

 First IGU CHE  
Indian Health  
Geography  
Symposium 2026



International Geographical  
Union Commission on Health  
and the Environment  
(IGU CHE)



FIRST IGU CHE  
INDIAN HEALTH GEOGRAPHY  
SYMPOSIUM

2026

ABSTRACT  
VOLUME



**Health Geography in India:  
Building a Community of Health Geographers across India**



FIRST IGU CHE  
**INDIAN HEALTH  
GEOGRAPHY**  
SYMPOSIUM, 2026



International Geographical Union  
Commission on Health and the  
Environment (IGU CHE)

**No** Cost for Registration

Participant **Certificate** Will Be Provided

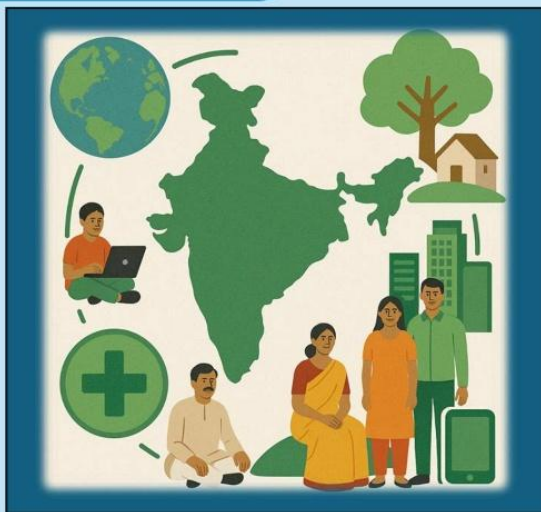
Health Geography **Award**

Health Geography **Community**

**Building**

## Health Geography in India:

Building a Community of Health Geographers Across India



**Date: 27th February 2026**

**Venue: Online**

**Abstract Submission Deadline:**

**27th of January 2026**

[Click Here for Abstract Submission](#)

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Abstract



[indiaiguche@gmail.com](mailto:indiaiguche@gmail.com)

<http://www.healthgeography.org/che-hg-symposium-india.html>

# SYMPOSIUM, 2026



## ORGANIZING COMMITTEE



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International Geographical  
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**Dr. Jayanta Gour**, Sambhu Nath College, Burdwan University, West Bengal, India.



**27 February 2026**

**11:00 AM - 7:00 PM (IST)**

***Health Geography in India: Building a community of health Geographers Across India***

## **Guidelines & Programme Schedule for the Participants**

**The online symposium will be held via Microsoft Teams in one plenary room & five breakout sessions, 100+ participants and 58 presentations across diverse and related themes, including: Health Geography || Urban Health || Migration and Health || Gender and Health || Climate Change and Health || Environment and Health || Infectious Diseases and Health || One Health**

Welcome to the inaugural symposium dedicated to the formation of a National Health Geography Group in India. This first national-level initiative has been organized by the **International Geographical Union (IGU) Commission on Health and the Environment (CHE)** in response to requests from Indian colleagues, reflecting a shared commitment to strengthening the field of health geography in India. We are delighted to bring together researchers, scholars, practitioners, and students from diverse backgrounds and regions on this shared platform.

Health geography sits at the intersection of place, people, and wellbeing. In a country as socially, culturally, and geographically diverse as India, building a collaborative and connected community around health geography is both timely and essential. This symposium marks an important first step toward creating a space for dialogue, learning, and collective action at the national level, while also strengthening engagement with the international health geography community.

Over the course of this event, we invite you to engage openly, share your experiences, explore new perspectives, and connect with others who share a commitment to understanding health through a geographical lens. We hope this gathering sparks new ideas, meaningful collaborations, and the start of a lasting network that extends well beyond today's conversations.

By bringing together Ph.D. scholars, early-career researchers, and established academics from across the country, this initiative aspires to build a cohesive national community of Health Geographers. Through this open and accessible digital forum, participants will be empowered to share perspectives, form research partnerships, and collectively advance the scope, visibility, and impact of Health Geography in India.

*This symposium is a small but important step toward building a national community of health geographers in India. We come from different research paths, but today we meet on a shared platform to learn from one another, connect across institutions and borders, and imagine what we can build together. We hope this experience is enriching, collaborative, and the beginning of a long and meaningful network for health geography in India.*



## How to access:

Enter the **Microsoft Teams** link below. You will be directly in the plenary room. You can assist with the event taking place in the plenary or go to a breakout room.

## Online Link and access details:

**Join the symposium 10 minutes before the start**

Conference Link Join: <https://teams.microsoft.com/meet/36164965226561?p=j5H9JqIPnYWCjgtchV>

**Meeting ID:** 361 649 652 265 61

**Passcode:** n5Mw3Cj6

## How to work with the Microsoft Teams platform:

Although you can connect virtually with **Microsoft Teams** Meetings without installing the software, we do recommend that you download and install it. No registration or fee is required for you to join a meeting via **Microsoft Teams**.

