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The Impacts of Climate Change on Pregnant Women in Greece

Vourdoubas John
Consultant Engineer, 107B El. Venizelou Str., 73132, Chania, Crete, Greece

Corresponding Author: **Vourdoubas John**

Abstract
Climate change has adverse and undesired impacts in human societies. Pregnant women belong to vulnerable groups in Greece which are harmfully affected from climate change. The effect of climate change on the health of pregnant women and newborn babies in Greece has been explored. Due to lack of studies in this topic in the country data from existing published research in other countries have been analyzed. Climate change causes many undesired and harmful impacts in Greece increasing the health risk in pregnant women. The undesired risks of pregnant women include miscarriage, preterm birth, stillbirth, endocrine dysfunction, difficulties in thermoregulation and increasing diseases. Additionally, they have increased risk of losing their property, crops and livestock while they have reduced access to healthcare, lower social support and probably mental health problems due to trauma. Our results indicate that several preventive measures should be developed to reduce the healthcare risk of pregnant women from extreme weather events in Greece while obstetricians and gynecologists should advise them about these risks and preventing measures. The current work could be useful to healthcare policy makers, to medicinal doctors looking after them as well as to pregnant women and their families.

Keywords: Climate Change, Greece, Impacts, Newborn Children, Pregnant Women

1. Introduction

The impacts of climate change on pregnant women and newborn children has been investigated during the last years worldwide although similar studies in Greece are currently limited [1, 2, 3, 4]. Existing research has explored the impacts of heat waves, big fires, floods and droughts on maternal health indicating the risks that arise from climate crisis and environmental disasters [5, 6]. The most important harmful impacts are related with endocrine dysfunction, low birthweight, preterm birth, stillbirth, gestational complications and mental health problems [7, 8, 9]. Several studies have examined the impacts of climate change on Greece which might affect pregnancy [10, 11].

The aim of the current work is to examine the impacts of climate change on pregnancy in Greece.

The research covers an existing gap in Greece regarding the effect of climate crisis on pregnant women and newborn children while it is innovative since there are limited studies on this topic in the country. The results could be useful to policy makers in the healthcare sector, to obstetricians and gynecologists as well as to pregnant women and their families.

2. Literature survey

The climate impacts on maternal health have been reviewed [1]. The authors stated that their findings indicate that extreme heat exposure in early and late pregnancy was associated with increased risk of preterm birth and stillbirth. They mentioned that climate drivers are consistently associated with adverse health outcomes for pregnant people. The climate change impacts on pregnancy health have been studied [2]. The author stated that existing research indicated that climate change affects pregnancy health directly via environmental disasters such as: extreme heat, wildfires, hurricanes, floods and droughts. He also mentioned that socioeconomically disadvantages populations may be more vulnerable. A report for protecting maternal, newborn and child health from the impacts of climate change has been published [3]. It is stated that extreme heat is associated with risks and complications that lead to adverse maternal, perinatal and neonatal outcomes. Extreme weather events can also negatively impact parents' and caregivers' mental health due to trauma, financial strain and loss of housing. The impacts of climate change during pregnancy, perinatal period and infancy have been reviewed [4]. The authors stated that most of the research is focused on high-income countries related with the harmful impacts of heat waves on pregnancy. It is also mentioned that

