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Climate Resilience And Gender Perspective In Sustainable Development Goals (Sdgs)

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Abstract: As we say climate resilience within the purview of gender perspective, the two issues are to be linked with each other in context. The paper views through the United Nations Framework Convention on Climate Change (UNFCCC), Conference of Parties (COP), Kyoto Protocol, Green Climate Fund (GCF), Paris agreement, International Forum for Environment, Sustainability & Technology (iFOREST) & finally the efforts of Ministry of Environment, Forests & Climate Change (MOEFCC) of Government of India.

On the other hand, regarding gender perspective, the paper focuses on the issue of preservation of indigenous seeds variety in the context of Genetically Modified Foods (GMF) that cover the preservation of indigenous variety of seeds as a challenge to the domain of GMF. Climate resilience and water stressed areas are interlinked. Here both the issues of GMF & water stress are interwoven with the lives of women. Climate resilience efforts and water stress has put pressure on agricultural lands of joint families & leading to land distribution in the families. As a sequel to the familial land distribution and high cost of agricultural inputs, the income stresses in the families have escalated. As a result of the escalation, women's participation in the labor force has increased. Earlier, it was a thought process that working women will eventually lead to women empowerment.

Currently, empowered and working women are also under threat. Due to patriarchal mindset, insecurities among spouses have escalated if the women happen to earn more in cash or kind. This precarious situation has led to high prevalence of Intimate Partner Violence (IPV). The issue of IPV violates basic human rights, undermines economic potential, reduces productivity, negatively impacts future generations when children witness violence at home.

Besides the concept of interlinking issues, the resurgence of geriatric population in the near future will also impact health care at domiciliary levels. Resurgence of climatic temperature will lead to extra effort in reducing internal temperature at home. With a burden on the household economy to keep the home cool coupled with rising food prices, the working dividend male population will be under tremendous pressure to feed both the ends of demography.

The dependant population at the initial end of life through the U5 population & through the geriatrics at the distal end of life will become a burden at the national level that is culminated by burden at the family level. The geriatric population will need an extensive domiciliary care that is again going to put further burden on the women at the household level.

As way outs, the paper sees the role of the male gender to diversify skill set, develop risk taking capacity so that they sustain the income of the households. For the females, multi tasking is the way out in nuclear families. While being tech centric, both the genders need to be socio centric as well. Social cohesiveness

coupled with spousal mutual respect will help us to improve the performances in various gender related indexes. Healthy behavior regarding household waste management & adoption of renewable sources of energy, rain water harvesting will not only add to climate resilience efforts for the current generation but also the future generations.

Similarly, efforts at mass level like focus on alternative energy sources, graduating from coal in a phased manner, reducing fossil fuels will bring the nation to better position in the progress of the Sustainable Development Goal number 13.¹²

Index Terms - UNFCCC, SDG, COP, GCF, IPV, iFOREST

I. INTRODUCTION

The pollution levels affect us in two dimensions. One is the indoor & the other is the outdoor. The paper discusses the issue of indoor pollution with the gender perspective.¹

The indoor pollution occurs mainly as a result of using bio-mass as cooking fuels contributes to Acute Respiratory Infections (ARI) & Pneumonia. The primary issue in indoor pollution is the Carbon Monoxide (CM) in the indoor air. Here, it is primarily the women who bear the brunt as they cook for the family as Mata Annapoorna (goddess of food as per Hindu traditions). Here, it is prudent to discuss the remedial interventions in this issue. Here, the women gender is directly related.¹