If you are not familiar with the platform, kindly see the following videos to learn the basic controls (e.g., navigate between breakout rooms, share screen, switch on/off mic and camera):

- Joining a **Microsoft Teams** Meeting via link: <https://youtu.be/xBuEiGActgQ?si=etIEcWTjbZWrQGDs>
- Screen Sharing (for presenters): <https://youtu.be/nqT59hoky04?si=Zl84pS8u4rQnDIVn>
- Breakout rooms: [https://youtu.be/ilUdDZ2QPvc?si=V43\\_BVIJsCZr8vLu](https://youtu.be/ilUdDZ2QPvc?si=V43_BVIJsCZr8vLu)
- Make sure your full name is listed as a participant. This is particularly important for all chairs who need to join the panel discussion, as we need to assign your seat.



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## Guidelines for presenters:

- Each presenter has a fixed time for their presentation, 10 minutes for the presentation, followed by a 5-minute question and answer/comments session.
- Presenters are encouraged to use their time wisely. Each plenary session will be overseen by a chair who will coordinate the session.
- The presenter's name is mentioned in the programme schedule; authors and co-authors will be included in the Abstract Volume.
- Details of the presentations should include a **problem statement, research methodology, study findings/results/implications, and conclusion.**
- Presenters must make their presentations (in PDF format) available to the conference organizers via email ([indiaiguche@gmail.com](mailto:indiaiguche@gmail.com)) on or before Tuesday, **24<sup>th</sup> February 2026.**
- Certificates will be provided to the presenters after the symposium and sent to their designated email addresses. Attendance at the full symposium is mandatory to receive the certificate.
- Presenters will receive feedback forms at the end of the symposium (Please provide your full name, as it will be displayed on the certificate). Kindly take a moment to complete them; your input is highly valuable.
- Confirm your internet connection and video and audio settings prior to your session.
- Should you have any questions, do not hesitate to contact us at ([indiaiguche@gmail.com](mailto:indiaiguche@gmail.com))

**We look forward to seeing you all soon!**



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## Programme Overview

Date	Time (IST)	Plenary Room	Breakout Room 1	Breakout Room 2	Breakout Room 3	Breakout Room 4	Breakout Room 5	
27 <sup>th</sup> February 2026 (Friday)	11:00 - 11:15	Welcome Address & Opening Remarks	*	*	*	*	*	
	11:15 - 12:00	Lightning Talks	*	*	*	*	*	
	<b>SESSION - 1</b>							
	12:00 - 1:00	*	Climate Change & Health	Urban Health	Gender & Health	Health Geography	Gender & Health	
	1:00 - 1:30	<b>Panel Discussion-1 (Session Chairs' Reports &amp; Discussion)</b>						
	1:30 - 2:00	<b>Lunch Break</b>						
	<b>SESSION - 2</b>							
	2:00 - 3:00	*	Health Geography	Migration and Health & One health	Health Geography	Gender & Health	Environment & Health	
	3:00 - 3:30	<b>Panel Discussion- 2 (Session Chairs' Reports &amp; Discussion)</b>						
	<b>SESSION - 3</b>							
	3:30 - 4:30	*	Health Geography	Infectious Diseases & Health	Urban Health	Health Geography	*	
	4:30 - 5:00	<b>Panel Discussion- 3 (Session Chairs' Reports &amp; Discussion)</b>						
	5:00 - 5:15	<b>Break</b>						
	5:15 - 5:45	Publication Discussion with Journal Editor	*	*	*	*	*	
	5:45 - 6:45	Plenary Session	*	*	*	*	*	
	6:45 - 7:00	Closing Session	*	*	*	*	*	

\* Breakout rooms are closed



International Geographical Union Commission on Health and the Environment (IGU CHE)





## PROGRAMME SCHEDULE

**Date: 27<sup>th</sup> February(Friday), 2026**

**Time: 11:00 AM -07:00 PM (IST)**

Time (IST)	OPENING SESSION	
11:00 - 11:20		
Plenary room	Welcome address and remarks on behalf of International Geographical Union (IGU) - Commission on Health and the Environment (CHE)	<p><b>Eva Pilot</b> <i>Scientific Secretary and Steering Board Member of the IGU-CHE</i></p> <p><b>Dr. Asrafal Alam</b> <i>Assistant Professor, Serampore Girls' College, University of Calcutta, West Bengal, India</i> <i>Steering Board Member of the IGU-CHE</i></p> <p><b>Dr. Shahnaz Basheer</b> <i>Assistant Professor, Dept. of Disaster Management, Loyola College of Social Sciences, Trivandrum, Kerala India</i></p>
		<p><b>Prof. Pradip Chouhan</b> <i>Dept. of Geography, University of Gour Banga, West Bengal, India</i></p>
11:20 - 12:00	Lightning Talks <b>Chair:</b> Eva Pilot	<p><b>Urvashi Prasad</b> <i>Director in the Office of the Vice Chairman at NITI Aayog, the Govt. of India</i></p>
		<p><b>Prof. L. N. Satpati</b> <i>Professor of Geography, Director, UGC HRDC, University of Calcutta, Kolkata, India</i></p>