several geographical regions and populations stand to be hit the hardest by a truly unjust burden from climate change. The relation between climate change and pregnancy complications has been explored [5]. The authors stated that heat stress can result in adverse pregnancy outcomes such as preterm birth, stillbirth and low fetal weight. They mentioned that the pathomechanisms through which heat stress interferes with pregnancy still remain vague. However, it is probable that the endocrine system is severely affected. The climate impacts on pregnancy have been studied [6]. The author stated that existing research indicates that the health of pregnant is adversely affected by air pollutants such as ozone, fine particulate matter and extreme heat. They mentioned that the adverse outcomes include preterm birth, low birth weight, stillbirth, infertility and miscarriage. The protection of pregnant women and babies from the health effects of climate change have been examined [7]. The authors stated that pregnant women and newborns are particularly vulnerable to health harms associated with wildfires. They mentioned that wildfire smoke results in exposure to toxic gases, volatile organic compounds and particulate matters which affect their health. The impacts of heat exposure on pregnant have been explored [8]. The authors systematically reviewed the literature trying to quantify the impacts of heat exposure on maternal, fetal and neonatal health globally. They found that the most harmful impacts were related with preterm birth, low-birth weight, hypertensive disorders in pregnancy, congenital anomalies and stillbirths. The impact of climate change on reproductive health and pregnancy outcomes has been studied [9]. The authors stated that environmental factors caused by climate change have adverse reproductive health outcomes. They mentioned that their findings indicate that increased exposure to particulate matter and extreme temperatures were associated with reduced fertility, increased risks of miscarriage, preterm birth and low birth weight. The impacts of climate change on the Greek economy have been studied [10]. The author stated that changes in Greece's climate includes: a) Rise of temperature, b) Decrease in the rainfall, c) Increase in the heat-waves days by 15-20 days per year by 2050, d) Rise in the sea level, and e) More frequent extreme weather events. These changes are going to have harmful impacts to agriculture, tourism, coasts and the quality of life in cities while they will have harmful impacts on health mainly due to very high temperatures. The consequences of climate change in Greece have been analyzed [11]. The author stated that climate change will affect several sectors in Greece including the agricultural and livestock sector, the life in cities, the tourism industry and the energy sector. He also mentioned that in many Greek areas the average temperature by 2050, will be more than 2.5 ^{o}C higher compared to the 1971-1990 period. The climate change's effects on pregnancy in coastal regions have been reviewed [12]. The authors stated that coastal residents face environmental challenges such as rising temperatures, air pollution, cyclones, hurricanes, ozon exposure, floods and saline water while prolonged exposure to these conditions exacerbates health risks. The climate change impacts on maternal and newborn health in Africa have been reviewed [13]. The authors stated that high temperatures can overwhelm thermoregulation in pregnant women, cause hydration and endocrine dysfunction and affect placental function. They also mentioned that high ambient temperatures increase the risks for several infections and affect the health of pregnant women. The impact of climate change risks on pregnancy through a climate justice lens has been explored [14]. The authors stated that climate change affects more specific populations. They mentioned that pregnant women are particularly vulnerable to climate change impacts since pregnancy represents a time of both psychological and physiological change that can be extremely sensitive to the environment. The effect of climate change on mothers, fetus and newborn children has been assessed [15]. The authors stated that climate change increases the risk of infant and maternal mortality, birth complications and poorer reproductive health particularly in vulnerable groups. They mentioned that the effects of malnutrition, infectious diseases, environmental problems and direct heat exposure on maternal health leads to severe healthy risks for mothers and children. A report regarding the impacts of extreme heat to pregnancy has been published [16]. The report stated that extreme heat presents dangerous risks to global maternal health and birth outcomes and it is becoming more frequent and intense due to climate change. Analyzing data from 247 countries the report stated that in Greece on the average 30 more pregnancy heat-risk days have been added annually due to climate change. A report regarding climate change and maternal, newborn and child health has been published [17]. The report stated that pregnant exposed to heat waves have increasing odds on premature death and preterm birth. It is also mentioned that air emissions that cause climate change are accelerating pregnancy complications. It is also stated that floods and droughts affect pregnant women reducing their access to healthcare, increasing malnutrition and leaving millions of families without homes, crops and livestock. The knowledge and perception of pregnant women regarding climate change has been studied [18]. The authors stated that more than half of pregnant women had satisfactory level of knowledge regarding climate change. They mentioned that they should be educated about the health impacts of climate change on their bodies and their babies. The impacts of climate change on pregnant women and the clinical practices to mitigate its effects in UK have been analyzed [19]. They stated that a woman centered approach to healthcare is essential focusing on inclusive personalized care that addresses the unique physiological, emotional, cultural and socio-economic needs of pregnant women. They also mentioned that the healthcare system should adopt greener practices while the education of pregnant women about the adverse health impacts of climate change is essential. The impact of climate change on women's health and the role of obstetricians and gynecologists has been examined [20]. The authors stated that climate crisis affects more vulnerable populations such as pregnant women and newborn children. They emphasized the fact that obstetricians and gynecologists should raise awareness and educate pregnant women and their families from the harmful effects of climate change on their health. The impacts of increasing global temperatures on maternal and newborn health in Africa have been studied [21]. The authors stated that extreme heat can overwhelm thermoregulatory mechanisms in pregnant women, especially during labor, causing dehydration, endocrine dysfunction, and compromise placental function. They mentioned that high ambient temperatures increase the rates of infections and the working performance of women. The climate change impacts on maternal health and pregnancy

outcomes in Africa have been studied [22]. The authors stated that Africa is vulnerable to climate-related disasters which adversely affect maternal health and pregnancy outcomes. They highlighted the increased incidence of tropical and waterborne illnesses due to climate change which disproportionately impact pregnant women. The impacts of heat exposure in utero on long-term health and social outcomes have been examined [23]. The authors reviewing few thousand articles on this issue stated that increasing heat exposure was associated with a multitude of detrimental outcomes across diverse body systems. They mentioned that the biological pathways involved are yet to be elucidated. The interrelation between obesity management and climate change in Greece has been studied [24]. The author stated that climate change makes more difficult the treatment of obesity mainly due to rising temperatures. He mentioned that treatment of obesity mitigates climate change mainly due to the change in the dietary pattern of the treated patients. A European research project HIGH HORIZON related with the impacts of climate change on pregnant women, the fetus and the newborn babies is carried out [25]. In the framework of this project two studies are conducted in Greece examining: a) The impact of thermal climate factors on women before and after pregnancy and in their children, and b) A birth cohort study on pregnant women and their infants. A joint press release from UNICEF, WHO and UNFRA was related with the impacts of climate change on pregnant women and their children [26]. It is stated that pregnant women, babies and children face extreme health risks from climate catastrophes. It is also mentioned that harm can begin even in the womb, leading to pregnancy-related complications, preterm birth, low birthweight and stillbirth while these impacts have been underestimated. The genetic basis of childhood obesity has been reviewed [27]. The authors stated that overweight and obesity in childhood and adolescence represent one of the most challenging public health problems of our century. They mentioned that the decoding of the genetic pathophysiology of obesity in the individual genotype will enable the design of personalized and preventing interventions for obesity in early life. The improvement of harmful symptoms in obese children and adolescents following the implementation of a personalized intervention program have been examined [28]. The authors stated that following such an intervention program significant decrease in anxiety and depression in youth with obesity was noted. They also mentioned that the improvement in mental health is likely mediated by an improvement in energy metabolism.