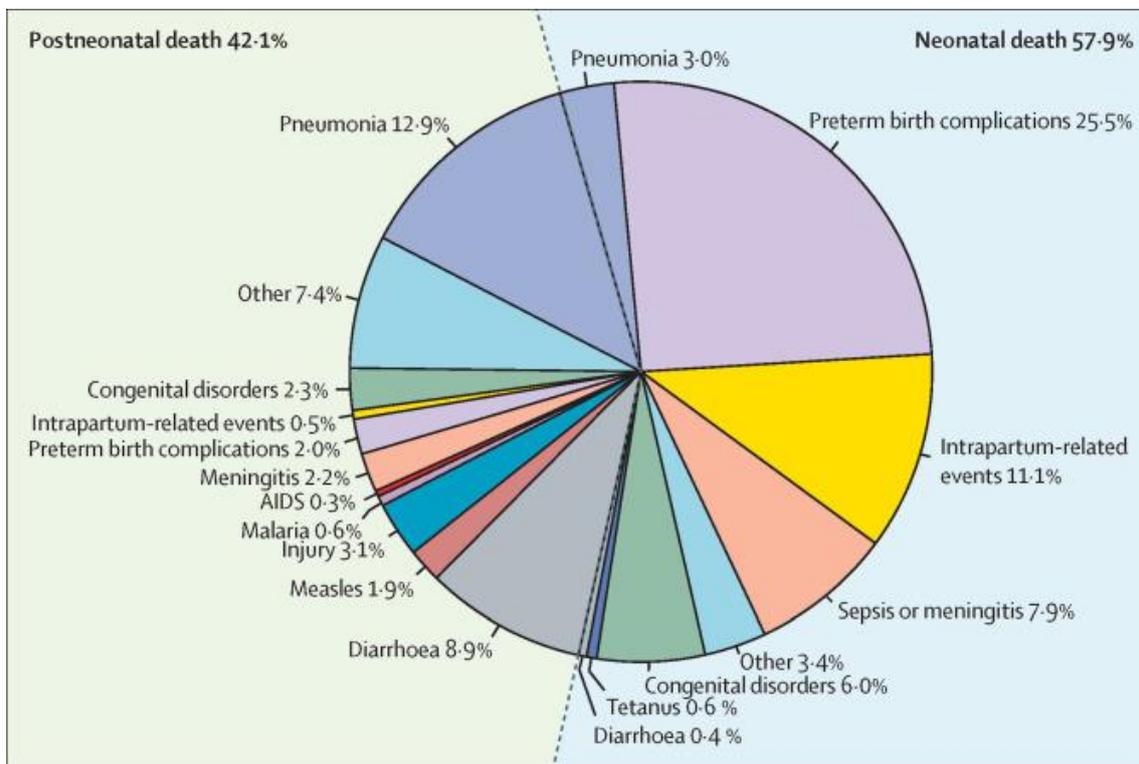
In the absence of census since 2011¹³, the National Family Health Survey (NFHS) is the largest survey to see the remedial interventions. As per NFHS 4, 43.8% of house-holds were using clean fuel for cooking & the uses of clean fuels have increased. In NFHS 5, data informs us that 58.6% of house-holds currently use clean fuels for cooking. This clearly shows that schemes like UjjwalaYojana launched in 2018 have reduced indoor pollution.²

Further, efforts of Tata trust in providing COEL (Carbon monoxide Emission Level) bangles to women are successful efforts to reduce indoor pollution. The COEL bangle measures the Carbon Monoxide (CO) & Particulate Matter (PM) in the wearer's surroundings & informs them visually, audibly when the air around them starts to harm their health. The women come out of their house till the levels of smoke billows down thereby indicating low levels of CO & PM.³

Indoor pollution is a major factor contributing to ARI in children & Chronic Obstructive Pulmonary Diseases (COPD) in the old. In fact, the intensity of indoor pollution directly impacts the Childhood Pneumonia Management Program currently called the Social Awareness & Actions to Neutralize Pneumonia (SAANS) since November 2019. Similarly, it also impacts the National Program for Health Care of the Elderly (NPHCE).⁴

In fact, Pneumonia & COPD are the major killers of these two groups. Here, again the women are the pivot in the families where they take care of the young and old. The figure 1 given below cites that pneumonia is attributed to 3% of all neonatal deaths & 12.9% of all post neonatal deaths thus contributing to almost 16% of all U5 deaths across the globe.⁵

Figure 1- Source- Liu L et.al, 2019.⁵



Similarly for outdoor pollution, the Ministry of Environment, Forest & Climate Change (MEFCC) launched the National Clean Air Program in January 2019 to prepare clean air action plans with an objective to reduce the PM_{2.5} pollution by 20-30% by 2024 as compared to 2017 in 122 cities. As a result of this effort, the Air Quality Index for cities is displayed by the pollution control boards at centre & state level.¹

A study done on air pollution and diabetes found that a 10µg/m³ rise in monthly average exposure to PM_{2.5} was associated with a 0.4 mg/dL increase in finger prick blood test and a 0.021 unit increase in HbA1c test. It also found that increase in average annual PM_{2.5} exposure by 10µg/m³ associated with a 22% higher Type 2 diabetes risk.⁶

