



# Climate Change & its impact on Rural Health (A Case Study of lesser & Shivalik Himalayan Region, Nainital District)

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**Abstracts:** Climate and life is a special gift of the earth, based on the climatic conditions, the physical structure, life style, food items of the fauna and flora are determined and which always change with time. Lesser Himalayas with mountainous characteristics also affect Himalayan rural human health through climate change changes in the elements of climate, as well as natural and man-made disasters, natural resources through deforestation, housing, livelihood resources and food supply. Is giving rise to related problems. Due to its direct effects (heat, stress, flood, storm events and temperature rise, cardiovascular disease and respiratory diseases and indirect effects of rain virus disease, mosquito, water borne diseases and changes in water quality, food related disorders) through disorders Due to the natural penetration of the entire Himalayan regions, the negative impact in rural human health is increasing and the chances of getting more are increasing day by day. The result of which is becoming more and more complete, due to which the lower-class community inhabited in the Himalayan regions is seen to be the most affected, which is getting away from the basic needs from the initial phase of climate change. In this way, the lesser Himalayan community is being vulnerable to all the diseases that were never possible in the Himalayan regions, by climate change for the last four to five decades (health, climate, lifestyle, production, business, physical living, and living, eating and drinking, customs and traditions) All human processes have been affected, including human health. Irregular rain, heat rise, dryness, humidity, drought and other seasonal events by increasing new diseases; Increase in human and animal diseases by increasing water borne diseases, new flora, insects and animals in the study areas to increase Himalayan stable life The instability is beginning to provide.

**Index Terms** - Heat stroke, parasites, dehydration, congestive diseases, and clauses. Oral disease and throat disease etc.

**I. Introduction** - Climate only plays an important role in the development of the human body. Human beings through their intelligence, scientific and scientific knowledge have done the job of making the environment worthy of their environment and creating environmental problems. As in the current decades, due to climate change or seasonal events, environmental damage in the whole world is increasing in the human population. Extreme climatic events of climate (temperature), heat-related mortality, heat stroke and parasites as in the current decades, due to climate change and seasonal events, environmental and human damage throughout the world is increasing the challenges of change. Extreme climatic events of climate (temperature), heat-related mortality, heat stroke and increase of parasites have caused human diseases and are indicating many types of threats to human health and continuously weakening the health rights of every person. Used to be Increasing temperature due to climate change is giving new diseases to North and North East South and South East and Central parts of India. Due to the same changes, lack of food production and water availability are negatively impacting human health due to diseases, dehydration, spread of positive diseases and increase in malnutrition. Similar changes in climate change effect from lesser Himalayan Study States Mountain ecosystem, rainfall, temperature, nutritional availability, livelihood resources, food system, food access, economy based on exchange, drinking water supply, and land use pattern changed to human health many Influenced by diseases, the Middle Himalayan is making human life painful. Qualitative and quantitative changes have been started in the air, water and local foods of the entire Himalayan region, which has become a by-product of human health. The Kedarnath water catastrophe of the year 2013 has revealed the new results of human or natural change.