3. Environmental impacts of climate change on Greece

Greece, a country known for its diverse ecosystems, extensive coastline, and mild Mediterranean climate, is experiencing profound environmental transformations as a result of climate change. While the region has always been prone to hot summers and periodic droughts, the scale, frequency, and intensity of environmental pressures have increased significantly in recent decades. Today, climate change is reshaping Greece's natural landscapes, affecting everything from forests and water resources to coastal zones and biodiversity.

3.1 Rising temperatures and heatwaves

One of the most significant environmental impacts of climate change in Greece is the steady increase in average temperatures. Heatwaves have become more intense and more frequent, with summer temperatures regularly surpassing historical norms. The Mediterranean basin is considered a climate "hotspot," warming faster than the global average, and Greece is no exception. These elevated temperatures accelerate the evaporation of water from soil and reservoirs, exacerbate drought conditions, and place additional stress on natural ecosystems. Heatwaves also alter the natural rhythms of flora and fauna. Plant species experience earlier blooming periods, disrupting pollination patterns and reducing resilience to pests and diseases. Animals, particularly reptiles, birds, and small mammals, face habitat stress as temperatures rise beyond their optimal thresholds. Prolonged heat also dries out vegetation, creating ideal conditions for wildfires—one of the most destructive environmental consequences currently facing Greece.

3.2 Wildfires and forest degradation

Wildfires have long been part of Greece's natural landscape, but climate change has intensified them dramatically. Higher temperatures, extended drought periods, and strong winds allow fires to ignite more easily and spread more quickly. In recent years, Greece has experienced some of the largest and most devastating fires in its modern history, destroying forests, agricultural land, and wildlife habitats. The environmental consequences are severe and long-lasting. Forests, particularly pine and marquis ecosystems, regenerate slowly after large-scale fires. Loss of vegetation leads to soil degradation, reduced biodiversity, and increased vulnerability to erosion and landslides. The destruction of forests also diminishes carbon-absorbing capacity, contributing further to climate warming. In many areas, the burning of vegetation has led to permanent ecological changes, with invasive species sometimes replacing native ones.

3.3 Drought and water scarcity

Another major environmental challenge linked to climate change in Greece is prolonged drought. Reduced rainfall, coupled with increased evaporation, results in declining groundwater levels, shrinking rivers, and stressed reservoirs. Many regions—especially islands and agricultural plains—now face periodic or chronic water shortages. These drought conditions impact both natural and human environments. Wetlands, which are crucial habitats for migratory birds and native species, shrink or dry out entirely during severe droughts. River ecosystems, such as those along the Achelous, Evros, or Pineios, experience reduced flows, affecting fish populations and riparian vegetation. Water scarcity also intensifies conflicts between agricultural, urban, and environmental water demands. As irrigation needs rise due to hotter, drier conditions, pressure on already-limited water resources increases, threatening both sustainability and ecological balance.

3.4 Extreme rainfall and flooding

While drought is a growing challenge, Greece is also experiencing more frequent extreme rainfall events. Climate change contributes to weather instability, leading to sudden and intense storms that unleash large amounts of rain in short periods. These storms overwhelm natural drainage systems and create severe flooding. Floods trigger soil erosion, pollute rivers and coastal waters with debris and runoff, and damage natural landscapes. Forests and

agricultural land stripped bare by fires are even more vulnerable to destructive flooding, as vegetation that normally stabilizes the soil has been lost. The combined effects of fires and floods create a cycle of environmental degradation that is increasingly difficult to break.

3.5 Sea-level rise and coastal erosion

Greece's extensive coastline—one of the longest in the world—makes it highly sensitive to sea-level rise. Rising seas lead to coastal erosion, flooding of low-lying areas, and saltwater intrusion into freshwater systems. Beaches, dunes, and coastal wetlands—themselves important ecosystems—are shrinking or becoming degraded. Small islands and coastal communities face the greatest risk. Beaches that support biodiversity and attract tourism are disappearing, while coastal infrastructure faces increasing pressure from storm surges and erosion. Saltwater intrusion affects coastal agriculture and contaminates groundwater aquifers, threatening long-term water security on many islands.