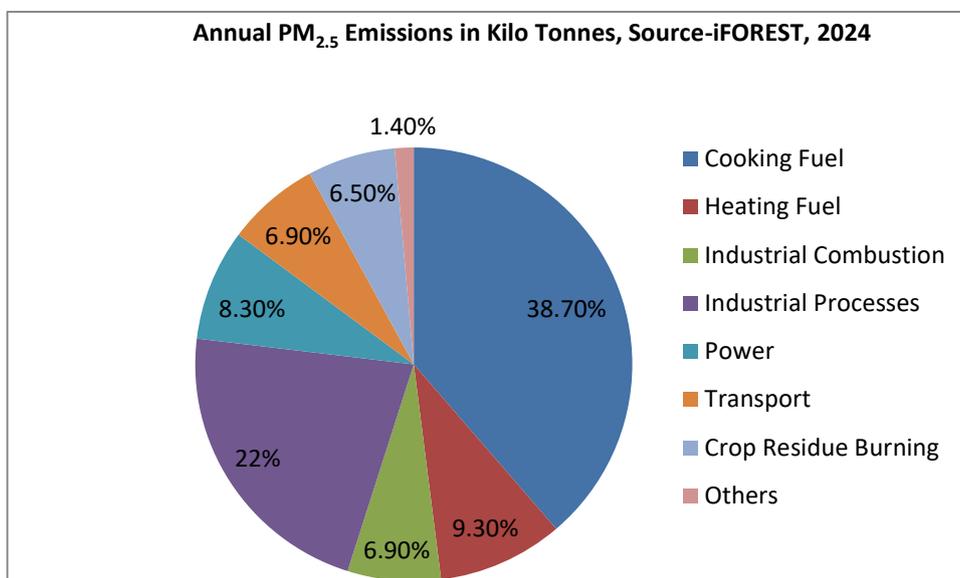
It is to be noted that the issue of outdoor is to be addressed at mass level where as indoor issues can be addressed at individual level.

In 2024, the Government of Uttar Pradesh with the support of World Bank initiated the concept of 'Airshed' in the Indo Gangetic Plains (IGP). The Airshed will be monitored for air quality through an aim to reduce the PM_{2.5} and PM₁₀ in the air. An airshed is an area from where the state draws its air mass which for UP is the entire Indo Gangetic Plain. The Uttar Pradesh Clean Air Management Authority (UP-CAMP) will develop strategies to reduce pollution in key areas such as industry, transport, agriculture, livestock, dust & waste management.⁷

In this section, the paper analyses the emissions of PM_{2.5} level in Kilo Tonnes (KT) as per International Forum for Environment, Sustainability & Technology (iFOREST) in 2014 in India. Contrary to the popular belief that crop residue burning is the major source of outdoor pollution, the major source is the residential biomass. According to the research, 48% of PM_{2.5} is emitted by residual biomass & these constitute of cooking fuel that contributes 38.7% & heating fuel contributes 9.3%. Following that, the next big source is industry where industrial combustion contributes 6.9% & industrial processes contribute 22%. Way behind is power that contributes 8.3%. Transport is attributed to 6.9% where as crop residue burning contributes 6.5% & finally others contribute 1.4%. The following figure gives the details of these break ups.⁸

The study cites that India emits approximately 5.2 Million Tonnes (MT) of direct PM_{2.5} in a year. This excludes natural & manmade dust.⁸