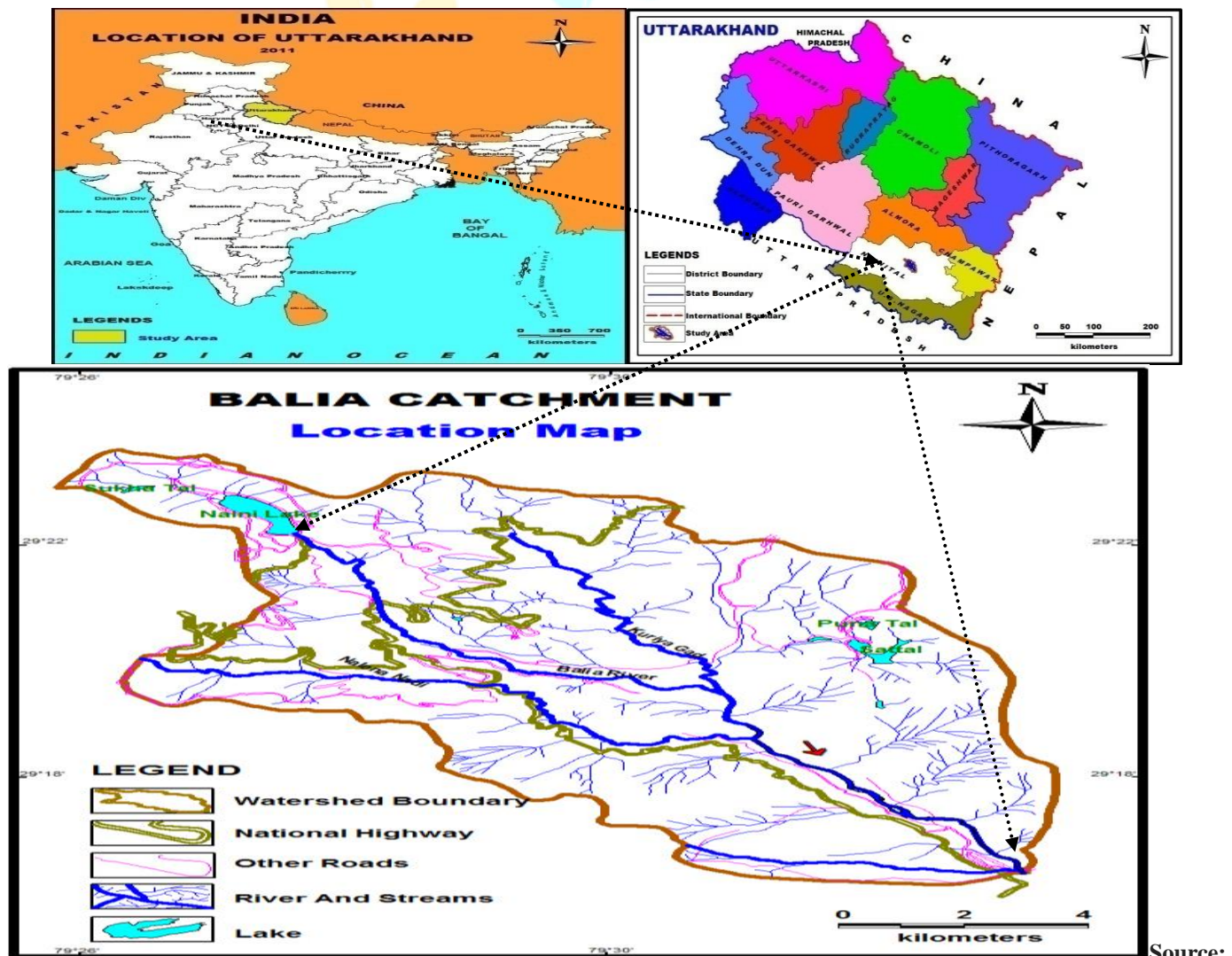
According to survey and interview findings, the mainstay of living in the Middle & Shivalik Himalayan study regions, (District Nainital) traditional agriculture, animal husbandry, change in food production is leading human health towards malnutrition. Through changing the seasonal elements (increase in temperature, rainfall, cold and hot winds, irregularity in rainfall, decrease in water resources), the Himalayan people are increasing the vulnerability of many diseases to human health by removing the community from natural reach. Jaundice, appendicitis, with all the diseases caused by cholera, typhoid, malaria, degu cancer, jaundice, appendicitis, caused by about 30-40 percent increase in place of the major archaic diseases (Cholera, Seasonal fever and TB) of lesser Himalayan regions. Has Diseases and health safe from the point of view of climate The lesser Himalayan study is providing suitable conditions for mosquito-borne diseases with the changing climate change conditions, as well as the daily food habits of the local rural community are changing.

**II. Research Objectives Research objectives-** The main objective of the research is to make the local (District Nainital) lesser Himalayan community aware of the impact of changing climate change in human health, i.e., understanding of the elements and based on testing, analysis and results of the changes in the physical and human aspects.

**III. Research Methodology** - Research paper mainly consists of survey of lesser Himalayan regions and direct experience of the community and the effect of changing climatic conditions on the health of the Middle

Himalayan community from the study and analysis of secondary points of the clinics of the extracted points. Research paper has been prepared on the basis.

**IV. Study Area-** lesser and Shivalik Himalayan regions (Especially Nainital District Ballia Catchment) have been included as research studies. Because this study has been equipped with all climatic characteristics on the basis of physical conditions and is equipped with human activities of entire Himalayan regions.



Source:

Indian Topographical Sheet No 53/o/7, 53/o/11

**V. Subject Themes-** The lesser Himalayan region is the most populous and own lifestyle and healthy environmental feature in the mountain ranges of the world, providing suitable climatic characteristics to preserve and lead a favourable life in terms of human health. But with the increase in global temperature over the last 4-5 decades, the entire Himalayan climate and weather cycle are changing, due to which many climatic and water-related negative effects have been seen in the health of the local community. The conditions of life that are safe and optimized for human health are affecting the life of Himalayan people and creating life crisis. Limited diseases occurring in Himalayan study regions, Cholera, Seasonal fever typhoid are gradually ending and are becoming the proliferation areas of many new diseases. Therefore, there is a need to adopt concrete strategies to save the health of lesser Himalayan public life in due course of time. An analysis of the effects studying in human health in the central Himalayan region has been based on the following points.



