

# Global Change Driven Effects of Climate on Food Security of the Indigenous Population of India: A Quality Systematic Review

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## ABSTRACT

This qualitative systematic review aims to understand the effect of global climate changes on the food security of the indigenous people (IP) of some areas of India. In India, there are 705 official and recognized ethnic groups, however, it is estimated that there are more ethnic groups that would qualify for the status of Scheduled Tribes but have not been officially recognized yet. Since the beginning of civilization, ethnic groups have helped protect biodiversity in and around their natural habitats in significant ways. As part of in situ biodiversity conservation and ecological restoration, endemic tribal people keep endemic plants and wild types in sacred groves that were once used for shifting agriculture but are now empty. Indigenous and ethnic peoples have adapted to the worst natural conditions. It has been found that the most interesting thing about these indigenous and ethnic groups is that they live in places with rich biodiversity. Moreover, indigenous people's livelihood and food security are climate-driven and they are keen observers of any change in the same. Climate change and severe events may exacerbate the vulnerability of indigenous populations. It is worth mentioning that the main challenges that are already encountered by the poor IP include economic and political exclusion, abuse of human rights, unemployment, discrimination, and resource depletion. A qualitative systematic review has been performed in this study. The search strategy, PICO model, inclusion and exclusion criteria, and data extraction table have been used for a methodological analysis of the research. The impact of climate change on land, wildlife, and water can be detrimental to the IP's traditional ways of livelihood, and food security. The residents of this specific community were further compelled to transfer and live in the areas where their ancestors had a site for thousands of years to minimize the detrimental effects. It affects their social capital, food security, water supply, sanitary conditions, mental health, ability to fight off infectious diseases and injuries, and availability of healthcare directly or indirectly. These people have a close interaction with the environment and its resources therefore, they are the first to experience the direct effect of climate change. It can be concluded that any change in climate affects the food security of IP in India.

**KEY WORDS:** GLOBAL, CLIMATE, CHANGE, FOOD-SECURITY, INDIGENOUS-PEOPLE ,

## INTRODUCTION

Indigenous people (IP) are separate cultural and societal groups that have common ancestral ties to the natural resources and lands on which they currently reside, were formerly displaced from, or both. The Indigenous food system is based on subsistence farming and food sovereignty. It includes the cultivation, processing, and consumption of food crops that are specific to a geographic location and its origin predates industrial agriculture. The lives of indigenous people are intertwined with the ecology in which

they reside. They form symbiotic relationships with the soil, water, and natural resources. Any possible danger to nature exposes species to the threat of food insecurity and existence (Saxena, 2021).

Indigenous people make up approximately 6% of the world's population and they account for approximately 90% of the extremely poor (World Bank Report 2024). The scenario is no different in India according to the census of India, 2011 tribal population constitutes 8.6% of the country's population and National Family Health Survey data, 2015-2016 says 45.6 percent of indigenous members live in the lowest wealth bracket. It has been found that natural resources and land on which the IP depend are indistinguishably linked with their cultural livelihood identities along with their spiritual and physical well-being. Indigenous peoples are communities

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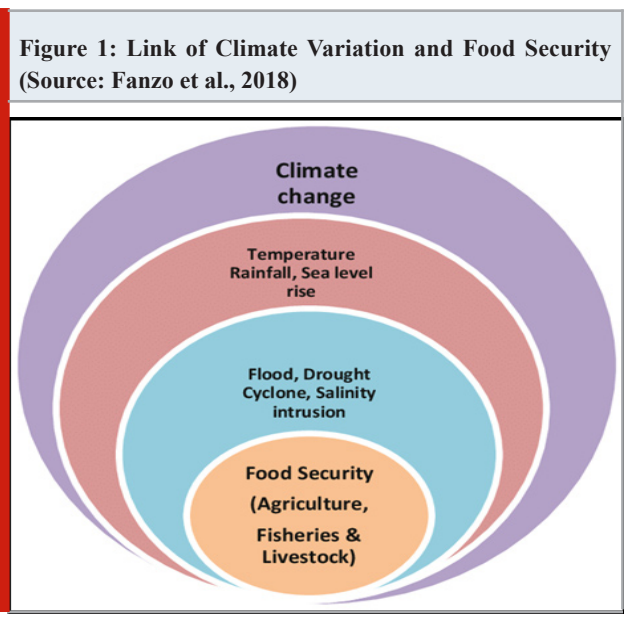
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with their languages, cultures, and beliefs, who have a special connection to the land and natural resources where they live. They are often distinct from the dominant societies in which they live.