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12:00 – 1:00		SESSION - 1
<p style="text-align: center;"><b>Breakout Room 1</b></p>	<p><b>Climate Change and Health</b> <b>Chair: Dr. Dhanjit Deka</b></p>	<p><b>Climate Change and Emerging Health Challenges in Jharkhand: An Overview</b> <i>Aashiya Khanam</i></p> <p><b>Mapping the Climate Change and its impact on psychological health of expecting women: A systematic review</b> <i>Shierie Fatma</i></p> <p><b>Mapping Micro-regional Variations in Climate Variability and Vector- Borne Diseases in Golaghat, Assam, India</b> <i>Haridra Bora</i></p> <p><b>Rising Temperatures and Thermal Discomfort: Implications for Heat- Health Vulnerability in Kerala, India</b> <i>Diya Vinod Kumar K</i></p> <p><b>An analytical study on the impact of climate change on health in Uttarakhand</b> <i>Dr. Nandi Gariya</i></p>
<p style="text-align: center;"><b>Breakout Room 2</b></p>	<p><b>Urban Health</b> <b>Chair: Dr. Ranjan Karmakar</b></p>	<p><b>Spatial Modelling of Urban Health Vulnerability to Waterborne Diseases Using Multi-Criteria Decision Analysis: A Case Study of Delhi, India</b> <i>Rahul Raturi</i></p> <p><b>Air Pollution and Psychological well-being: A Longitudinal Geographical study of Anxiety, Stress and Sleep Disturbance among Children and Adults in Delhi National Capital Region</b> <i>Saman Nusrat</i></p> <p><b>Urban EcoScore Index-Based Assessment of Biophilic Conditions and Natural Habitability of Kolkata Metropolitan Area using Enhanced Indices and Machine Learning</b> <i>Md Saharik Joy</i></p> <p><b>Impact of Changing Food Habits on Different Age Groups in Urban Area: A Case Study of Siwan Town</b> <i>Dr. Archana Kumari</i></p>



<p><b>Breakout Room 3</b></p>	<p><b>Gender and Health</b> Chair: Dr. Rukhsana</p>	<p><b>Gender Differences in Bone Health: A Geographical and Lifestyle Perspective</b> <i>Mohd Danish</i></p> <p><b>Role of antenatal care on safe delivery and neonatal health among tribal women in Dakshin Dinajpur district, West Bengal</b> <i>Banshita Basak</i></p> <p><b>Exploring the Roles of Male Involvement and ASHA in Antenatal Care Utilization: A Case Study of Tribal Women in Dakshin Dinajpur District, West Bengal, India</b> <i>Asit Halder</i></p> <p><b>Maternal Educational Inequalities and Child Undernutrition among the Muslim Community in Bankura District, West Bengal</b> <i>Dr. Sk Anamul Hoque</i></p>
<p><b>Breakout Room 4</b></p>	<p><b>Health Geography</b> Chair: Dr. Jayanta Gour</p>	<p><b>Health Inequality and Patient Mobility: Assessing the Outflow of Healthcare Seekers from West Bengal to Other Indian States</b> Tanmoy Basu</p> <p><b>The Uneven Geography of Healthcare in Maharashtra, India: A Socio- Spatial Analysis of Inequalities</b> Komal Laxman Turkar</p> <p><b>Pattern and Determinants of Patient Mobility from Malda District of West, Bengal in India</b> Naba Kumar Bera</p> <p><b>Does unhygienic disposal of children's feces increase the risk of diarrhea among rural Indian children? Findings from the 5th National Family Health Survey</b> Koyel Majumder</p>
<p><b>Breakout Room 5</b></p>	<p><b>Gender and Health</b> Chair: Dr. Shatarupa Dey</p>	<p><b>Health, Environmental Sustainability, and Period Poverty: An Analysis of Contemporary Menstrual Hygiene Solutions</b> <i>Saptadipa Chakraborty</i></p> <p><b>Urbanization and Mental Health of Women in Delhi</b> <i>Ojasvi</i></p> <p><b>A Cross-Sectional Study Of Menstrual Hygiene Practices and Beliefs Among Adolescent Girls at Higher Secondary Level in Selected Schools of Rural, Semi Urban and Urban Regions of Palakkad District, Kerala, India</b> <i>Sreelakshmi Vathmikam</i></p> <p><b>Effect of water crisis on rural women: a review of Indian perspectives</b> <i>Sumaiya Khatun</i></p>