Figure 2- PM_{2.5} emissions in India⁸



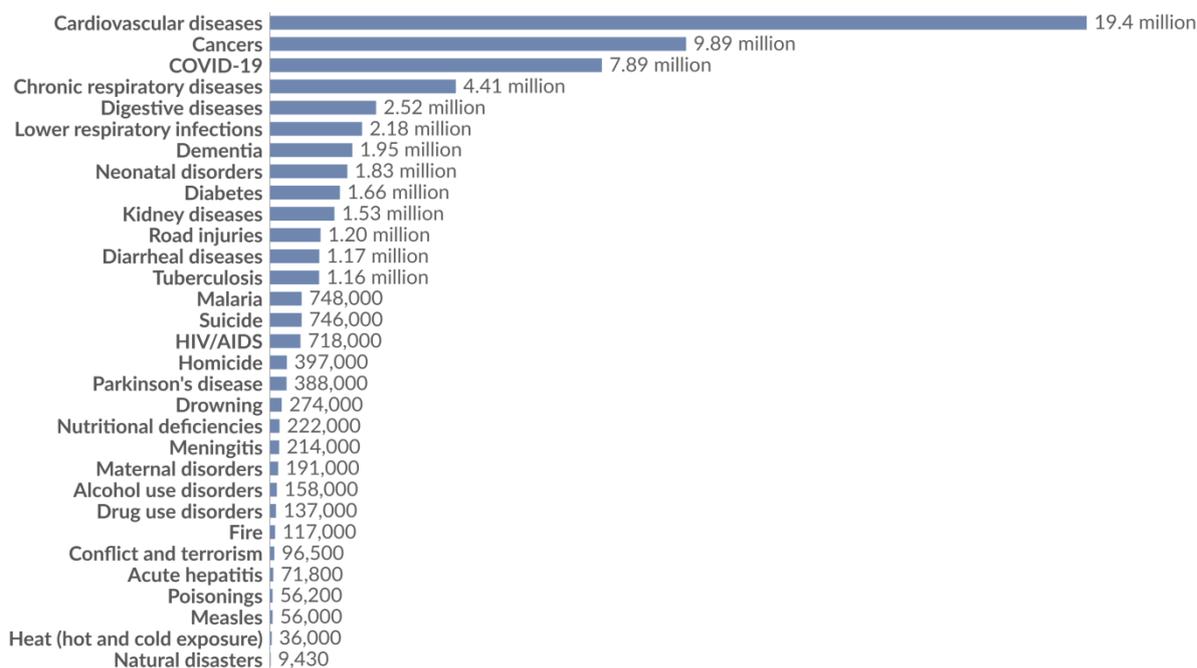
The figure below shows the causes of death as per the Global Disease Burden (GDB) study. Here, the paper mixes the effects of both the indoor & outdoor pollutions. One can see that respiratory infections are attributed to 4.41 million deaths through Chronic Respiratory Diseases (CRD) and 2.18 million to Lower Respiratory Infections (LRI) in a year. Hence, 6.59 million deaths are directly related to air pollution that harbors further viral, bacterial, fungi & parasitical infections. The air pollution thus contributes to susceptibility of the children as well as the old.⁹

Figure 3- Global Disease Burden Study, 2024⁹

Causes of death, World, 2021



The estimated annual number of deaths from each cause. Estimates come with wide uncertainties, especially for countries with poor vital registration¹.



Data source: IHME, Global Burden of Disease (2024)

OurWorldinData.org/causes-of-death | CC BY

1. Civil Registration and Vital Statistics system: A Civil Registration and Vital Statistics system (CRVS) is an administrative system in a country that manages information on births, marriages, deaths and divorces. It generates and stores 'vital records' and legal documents such as birth certificates and death certificates. You can read more about how deaths are registered around the world in our article: How are causes of death registered around the world?

Gender Perspective & Genetically Modified Seeds

In the age of Genetically Modified Foods (GMF) or seeds, women in across 50 villages of Zaheerabad of Telangana state have held on to about 80 varieties of indigenous seeds that are nothing less than family heirlooms for them. They are a community of 5000 Dalit & Tribal women from Raikode mandal (administrative division) of the state of Telangana. Some of the indigenous millet varieties are Korra Biyam, Sama Biyam, Arikelu, Nallodlubiyam, Tellaodlabiyam, Arekellu, Yarodlu, Porrakodlu, Pacha Jonna, Sai Jonna, Yarrasai Jonna, Garib Jonna & Taidalu which is a native variety of Ragi or Finger Millet.¹⁰

Some of the women who had earned name for themselves are Begari Laxmamma who has earned the moniker 'Seed Saviour'. Women like Algul Narsamma runs shows on farming on a community radio station for cultivators.¹⁰

Women have not only contributed to preserving millets but also indigenous rice varieties. Indian Agricultural Scientist, Dr. Swati Nayak of Odisha popularly known as 'Bihana Didi' (Seed Sister) by cultivators is another woman contributing to climate resilience. She has promoted the use of varieties like 'Sahabhagi Dhan'. She has been honored with the Norman Borlaug award in the year 2023. She works with small farmers to introduce drought tolerant varieties of paddy. She uses innovative approach to engage farmers in demand driven rice seed systems.¹¹