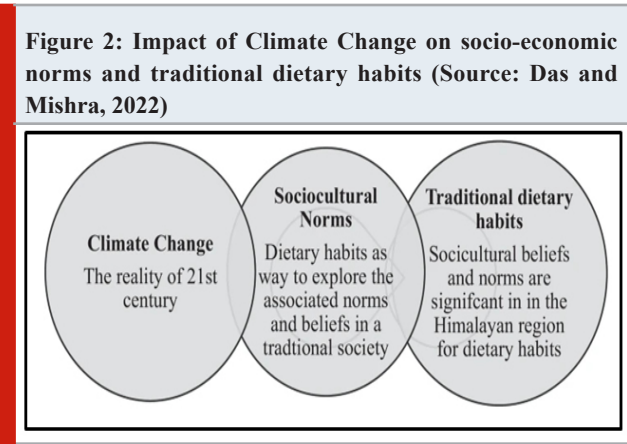
Indigenous people often have their own language, which is different from the official language of the region. They have unique knowledge systems and practices for managing natural resources sustainably. Interestingly, indigenous peoples have a special connection to their ancestral land, which is important for their survival; they have a historical connection to the region they live in, dating back to before colonization. The United Nations has indicated a “code-red” making climate change an existential threat to humanity (Intergovernmental Panel on Climate Change, Sixth Assessment Report, 2021).

The world is rapidly warming and the consequence manifests in an intensification of floods, droughts wildfires, and other traumatic exposures. The marginalized and vulnerable sections like the Indigenous people have contributed the least to climate change but historical discrimination, political disenfranchisement make surviving climate change and thriving within it more challenging (Barnwell et al.,2022).

As the IP have their dependency and close interaction with the environment and its resources, they come the first to feel the direct effect of climate variation. It is worth mentioning that the main challenges which are encountered by the poor IP include economic and political exclusion, abuse of human rights, unemployment, discrimination, and resource depletion. As per the observation of Thomas et al., (2019), extreme weather occurrences are a prime example of how unevenly people are affected by climate change, even within relatively limited geographic areas. These challenges become worse due to climate change. It is worth mentioning that climate change causes danger and threat to the survival of the IP of India even though they contribute little to no greenhouse gas emission.



According to the report of Global Food Policy 2022, a warning has been issued stating that the climate change will push the Indian people towards hunger by the end of 2030 due to the decline in agricultural production and food supply chain disruption. According to the findings of Fanzo et al., (2018), the climatic change significantly impacts the food system because it affects the way of food production and consumption. The main aim of food security is to ensure that people at all times have social physical and economic access to safe nutritious and sufficient food which made their dietary needs and food preference for a healthy and active life. In the context of IP of India, they eat nuts, fruits, roots, seeds, vegetables, and grasses.



**Problems faced by the tribals of India due to climate change:**  
 One of the greatest problems of modern society is climate change. It threatens the security and lives of the vulnerable sections of societies worldwide. Carroll and Noss (2021), in the context of India, stated that the local population specifically those who live near the high-risk prone zones such as mountain regions and coastal areas are expected to face high unpredictability due to the change in the climate. It is worth mentioning that the local health beliefs and Indigenous knowledge act as a shelter which helps to prohibit and prompt the responsiveness and sensitivity towards climate instability. Henceforth, ensuring nutritional and food security is one of the primary tasks of the strategy makers and the government of India.

In India, there are 705 official and recognized ethnic groups, however, it is estimated that there are more ethnic groups that would qualify for the status of Scheduled Tribes but have not been officially recognized yet. It is estimated that many IPs keep a language distance from the original languages or languages of the region of the country in which they reside. However, many have either lost their native languages or are in danger of going extinct because of being uprooted from their homes and/or relocated to other areas.

It has been estimated that the dietary habits of the tribal community in the Himalayan region are changing because of climate change. It is a new norm in the 21st century. According to many studies conducted both natural and anthropomorphic factors are responsible for climate and environmental change. In addition, the anticipated impact of climate variability creates a severe impact

on the food security of the vulnerable communities or IPs who are deciding near the mountain areas and coastal regions. It has also been estimated that the change in climate on the natural ecosystem creates a higher possibility of increased incidence of inadequate rainfall, unpredictable change in temperature, and forest fire. It is worth mentioning that a prolonged period of climatic change might result in disrupting the seasonal precipitation rates and water availability, impact the mountain ecology, and affect food security.

It has been found that the impact of climate variability differs among different and unprivileged communities and distinct social groups. The distinct social groups and unprivileged communities are the most vulnerable ones. According to the research of Das and Mishra (2022), in the context of Indian IP, it has been found that most of the Himalayan population lives in rural areas and with lack of proper communication and connectivity with the real world. It has been identified that most food security gets heightened at times of drastic climate changes and adverse environmental events. It highly creates a negative impact on the food and nutritional intake of these IP communities in India.

Climate change not only impacts food production but also reduces freshwater resources. According to Rizal and Anna (2019), climate changes that are induced by natural calamities can result in food insecurity. Some of its examples are an increase in drought, agricultural labor migration, joblessness, and high food insecurity. Moreover, the lifestyle of indigenous people can be severely impacted by environmental change. For example, the declining knowledge of ethnobotanical species has resulted in a reckless increase in the use of natural resources.

Similarly, Das and Mishra (2022), stated that climate change can also impact the traditional living way of tribal and vulnerable communities such as animal herding. Animal herding has been considered to be one of the most common customary practices in the herding community and exists in Mountain regions. All of these factors and understanding that the change in climate and environmental changes directly impact the food security of the vulnerable section or tribal communities of India.