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1:00 - 1:30	PANEL DISCUSSION - 1	
Plenary Room	<b>Session Chairs's Report &amp; Discussion</b>	
	<p><b>Panel Chair:</b> Eva Pilot</p> <p><b>Panel Discussant:</b> Dr. Dhanjit Deka, Dr. Ranjan Karmakar, Dr. Rukhsana, Dr. Jayanta Gour, Dr. Shatarupa Dey</p>	
1:30 - 2:00	Lunch Break	
2:00 - 3:30	SESSION - 2	
Breakout Room 1	<b>Health Geography</b> <b>Chair:</b> Dr. Meghna Maiti	<p><b>Utilization of Ante Natal Care Services among hilly and non-hilly areas of India: Evidence from National Family Health Service-5</b>  <i>Ankit Gupta</i></p>
		<p><b>Socio-Economic condition and Occupational Health hazards among the Rag-Pickers Workers in Malda district of West Bengal: A Micro Level Analysis</b>  <i>Dr. Md Areful Hoque</i></p> <p><b>Investigating the Unfair Concentration of Unskilled Birth Attendants among Lower Wealth Households in India: A Study of Predictors and Wealth-Based Disparities</b>  <i>Mithun Sarkar</i></p> <p><b>Decomposing the Spatial Inequalities of Child Full Immunization Coverage Among Children Aged 12-23 Months in India: A Fairlie Decomposition Analysis</b>  <i>Tanmoy Ghosh</i></p>
Breakout Room 2	<b>Migration and Health &amp; One Health</b> <b>Chair:</b> Dr. Shilpi Yadav	<p><b>Impact of Migration on Physical and Mental Health</b>  <i>Babita</i></p>
		<p><b>Determinants of Functional Decline Among Older Adults in India: A Comprehensive Analysis of ADL and IADL Difficulties by using LASI Wave 1 Data</b>  <i>Md Mohsin</i></p> <p><b>One Health Spatial Analytics for Antimicrobial Resistance in Indian Watersheds: A Systematic Review</b>  <i>Dr. K. Katturajan</i></p> <p><b>Knowledge, Attitudes, and Health Impacts of Long COVID in Rural Ballia, Uttar Pradesh: A Cross-Sectional Analysis</b>  <i>Kriti Tiwari</i></p>



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<p><b>Breakout Room 3</b></p>	<p><b>Health Geography</b> Chair: Prof. Rashid Aziz Faridi</p>	<p><b>The Association Between Domestic Violence and Antenatal Care Utilisation Among Ever-Married Women in India: Evidence from NFHS-5</b> <i>Subhankar Singha</i></p> <p><b>Applications of GIS and Spatial Analysis in Health Research: A Comparative Systematic Review of India and China</b> <i>Pankaj Roy</i></p> <p><b>Integrated health vulnerability assessment using RS-GIS and MCDA: A case study of Barrackpore - Bidhannagar subdivision, North 24 Paraganas, West Bengal</b> <i>Priyanka Dasgupta</i></p> <p><b>Prevalence of Hypertension and Risk Factors Among Women of Reproductive Age Group (15-49 Years) in Flood-Affected Districts of India</b> <i>Abhishek Agarwalla</i></p>
<p><b>Breakout Room 4</b></p>	<p><b>Gender and Health</b> Chair: Dr. Bikash Das</p>	<p><b>Uneven Health Landscapes: Spatial Vulnerability to Anaemia among Women (Age 15-49 years) in Bihar</b> <i>Ms Richa Jha</i></p> <p><b>Abortion as a reproductive justice among unmarried women in Maharashtra- a narrative analysis</b> <i>Pravin Kokane</i></p> <p><b>Socio-demographic correlates of adequate menstrual health and hygiene practices among young tribal women in India</b> <i>Husnara Sarkar</i></p> <p><b>Emotional Intimate Partner Violence as an Under-Recognized Risk Factor for Hypertension Among Women of Reproductive Age in India</b> <i>Dr. Apurba Sarkar</i></p>