***Impacts of Climate Change on lesser Himalayan Community Health-*** in the Himalayan regions during the climate change, there has been an Increasing in Mortality and heat stroke rate, malnutrition and early deaths due to extreme rising temperatures. Severe seasonal such as frequency and severity of weather and climate phenomena, rising temperature, heavy rainfall and drought are the risks of experiencing new climatic hazards and facing water-borne diseases and hazards to the Himalayan community. Diseases in the lesser Himalayan region are increasing rapidly due to pathogens and parasites due to high temperatures, which are caused by many tropical diseases. Due to which many health hazards are coming together. The speed with which climate change and carbon emission rates are increasing in India will increase the average temperature of India by about 1°C by the year 2030, affecting about 60 crore people.

Which has the potential to be the most Himalayan people community? Due to the increasing temperature in climate change, India is facing a new and new disease in the north and north east of south and southeast a central part. climate change, where floods, drought, half, cyclone, hot winds and sea lions are damaging the structural pattern and ecosystems in the central Himalayan regions, the same changes by reducing food production and water availability, dehydration, spread of congestive diseases and increasing in malnutrition are doing, as well as negatively affecting human health.

Heaven lesser Himalayan part of the earth is being affected by hot winds. Due to which the forest fire is providing a new nutrition. And the changing of mountain ecosystem, rainfall, temperature nutrition availability, livelihood resources, food system, food access, economy based on market, drinking water supply, diseases and land use pattern have started affecting human health. Due to which, along with ecological changes in the central Himalayas, human life has also been painful. Wind here in providing a strong base to human health in the inaccessible mountainous regions. Water and local food are the only natural nutrients. In which qualitative and quantitative changes are taking place which are the result of human health empowerment.

According to survey and interview findings, the mainstay of livelihood in the Central Himalayan study areas is the traditional occupation agriculture, animal husbandry, changes in food productivity leading to human health malnutrition. Seasonal elements (temperature increase in rainfall, cold and hot winds, irregularity in rainfall, and wide reduction in water resources) are also showing reduction in the means of natural access. Also, due to the increase in temperature, the rural communities working in traditional agri-business have started migrating mainly to urbanized areas which are not favourable for human health and it is known that Himalayan region is inviting many types of health-related changes. Giving by change. 30-35 years ago, the states whose major diseases were Cholera, Seasonal fever and TB, these have become the cause of typhoid malaria, Daegu TB, Cancer, jaundice, abdominal diseases for the last 5-10 years. There has been an increase of about 30-40 percent in the number of jaundice and appendicitis patients, in women, especially leucorrhoea and stomach related diseases have increased 20-25 percent more than men. Diseases and health safe from the point of view of climate, the Himalayan region is gradually providing suitable conditions for the development of mosquitoes with the changing climate. Due to the continuous increase in mosquito-borne diseases, the result was obtained from the selective rural community of gold or the result that the climate project and weather and temperature in

the Himalayan region was influenced by the effect of snow, snow and other seasonal phenomena. Changes in access, technology, irrigation water, drinking water, living, etc. are also changing human health.

Which is working to make the community living in a healthy state physically disabled, as well as the change in traditional occupation by the community's animal husbandry, home, food, clothing, agriculture, local industry, vegetation, trade, culture, Changes are also visible on population and migration. Due to which the number of people suffering from diseases is increasing continuously in the Himalayan regions, details of which are given in Table No. 1 and Diagram No. 1 and 2.

### Human Health Affected by Climate Change in Lesser Himalayan Study Regions 2013-2022

S. No	Month's	Year wise Number of Peasants											Monthly Average
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	
1	January	460	268	478	831	598	729	518	430	131	216	4659	465.9
2	Feb.	445	465	551	759	718	823	579	454	211	143	5148	514.8
3	March	480	464	681	892	1061	704	761	503	234	223	6003	603.0
4	April	525	399	728	1092	825	654	533	261	176	238	5431	543.1
5	May	430	457	721	1234	807	1184	776	237	161	357	6364	636.4
6	June	300	553	726	1081	858	1119	606	170	135	527	6075	607.5
7	July	399	666	966	113	878	1047	714	210	206	-	5199	577.66
8	August	301	461	953	1252	1132	1426	981	121	237	-	6864	762.66
9	Sep.	321	567	927	1252	1284	1036	742	85	220	-	6434	714.88
10	Oct.	355	451	908	701	984	1048	340	135	167	-	5089	565.44
11	Nov.	401	401	467	806	844	714	468	129	173	-	4403	489.22
12	Dec.	656	654	499	896	762	995	397	177	196	-	5232	581.3
Total Patient		5070	5716	9341	10909	10751	11479	7415	2912	2247	1704	66901	-
Annul Average		422.7	483.8	717.0	909.08	895.91	956.58	617.91	242.66	187.25	284	5575.08	-