#### **Impact of Climate Change on the food security of Indian IP:**

The tribal community and IP of India face a substantial ecological issue caused by the change in the climate. The change also includes alteration in the populations of species that are important to their culture and the possibility of entire human settlements being forced to migrate. According to the findings of Bang et al., (2018), these challenges the tribal people to remain concerned for collective continuance. Collective continuance refers to the capacity of the community to adapt different sufficient ways to flourish the livelihood of its members into the future. Moreover, adaptation refers to the adjustment made by the population in response to the anticipated changes.

According to Nursey-Bray et al., (2018), it has been considered that the indigenous people are the worst affected society by climate change. The effects of changing climates such as frequent

droughts, hurricanes, burning temperatures, plagues and diseases, and floods make the survival of IP difficult. At the same time, it also highly influences their food security because climate change directly impacts the agriculture and availability of food. As the IP is mostly dependent on Natural sources therefore their food chain is highly interrupted by climate or environmental changes.

However the failure to understand and recognize the responses and challenges faced by them exacerbates their suffering. Moreover, as per the observation of Patil (2019), every step of their lives is impacted by disadvantages and prejudice regarding climate change. It is worth mentioning that the close relationship of IP with the natural environment and resources makes them highly sensitive to the effects of global warming (Kumar et al., 2020). In some cases, it has been identified that the existence of many people and tribal communities is threatened by climate change and by the fast-expanding production of biofuels, which are being promoted as a "solution" to the challenge.

The Bhil has been the largest tribal group in India. This ethnic group is found in Gujarat, Chhattisgarh, Karnataka, Madhya Pradesh, Rajasthan, and Andhra Pradesh. As per Saxena et al., (2019), the major climate change that is faced by this community is a drought. In addition to the context, it has been found that in many parts of India, the lack of monsoon creates a water shortage, which results in poor yields. The major drought-prone areas of India are found to be Northern Karnataka, Andhra Pradesh, Telangana, Gujarat, Odisha, Southeastern Maharashtra, and Rajasthan.

According to D'Cruz et al., (2022), it has been found that most of the Bhils are farmers. However, the continuous pressure of marginal land holdings, subsistence agriculture, debt burden and frequent drought has forced many of these indigenous people to leave their land and switch occupations. Drought causes depletion of water availability in soil which directly impacts livestock productivity. As per Sharma et al., (2020), as most of the people in this community survive on farming therefore drought directly impacts their food accessibility and availability. The lack of food created hunger issues and led the people to starve for many days.

#### **How does IP respond to such climatic change and its negative impact on food security?:**

The cultural and natural resources of indigenous people in India are impacted by human cause changes and climate changes. As its effect starts to get worse the traditional ecological knowledge system which enables both indigenous and non-indigenous people to discover and adopt various methods to understand the ecological changes. According to the research of McCunn (2021), it is worth mentioning that the Indigenous people tend to live close to the environment and nature rather than people who are growing up in cities. It has been found that the people who live in cities make more food products than they require for survival.

According to the research of Gartaula et al., (2020), this provides the IP section of India with an extraordinarily intimate sense of knowledge of local weather animal and plant life. Over many

centuries, traditional knowledge has been accumulated by the Indigenous people on subjects like when to grow crops and where to go hunting for food. However, as the climate changes, some of this knowledge is now proving to be outdated. Some civilizations are in danger of extinction due to climate change and the rapidly expanding area being planted in biofuel crops.

It is worth mentioning that the capacity of indigenous people to assess and monitor their environment and make decisions, such as whether to plant crops, has also been hampered by the increasingly unpredictable weather. As per the observation of Etchart (2022), they have grown increasingly interested in finding other ways to survive, such as assisting drug traffickers or letting loggers and gold prospectors enter the jungle. The indigenous and peasant groups of India who live in forests are being negatively impacted by the biofuel crops. It has been found that biofuel crops are promoted as a part of the solution to climate change. The land rights, traditional ways of life, and even survival of indigenous community people are threatened or destroyed.

**The reason behind persisting climate change-related food security problems:** Climate change has been a major reason for the food security in the Indian economy. In addition to this, in referring to, Figure 2 keeping in mind the ‘availability’, ‘ability’, ‘utilization’ as well as ‘sustainability’, the formidable problems are still prevailing thus, sustainable practice of agriculture is being carried out by putting greater emphasis on the public health and food security. According to the perspective of Duchenne-Moutien and Neetoo, (2021), “Sustainable development goals” adopted by the Indian government are targeting ending hunger and achieving food security by improving nutrition. Climate change has had a huge influence on our food chain. It has an impact on how we produce and consume food. This influence is magnified in a primarily agricultural country such as India, causing ripple effects across the food system. India is seeing its warmest days in recent memory. The continuing heatwave has caused considerable harm to agriculture as well as food security (Outlookindia.com.,2022).

