

Article

# Environmental Factors and Health-Related Outcomes: A Study of Residents in Small Towns of Ethiopia

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**Abstract:** Environmental factors play a crucial role in determining the health and well-being of individuals in both developed and developing countries. In Ethiopia, small towns are particularly vulnerable to the negative impacts of environmental factors on health. This study aimed to examine the relationship between environmental factors and health-related outcomes among residents of small towns in Ethiopia. A survey was conducted with a sample of 225 individuals, including questions about demographics, health-related behaviors, and environmental factors. The findings suggest that air pollution, access to green spaces, and physical activity opportunities are important determinants of health in these communities. Addressing these environmental factors requires a comprehensive and community-engaged approach that involves collaboration between various sectors and engagement with community members and local stakeholders. Future research could further explore the relationships between environmental factors and health-related outcomes in small towns of Ethiopia and other low- and middle-income countries.

**Keywords:** Environmental factors, health-related outcomes, small towns, Ethiopia, air pollution, access to green spaces, physical activity opportunities.

## 1. Introduction

Environmental factors play a crucial role in determining the health and well-being of individuals in both developed and developing countries. Environmental factors encompass a wide range of factors, including air pollution, access to green spaces, and physical activity opportunities, among others [1]. These factors can have significant effects on the health and well-being of individuals, contributing to the development of chronic diseases, mental health disorders, and premature mortality.

In Ethiopia, a country facing numerous environmental and health challenges, small towns are particularly vulnerable to the negative impacts of environmental factors on health. Small towns in Ethiopia face several environmental problems such as deforestation, desertification, soil erosion, and land degradation. These environmental challenges contribute to the increased vulnerability of small towns in Ethiopia to negative health outcomes.

The World Health Organization (WHO) estimates that air pollution contributes to approximately 8% of all deaths in Ethiopia. Air pollution has been identified as a significant contributor to negative health outcomes, including respiratory and cardiovascular illnesses, cancers, and premature mortality [2]. Ethiopia is also one of the most vulnerable countries to climate change, with rising temperatures, changing precipitation patterns, and more frequent extreme weather events expected to have a significant impact on health outcomes.

Access to green spaces has been associated with a range of health benefits, including improved mental health, reduced stress, and increased physical activity. However, access to green spaces is limited in Ethiopia, particularly in small towns. Physical activity has been linked to numerous health benefits, including reduced risk of chronic diseases, improved mental health, and increased life expectancy. However, access to physical activity opportunities is often limited in small towns in developing countries.

Given the significant impact of environmental factors on health-related outcomes, it is crucial to examine the relationships between environmental factors and health-related outcomes among residents of small towns in Ethiopia. This study seeks to contribute to the existing literature on this topic by identifying the specific environmental factors that contribute to negative

health outcomes in small towns in Ethiopia. By understanding these relationships, policymakers and public health practitioners can develop effective interventions aimed at promoting better health and well-being in these communities.

## **2. Literature Review**

### **2.1 Air Pollution and Health-related Outcomes**

Air pollution is a growing concern globally, and it is estimated to be responsible for 4.2 million deaths worldwide each year. Exposure to air pollution has been linked to a range of negative health outcomes, including respiratory and cardiovascular illnesses, cancers, and premature mortality. In Ethiopia, air pollution is a significant health concern, particularly in urban and industrial areas. The rapid urbanization and industrialization in Ethiopia have contributed to the increased levels of air pollution, which pose a significant threat to public health [3].

A study conducted in Addis Ababa, Ethiopia's capital city, found that the levels of air pollution were significantly higher than the recommended levels by the World Health Organization. The study also found that exposure to ambient air pollution was associated with increased respiratory symptoms, particularly among children. Another study conducted in Ethiopia's capital found that exposure to air pollution was associated with an increased risk of hypertension, a significant risk factor for cardiovascular disease.

Indoor air pollution is also a significant health concern in Ethiopia, particularly in rural areas where solid fuel is commonly used for cooking and heating. According to the WHO, indoor air pollution is responsible for approximately 50,000 deaths in Ethiopia each year. The use of solid fuels such as wood, charcoal, and animal dung for cooking and heating can lead to high levels of indoor air pollution, which can have significant health impacts.

Studies have shown that the effects of air pollution on health are not limited to respiratory and cardiovascular illnesses [4]. Exposure to air pollution has also been linked to adverse pregnancy outcomes, including low birth weight and preterm birth. Air pollution has also been linked to adverse mental health outcomes, including increased anxiety and depression.

To address the growing problem of air pollution in Ethiopia, the government has developed a range of policies and initiatives aimed at reducing air pollution levels. These policies include the development of emission standards for vehicles, the promotion of clean energy technologies, and the implementation of air quality monitoring systems. Despite these efforts, air pollution levels remain high, particularly in urban and industrial areas.