Table No. 01 Source: Primary Health Center Jolikot

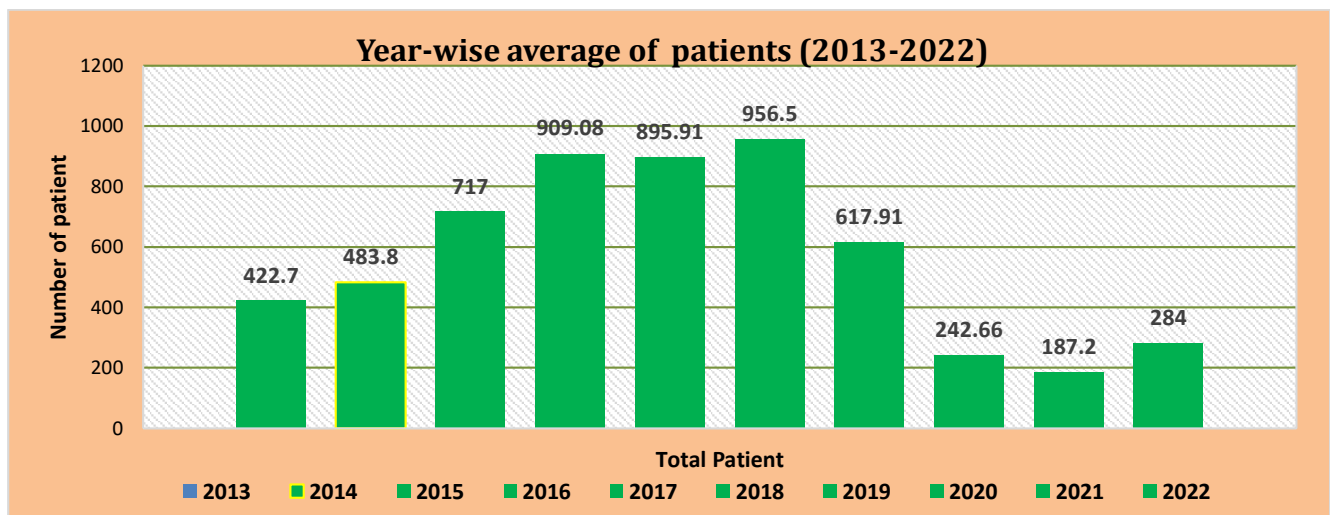


Fig. No. 01 Source: Primary Health Center Jolikot

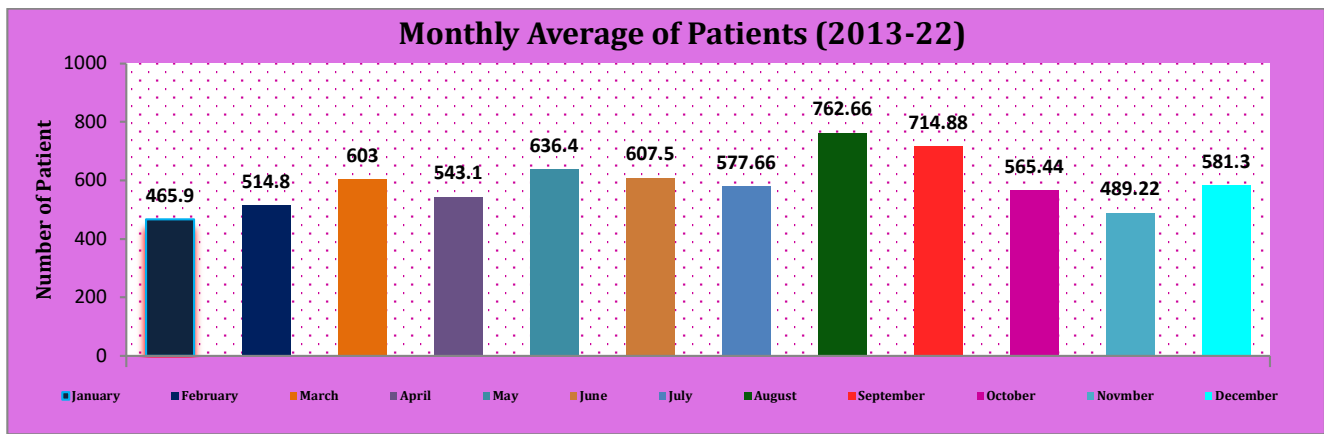


Fig. No. 02 Source: Primary Health Center Jolikit

From Figure number 01 There is a gradual increase in the number of patients with the highest increase in the average number occurring in the year 2018 while the year 2021 shows the lowest growth level. But in reality, during this period, the number of patients has increased in the local area more than in the year 2018, due to Covid 19, registration in the primary health Center could not be done. Only those who were suffering from severe rheumatic fever were able to register at the health Center to avail the health benefits. The maximum increase in the number of patients has been estimated since the year 2015. The same is revealing the average increase in the number of patients in only 6 months of the year 2022, in which the reason for the increase is irregularity in temperature and rainfall, change in elements of climate, changes in daily life and food system due to covid. The rapid changes in the population have been found mainly during the responsible research field surveys.

There has been an increase of about 53 percent in the number of patients available in the year 2018 as compared to the year 2013. Which is indicating further increase in the number of patients in future with the change in climate and weather conditions. During the seven years, the highest average • increase in the number of patients month-wise is happening in the month of September and the least in the month of January. From which it is known that the lesser Himalayan community is being affected more by the increase in temperature, the same intense humid heat and high humidity in the months of August and September are considered to be the period of favourable conditions for the flourishing of diseases in the Lesser Himalayan regions and the local community. It has been known from the traditional experiences and self-observation that in the central Himalayan regions, the rainy season was considered to be the most appropriate time from the point of view of human health for a long time. According to people involved in health services, the number of different diseases per person in the Lesser Himalayan regions varies from 5 to 10 percent per year. References Has been of throat patients. Which is increasing gradually. Apart from this, nose, ear, mouth, skin, fungal reaction, stomach related diseases, tumour, tuberculosis, blood pressure and fungal disease have become the major Central Himalayan diseases. Along with this, all the water-borne diseases which used to occur in a particular season, are now becoming active in any season, due to which the changing weather and global temperature are being considered mainly responsible by the people here on the basis of their long experiences. And along with the human community, animal health has also started changing.