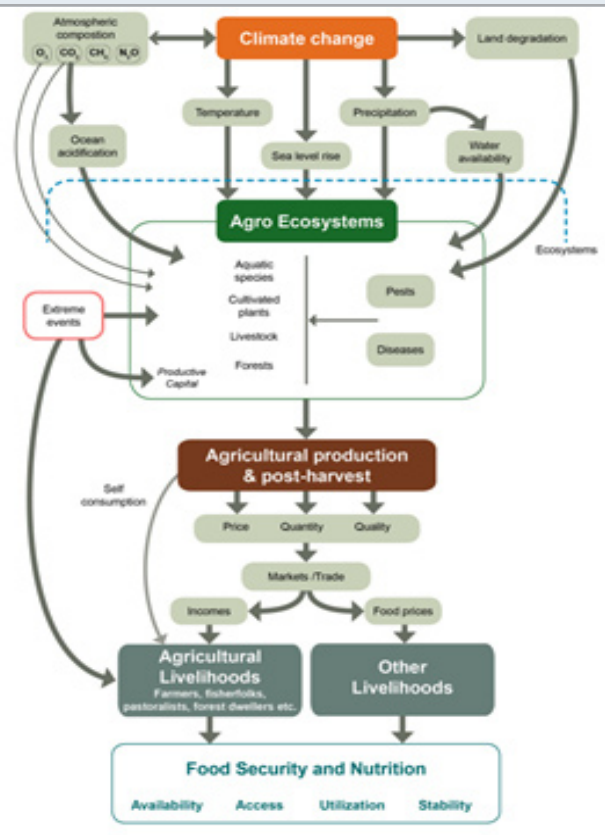
It has harmed the wheat crop therefore harming food production, making the cost of wheat flour to skyrocket. Furthermore, it should be viewed despite the reality that food security seems all about quantity but about nutritional quality. However, the Indian economy failed to achieve the development goals for the millennium and resulting in a proportion of individuals suffering from hunger.

Additionally, the associated problems related to climate change are increasing gradually and calls out for urgent action to be taken for allowing enough time to build resilience in the food production system of India. As seen in the figure above, climate change poses a continuum of threats to agribusiness, agricultural productivity, economically and social ramifications, including, national food security.

According to Munaweera et al., (2022), on the farm, the production of the field crop might rise, or decline based on herbicides fighting

for nutrients and water, as well as corrective farming measures. Pests, as well as illnesses, are anticipated to spread because of climate change, emerging in places that are less equipped for them, both biologically as well as procedurally, with possibly greater terrible impacts (Fao.org., 2019). These increased hazards to farm productivity immediately result in increased threats to the achieving food security of those who depend on traditional agriculture for food as well as a living. Thus, these individuals can influence faraway communities' food security as well as nutrition via price fluctuations along with interrupting commerce.

**Figure 3. The cascading consequences of climate change on food security as well as nutrition are depicted schematically (Source: Fao.org., 2019)**



**Drawbacks and Difficulties faced by the IP while responding to climate change and food security:** Concern regarding ensuring food security, especially for the vulnerable communities has grown as a result of the threat of climatic change and global environmental changes such as land cover, change in availability of water, cycling, and altered availability of nitrogen. According to the views of George and McKay (2019), it is worth mentioning that there is also growing worry that meeting the cost of food demand from a rise in population and shift of that reference would result in more environmental degradation, native vegetation loss, and more agricultural intensification. This might also impact the food security and food system of the indigenous people. As per the observation of Zurayk (2020), food security is not only concerned with the availability of food but also the accessibility and utilization of food. However, it has been found that climatic change can impact food security and food availability. As indigenous

people are the closest to the environment and nature therefore their food security is highly impacted by climatic change.

In addition, it has been found that short-term adaptation activities are underway, but capacity, constraints, and resources limit the implementation of the long-term strategies. It is important to note that some mitigation measures have unpleasant direct and indirect consequences for the IP community. For illustration, some initiatives for agriculture may reduce the emission of greenhouse gases but also lead to an increase in the plantation of monoculture crops and have been identified to be linked with the decline in food security and biodiversity.

As per the views of Mukhopadhyay et al., (2021), it can be said that to prevent these plans from having a negative impact on IP communities, it is essential that these groups fully and effectively participate in the development of the mitigation measures that the state develops.

As climate change direct impact, the food security of the indigenous people, an issue of child and maternal nutrition in these community suffers. According to the observation of Noll and Murdock (2020) food security and food sovereignty for the IP includes the principles of effective management and proper use of nutrition and food resources. It is important to note that in order for this to happen, traditions and cultural values are highly required to be understood for safeguarding local food systems and ensuring that vulnerable women and children receive enough nourishment.

As per the views of Drost (2019) when Indigenous values for holistic health are honored, including the emotional, spiritual, and mental components, as well as physical health status, this successfully happens with self-determination and can result in health improvement. It has been observed that the traditional values of IP recognize that the ecosystem food diversity and gender parity contribute to the provisioning of food security. Similarly, according to the findings of Domingo et al., (2021), the value for nutrition, protection, and care of kin and their natural resources are a consistent thread in the indigenous society is a special issue. On this note, it can be said that policies to protect and recognize the right of the IP to their food security and land will benefit human society.

Nalau et al., (2018) found that IP play an important role in many ecosystems as they stay active in their territories and land and thus help to enhance the resilience of these ecosystems. In addition, the IP of India understands and responds to the effect of Climate Change in very innovative ways such as relying on their traditional piece of knowledge and technological interventions to find reliable solutions that might help the Indian society to cope with the challenge. Due to food insecurity, the IP was forced and chose to migrate away from their traditional, and due to this they often face double discrimination as indigenous people and migrants.