<p><b>Breakout Room 5</b></p>	<p><b>Environment and Health</b>  <b>Chair:</b> Dr. Margubur Rahaman</p>	<p><b>Environment and Health</b>  <i>Neha Rani</i></p> <p><b>Significance of Health Geography in Mitigating the Age-Old Health Issues and Managerial Challenges in Remote Islands of Tropical Deltas: Special Reference to Sundarban Delta in India</b>  <i>Dr. Jayanta Gour</i></p> <p><b>Smell and the City: A Spatial Olfactory Planning Framework</b>  Lakshya Gupta</p> <p><b>A Study of BMI and Carbon Footprint among Students and Staff: Evidence from Government Arts and Science College, Tholanur</b>  Safiya P.K</p>
<p><b>3:00 - 3:30</b> <b>PANEL DISCUSSION - 2</b></p>		
<p><b>Plenary Room</b></p>	<p><b><i>Session Chairs's Report &amp; Discussion</i></b></p> <p><b>Panel Chair:</b> Dr. Asraful Alam  <b>Panel Discussant:</b> Meghna Maiti, Dr. Shilpi Yadav, Prof. Rashid Aziz Faridi, Dr. Bikash Das, Dr. Margubur Rahaman</p>	
<p><b>3:30 - 5:00</b> <b>SESSION - 3</b></p>		
<p><b>Breakout Room 1</b></p>	<p><b>Health Geography</b>  <b>Chair:</b> Prof. Swati Rajput</p>	<p><b>Spatial Disparities in Public Health Care Infrastructure and Accessibility: A District-Level Study of Jhajjar, Haryana</b>  <i>Ashika Kadian</i></p> <p><b>Socio-Economic and Spatial Inequalities in Cancer Incidence in Nalbari District, Assam</b>  <i>Parismita Goswami</i></p> <p><b>Health care Accessibility Measures Using Network Analysis Technique of GIS –A case study of a Rural District of South India.</b>  <i>Dr .K. Rajakokila</i></p> <p><b>Kernel Density Estimation in Assessing Primary Healthcare Performance and Patient Perception in Madurai District</b>  <i>Vinothini C</i></p>



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<p><b>Breakout Room 2</b></p>	<p><b>Infectious Disease Health Geography</b> Chair: Prof. Praveen Kumar Pathak</p>	<p><b>Spatial Assessment of Dengue Risk Zones in Dindigul District, Tamil Nadu using the AHP Approach</b> <i>Dr. D. Balaji</i></p> <p><b>Prevalence and Determinants of Multimorbidity among Older Adults in India: Evidence from LASI Wave 1 (2017–18)</b> <i>Gwmsath Mushahary</i></p> <p><b>Spatial Epidemiology of Dengue in West Bengal</b> <i>Sujay Mondal</i></p> <p><b>Integrating Flood Susceptibility Mapping and Health Risk Zonation for Dengue and Leptospirosis in Ernakulam District</b> <i>Dr. Neethu.V.V</i></p>
<p><b>Breakout Room 3</b></p>	<p><b>Urban Health</b> Chair: Prof. Lancelet T.S</p>	<p><b>The ‘Green’ Prescription: Evaluating the Impact of Urban Public Spaces on Mental Well-being in Modern Cities</b> <i>Sristy Raj</i></p> <p><b>Urban Waterlogging and Public Health: An Assessment of Health Awareness and Preventive Practices in Urban-Flood Areas</b> <i>Akansha Yadav</i></p> <p><b>Precarious Livelihood, Vulnerability and Health Risks among Gig Workers in Delhi</b> <i>Sangeeta</i></p> <p><b>Socio-Economic Determinants of Gender Disparities in Healthcare Access in Kolkata.</b> <i>Moumita Kundu</i></p>
<p><b>Breakout Room 4</b></p>	<p><b>Health Geography</b> Chair: Dr. Pravin Kokane</p>	<p><b>Public Health Vulnerability During ‘Nautapa’: An Empirical Study in East-Central India</b> <i>Moumita Pal</i></p> <p><b>Perception of Menstrual Hygiene among College-Going and Non-College- Going Girls in Ara, Bihar: A Primary Survey</b> <i>Dr. Dweepika Shekhar Singh</i></p> <p><b>Spatial Inequality in Healthcare Access in Labpur C.D. Block of Birbhum district of West Bengal: A Geographic Overview</b> <i>Pallabi Mondal</i></p> <p><b>Public Health Impacts of Riverine Pollution: A Demographic Study of Disease Patterns Along the Hindon River in Shimlana Village, Western, Uttar Pradesh</b> <i>Kamakshi</i></p>



International Geographical Union Commission on Health and the Environment (IGU CHE)





4:30 - 5:00	<b>PANEL DISCUSSION - 3</b>
Plenary Room	<p style="text-align: center;"><b><i>Session Chairs's Report &amp; Discussion</i></b></p> <p><b>Panel Chair:</b> Dr. Shahnaz Basheer</p> <p><b>Panel Discussant:</b> Prof. Swati Rajput, Prof. Praveen Kumar Pathak, Prof. Lancelet T.S, Dr. Pravin Kokane</p>
5:00 - 5:15	<b>BREAK</b>
5:15 - 5:45	<b>PUBLICATION DISCUSSION WITH JOURNAL EDITOR</b>
Plenary Room	<p style="text-align: center;"><b>Chair:</b> Dr. Varun Goel</p> <p style="text-align: center;"><b>Dr. Michael Widener</b> <i>Co-Editor in Chief: Health and Place</i></p>
5:45 - 6:45	<b>PLENARY SESSION</b>
Plenary Room	<p style="text-align: center;"><b><i>Next steps towards a Health Geography National Group in India</i></b></p> <p style="text-align: center;"><b>Chair:</b> Eva Pilot <i>IGU CHE</i></p>
6:45 - 7:00	<b>CLOSING SESSION</b>
Plenary Room	Concluding Remarks & Way Forward