For the last 10 years, it has been found from the experiments being done in the animals of the local area and from the medical evidence that natural and artificial insemination capacity is decreasing in the local animals. 5-10 percent reduction in milk production and 20-25 percent reduction in milk production capacity has been reported in cattle. Due to change in climate and weather, the change of housing forms is not becoming as useful for the health of the Lesser & Shivalik Himalayan community as the traditional habitats were favourable for health for a long time because those traditional habitations have been in accordance with the local weather and climate conditions. While the modern settlements are having opposite ecological system in terms of weather and climate, which are true only in the construction structure, but not very useful from the health point of view, along with the change in the housing pattern, lifestyle, clothing and food items, is increasing the number of diseases by inviting incurable diseases and decreasing immunity of the Shivalik & lesser Himalayas.

### Climate Change Impacts in lesser & Shivalik Himalayan Human Health and Activities

Effective Divers	30-35 years ago,	Current Routine	Percentage
Routine	About 95 percent of the agriculture and traditional animal husbandry years were completed on the day today labour.	Traditional business with the reduction of farming and animal husbandry, about 50 per cent of the private work, wages and tourism activities are carrying out the rural community routine in the mid-Himalayan surveyed areas.	45
Food Style	Traditional food in edible material is wheat, maize, barley. Koda millet, Sorghum bicolor millet, pulses and vegetables, about 80% milk products and forest products, about 20% were included as organic food system.	With the adjustment of climate change modernity, the use of junk food accounts for about 25% in place of traditional foods in food grains and about 5% use of milk products due to animal husbandry reduction and up to 99 percent reduction in wild foods and inorganic foods are used continuously.	Food 55 Milk Product 20
Cloth	Due to the mid-Himalayan cold climate, the use of 70% traditional clothing was the cause of yoga protection.	Due to the warming climate, about 50-60 percent change in traditional dress costumes and ecology has been encouraged. The disease spread or work has arisen.	60
Life-Style	About 80 percent of the rural community used to live low-level economic and slum dwellings, but was fully healthy.	The rural community is leading a medium and high level of life in which the human health of most facilities is becoming increasingly critical every day.	30
Health Status	About 90 percent of the community lived disease free. Cholera, TV, Seasonal fever was the major diseases.	About 90 percent of the rural community is living with disease. All diseases have started occurring in the present time.	90