According to Agarwal (2018), one of the biggest drawbacks of climate change and food insecurity is that indigenous people

become more vulnerable to irregular migration such as due to abrupt displacement caused by a catastrophic or climate change event, limited legal migration alternatives, and little opportunity to make educated decisions, people of this community are more susceptible to crimes like trafficking and smuggling. It has been observed that people who belong to the indigenous communities are being forced to move to cities for economic reasons by deforestation, particularly in emerging nations. These families frequently end up in urban slums.

The aim and objectives of this research is to understand the effect of variations in climate on the food security of the IP of India. The objectives that are set by the research analyst for this study are defined below: To understand the major problems faced by the Indigenous people of India due to climate change, to analyze the impact of Climate Change on the food security of Indian Indigenous people? to investigate how Indigenous people respond to such climatic change and its negative impact on food security and to find out the drawbacks and difficulties faced by the Indigenous people while responding to climate change and food insecurity.

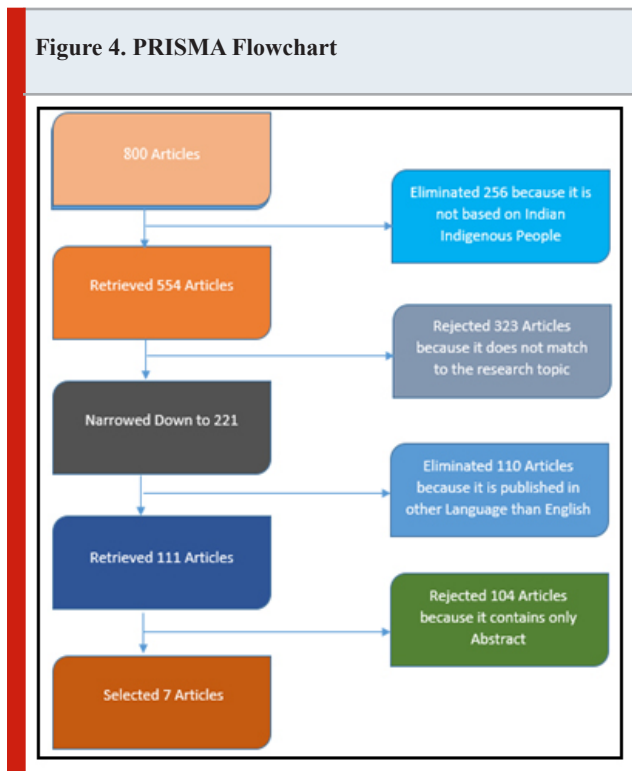
This systematic review further aims to bring together all the sources of evidence on the effect of Climate Change on the food security of Indian IP. From this systematic review, readers can expect to gain an in-depth analysis of the major impact of food insecurity caused by climate change on the IP of India. Moreover, it also had a special emphasis on understanding the major factors and challenges faced by the local tribes or communities and Adivasis to survive the drastic change and the hit on their food security.

## METHODOLOGY

According to the research subject or study area, the researcher has initially gathered a total of 800 publications. Following an analysis of these 800 studies, it was discovered that 256 of them did not consider the indigenous populations of India. As the studies that focused on India's indigenous people were expressly excluded from the selection criteria, the researcher disregarded these 256 papers. Out of 800 items, 256 were discarded, leaving 544 behind. However, the analysis of these 544 papers revealed that 323 did not correspond to the research subject. These kinds of articles are eliminated for this specific purpose, leaving only 221 items in total.

Following a study of the remaining articles, it was determined that 110 of them did not meet the selection criteria since some of them were not written in English. These 110 articles have been removed from the study to preserve the validity and trustworthiness of the research. The fundamental goal of this elimination was to guarantee the veracity and accuracy of the outcomes. The total number of studies has now been reduced to 111 publications, although 104 of them simply have abstracts and do not provide a thorough understanding of the study. This specific reason led to the elimination of these 104 papers from the research as well. Consequently, just 7 publications were left on which to base the findings, as shown in the Prizma Flow Chart (Fig No 4).

Figure 4. PRISMA Flowchart



## RESULTS

Das and Mishra, (2022): This study includes the participants of the indigenous people who live in the Himalayas. This research examines the eating practices of the indigenous people during climate-related catastrophes. It is worth mentioning that the goal of this systematic review is to evaluate indigenous eating habits that are significant to the culture and socio-ecological dynamics to promote sustainable consumption patterns (Das and Mishra, 2022).

The study revealed that man-made activities such as overpopulation, pollution, burning fossil fuel and deforestation have a high impact on the degradation of Himalayan areas which makes the residents of that vertical area more susceptible to climate variations or changes. This study also replied that a complete understanding of the local socio-cultural attitudes related to food choices is necessary for inclusive and responsive climate change initiatives (Das and Mishra, 2022).

El Bilali et al., (2020): This study has been conducted with the view of understanding the impact of Climate variation on the food security of vulnerable people. The study highlights the challenges faced by indigenous people due to the continuous chemical changes. The author reveals that climate change has a negative impact on the food security and food availability of the vulnerable people of India. It is a qualitative study that reflects that the accessibility of food has been impacted by factors like food availability, food production, and effects of extreme weather occurrences (El Bilali et al., 2020).