International Geographical Union Commission on Health and the Environment (IGU CHE)





## **ORGANIZING COMMITTEE**

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*This symposium marks the first step toward creating a warm, inclusive, and safe digital space for building a National Health Geography Group in India. We come together from diverse research journeys, institutions, and regions, each bringing unique perspectives to the shared goal of strengthening health geography in the country.*

*We hope this platform offers meaningful opportunities for international exposure, interdisciplinary learning, and rich professional networking. More importantly, we envision this symposium as the beginning of a strong, collaborative network of health geographers across India, one that fosters dialogue, mentorship, and sustained partnerships.*

*May this gathering be a fruitful and inspiring experience for all participants today, and a foundation for future collaborations that advance health geography research, policy engagement, and practice in India.*

## Session 1

### *Parallel Session 1: Climate Change and Health*

## Climate Change and Emerging Health Challenges in Jharkhand: An Overview

Aashiya Khanam\*

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Climate change is a major global health threat, intensifying extreme weather events, heat waves, floods and vector-borne diseases. Greenhouse gas emission continues at or above present level, additional warming will occur leading to significant changes in global climate system, throughout the 21st century. It disrupts food and water system, worsens air pollution, and increases malnutrition, injuries, and infectious diseases. Vulnerable groups, including children, the elderly, pregnant women, and low-income communities face the greatest risks. Climate change also aggravates non-communicable diseases and mental problems through stress, displacement and loss of livelihoods. The abstract emphasizes the need for mitigation, adaptation, resilient health system, and intersectoral policies to reduce exposures, protect vulnerable populations, and safeguard maternal pregnancy, and childbirth. In state with limited resources, access to essential reproductive health services, including, maternal care before and after childbirth, is already restricted. In disaster situations, these challenges are further intensified, worsening health outcomes for women in Jharkhand. Jharkhand's heavy reliance on mining and industrial activities makes it significant source of greenhouse emissions. Carbon dioxide released from these industries contributes to rising temperature, with mining operations playing major role in increasing CO<sub>2</sub> levels. The analysis shows the link between climate change and health. It also shows the primary health risk associated with climate change, to increase awareness among vulnerable communities, healthcare professional, and policymakers regarding the effects of climate change on human health in Jharkhand. Some of the objectives stated are to study and explain how climate change is affecting human health in Jharkhand, to determine the main health problems in the Jharkhand region that are related to climate change. The study is based entirely on secondary data. The study conducted using descriptive and analytical research method, drawing upon Secondary data sources. Data includes government reports, policy documents, declarations, agendas, and relevant international treaties and conventions. Journals, books, online database, articles, commentaries, and library archives. Climate change is an urgent public health crisis, driving rising physical and mental health problems. Cutting carbon emission, increasing the use of renewable energy, and improving public awareness are essential to curb these growing health risks. Even though Jharkhand has more than 33% of forest cover, the effects of climate change are becoming increasingly evident in the region. The state must prioritize both mitigation and adaptation efforts. Addressing this concern will require a multi-level collaborative approach involving local communities, government authorities, and international organizations.

**Keywords:** Climate Change, Human Health, Jharkhand, Air Pollution, Vector borne Diseases, Heatwaves and floods.

## Mapping the Climate Change and its impact on psychological health of expecting women: A systematic review



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**Background:** The climate crisis is one of the key public health concerns, negatively affecting economy, public health and development. In the domain of public health, climate change found to be positively linked with multifaceted sexual and reproductive health. Although, climate change and sexual and reproductive health is positively linked; there is no study which contextualizes this diverse phenomenon within a research framework. Therefore, the present chapter presents the systematic and critical summary of multifaceted reproductive and health issues by drawing facts, figure and future research direction.

**Methods:** The present chapter conducted a systematic review, in which electronic databases include: Scopus, Medline, Prem EDLINE, EMBASE, CINAHL and PubMed and applying keywords “Climate Change”; “Expecting Women”; “Psychological Health”; “Mental Distress”. Based on inclusion criteria of the present research interest, the present chapter selected a total of ten peer- reviewed research articles. Descriptive research approach is used to present the research outcomes.

**Result:** Most of the studies highlighted that climate change emerged as a prominent factor impacting reproductive well-being. Extreme climate-induced anxiety is exacerbated antenatal depression. Another finding reveals that 81.6% of expecting women expressed climate-related concerns for their children, linking these to increased psychological risks, higher rates of stillbirth, preterm birth, and developmental issues. An interlinkage exists between climate change associated risk of postpartum depression, posttraumatic stress disorder and low birth weight infants.