Table No. 02 Source: Lesser & Shivalik Himalaya Geographical Survey 2013-22

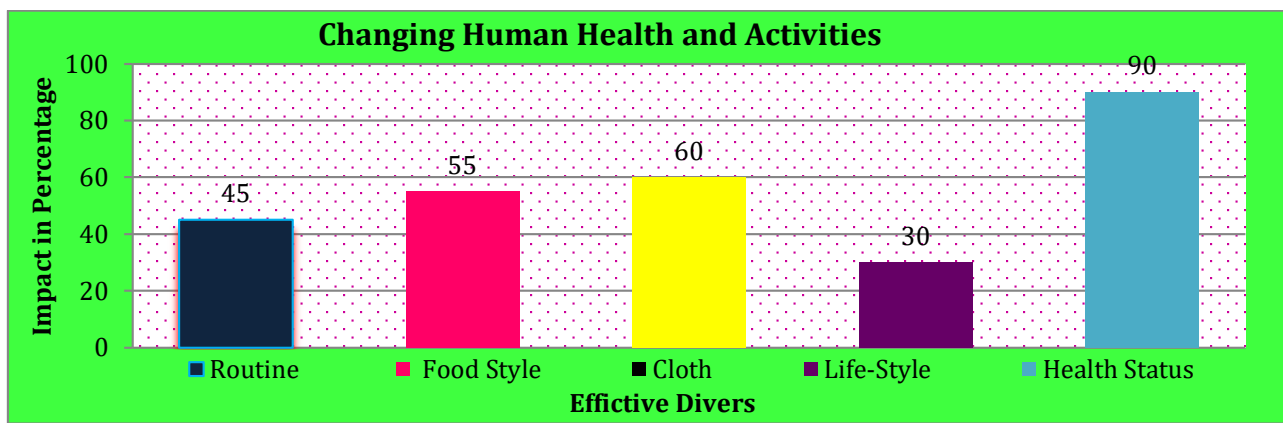


Fig.

No. 02 Source: Lesser &amp; Shivalik Himalaya Geographical Survey 2013-22

In the mid-Himalayan regions, in the past 30-35 years and in the current years, the change in climate change is 45% in daily routine, 55% in food, 60% in clothing, 30% in living and 50% in health level. Has been found which is related to the changing trend of climate change and food. As a result of climate change impact and changing traditional occupation, women of middle and low economic level families remain malnourished due to lack of adequate nutritious food. On the other hand, the change of seasonal element serves to nourish health. The same has been found in women of more than 40 years of age, excess of leucorrhoea and 15-30 days change (increase in time) in menstrual tendency.

**Water related diseases-** Water related Diseases In the Himalayan regions due to lack of clean water due to global climatic conditions, water containing polluted microbes is causing many diseases in the Himalayan community and impure water is presently leading to death with disease originator while The area is declared as a future water reservoir as clean water, but now it is being affected by climate change effects, due to temperature rise, lack of rainfall and spread of seasonal events, changes in the quality of natural water sources and water reserves in many types Water borne diseases are gradually spreading in the central Himalayan rural areas. Due to which water-borne diseases like malaria, dengue, mosquito borne and jaundice stones are being caused. In this way, climate change is considered not only the father of any particular type of diseases but also the carrier of all the old and new diseases of the world.

In Himalayan study states, every day, after the discoveries and medical field of medical and health sector, some new disease is being born and the number of patients is increasing progressively. In comparison to the year 2013, more than two times the number of patients has been reported till the year 2018. In which most of the community has been prone to water borne diseases. There was a total of 5,070 patients in the year 2013 which has increased to 11,481 in the year 2018. In the past 10-15 years, due to the increase in heat, the number of mosquitoes has been doing past Himalayan studies, and all water borne diseases are becoming more active. Acute pain in the local community, acute pain in the limbs, increase and decrease in blood pressure has become a common disease.

According to the rural regional survey results, each person is definitely restricted in one season, while water-borne diseases were more prevalent during the pre-defined period, but due to changes in climate and weather elements, it was prevalent in all months of the year. Activated over 4-5 years. Based on the findings of the survey and interview, 30–35 years ago, water-related diseases may cause fever, cholera, typhoid, jaundice



and diarrhoea. There were skin diseases, stones and stomach diseases, of which, mainly, fever, cholera and typhoid were the main diseases. This is currently changing with the change in the elements of climate, in which diseases of all types of plains and mountainous regions have been found. In this context, the details of water-borne diseases are given in table number 03 and Figure number 04. on the basis of total population density of water basin, capacity and scarcity.