It is worth mentioning that the food usage and dietary habits of the indigenous group change due to the variation made in the production system brought by the change in the climate. At the same time, long-term food security has also been found to be impacted by the impact of changing climate on the stability of the food system and its resilience. Additionally, the pursuit of food security increases greenhouse gas emissions from deforestation and land use changes by increasing agricultural intensification and agricultural area expansion (El Bilali et al., 2020). Because of the complex relationship between food security and climate change, there is a need for integrated policies that maximize co-benefits while resolving trade-offs.

This study by Bilali reveals that the indigenous people who live in such conditions has a high rate of poverty and hunger because of the adverse effect of Climate variation on food security. The author has also reflected that the degradation of climate and the utilization of food has also impacted the nutritional status of the population, especially in the context of poor and Indigenous people (El Bilali et al., 2020). The change in climate results in increasing temperature, reducing the quality of water, and hygiene habits special in semi-arid and arid areas. It also increases the burden of diseases such as diarrhea among the children of the indigenous community. This qualitative research has also stated that global warming is one of the causes of malnutrition because it negatively impacts the nutrition and food security of vulnerable groups such as children and women.

Patil, (2019): This study was conducted on the tribal population living in the Satpuda Mountain Region of Jalgaon District. This particular research has been conducted by Patil to understand the issues of food security faced by the IP who resides in the Satpuda Mountain Region of Jalgaon District. The results of the study are based on both primary and secondary results. The study reveals that this area is not able to produce enough food to suit the needs of the local people. Food availability has generally been dropping in the study region. Due to a decreased percentage of land being used for agriculture and a growing population, there is less food available in the Satpuda region (Patil, 2019).

Food security is severely hampered by the significant yearly variations in the supply of food grains brought on by the frequent occurrence of droughts and the uneven distribution of rainfall across regions. This research states that the government must protect the tribes' agricultural land to ensure their food security. It can be said that the primary source of the poor tribal people's food security is the land. They should not lose their government, as this would harm their economic situation. It is worth mentioning that if they are required to be relocated, then they must be given the same quality of land and housing (Patil, 2019). It has been found that the Public Distribution System (PDS) cannot provide enough food and all forms of nourishment on its own. As a result, the government need to make the necessary provisions so that people can produce their own food close to home and save money on transportation.

**Sebastian (2019):** This study is based on the Baiga Tribe in India. The primary aim of the study is to understand the use of Sustainable resource management with the help of indigenous knowledge and practices on the food security of the Baiga Tribe in India. It is a qualitative study and the main aim of the study is to prove that indigenous knowledge and practices are a key to sustainable food security.

The study defines that India has a long history of advanced civilization that can be traced back to its ancient past and ancient Indian village system. At last, it can be said that this research provides insight into the value of indigenous knowledge in various tribal and rural people's efforts to manage forests and local resources sustainably. According to the results analyzer, the importance of indigenous knowledge as a tool for development is strengthened by both grassroots community activities and securing the regionally recognized patterns of sustenance for the tribe and village communities.

**Datt et al., (2022):** The primary goal of this research is to understand the technical Innovation and interventions used by the indigenous groups in India for supporting sustainable development. This study considers the weaker section i.e. the tribal and indigenous people of India and the use of medical interventions to improve and support their living conditions. According to this research, approximately 60% of the Indian population directly depends on agriculture and is found to be related to industries for their livelihoods. The study reveals that the two main categories of methodology that may be used by the vulnerable section to evaluate how the change of climate affects their agriculture are partial equilibrium and equilibrium approaches (Datt et al., 2022).

**Townsend et al. (2020):** This study highlights that a nature-based solution is one of the best methods to eliminate the negative impact of Climate Change on food security and the challenges faced by indigenous people. The foundation of "nature-based solutions" (NBS) is the idea that when ecosystems is healthy and well-managed, they offer crucial advantages and services to people. It helps in lowering greenhouse gas emissions, securing safe water supplies, improving the quality of the air, and boosting food security (Townsend et al., 2020).

**Schramm et al. (2020):** According to the researcher, climate change directly threatens human health dramatically, such as heat-related morbidity and mortality, exposure to air pollution and particulate matter (PM) 2.5 due to wildfires create a chronic impact on the Indigenous community because they are uniquely vulnerable due to the impact of climate-related events. The climatic and environmental change highly affect the practices, cultural and Physical health, lifeways, and self-sustenance of the indigenous communities.

The study reveals that this indigenous group are leading the way toward innovative health-related climatic change adaptation by using novel approaches and traditional knowledge (Schramm et al., 2020). In this research, the word "Indigenous" has been used

interchangeably with the term "tribes". The study reflects that an increase in global temperature and continuous weather changes created a very negative impact on the food security of vulnerable communities.

It is worth mentioning that the climate change can create damage to land, life, and water which negatively affects the traditional practices and food security of the IP. Moreover, to mitigate the negative impact, the people of this particular community were forced to relocate and live in the lands where their ancestors had a site for thousands of years (Schramm et al., 2020). It directly or indirectly impacts their social capital, food security, supply of water, sanitation, mental health, infectious disease, and injury and reduces access to Healthcare.