**Conclusion:** The chapter concludes that impacts of climate change on sexual and reproductive health is adverse, particularly among pregnant women. It is imperative to further investigate its role as a contributing stressor to anxiety and psychological distress, particularly among uniquely vulnerable populations such as expectant women.

**Keywords:** Climate change anxiety, Antenatal depression, Expectant women, Antenatal distress.

## Mapping Micro-regional Variations in Climate Variability and Vector-Borne Diseases in Golaghat, Assam, India

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Vector-borne diseases (VBDs) like malaria and acute encephalitis syndrome (AES) are a major public health concern in Assam, given its high climate vulnerability and recurrent flooding.

Previous studies are mostly conducted at the district level and are dependent on aggregated climatic data derived from a single station which fails to capture the micro-variations within the district. This study incorporates a more localised spatio-temporal analysis of long term climatic and disease variability across the eight community development blocks of Golaghat using trend analysis, heat maps and spatial interpolation. The study utilises rainfall records spanning over 25 years from both micro-level datasets (tea-garden stations) and Indian Meteorological Department (IMD) dataset for Golaghat station. Reported cases of diseases (malaria and acute encephalitis syndrome), retrieved from the National Vector-Borne Disease Control Programme, Golaghat were also sorted and arranged for block-level analysis. The study argues that intensive methods of micro-level data association is a requirement to understand the impact of climate variability and vector borne diseases. This research provides relevant insights into the impact of climate variability on VBDs and how rainfall and temperature variations between 2000 and 2025 have a positive impact on VBD outbreaks in Golaghat district of Assam.

**Keywords:** Vector-borne diseases, block-level analysis, trend test, spatial interpolation, climate variability

## Rising Temperatures and Thermal Discomfort: Implications for Heat-Health Vulnerability in Kerala, India

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Rising temperatures and increasing humidity related with climate change pose significant challenges to human health, particularly in tropical regions such as Kerala, India. Previous studies have successfully applied Thom's Discomfort Index to assess outdoor thermal stress in tropical environments, demonstrating its effectiveness in capturing seasonal and long-term trends in human thermal discomfort (Talukdar *et al.*, 2018). But only limited attention has been given to the spatial intersection between thermal stress and population vulnerability from a perspective of health geography. This study examines long term temperature trends and thermal discomfort in Kerala and along with the analysis by integrating health related vulnerability including socio economic conditions, occupational exposure, housing characteristics, and heat related morbidity. Mean monthly maximum temperature and relative humidity data from four major stations such as Thiruvananthapuram, Alappuzha, Punalur, and Palakkad have been taken and analysed for the period 1960–2020. The Mann–Kendall non-parametric test was used to assess temperature trends; at the same time Thom's Discomfort Index (DI) was used to evaluate levels of human thermal stress across two time periods (1960–1990 and 1991–2020). For the understanding of climatic exposure within a health geography framework, datasets including Census of India occupational classifications, National Sample Survey (NSS) housing condition data, and district-level health statistics from the National Health Mission (NHM), Kerala have used. Results indicate a statistically significant increase in mean maximum temperatures across all stations, accompanied by a marked rise in thermal discomfort, particularly during summer and post monsoon months. Discomfort Index values mostly fall within category associated with widespread physiological stress and medical emergency conditions. Vulnerability is found to be unevenly distributed, with higher risk observed among outdoor workers engaged in agriculture and construction, and populations living in poorly ventilated or semi pucca dwellings. District health profiles show increase in heat related illnesses such as heat exhaustion, dehydration, and heat stroke during high discomfort periods. The study indicates that climatic exposure alone does not fully explain heat-related health risks



rather, the interaction between thermal stress, occupational exposure, and housing quality shapes spatial patterns of vulnerability. By integrating socio economic and health data with climatological data, this research contributes to health geography by highlighting place based inequalities in heat risk. The findings show the need for targeted action plans when it comes to temperature rise, improved housing ventilation, occupational safety measures, and climate sensitive public health interventions in Kerala under future warming scenarios.

**Keywords:** Health Geography; Heat Stress; Thermal Discomfort Index; Heat-Related Illnesses; Vulnerable Populations; Outdoor Work; Housing Conditions.