Mridula Ramesh, founder of the Sundaram Climate Institute that focuses on waste, water solutions & climate resilience. She is the author of two readable books. One is on 'The Climate Solution' & the other is 'Watershed'.¹⁷

Men are also not far behind to become friend of seeds while protecting rare crops. Mr. Killo Pandanna of ASR district of Andhra Pradesh has preserved seed varieties like Isuka Ravvalu that is a small grain rice with delightful aroma. Other varieties that he has saved are Pasupu Sannalu, Nalla Shatikalu, Mamidi Shatikalu, Seeta Korra which is a millet, Nalla Korra, Sakinalu which is a rare millet, Gem Corn, Purple Corn, varieties of Rajma beans & Pulses. His seed vault is a store house of 200 rare seeds that are self collected. It is no less than Norway's Svalbard Global Seed Vault, the world's largest such facility.¹⁰

While GMF address the issue of mass production that can feed masses, these seeds or crops are not climate resilient. The traditional varieties of seeds or crops are suitable for local agro climatic conditions. These varieties are resilient to drought and attract fewer pests compared to hybrid seeds or GM seeds.

These agents of climate resilience have learned from hands on experience gained in the fields. Many paddy & millet varieties are becoming rare & may vanish if not protected through agriculture.

Some of the highlights that Government of India put on women's day of 2025 are related to women led developments. These are given below.¹⁴

- The Sex Ratio at Birth (SRB) increased from 918 to 933.
- 50% of admissions in Science, Technology, Engineering, Main Stream (STEM)
- Admissions in National Defense Academy (NDA) & Sainik Schools
- Permanent commission in armed forces
- 48% startups with at least one female director
- 70% of beneficiaries are women in Mudra Yojana
- 10 crores (100 millions) rural women linked to Self Help Groups (SHG)
- Maternity leave extended from 12 weeks to 26 weeks.
- 3.7 crores (37 million) beneficiaries got ₹ 16,500 crores (165000millions) through Pradhan Mantri Matru Vandana scheme of Integrated Child Development Services (ICDS) of Women & Child Development (WCD) ministry.
- 75% Pradhan Mantri Awas Yojana owners are women.
- 10 crores (100 millions) kitchens are linked with Ujjwala scheme.
- 15 crores House Holds covered under Har Ghar Nal Pe Jal scheme.
- 12 crores toilets made at HH level
- Triple Talaq banned
- No need of Mehram for Haj.

Water, Trees, Species, Management¹⁵

The African Baobab, botanically known as 'Adansonia Digitata' is one tree that is aligned to climate resilience. Radio carbon analysis of the interior tissue from separate branches shows that around 2000 years ago these trees existed. These trees are the longest angio sperms trees on the planet. 14th century traveler Ibn Battuta wrote about these trees.

Tribes like the Kung of the western Kalahari Desert used reed pipes to sip water directly from the tree. The waters of Baobabs are rich source of nutrition. The leaves of the tree are rich in calcium & antioxidants. Fruits are filled with nutrition & are easy to carry & dry. It is the males who bore the stem of the tree to bring water in places like Madagascar island.

After the late 19th century, following the famine the British imported the tree 'Prosopsis Juliflora' (PJ). This is a drought resistant plant that supplies firewood so that people do not enter reserve forests for fuel woods.

By the 1960s, Rann of Kutch encroached upon by the Banni Grasslands. PJ was brought to hold back the desert. It took over the grassland & burrowed its tap root into the deepest reserves of water. India's own PJ, the Khejri cannot meet the demand for firewood.

After a drought in 1950s, the Chief Minister of Madras state, K.Kamaraj had the seeds of PJ widely distributed especially in dry Ramnad district. Invaders like Lantana, Water Hyacinth & Tomato. Paddy in Punjab & Haryana covered only less than 7% crop area in Punjab. As rice is a water gorger, these northern states are not compatible for rice but wheat cultivation.

Similarly, the 'Eucalyptus' tree of late has been known to be a water gorger & its plantation is now not promoted.

Global Climate agreements¹⁶

On January 2025, the United States exited from Paris agreement of 2015. The agreements are signed under the United nations Framework Convention on Climate Change (UNFCCC).