The major consequences of changing climate include mild distress and stress and mental disorders such as post-traumatic, stress anxiety, and depression. As climate change increases the possible spread of viral infections. The majority of health care needs are met through out-of-pocket expenditure, which further increases the financial misery. According to the researcher the indigenous people have been facing socio-economic disparities and healthcare barriers.

The study indicates that the people in this community maintain and foster a subtle and multifaceted relationships between the natural world and the human world. Due to their close connection with the land, they experience heightened impact of climate change. According to the study indigenous community are now using novel approaches and traditional knowledge to support the fragile ecosystem and mitigate the hazards.

## DISCUSSION

The first article focuses on the indigenous group who live in the Himalayas. The main goal of this systematic review study is to describe the indigenous group's eating habits and how they are impacted by natural and environmental changes (Das and Mishra, 2022). Moreover, this study has reflected that the changes in the social and economic dynamics impact their eating habits and food security.

The shift in the crop cycle has restricted or changed their dietary patterns. The extensive and early melting of glaciers in the Himalayas have hampered fishing and reduced freshwater supplies. Therefore, the researcher states that promoting sustainable consumption and a deeper understanding of the indigenous community's traditional knowledge is crucial to maintaining their well-being and health and combating climate change in this fragile ecosystem.

In the second article, the study's primary outcome revealed that the IP community's dietary pattern had been impacted by the change in the climate by reducing crop yield, fish, and animal productivity. (El Bilali et al., 2020). Reduction in pastoral land and fodder negatively impacts livestock weight. It is worth mentioning that the reduced consumption of food might create a negative

nutritional impact on Indigenous people, such as a reduction in protein, Vitamin D, Omega-3 fatty, iron, and Zinc, (El Bilali et al., 2020). Dietary quality is affected by food resource availability, accessibility, quality, and usability changes. Along with this, another detrimental effect in which climate change impacts food is the reduction in the nutritive value of crops. It increases the danger of food contamination. It has also been found that the change in Climate creates a significant impact on the food safety and nutrition of indigenous people.

The third article highlights the food security challenges faced by the tribal population of the Satpuda Mountain Region of Jalgaon District. It was found that there are many issues of food security faced by the population who resides in the Satpuda Mountain Region of Jalgaon District (Patil, 2019). This study reflects that the mentioned area cannot produce enough food due to erratic rainfall and global warming to suit the dietary needs of the local people, which causes food scarcity in the region. Less food is available in the Satpuda region due to a decline in land used for agriculture and a rise in population. Food availability has generally been dropping in the study region. It has forced the IP of this area to shift to another place. In this scenario, the variation in

Climate has negatively impacted food production, which has led to food shortage in that area. As 40% of the Satpuda hilly tribe live on the periphery of the forest, recent deforestation has further marginalized them. It was observed that there is a decreased percentage of land used for agriculture and a growing population, and less food is available in the Satpuda region (Patil, 2019). The researcher stated that the government must protect the agricultural land of the tribe to ensure their food security. If they are required to be relocated, they must be given the same quality of land and housing.

The fourth article provides insight into how the one of oldest tribes of Central India is pushed to the brink of extinction. The market-driven forces have unsustainably extracted forest resources reducing the meagre available food sources. Moreover, the administrative policy “The Indian Forest Act, 2006” alienated the Baiga from their ancestral land. The paper speaks about the value of indigenous knowledge in various tribal and rural people's efforts to sustainably manage forests and local resources (Sebastian 2019).

The study emphasizes group efforts at the grassroots level and securing the locally acceptable patterns of subsistence for the tribal and village communities, reiterating the value of indigenous knowledge as a development instrument. (Sebastian Lakra, 2019) The fifth article describes the understanding of the technical innovation and interventions used by indigenous groups in India to support sustainable development (Datt et al., 2022). It has been found that 60% of the Indian population directly depends on agriculture (Datt et al., 2022).

Due to their dependency on Climate, agriculture is highly impacted by climate conditions influencing their food security. It was discovered that partial equilibrium and equilibrium techniques are

the two primary kinds of methodology that the vulnerable section may employ to assess how the change in Climate impacts their agriculture (Datt et al., 2022). According to the researcher, these two models can be used by the indigenous section of society to eliminate the adverse impact of climate variation and to support sustainable development.

After analyzing article six, it was found that the NBS is very beneficial in minimizing the negative impact of climate change as global warming on people (Townsend et al., 2020). As NBS provides 30%-40% of carbon dioxide mitigation (Townsend et al., 2020). The NBS method is very advantageous in reducing Global Warming. It suggests that increasing plantations is beneficial to sustain the environmental impact. This method is also reliable for IP to reduce the negative impact of climate variation. It will help to shield the challenges such as displacement due to catastrophic flooding, food insecurity, drought, fire, and threats to critical infrastructure.

The seventh and last article helps us understand that climate change impacted the land, water, and life and is challenging the IP's traditional ways of life and food security (Schramm et al., 2020). The residents of this specific community were further compelled to transfer and live in the areas where their ancestors had a site for thousands of years (Schramm et al., 2020). It affects their social capital, food security, access to clean water and sanitation, mental health, infectious diseases, and injuries spread, and their ability to receive healthcare directly or indirectly. The researcher claims that healthcare and socioeconomic restrictions are issues that indigenous people must deal with.

