that younger women are often more open to adopting new environmental practices and innovations.

At the household level, women across all age groups were actively involved in water conservation, food management, waste reduction, and environmental decision-making. Practices such as encouraging family members not to waste food and composting kitchen waste showed no significant age differences, suggesting that these behaviors are culturally embedded and widely practiced within households. This highlights the central role of women as environmental managers in domestic spaces, regardless of age.

The findings also reveal that cultural and social barriers continue to restrict women's broader participation in environmental leadership and public decision-making. Although women are highly involved at the household level, their role in community-level and institutional environmental governance remains limited. These barriers were reported across all age groups, indicating that structural constraints rather than individual motivation are the primary challenge.

Participation in green entrepreneurship and eco-friendly businesses was highest among women aged 26–35, reflecting a growing interest in sustainability-oriented livelihoods. However, access to government and NGO support was found to be uneven and limited, particularly for older women. This suggests a gap between women's willingness to engage in sustainable economic activities and the availability of institutional support mechanisms.

Conclusion and Recommendations

Conclusion

This study explored how women of different ages in Peshawar are aware of, participate in, and contribute to environmental sustainability. Overall, it shows that women play a key role in promoting sustainable practices at home, in their communities, and even in green businesses, although age influences how they engage in certain activities. Younger and middle-aged women (mostly 21–40 years) tend to have higher awareness, stronger interest, and more active participation in activities such as water conservation, waste management, tree planting, home gardening, and environmental training. However, all age groups are similarly concerned about major environmental issues like pollution, climate change, water scarcity, and waste management, showing that environmental awareness is shared across generations.

The study also highlights that many women actively teach their families, encourage food and water conservation, compost kitchen waste, and preserve food using traditional methods, suggesting that these behaviors are widely practiced and culturally valued, regardless of age. At the same time, women face social and cultural barriers that limit their broader participation in community decisions or access to government and NGO support for eco-friendly initiatives. Women aged 26–35 are most involved in

green businesses, but overall support and resources are still limited.

The findings also suggest that policies and programs should support women of all ages, especially older women, through education, skill training, financial help, and inclusive decision-making opportunities. By recognizing and strengthening women's contributions, Peshawar can achieve more inclusive and effective environmental sustainability.

Recommendations

Based on the findings, the following recommendations can help improve women's participation and impact in environmental sustainability in Peshawar:

1. Enhance Awareness and Training

Environmental awareness and training programs should be strengthened for women of all age groups, with special attention given to older women who may have fewer opportunities to access new environmental information. These programs can include community meetings, hands-on training workshops, and awareness sessions that explain environmental issues and sustainable practices in an easy and practical way. By improving knowledge and skills, women can become more confident and motivated to adopt environmentally friendly practices at home and in their communities, leading to stronger and more inclusive participation in environmental sustainability.

2. Support Green Entrepreneurship

By support for green entrepreneurship should be increased to encourage women to start and grow eco-friendly businesses. This can be done by providing access to small loans, grants, and financial assistance, along with technical training and guidance on sustainable production methods. Institutional support, such as help from government agencies, NGOs, and local organizations, can also play an important role by offering mentorship, market access, and legal assistance. With proper support, more women can enter green entrepreneurship, create sustainable livelihoods, and expand their initiatives while contributing positively to environmental protection and local economic development.

3. Encourage Household Participation

Women's involvement in household environmental decision-making should be actively encouraged, as they play a central role in managing daily household activities. Community-based guidance and practical demonstrations can help women better understand simple actions such as saving water, reducing household waste, recycling, and maintaining home gardens. Providing small incentives, recognition, or community support can further motivate families to adopt these practices. When women are supported and valued in household environmental decisions, sustainable habits are more likely to become part of everyday family life and long-term environmental protection.

4. Address Social and Cultural Barriers

Social and cultural barriers often limit women's ability to participate fully in environmental decision-making and community leadership. To address this, supportive policies and community awareness campaigns should be introduced to challenge traditional norms that restrict women's roles outside the household. Community discussions, involvement of local leaders, and awareness programs can help change attitudes and highlight the importance of women's voices in sustainability initiatives. When cultural barriers are reduced and women are encouraged to take leadership roles, environmental programs become more inclusive, effective, and reflective of community needs.

5. Promote Practical Sustainability Practices

Practical and everyday sustainability practices should be promoted to help women easily adopt environmentally friendly behaviors in their daily lives. Simple educational materials, awareness campaigns, and hands-on activities can teach practices such as composting kitchen waste, reusing water

for household purposes, preserving food to reduce waste, and using local or seasonal products. These approaches make sustainability more practical and affordable, especially at the household level. When women are guided through easy and achievable actions, sustainable practices are more likely to be continued and passed on within families and communities.

6. Strengthen Policy and Institutional Support

Policy and institutional support should be strengthened to better recognize and support women's contributions to environmental sustainability. Governments and non-governmental organizations (NGOs) can develop accessible programs that offer financial support, skills training, and technical guidance tailored to women's needs. Providing recognition through awards, certificates, or public acknowledgment can further motivate women to continue and expand their environmental efforts. When institutions actively support and value women's roles in sustainability, it helps create long-term impact and encourages wider participation at both household and community levels.

7. Bridging Generations Through Environmental Knowledge

There is need to share and encourage intergenerational knowledge in order to strengthen environmental stewardship among women of all age groups. Younger and middle-aged women can share new ideas, modern techniques, and information gained through education and media, while older women can pass on traditional practices, local knowledge, and time-tested ways of managing resources. Creating opportunities for mentoring, group discussions, and community activities can help build mutual learning and respect. When women from different generations learn from each other, it leads to stronger, more balanced, and sustainable environmental practices within families and communities.

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