The Kyoto protocol was adopted in 1997 & the United States exited from the treaty in 2001. In this protocol, 37 industrialized countries had signed the treaty to lower the CO₂ emissions. The United States has also withdrawn from the agreement in 2017 also. The United States withdrew from the agreement to save their economy as they say.

Exiting from the agreement means the United States would cease to implement its targets to cut emissions and contribute to the Green Climate Fund. The fund is a corpus to help climate vulnerable countries adapt to climate change.

When the United States exited in 2017, technicalities in the Paris agreement had mentioned that it would take a signatory country three years to withdraw & an extra year to intimate the United Nations governing body.

The Paris agreement committed all countries to keep temperatures from exceeding 1.5⁰ C or pre industrial times failing which to certainly keep the temperature below 2⁰C.

The first Conference of Parties (COP) first occurred in Bonn in 1995. The mother convention the UNFCCC gives the Paris agreement & Kyoto protocol the real meaning. Until 2006, the United States was the world's largest emitter of greenhouse gases. It has been non committal towards taking the legally binding emission cuts that the United States should have done. The Carbon Dioxide concentrations in the atmosphere were largely due to historical emissions by developed countries. Hence, these countries had to pay for the bulk of the costs to clean up. The United States sends large delegations as 'observers' to be involved closely with negotiations in spite of exiting from agreements.

Further, it translated to developing countries to continue on a fossil fuel pathway. The major fossil fuel economies like the United States, Australia & Canada expressed discomfort. Hence, a joint implementation emerged. In this implementation, countries earn credits for implementing clean energy projects in developing countries and this idea surfaced.

In 2005, the Conference of Parties at Montreal the head of the United States delegation walked out of the negotiations although the United States was not a part of the Kyoto protocol. Currently, the United States is the world's largest crude oil producer & achieved record production in 2023. It is also the largest producer of gas in 2022, it was the largest exporter of Liquefied Natural Gas (LNG). The United States is critically short of achieving its greenhouse gas emissions target. As on 2022, it has achieved only about 1/3rd of its 2030 emissions reduction goal.

India, China & Indonesia depend on coal & the European Union (EU) & US do not depend on coal. President Trump's espousal of a 'Drill Baby Drill' means more fracking and oil & gas drilling. The exit of United States might lead to developing countries will not meet ambitious targets but the climate targets have not managed to slow down global emissions as evident by the latest COP in 2024 at Baku.

Rare Earths¹⁸

This section is related to climate resilience because of the resurgence of electric vehicles. As these electric vehicles need these rare earth elements to make the batteries, the discussion on these elements is crucial.

Rare earths are not rare in nature. These elements occur abundantly but globally are often not concentrated enough to make for viable extraction. These elements are in beach sands & rock formation known as 'Monazites', These are clubbed as atomic minerals as these elements occur in earth surface along with Thorium & Uranium. There are a group of 17 rare earth elements. These are Scandium, Yttrium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Thulium, Ytterbium, Lutetium, Dysprosium, Holmium & Erbium.

Countries like New Caledonia, Greenland, Bolivia, Congo & Afghanistan extract metals & send to China for refining & processing. Till 1990s, the United States & the West led more earth mining & shipped heavy industry & its polluting effects to China & the East. China shifts the destructive mining practices to Myanmar. In Peru, Pakistan, Papua New Guinea copper mining brought violence, separate movements & war. Wide spread criminal activity are seen in Chile & South Africa.

Batteries need Nickel & the supply comes from Russia. Congo supplies 70% of the world's Cobalt. In Atacama Desert of Chile, Lithium is abundant.

The consequences of the extraction & exploration of these Rare Earths have led to environmental catastrophes, child labor, slavery, murder, geopolitical up-heaves, destruction of rain forests & rivers in Indonesia & Phillipines. Among the Rare Earths, the most sought after are Lithium, Cobalt, Nickel, Gold, Indium, Yttrium & Neodymium. Further, deep ocean & outer space are also explored for mineral aspects.

These are used in mobile phones. One i-phone has 75 pounds of Copper Ore. We need these elements to capture sunlight, air, turbines, panels, charging stations, cables & batteries. Global finance, internet, satellite surveillance, oil transport, jet engines, television, GPS & emergency rooms also need these elements. Neodymium is used in permanent magnets in Electric Vehicle (EV) motors & wind turbines.