3.6 Impacts on biodiversity and ecosystems

Climate change disrupts ecosystems across Greece. Temperature shifts and altered rainfall patterns endanger endemic species, many of which have adapted to very specific microclimates found in Greece's mountains, islands, and forests. For example:

- Alpine and subalpine plant species retreat higher up mountain slopes, with no further migration possible once they reach the summit.
- Marine ecosystems suffer from warming seas, which allow invasive species—such as the lionfish and rabbitfish—to thrive while threatening native fish populations.
- Wetland species face habitat fragmentation as marshes and freshwater systems shrink.

The cumulative loss of biodiversity weakens ecosystem resilience, reducing the ability of natural systems to recover from disturbances. The impacts of climate change in Greece are presented in table 1.

Table 1: Impacts of climate change in Greece

1	Higher temperatures and increased heat waves
2	Rising sea levels
3	Reduced rainfall and snowfall
4	Increased extreme weather events such as storms, floods, droughts et cetera
5	Increased number of wildfires and diseases
6	Destruction of sensitive ecosystems
7	Increased air pollution

Source: Own estimations

4. The impacts of the climate change on pregnancy

The climate crisis—driven by rising global temperatures, extreme weather events, air pollution, and ecosystem disruption—poses significant risks to human health. Among the most vulnerable groups are pregnant individuals, whose physiology and living circumstances make them uniquely sensitive to environmental stressors. A growing body of research across epidemiology, obstetrics, environmental science, and public health shows that climate-related exposures can influence pregnancy outcomes, fetal development, and long-term child health.

4.1 Heat Exposure and Maternal Health Risks

Physiological Vulnerability

Pregnancy naturally increases metabolic rate, blood volume, and cardiovascular demand. These changes reduce the body's ability to regulate heat, making pregnant individuals more susceptible to heat stress. As global temperatures climb and heat waves intensify, exposure to extreme heat has emerged as a major environmental threat.

Effects on Pregnancy Outcomes

Numerous studies have linked high ambient temperatures to:

- Preterm birth
- Low birthweight
- Stillbirth
- Hypertensive disorders of pregnancy

Heat exposure may trigger dehydration, reduce placental blood flow, or activate inflammatory and hormonal pathways that increase uterine contractions. Even relatively short heat spikes have been associated with increased risk of undesired outcomes.

Occupational and Social Dimensions

Pregnant individuals in physically demanding outdoor jobs - such as agriculture and factory work - face amplified risks. Those without access to cooling (air conditioning, shade, or water) are disproportionately affected, highlighting the intersection of climate change and socioeconomic inequality.

4.2 Air Pollution and Poor Birth Outcomes

Climate Change Worsens Air Quality

Rising temperatures intensify the formation of ground-level ozone. Climate-driven wildfires release particulate matter (PM2.5) that travels long distances, exposing pregnant individuals even in regions far from active fires. Dust storms and industrial pollution also increase with environmental degradation.

Consequences for Pregnancy

Exposure to air pollutants has been associated with:

- Placental inflammation
- Gestational hypertension
- Fetal growth restriction
- Preterm birth
- Developmental impacts extending into childhood

PM2.5 can enter the bloodstream and has been found in placental tissue, raising concerns about direct fetal exposure to harmful particles.

Wildfire Smoke as a Growing Hazard

Wildfire seasons are longer and more severe due to the climate crisis. Wildfire smoke contains thousands of chemical compounds, many of which are toxic. Pregnant individuals exposed to wildfire smoke events show increased risk of low birthweight and preterm delivery. Because wildfire smoke can travel across continents, this issue is now global in scope.

4.3 Storms, Floods, and Hurricanes

Climate change increases the frequency and severity of extreme weather events such as hurricanes, floods, and cyclones. Pregnant individuals caught in these disasters

often face:

- Limited access to prenatal care due to damaged healthcare facilities
- Stress and trauma
- Contaminated water supplies
- Displacement from homes and social support networks

Indirect Health Impacts

Stress and instability caused by evacuations or loss of housing can influence pregnancy outcomes. Chronic stress is associated with increased risk of preterm birth and low birthweight. Moreover, crises often interrupt medications, prenatal vitamins, and routine monitoring for conditions like gestational diabetes or preeclampsia.

Long-Term Infrastructure Challenges

Communities already facing healthcare shortages are hit the hardest. After major disasters, it can take months or years to restore clinics, supply chains, and transportation systems essential for safe pregnancy care.

4.4 Infectious Diseases and Climate-Driven Spread

Changing Disease Patterns

The climate crisis alters ecosystems and expands habitats for vectors such as mosquitoes and ticks. Warmer temperatures and altered rainfall patterns facilitate the spread of various diseases. Rising temperatures and changing precipitation patterns increase the geographic range and season length of these diseases, raising the number of pregnant individuals at risk.

4.5 Food Security, Nutrition, and Maternal Health

Climate change affects global food systems through crop failures, droughts, soil degradation, and disruptions to supply chains. Pregnant individuals require higher caloric and micronutrient intake; nutritional deficiencies during pregnancy can have long-term developmental consequences.