Discussion of the Key Findings concerning the most recent academic literature

Indigenous social order is highly threatened by an array of climate change consequences. Indigenous knowledge and traditional ways of life are being continuously undermined by actual and projected rates of climate change. Loss of ancient knowledge in the face of rapidly altering ecological conditions, depletion of freshwater sources, and eviction from ancestral lands are a few examples of key vulnerabilities.

The study reveals that although the Indigenous community has made significant progress in comprehending climatic variations, the counteractions to mitigate the effects of the changing environment is still insufficient. It is insufficient because the IP section still faces compounded impacts of historical discrimination, colonialism, current administrative policy issues, and persistent social and economic problems. All these factors need deeper assessment to help build adaptive strategies and combat climate change. As indigenous people live far from the modern world and close to the environment and nature, they directly bear the negative impact of climate variation. It has been found that the variation in Climate has negatively impacted food production, which has led to food shortages in areas.

The food shortage challenges the food security of the IP. In India, most IP are farmers, such as the Bhil Community. Their



livelihood and food security are negatively impacted by climate change. The rising temperatures, frequent droughts, and flood reduces crop fertility and yield. It creates a challenge to the food security of IP. The main findings from the result section are that the Indigenous community is closely associated with nature and the environment.

Therefore, any variation in the climate directly impacts their food security and livelihood. From the academic resources used in this research, it has been found that the variation in climate not only impacts the production of food but also reduces freshwater resources. Climate changes that are induced by natural calamities can result in causing food insecurity. Some of its examples are an increase in drought, agricultural labor migration, unemployment, and high food insecurity. All these factors help in successfully stating that the variation in Climate brings a significant challenge to the food security and health of the Indigenous People of India. Moreover, it also affects their social capital, food security, access to clean water and sanitation, mental health, the spread of infectious diseases and injuries, and their ability to receive healthcare in this community

**Recommendations:** To minimize the impact of the challenges faced by the IP of India, it can be recommended that the government of India should promote the health and well-being of the tribal communities in India. It has been identified that many of the people of this community live far from the modern world and the reach of technology.

However, the government should take effective steps to ensure their health and safety. As the variation in Climate directly impacts their food security, the government should take steps such as providing health and minimum living requirements to them, such as food, clothing, and shelter. It is important to note that this systematic study reveals that most times, the indigenous group is forced to leave their ancestral land in search of food; in this context, the government should provide them with constant food and accommodation because they are living below the poverty line.

The economic condition of India and the neglect by the policy makers is the challenge of this recommendation. Women and children of this community suffer from hunger and malnutrition because of the unavailability of food.

On this note, the government should provide appropriate Healthcare services and medical camps in such areas to provide them healthcare treatment for free. This research describes several interventions that IP can follow to eliminate the negative impact of environmental changes. The NPOs and NGOs can run effective campaigns and workshops to make them aware of the technical interventions that they can use to minimize the negative impact.

It is worth mentioning that the women of this community should be provided with jobs to make handicrafts. Moreover, this will also give them a different source of earning, which is beneficial

to support their living food and food security. Further applications of the research to public health practice.

It is important to note that this research can be used for public health practice because it includes an in-depth analysis of the health challenges faced by the indigenous community due to climate variations. The researcher found that the weather and climate change directly impact the agriculture and food security of IP in India. It results in poverty, starvation, hunger, and malnutrition. This escalates the economic distress and mental health of these vulnerable sections of society.

This research helps understand the significant challenges aligned with public health directly faced by the IP of India. It has been found that the variation in climate results in nutritional insecurity, malnourishment, and wasting amongst indigenous people. As most of the people in this community are farmers, the change in climate impacts their food production. For example, an increase in temperature, drought, flood, and lack of rain damages the food crop, resulting in starvation from hunger. New researchers can use this research study to understand the impact of variation and Climate on the food security of the IP.

Moreover, this study also reveals the significant challenges and interventions that this particular group can implement to reduce the negative impact of climate variation and promote sustainable development. The recommendations of the systematic review are very beneficial to educating the IP section of India regarding the interventions they can use to eliminate the man-made effect on environments, such as global warming through ecosystem preservation or conservation, better forest management techniques, and afforestation.

## CONCLUSION

From this research, it has been found that climate change is a big issue that might create an impact on public health. From this study, the research has gained awareness of the serious health challenges that are faced by the IP community in India. It has been identified that extreme weather and catastrophic events change the geographical distribution of forests and the prevalence of food shortage can cause rampant spread of infectious diseases and water-borne illnesses. At the same time, it also negatively impacts the mental health of the people. In the context of IP of India, it has been found that extreme weather conditions such as drought, heavy rainfall, flood, and high temperatures cause a negative influence on their health and well-being.

The health of the people of this community starts to decline because of the major challenges of food security and livelihood. It is important to note that the study highlights the measures of intervention and methodologies that can be used to reduce the negative impact of climate variation and strengthen the response strategy. On this note, it can be said that this might create a significant influence on public health practice. The recommendations that are provided have a special emphasis on

the improvement and future Healthcare practices towards the IP of India.

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