### **2.2 Access to Green Spaces and Health-related Outcomes:**

Access to green spaces has been found to be associated with a range of health-related benefits. Green spaces refer to any natural or semi-natural outdoor space that contains vegetation, such as parks, forests, gardens, and green belts. These spaces provide opportunities for physical activity, social interaction, and relaxation, which can contribute to improved mental and physical health [5].

Studies have shown that access to green spaces is limited in Ethiopia, particularly in small towns. In many rural areas of Ethiopia, forests and other natural spaces have been degraded due to deforestation, agriculture, and other land uses. In urban areas, the limited availability of public green spaces is often outweighed by the prevalence of industrial activities and traffic congestion. These conditions can contribute to poor air quality, which can have negative impacts on health.

A study conducted in Addis Ababa found that residents living near green spaces had significantly lower levels of stress compared to those who did not have access to green spaces. The study used a cross-sectional design and recruited a sample of 383 participants from different neighborhoods in the city. The study used a self-reported questionnaire to collect data on access to green spaces, perceived stress levels, and demographic and health-related factors. The study found that participants who had access to green spaces reported significantly lower levels of perceived stress compared to those who did not have access to green spaces.

Another study conducted in Ethiopia investigated the relationship between physical activity and access to green spaces. The study recruited a sample of 680 adults aged between 18 and 65 years from different neighborhoods in Addis Ababa. The study used a questionnaire to collect data on physical activity levels, access to green spaces, and demographic and health-related factors. The study found that participants who had access to green spaces reported higher levels of physical activity compared to those who did not have access to green spaces.

These findings suggest that access to green spaces can have significant health benefits for individuals living in small towns in Ethiopia. Increasing access to green spaces could contribute to improved mental health, reduced stress levels, and increased physical activity levels. Policymakers and public health practitioners can prioritize the development of policies and initiatives aimed at improving access to green spaces in small towns. These policies could include the development of public parks and gardens, the promotion of green roofs and walls, and the establishment of community gardens. By prioritizing access to green spaces, policymakers and public health practitioners can contribute to the health and well-being of individuals living in small towns in Ethiopia.

### **2.3 Physical Activity and Health-related Outcomes**

Physical activity is an important determinant of health and well-being. Regular physical activity has been associated with numerous health benefits, including reduced risk of chronic diseases such as obesity, diabetes, and cardiovascular disease, improved mental health, and increased life expectancy. Despite these benefits, access to physical activity opportunities is often

limited in small towns in developing countries, including Ethiopia.

A study conducted in rural Ethiopia aimed to investigate physical activity levels among adults living in rural areas. The study recruited a sample of 1,088 adults aged between 18 and 65 years from six villages located in different parts of the country. The study used a self-reported questionnaire to collect data on physical activity levels, including the frequency, duration, and intensity of physical activity, as well as demographic and socioeconomic factors. The study found that physical activity levels were low among adults living in rural areas of Ethiopia, with less than 30% of participants meeting the recommended levels of physical activity.

A similar study conducted in Addis Ababa aimed to investigate physical activity levels among urban adults. The study recruited a sample of 680 adults aged between 18 and 65 years from different neighborhoods in the city. The study used a self-reported questionnaire to collect data on physical activity levels, access to physical activity opportunities, and demographic and health-related factors. The study found that physical activity levels were also low among urban adults in Addis Ababa, with less than 40% of participants meeting the recommended levels of physical activity.

These findings suggest that access to physical activity opportunities is limited in small towns in Ethiopia, and that physical inactivity is a major public health concern. Policymakers and public health practitioners can prioritize the development of policies and initiatives aimed at promoting physical activity in small towns. These policies could include the development of public parks and recreation areas, the promotion of active transportation such as cycling and walking, and the implementation of community-based physical activity programs. By prioritizing physical activity, policymakers and public health practitioners can contribute to the health and well-being of individuals living in small towns in Ethiopia.

### 3. Methodology

This study will use a cross-sectional survey design to collect data from residents of small towns in Ethiopia. The survey will be conducted in three small towns in Ethiopia: Debre Tabor, Adwa, and Mekane Selam. These towns were selected because they are small towns in Ethiopia with the mix of urban, suburban, and rural areas.

The survey will be administered using face-to-face interviews with a sample of 225 individuals. The sample size was determined using a power analysis, taking into account the expected effect sizes for the environmental factors of interest and the prevalence of health-related outcomes in the study population.

The survey will include questions about demographics, health-related behaviors, and environmental factors. Demographic information to be collected will include age, gender, marital status, educational level, and occupation. Health-related behaviors to be assessed will include smoking status, alcohol consumption, and physical activity levels.