How Climate Change Impacts Nutrition

- Drought and crop loss reduce availability of fresh produce and staple crops.
- Flooding and storms disrupt food transportation.
- Heat stress on crops lowers nutritional quality, including protein content.
- Economic impacts (job loss, resource scarcity) reduce household food security.

Malnutrition during pregnancy can contribute to low birthweight, anemia, preeclampsia, and impaired fetal brain development.

4.6 Water Scarcity and Contaminated Water Sources

Climate change alters precipitation patterns, creating water scarcity in some regions and flooding in others. Both circumstances affect pregnant individuals:

Water Scarcity

- Reduced access to clean drinking water increases risk of dehydration, heat illness, and urinary tract infections.
- Poor hygiene due to limited water raises risk of infections harmful to pregnancy.

Contaminated Water

Floods and infrastructure breakdown can contaminate water with sewage, chemicals, and infectious agents. Waterborne pathogens such as cholera and E. coli pose particular danger during pregnancy.

4.7 Mental Health Impacts

Pregnancy-Related Stress Amplified by Climate Events

Pregnancy is already a period of emotional and psychological vulnerability. Climate-related stressors—such as losing a home to wildfire, uncertainty during extreme weather, or economic strain from climate impacts—can intensify risks of:

- Anxiety
- Depression
- Post-traumatic stress
- Pregnancy complications linked to chronic stress hormones

The mental-health dimension of climate change is increasingly recognized as a critical but understudied aspect of maternal well-being.

4.8 Disproportionate Impacts on Marginalized Communities

Climate change does not affect all pregnant individuals equally. Factors such as income, race, geographic location, occupational exposure, and access to healthcare determine vulnerability. Communities facing systemic barriers often:

- Live in hotter neighborhoods with fewer green spaces
- Work in outdoor or labor-intensive jobs
- Have less access to air conditioning or clean water
- Experience structural racism in healthcare and disaster response

The unequal distribution of climate-related risks deepens existing maternal health disparities. The climate crisis is not just an environmental issue—it is a maternal and reproductive health crisis. Pregnant individuals face heightened risks from heat exposure, air pollution, extreme weather events, infectious disease spread, food and water insecurity, and mental-health stressors. These environmental pressures intersect with socioeconomic and healthcare inequalities, creating a landscape where the most vulnerable face the greatest harm. Addressing these challenges requires coordinated efforts in public health, environmental policy, climate mitigation, healthcare infrastructure, and social support systems. Protecting pregnant individuals in a warming world involves both reducing greenhouse gas emissions and developing targeted community-level interventions that safeguard maternal and fetal health. As the climate continues to change, understanding and responding to these impacts becomes an essential component of ensuring healthy pregnancies and resilient societies. The impacts of climate change on pregnant women are presented in table 2 while the adverse pregnancy outcomes in table 3.

Table 2: Impacts of climate change on pregnant women

Direct impacts	Indirect impacts through the physical environment	Indirect impacts through the social environment	Biological/physiological changes	Psychological changes
a)Heat waves b)Wildfires c)Extreme weather events(drought, hurricanes,floods)	a)Air pollution b)Food scarcity and water contamination c)Shift in vectors, hosts, and pathogen distribution	a) Oxidative stress b) Inflammatory Responses c)Endocrine disruption d) Malnutrition e) Infection	a)Food and water insecurity b) Conflicts due to resource scarcity c) Displacement	a)Stress b)Mental health

Source: [2]

Table 3: Adverse pregnancy outcomes due to climate change

1.	Gestational complications
2.	Low birthweight
3.	Restricted fetal growth
4.	Preterm birth
5.	Spontaneous abortion
6.	Neonatal mortality

Source: [2]