### Central Himalayan Community Waterborne Disease Changed Pattern (In Percentage)

Waterborne Disease	30-35 Years Ago.	Know
Seasonal Fever	63.4	4.4
Cholera	12.6	9.4
Dysentery	10.4	11.2
Diarrhoea	4.6	5
jaundice	1.2	15.4
Typhoid	4	2.8
Stomach Related	1.4	24.6
Skin diseases	1	15.6
Calculus	1.4	11.6
Total	11-11	11.11

Table No. 03 Source: Lesser & Shivalik Himalaya Geographical Survey 2013-22

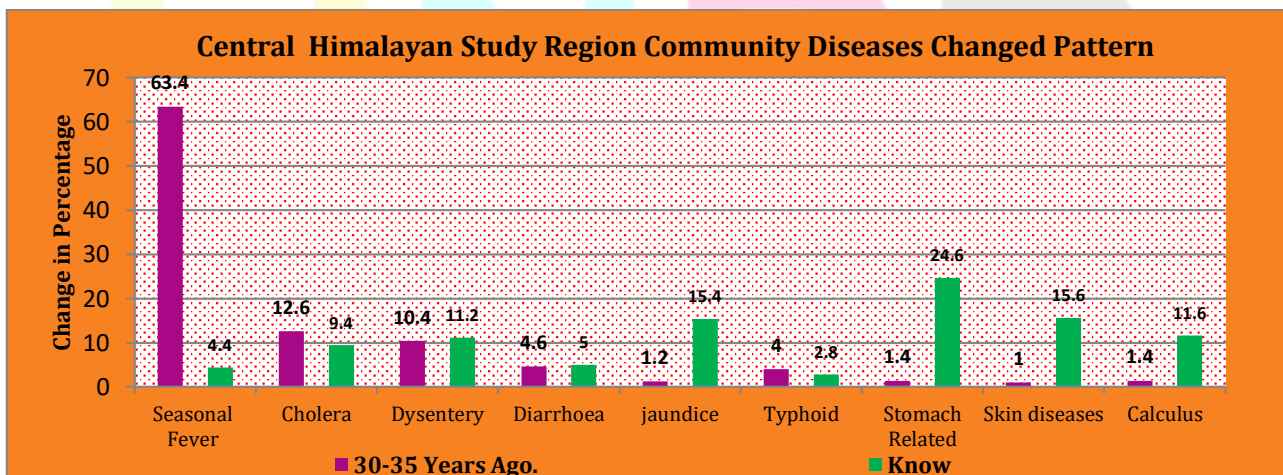


Fig. No. 04 Source: Lesser & Shivalik Himalaya Geographical Survey 2013-22

Details of water-borne diseases found in 50 percent of the families studied as a geographical survey sample 30 to 35 years ago and based on the diseases occurring in the current years; The number of negative effects from 0.4 to 59 % in the past and present A positive difference has been found. In 30-35 Years ago, the average seasonal fever is 63.4 %, cholera 12.6 %, Dysentery 10.4 %, diarrhoea 4.6 %, jaundice 1.2 %, typhoid 4%, stomach related diseases 1.4%, skin 1%, and Stones 1.4%. This used to be only in men. he is more active in current age with mean fever average 44% cholera, 94% dysentery 11.2%, diarrhoea 5% jaundice 15.4% typhoid 28%, stomach related diseases 24.6%, skin disease 15.6%, appendicitis 11.6%. Have been done. Average

While pre-existing diseases (terminal fever, malaria and typhoid) have decreased by 21% on average and about 70-80% per disease with modern medical practice. The increase in diseases is mainly affected due to decrease in water quality, the percentage of diseases related to jaundice stone, skin and stomach have increased by about 1050% due to change in climate and water quality. Stomach related disease in terms of average per disease, Jaundice disease highly sensitive disease condition with high average Stones, Cholera disease Moderate sensitive condition Diarrhoea, Typhoid fever Typhoid with low levels Low whiteness

Let's state the situation. Based on the survey findings, it was found that about 60 to 70 % communities in the total population are affected by different types of water-related ramifications due to the effect of temperature and contaminated water, affecting the birth of many water-borne organisms, including the adjacent human population. But presently due to change in its natural form of climate change effect, the safe human community is also suffering from disease gradually. In which about 49 percent water related diseases have been found.

**VI. Conclusions-** Lesser & Shivalik Himalayan Study with mountainous characteristics gives rise to health-related problems affecting the human health through natural disaster resource processing housing, livelihood scans and food supply due to life-threatening family impact in the present-day state. In conclusion, due to climate change, the reduction in disease resistance in human health is increasing the number of diseases and number of patients as well as providing their conditions for changing life-threatening diseases.