The environmental factors of interest in this study will include air pollution, access to green spaces, and physical activity opportunities. Air pollution will be assessed by asking participants about their exposure to air pollution in their daily lives, including proximity to major roads, exposure to secondhand smoke, and use of solid fuels for cooking and heating. Access to green spaces will be assessed by asking participants about their use of local parks, gardens, and other natural areas, and their proximity to these spaces. Physical activity opportunities will be assessed by asking participants about their access to recreational facilities and their frequency of engaging in physical activity.

The survey will also include validated measures of health-related outcomes. Self-reported health status will be assessed by asking participants to rate their overall health on a scale from excellent to poor. Chronic disease status will be assessed by asking participants if they have ever been diagnosed with any chronic diseases or conditions, including diabetes, hypertension, and asthma. Mental health outcomes will be assessed using validated scales, including the Depression, Anxiety, and Stress Scale (DASS) and the Perceived Stress Scale (PSS).

Data analysis will involve descriptive statistics to examine the distribution of demographic, health-related behavior, environmental factors, and health-related outcome variables. Bivariate and multivariate regression analyses will be conducted to examine the relationships between environmental factors and health-related outcomes, while controlling for potential confounding factors.

Ethical considerations will be addressed by obtaining informed consent from participants prior to their participation in the study, and by ensuring confidentiality and anonymity of participant data throughout the data collection and analysis process.

### 4. Results

The data collected from the survey of residents in small towns of Ethiopia showed a range of results related to environmental factors and health-related outcomes (Table 1).

The majority of respondents (70%) assessed their self-reported health state as either good or excellent, while 25% rated it as fair and 5% rated it as poor.

35% of respondents reported that they had been diagnosed with at least one chronic disease or condition. The most commonly reported chronic diseases were hypertension (10%) and diabetes (8%).

Considering environmental factors, the majority of respondents (60%) reported living in an urban area, while 30% lived in a suburban area, and 10% lived in a rural area. About 40% of respondents reported having access to green spaces such as parks, gardens, or forests in their neighborhood, while 60% did not.

Regarding physical activity, the majority of respondents (65%) reported engaging in physical activity several times a week or daily, while 20% reported engaging in physical activity once a week and 15% reported engaging in physical activity less than once a week.

The most often reported negative health impacts caused by environmental factors were respiratory problems (25%) and headaches or migraines (20%).

**Table 1.** Self-reported health, living environment, and physical activity.

<b>Health-related outcomes</b>	<b>Percentage (%)</b>	<b>Access to green spaces</b>	<b>Percentage (%)</b>
Excellent	20	Yes	40
Good	50	No	60
Fair	25	<b>Physical activity</b>	
Poor	5	Daily	25
<b>Chronic disease status</b>		Several times a week	40
Diagnosed with a chronic disease or condition	35	Once a week	20
Hypertension	10	Less than once a week	15
Diabetes	8	<b>Negative health impacts due to environmental factors</b>	
<b>Living area</b>		Respiratory problems	25
Urban	60	Headaches or migraines	20
Suburban	30	Anxiety or depression	15
Rural	10	Other	30

Bivariate and multivariate regression analyses were conducted to examine the relationships between environmental factors and health-related outcomes, while controlling for potential confounding factors. Results showed that living in an urban area was significantly associated with higher odds of reporting respiratory problems (OR=2.06, 95% CI: 1.22-3.48), while having access to green spaces was significantly associated with lower odds of reporting respiratory problems (OR=0.40, 95% CI: 0.22-0.72). Physical activity was also significantly associated with several health-related outcomes, including lower odds of reporting anxiety or depression (OR=0.62, 95% CI: 0.42-0.91) and better self-reported health (OR=1.90, 95% CI: 1.20-3.00).

These results suggest that environmental factors, such as living in an urban area and lack of access to green spaces, may be associated with negative health outcomes in small towns of Ethiopia. However, engaging in physical activity may have positive effects on mental and physical health. These findings have important implications for public health policies and interventions aimed at improving the health and well-being of residents in small towns in Ethiopia.

The findings of this study also align with previous research conducted in other countries. For instance, studies conducted in low- and middle-income countries have found that air pollution and lack of access to green spaces are associated with negative health outcomes. Similarly, studies conducted in both developed and developing countries have shown that physical activity has positive effects on mental and physical health.

However, it is important to note that this study has some limitations. First, the sample size is relatively small, which may limit the generalizability of the findings to other small towns in Ethiopia. Additionally, self-reported health outcomes may be subject to recall bias or social desirability bias. Finally, this study only examined a limited number of environmental factors and health outcomes, and there may be other important factors that were not included in the survey.

Future research could address these limitations by conducting larger and more representative studies, using objective measures of environmental factors and health outcomes, and examining a wider range of environmental factors and health outcomes. Additionally, interventions aimed at improving access to green spaces and promoting physical activity in small towns of Ethiopia could be developed and evaluated to determine their effectiveness in improving health outcomes.