5. Impacts of climate change in Greece on pregnant women and on newborn babies

The effects of climate change are increasingly visible in Mediterranean countries such as Greece. With rising temperatures, more frequent heatwaves, intensifying wildfires, shifting patterns of infectious diseases, and increased air-pollution events, Greece provides a clear example of how environmental pressures can interact with vulnerable populations. Among those most at risk are pregnant women and newborn babies. Because pregnancy involves complex physiological changes and newborns have immature biological systems, both groups face heightened sensitivity to climate-related stressors. In Greece, these impacts manifest across environmental, social, and health dimensions, creating risks that require urgent attention from public health authorities, clinicians, and policymakers. One of the most significant climate-related challenges facing Greece is extreme heat. The Mediterranean region is warming at a rate roughly 20% faster than the global average, and Greece has experienced some of the highest recorded temperatures in Europe in recent years. Pregnant women are particularly vulnerable during heatwaves because pregnancy naturally increases metabolic heat production while reducing the body's ability to dissipate heat efficiently. Exposure to high temperatures has been associated in scientific research with an increased risk of dehydration, heat exhaustion, and complications such as preterm birth or low birth weight. For women working outdoors—such as those in agriculture, tourism, or construction—these risks can be intensified. In Greece, where summer temperatures often surpass 40°C and heatwaves can last for extended periods, the physical strain placed on expectant mothers can become considerable. For newborns, the danger of extreme heat is equally profound. Infants have a limited capacity to regulate body temperature, making them prone to heat stress, dehydration, and overheating. During prolonged heatwaves, families may struggle to maintain safe indoor temperatures, especially in older homes without adequate air-conditioning. Increased energy costs—exacerbated by global energy fluctuations—also mean that some households may limit cooling even when conditions are unsafe, further endangering infants. Moreover, heat can worsen air-quality problems, which pose additional threats to newborn health. Another critical dimension of climate change in Greece is air pollution—particularly the presence of fine particulate matter (PM2.5) from vehicle emissions, industrial activity, and, increasingly, wildfires. Scientific studies link exposure to air pollution during pregnancy with higher risks of gestational hypertension, reduced fetal growth, and adverse birth outcomes. Greece's devastating wildfire seasons, especially in regions such as Attica and the islands, significantly degrade air quality over large areas. Smoke from wildfires contains a mix of toxic particles and chemicals that can be inhaled deep into the lungs. Pregnant women exposed to wildfire smoke may experience respiratory distress or inflammation, conditions that can indirectly affect fetal development. For newborns, exposure to polluted air can impair lung development, increase the likelihood of respiratory infections, and contribute to long-term chronic disease risk. Climate change is also shifting patterns of infectious diseases in Greece. Warmer temperatures and changes in rainfall influence the distribution of vectors such as mosquitoes. Greece has already witnessed the reemergence of West Nile virus in recent years. Although infections in pregnant women are relatively rare, vector-borne diseases pose potential risks, including maternal illness or complications that may indirectly affect the fetus. The expansion of mosquito seasons raises public health concerns for newborns as well, who are more susceptible to fevers and infections. While Greece has strong public health infrastructure, the pace of ecological change can challenge surveillance and prevention systems. Water scarcity and heat-driven drought also have important health and social implications. Greece faces increasing pressure on water supplies, particularly on the islands during peak tourist seasons. Water shortages can compromise hygiene, increase the risk of gastrointestinal infections, and place additional stress on pregnant women, who require adequate hydration and sanitation. Some regions rely on desalination, which can be interrupted during extreme heat or energy shortages, leaving communities temporarily vulnerable. Pregnant women in rural or economically disadvantaged areas may be disproportionately affected. Climate-related stressors do not operate in isolation—they also interact with social and psychological factors. Natural disasters such as wildfires and floods, which Greece has experienced repeatedly, can cause displacement, property loss, and emotional trauma.

Pregnant women exposed to these stressors may experience heightened anxiety or depression, which itself can negatively influence pregnancy outcomes. For new mothers, disrupted access to healthcare, stress from evacuations, or limited social support can make early childcare more difficult. Post-disaster environments also pose challenges for breastfeeding, nutrition, and safe infant sleep conditions. Despite these risks, Greece has significant opportunities to protect pregnant women and newborns through targeted climate adaptation strategies. Strengthening heat-health action plans, expanding cooling centers, and ensuring pregnant women receive heat-related guidance during prenatal care are essential steps. Improving indoor cooling in hospitals and maternity wards, particularly in regions experiencing prolonged heatwaves, can safeguard newborn health. Investments in emissions reductions can improve air quality, while expanding wildfire prevention and rapid-response systems can reduce exposure to smoke. Public health campaigns can educate families about protecting infants during extreme temperatures or poor air-quality days. Additionally, integrating climate risk assessments into prenatal healthcare can help clinicians support high-risk pregnancies more effectively. The impacts of climate change are exacerbated in pregnant women. Socioeconomically disadvantages and rural populations, including pregnant women, are more vulnerable to climate impact effects. Overweight and obese pregnant women living in old energy poor houses without proper temperature control are also vulnerable to climate change effects. The expected impacts of climate change on pregnant women and newborn babies in Greece are presented in table 4.

Table 4: Expected impacts of climate change on pregnant women and newborn babies in Greece

Climate change effects/impacts	High temperatures and heat waves	Big fires	Extreme floods
1.	Increase risk of miscarriage, preterm birth, stillbirth and premature death	Loss of housing	Loss of housing
2.	Overwhelm thermoregulation	Financial straining	Financial straining
3.	Increase diseases and infections	Mental health problems due to trauma	Mental health problems due to trauma
4.	Increase dehydration	Reduced access to healthcare	Reduced access to healthcare
5.	Result in endocrine dysfunction	Loss of crops and livestock	Loss of crops and livestock
6.	Decrease working performance	Increased malnutrition	Increased malnutrition
7.	Reduced ability to dissipate heat particularly in obese pregnant women	Exposure to toxic gases and increased pregnancy complication	Lack of potable water
8.	Newborn babies have limited capacity to regulate body temperature and suffer more during heat waves		Limit social support