**VII. Suggestion-** Study State Himalayas, being the new mountain region of the world representing the most population, as well as climatic characteristics, has become a more useful mountain range in terms of human health. In spite of difficult circumstances, it is a land providing good natural conditions in the discharge of life and health protection, in which the mountainous community inhabiting the traditional living practices for healthy living and controlling and sustaining development in human transformed activities. And solid policies of natural resource management have to be implemented.

**VIII. Acknowledgment -** I express my gratitude to the lesser & Shivalik Himalayan rural community who provided me with the right information and my valuable time in surveying various fields in preparing research papers. both of us researchers would like to express special gratitude to the Indian Council of Social Science Research, New Delhi (ICSSR) with whose research fellowship we are doing our research work. we are thankful to our parents with whose love and support, I was able to complete this task. Also, especial thanks are due to the publisher of the research paper, who give it the final shape.

## IX. Reference

- ♣ Bhattacharya S, Sharma C, Dhiman RC, Mitra AP. 2006. *Climate Change and malaria in India*. Curr Sci 90:369–375.
- ♣ Davis, William. Morris; 1894: *Elementary Metrology*. Wwww Amazon.com
- ♣ Dhiman RC, Pahwa S, Dash AP. 2008. *Climate change and Malaria in India: interplay between temperature and mosquitoes*. Regional Health Forum 12:27–31.
- ♣ Ebi KL, Paulson JA. 2010. *Climate change and child health in the United States*. Curr Probl Pediatr Adolesc Health Care. 40:2–18

- ♣ EPA, 2014: *Climate Change Indicators in the United States*, 2014. 3<sup>rd</sup> Edition. EPA 430-R-14-04, 107 pp. U.S. Environmental Protection Agency, Washington, D.C.
- ♣ <http://www.epa.gov/climatechange/pdfs/climateindicators-full-2014>.
- ♣ Huntington, Ellsworth. 1935: *Civilization and Climate Geography* 6<sup>th</sup> edition University Library Assiciation Bookstore. Amazon.com
- ♣ Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Core Writing Team, Pachauri RK, Reisinger A, Eds 1911. Geneva: Intergovernmental Panel on Climate Change). Hippocrates, 640: Encyclopaedia Britannica, wikipedia.org
- ♣ IPCC, 2014: *Climate Change Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.
- ♣ Kant, Immanuel; 1802: *Natural Science* university of California, San Diego Kathleen F. Bush, George Luber, S. Rani Kotha, other, s2009: *Impacts of Climate Change on Public Health in India: Future Research Directions. The Joint Indo-U.S. Workshop on Climate Change and Health*.
- ♣ Mandal K. 2008. *Drinking Water Supply vis-a-vis Technological Interventions for Social Empowerment of Rural India*. Available: <http://www.nistads.res.in/indiasnt2008/t6rural/t6rur7.htm> [accessed 23 May 2010].
- ♣ McMichael A. 2004. *Climate Change. In: Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors*, Vol. 2 NRC, 2012: *Disaster Resilience: A National Imperative*. National Academies Press, Washington, D.C., 244 pp.
- ♣ Patz JA, Olson SH. 2006. *Climate change and health: global to local influences on disease risk*. *Ann Trop Med Parasitol* 100:535–549
- ♣ Retzel, F. 1875: *The laws of special growth of states*, wikipedia.org
- ♣ Singh MR, Upadhyay V, Mittal AK. 2010. *Addressing sustainability in benchmarking framework for Indian urban water utilities*. *J Infrastr Systems* 16:81–92.
- ♣ Sinha, T.K. 2009: *Book Traversal links for water Related Diseases and Precaution: Drinking water standards in India*.
- ♣ Wiley, L.F, Gostin, LO. 2009. *The international response to climate change: an agenda for global health*. *JAMA* 302:1218–1220.
- ♣ [www.https://doi.org/10.1086/322632](https://doi.org/10.1086/322632), *clinical Infectious Diseases*, Volume 33, Issue 4, 15 August 2001, Page 492-503,
- ♣ [www.https://me.gov.in](http://www.me.gov.in) distinguished-le...
- ♣ [www.https://sulabhenvi.nic.in](http://www.sulabhenvi.nic.in) databasehindi
- ♣ [www.https://health2016.org](http://www.health2016.org) global change.gov
- ♣ [Www./https. archive.indiaspenhindi.com](http://www.archive.indiaspenhindi.com)
- ♣ Zeune, 1818: *Geography in relation to nature and the history of man*. *Geographie.hu-berlin.de*
- ♣ Zuckerman JN, Rombo L, Fisch A. 2007. *The true burden and risk of cholera: implications for prevention and control*. *Lancet Infect Dis*. 7:521–530