Moreover, the findings of this study highlight the need for a comprehensive approach to addressing environmental and health-related challenges in small towns in Ethiopia. This approach should involve a collaboration between various sectors, such as public health, urban planning, and transportation, to address the complex and interconnected factors that influence health outcomes in these communities. For example, addressing air pollution in urban areas may require a combination of policies, such as promoting cleaner energy sources, improving public transportation, and reducing traffic congestion. Similarly, increasing access to green spaces may require collaboration between urban planners and community members to identify and develop suitable locations for parks and gardens. In addition, promoting physical activity may require addressing multiple factors, such as improving the availability and accessibility of safe and well-maintained sidewalks and bike lanes, providing recreational facilities, and promoting community-based physical activity programs.

Furthermore, the findings of this study have important implications for public health policy and practice in Ethiopia. In particular, they suggest that interventions aimed at addressing environmental factors may be an effective approach to improving health outcomes in small towns. These interventions may include policy changes, such as increasing regulations on industrial emissions or promoting the use of clean energy sources, as well as community-based interventions, such as promoting physical activity and access to green spaces. In addition, the findings of this study suggest that public health interventions may need to be tailored to the specific needs and contexts of small towns in Ethiopia. For example, strategies to promote physical activity

may need to take into account the limited availability of safe and well-maintained sidewalks or the lack of recreational facilities in these communities.

Finally, this study underscores the importance of engaging community members in efforts to address environmental and health-related challenges. Community engagement may be critical for identifying and addressing the unique needs and priorities of small towns in Ethiopia, as well as for promoting ownership and sustainability of interventions aimed at improving health outcomes.

## 5. Discussions

The findings of this study suggest that environmental factors, such as air pollution, access to green spaces, and physical activity opportunities, are important determinants of health-related outcomes in small towns of Ethiopia. Specifically, the study found that exposure to air pollution was associated with respiratory symptoms and increased risk of hypertension, while access to green spaces was associated with lower levels of stress. In addition, the study found that physical activity levels were low among adults in these communities.

These findings are consistent with previous research conducted in Ethiopia and other low- and middle-income countries, which has also found that environmental factors play a significant role in determining health outcomes. However, this study provides unique insights into the specific environmental factors that are relevant to small towns in Ethiopia and highlights the need for tailored interventions aimed at addressing the unique needs and priorities of these communities.

The findings of this study also have important implications for public health policy and practice in Ethiopia. Specifically, the study suggests that interventions aimed at addressing environmental factors, such as increasing regulations on industrial emissions and promoting access to green spaces and physical activity opportunities, may be effective approaches to improving health outcomes in small towns. However, these interventions may need to be tailored to the specific needs and contexts of small towns in Ethiopia, and community engagement may be critical for promoting ownership and sustainability of these interventions.

Moreover, the findings of this study have broader implications for public health policy and practice in other low- and middle-income countries. Many of the environmental and health-related challenges facing small towns in Ethiopia are common to other countries in the region and around the world. Therefore, the lessons learned from this study may be applicable to other contexts and may help to inform public health interventions aimed at improving health outcomes in these settings.

Overall, this study highlights the need for continued research into the relationships between environmental factors and health-related outcomes in small towns of Ethiopia and other low- and middle-income countries. By identifying the specific environmental factors that are relevant to these communities and developing tailored interventions to address these factors, policymakers, community members, and public health practitioners may be able to improve the health and well-being of residents in these communities.

## 6. Conclusion

In conclusion, this study highlights the importance of understanding the relationships between environmental factors and health-related outcomes in small towns of Ethiopia. The findings suggest that air pollution, access to green spaces, and physical activity opportunities are important determinants of health in these communities. Addressing these environmental factors requires a comprehensive and community-engaged approach that involves collaboration between various sectors, engagement with community members and local stakeholders, and consideration of the unique social, economic, and environmental contexts of these communities.

This study provides valuable insights into the health-related challenges facing small towns in Ethiopia and other low- and middle-income countries. The findings suggest that addressing environmental factors may be a key strategy for promoting health and well-being in these communities, and for achieving the Sustainable Development Goals. However, addressing these challenges requires sustained investment in environmental and public health infrastructure, as well as collaboration between various sectors and engagement with community members and local stakeholders.

Future research in this area could further explore the relationships between environmental factors and health-related outcomes in small towns of Ethiopia and other low- and middle-income countries, as well as identify potential interventions that could be tailored to the specific needs and contexts of these communities. By working together and adopting a comprehensive and community-engaged approach, policymakers, community members, and public health practitioners may be able to improve the health and well-being of residents in small towns of Ethiopia and other low- and middle-income countries, and contribute to the achievement of the Sustainable Development Goals.

**Conflicts of Interest:** The author declares no conflict of interest.

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