Source: own estimations

6. Discussion

Climate change has undesired and harmful impacts in Greece particularly on vulnerable social groups. Pregnant women are affected by climate change and extreme weather events in various ways. The current study indicates that higher temperatures, extreme weather events, big fires, floods and droughts increase the risks in pregnant women and newborn babies. The undesired impacts can be categorized as direct and indirect as well as impacts related with biological, physiological and psychological changes. Our results imply that the healthcare policy makers in Greece should take into account the vulnerability of pregnant women to climate change and take care to reduce their health risk. Taken into account the low fertility rate in Greece protection of pregnant women from various harmful extreme weather events is urgent and important. Additionally, obstetricians and gynecologists should inform pregnant women and their families about the risk arisen from climate change and should propose appropriate measures reducing their risks particularly in those belonging to vulnerable socioeconomic groups. Taking into account the lack of relative studies in this field in Greece our results are based on data taken from international studies realized in other countries that might differ slightly from Greece's data. Future work should be focused on the realization of experimental studies on this topic in Greece as well as in the study of climate change impacts on vulnerable pregnant women in the country such as overweight and obese women, women living in remote areas and energy poor women living in old houses without appropriate temperature control.

7. Conclusions

The impacts of climate change on pregnant women in Greece have been investigated. It has been indicated that the undesired effects of climate change in the country have adverse impacts on the health of pregnant women, on fetus and on newborn babies. The socioeconomically vulnerable pregnant women are more affected from climate change in the country. The main adverse health effects on pregnant women include:

a) Increase risk of miscarriage, preterm birth, stillbirth and premature death,
b) Endocrine dysfunction,
c) Loss of housing, crops, livestock and financial problems,
d) Exposure to toxic gases and increased pregnancy complications,
e) Mental health problems due to trauma,
f) Reduced access to healthcare,
g) Limited social support, and
h) Increased malnutrition and lack of potable water.

The main points in our work that should be taken into account include the followings:

a) Climate change has adverse effects on pregnant women in Greece,
b) Socioeconomically vulnerable pregnant women are more affected,
c) The efforts for climate change mitigation and adaptation

in the country should be intensified,

d) Obstetricians and gynecologists should inform pregnant women and their families about the health risks arisen from climate change,
e) Pregnant women who work, reside in remote areas or live in energy poor houses should take care about their health in case of extreme weather events, and
f) The state and the local municipalities should provide guidance and support to pregnant women in the case of extreme weather events.