The way out is to reuse & repair of devices, cutting consumption, less heating, less cooling, less wasting. The best thing is to not to buy a car at all.

Gender- Changing Perspectives

As mentioned in the abstract, the emergence of nuclear families as a result of the water stress due to climate crisis has resulted in changing scenario in gender issues. This section details out this aspect.

The National Family Health Survey 5 covered 235,000 women. The result indicates that 31.8% experienced violence from their husband or intimate partner in 2019-2021. It is comparable to Tajkistan where this indicator is 30.8%, in Phillipines & Maldives this indicator is less than 18%. Physical violence alone in India was 28.2%. Further, NFHS 5 mentions that out of all physical or sexual violence, only 1% reported through normal & formal channels like police, doctors, lawyers, social workers in 2019-2021.²

India passed the Protection of Women against Domestic Violence Act (PWDVA) in 2005. Life time Intimate Partner Violence (IPV) decreased by 2% points during 2015-2021. During 2015-2019, the PWDVA registered cases was 0.1/100,000 population. Reports of cruelty by husband or relatives was less than 20/100,000 populations.²⁰

The issue of Intimate Partner Violence (IPV) is an emerging issue in nuclear families. Intimate Partner Violence is one of the most common forms of violence against women & includes physical, sexual, emotional abuse & controlling behaviors by an intimate partner.¹⁹

Employed women are at higher risk of violence if they earn more. The risk of violence is lower if husband is more educated; reporting by victims is more common, lower societal acceptance of IPV is the outcomes.¹⁹

Water stress

Water touches every aspect of development. It drives economic growth & supports healthy ecosystems & is essential & fundamental for life itself. 2 billion people across the globe do not have safely managed drinking water services. It is obvious that a major chunk of the water issue is managed by women in the households. Climate change expresses itself through water. Natural infrastructure at community level is the need of the hour.²¹

Economic growth is a thirsty business. Water is crucial in determining whether the world will achieve the Sustainable Development Goals (SDG), The world needs a fundamental shift in how it understands, values & manages water. Water is essential for inclusive growth. Water knows no borders. A smart investment in clean water & sanitation is crucial.²¹

Diseases related to climate issues

Climate change refers to long term shifts in temperatures & weather patterns. Since the 1800s, human activities have been the main driver of climate change primarily due to the burning of fossil fuels like coal, oil & gas. Burning fossil fuels generates green house gas emissions that act like a blanket wrapped around the earth trapping sun's heat & raising temperature. Carbon Dioxide & Methane are the two leading green house gases. The consequences of climate change include intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity.²³

The climate effect has put the burden on the population through a vast number of diseases. These are vector borne, bacterial, viral, fungal & parasitical. Neglected Tropical Diseases becoming an emerging issue is attributed to climate issues.²²

These diseases are Dengue, Malaria, Scrub Typhus, Chikungunya, Kala-Azar, Filariasis, Lepto Spirosis, Japanese Encephalitis, Rabies, Acute Diarrheal Diseases, Hepatitis A, Hepatitis E, Acute Respiratory Illness, Enteric fever.²²

The Intergovernmental panel on Climate Change (IPCC) in its 6th assessment report cites that it will be harder to adapt with increased global heating. It impacts health in a myriad of ways like death, illness, heat waves, storms, floods, disruption of food systems, zoonoses, food-water & vector borne diseases, mental health issues.²²

It also impacts livelihoods, equality, access to health care & social support structures. The impact is severely felt among women, children, ethnic minorities, poor communities, migrants of displaced persons, older populations & under lying health conditions.²²

Way Out

Life style changes, waste management at individual & mass level, water management at individual & mass level, mutual respect for both genders, socio centric approach, sensitization of water management issues at individual & mass level.

Some of the steps that can be taken are detailed out here. These are waste segregation at household level, using dustbins at household & mass level, schools to act as change agent & habit inducing places regarding waste management. Focus has to be on the future generations so that these behaviors sustained in the long run.

These are difficult to do but there is no way out. Looking ahead, this month only i.e. on 21.4.2025, Government of UP has signed a Memorandum of understanding with iFOREST to provide technical support on climate issues.²⁴

Acknowledgement

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