8. References

1. Masters C, Wu C, Gleeson D, *et al*. Scoping review of climate drivers on maternal health: Current evidence and clinical implications, Systematic Reviews. AJOG Global Reports, 2025; 1-12. Doi: http://dx.doi.org/10.1016/j.xagr.2025.100444
2. Ha S. The changing climate and pregnancy health. Current Environmental Health Reports. 2022; 9:263-275. Doi: https://doi.org/10.1007/s40572-022-00345-9
3. Protecting maternal, newborn and child health from the impacts of climate change – A call for action, 2023, WHO. Retrieved from: https://iris.who.int/server/api/core/bitstreams/731c186b-c1ed-42e5-99d5-835b7b98b1c3/content
4. Persson I, Sturm A, Manchikanti S, *et al*. Impacts of climate change during pregnancy, perinatal period and infancy: A systematic review. BMJ Pediatrics Open, 2025; 9:e002895. Doi:10.1136/bmjpo-2024-002895
5. Yüzen D, Graf I, Diemert A, Arck PC. Climate change and pregnancy complications: From hormones to the immune response. Frontiers in Endocrinology, 2023; 14:1149284. Doi: 10.3389/fendo.2023.1149284
6. Giudise LC. A clarion warning about pregnancy outcomes and the climate crisis. JAMA Network Open, 2020; 3(6):e208811. Doi: 10.1001/jamanetworkopen.2020.8811
7. Rasmussen SA, Jamieson DJ. Protecting pregnant people and babies from the health effects of climate change. The New England Journal of Medicine, 2022; 387(11):957-959. Doi: 10.1056/NEJMp2210221
8. Lakhoo DP, Brink N, Radebe L, *et al*. A systematic review and meta-analysis of heat exposure impacts on maternal, fetal and neonatal health. Nature Medicine. 2024; 31:684-694. Doi: https://doi.org/10.1038/s41591-024-03395-8
9. Papadiochou A, Diamanti A, Metallinou D, *et al*. Impact of Climate Change on Reproductive Health and Pregnancy Outcomes: A Systematic Review. Cures, 2024; 16(8):e68221. Doi: 10.7759/cureus.68221
10. Georgakopoulos TH. The impact of climate change on the Greek economy, Dianeosis, 2017. Retrieved from: https://www.dianeosis.org/en/2017/08/impact-climate-change-greek-economy/
11. Georgakopoulos TH. The consequences of climate change in Greece, Dianeosis, 2017. Retrieved from: https://www.dianeosis.org/en/2021/12/the-consequences-of-climate-change-in-greece/
12. Setyani ER, Rusprayunita SRA, Wahab A. A Scoping Review on Understanding Climate Change's Effects on Pregnancy in Coastal Regions. Jurnal Kesehatan Lingkungan - Journal of Environmental Health. 2024; 16(4):378-391. Doi: https://doi.org/10.20473/jkl.v16i4.2024.378-391
13. Chersich MF, Maimela G, Lakhoo DP, *et al*. Climate change impacts on maternal and newborn health in Africa: Intervention options. Journal of Clinical Medicine. 2022; 4(3):169-172. Doi: http://dx.doi.org/10.18772/26180197.2022.v4n3a7
14. Keenan OJ, Papatheodorou S, Ghosh AK. Examining the Impact of Climate Change Risks on Pregnancy through a Climate Justice Lens: A Review. Atmosphere. 2024; 15:975. Doi: https://doi.org/10.3390/atmos15080975
15. Rylander C, Øyvind Odland J, Sandanger TM. Climate change and the potential effects on maternal and pregnancy outcomes: An assessment of the most vulnerable - the mother, fetus, and newborn child. Global Health Action. 2013; 6(1):19538. Doi: 10.3402/gha.v6i0.19538
16. Climate change increasing pregnancy risks around the world due to extreme heat, A climate central analysis of the past five years (2020-2024), 2025. Retrieved from: https://assets.ctfassets.net/cxgxgstp8r5d/4XB8ACtuuQBlUaIQoyi0AE/e45c4ebbbc14f460b48a7b12b58045e4/Climate_change_increasing_pregnancy_risks_around_the_world_due_to_extreme_heat__2020-2024_.pdf
17. Climate change and maternal, newborn and child health: Time for action, 2025. Retrieved from: https://www.lshtm.ac.uk/media/92266
18. Mahmoud Abdelrahman W, El Ella Hasan ESA, Hassan RS, Mongy Ismail BA, Aboushady RM-N. Knowledge and beliefs regarding climate change among pregnant women attending outpatient clinics. Egyptian Journal of Health Care. 2024; 5(2):1502-1514. Retrieved from: https://journals.ekb.eg/article_373238_e633842817bd6e59b6c0a1272c08dbc4.pdf
19. Samara A, Hanton T, Thakar R, Jauniaux E, Khalil A. Impact of climate change and environmental adversities on maternal and fetal health: The role of clinical practices and providers in mitigating effects and prioritising women's health in the UK. Frontiers in Global Women's Health. 2025; 6:1483938. Doi: 10.3389/fgwh.2025.1483938
(Reprinted)
20. Giudice LC, Llamas-Clark EF, DeNicola N, *et al*. Climate change, women's health and the role of obstetricians and gynecologists in leadership. International Journal of Gynecology Obstetrics, 2021, 1-12. Doi: 10.1002/ijgo.13958
21. Chersich MF, Scorgie F, Filippi V, Luchters S. Increasing global temperatures threaten gains in maternal and newborn health in Africa: A review of impacts and an adaptation framework. International Journal of Gynecology Obstetrics. 2023; 160:421-429. Doi: 10.1002/ijgo.14381
22. Dumbuya S, Chabinga R, Ferede MA, Saber M. Climate change impacts on maternal health and pregnancy outcomes in Africa. Journal of Water and Health. 2024; 22(11):2013-2021. Doi: https://doi.org/10.2166/wh.2024.254
23. Brink N, Lakhoo DP, Solarin I, *et al*. Impacts of heat exposure in utero on long-term health and social outcomes: A systematic review. BMC Pregnancy and Childbirth. 2024; 24:344. Doi: https://doi.org/10.1186/s12884-024-06512-0
24. Vourdoubas J. The interrelation between obesity management and climate change in Greece.

International Journal of Current Science Research and Review. 2024; 7(8):5925-5935. Doi: 10.47191/ijcsrr/V7-i8-08
25. The impacts of climate change on the pregnant women, the fetus and the newborn - European research project HIGH - HORIZONS. Retrieved from: https://high-horizons.uth.gr/the-impacts-of-climate-change-on-the-pregnant-woman-the-fetus-and-the-newborn-european-research-project-high-horizons-11-april-2024/
26. Climate change is an urgent threat to pregnant women and children, Joint Press Release from UNICEF, WHO and UNFRA. Retrieved from: https://www.unicef.org/press-releases/climate-change-urgent-threat-pregnant-women-and-children
27. Vourdoumpa A, Paltoglou G, Charmandari E. The Genetic Basis of Childhood Obesity: A Systematic Review. Nutrients. 2023; 15(6):1416. Doi: 10.3390/nu15061416. PMID: 36986146; PMCID: PMC10058966.
28. Vourdoumpa A, Paltoglou G, Manou M, Mantzou E, Kassari P, Papadopoulou M, *et al*. Improvement in Symptoms of Depression and Anxiety and Cardiometabolic Risk Factors in Children and Adolescents with Overweight and Obesity Following the Implementation of a Multidisciplinary Personalized Lifestyle Intervention Program. Nutrients. 2024; 16:3710. Doi: https://doi.org/10.3390/nu16213710