## An analytical study on the impact of climate change on health in Uttarakhand

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Generally, long-term changes in the climate cycle are called climate change. Climate change has emerged as a major challenge facing the global community. It is a comprehensive challenge with far-reaching environmental, economic, and social consequences. Today, the world's attention has focused on the adverse effects of climate change and how to deal with and adapt to them. Climate change has become a significant issue for environmentalists, planners, and policymakers. The adverse effects of climate change are visible in the form of melting glaciers, the snow line shifting higher, changes in river flow, reductions in food production and biodiversity, increased weed growth, and difficulties in forestry and agriculture-based livelihoods. However, the lack of long-term climate data to study climate change and its impact on ecosystems still makes it difficult to draw definitive conclusions. (Climate Change Uttarakhand) Studies conducted by scientists in the Himalayan region indicate that the rate of atmospheric warming in the Himalayas is faster than in other mountainous regions of the world. This temperature increase has been particularly pronounced during the winter season. According to the Indian Institute of Tropical Meteorology, Pune, rainfall in India has decreased by 68 percent over the past 100 years. However, rainfall in Jammu and Kashmir has increased, and the average temperature in the Kashmir Valley has risen by 1.45 degrees Celsius over the past two decades. A study conducted by our institute in the Alaknanda Valley (Garhwal) revealed that annual temperatures increased by 0.15 degrees Celsius between 1960 and 2000. Analysis of satellite images suggests that Himalayan glaciers have retreated by approximately 67 percent. In neighboring Nepal, glaciers have been estimated to shrink at a rate of up to 10 meters per year. The rise in global temperature is primarily due to rising carbon dioxide, which has surpassed 280 ppm before the Industrial Revolution and now exceeds 400 ppm. Similarly, the concentration of other harmful greenhouse gases in the atmosphere is also increasing. Between 1970 and 2004, a 70 percent increase in atmospheric concentrations of greenhouse gases has been observed. According to the World Climate Monitor (2006), the Earth's average temperature has increased by a record 0.74 degrees Celsius over the past 100 years. Similarly, sea level rose by an average of 1.8 mm from 1961 to 2003, a faster rate of 3.1 mm from 1993 to 2003. According to scientists, the average Earth surface temperature could increase by 1.4 to 5.8 degrees Celsius by the year 2100, and sea level could rise by 0.18 to 0.59 meters per year. This article focuses on the impacts of climate change on Uttarakhand's life, agriculture, water, and forest ecology, and suggests some important research and development points for future work.

## Session 1

### *Parallel Session 2: Urban Health*

## **Spatial Modelling of Urban Health Vulnerability to Waterborne Diseases Using Multi-Criteria Decision Analysis: A Case Study of Delhi, India**

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This study examines the spatial and temporal dynamics of waterborne diseases in Delhi to identify vulnerable areas and understand the factors that shape uneven health risks across the city. Using reported cases of major waterborne diseases such as diarrhoea, typhoid, cholera and hepatitis, the research analyses disease trends across districts and municipal wards over time. A multi-dimensional vulnerability framework is developed by integrating socio-economic characteristics, environmental conditions, water and sanitation infrastructure, and health infrastructure indicators. Geospatial techniques and the Analytic Hierarchy Process are employed to assign indicator weights and generate a composite Waterborne Disease Vulnerability Index. The resulting maps reveal distinct spatial clustering of high-risk zones, largely concentrated in densely populated areas with inadequate water supply, poor sanitation, open drainage, and limited access to health services. The findings indicate that WaSH infrastructure deficits, when combined with socio-economic stressors, significantly amplify disease vulnerability. Hotspot analysis further highlights the persistence of risk in specific wards, reflecting chronic infrastructural and governance challenges. By linking disease incidence with spatial patterns of vulnerability, the study provides evidence-based insights for targeted urban health interventions. The research contributes to urban health geography by offering a citywide, integrated approach to assessing waterborne disease vulnerability and supporting more localized, data-driven policy responses.

**Keywords:** WaSH, Analytic Hierarchy Process, epidemiology, health, infectious diseases

## **Air Pollution and Psychological well-being: A Longitudinal Geographical study of Anxiety, Stress and Sleep Disturbance among Children and Adults in Delhi National Capital Region**

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Air pollution has emerged as one of the most severe environmental challenges confronting urban populations worldwide, particularly in rapidly urbanizing regions of the Global South. In India, persistent deterioration in air quality has transformed air pollution into a chronic public health crisis, with concentrations of particulate matter and gaseous pollutants regularly exceeding national and international safety standards. While the physical health impacts of air pollution—such as respiratory and cardiovascular diseases—are well documented, its psychological consequences remain comparatively underexplored, especially in highly polluted South Asian megacities. Emerging global evidence suggests that prolonged exposure to polluted environments may adversely affect psychological well-being, contributing to



anxiety, heightened stress, and sleep disturbances. However, systematic longitudinal evidence from India, particularly within an environmental–geographical framework, remains largely absent. This study proposes a longitudinal geographical investigation of the relationship between ambient air pollution and psychological well-being among children and adults in Delhi National Capital Region (NCR), one of the most polluted metropolitan regions in the world. Grounded in the concept of environmental stress, the research examines air pollution as a chronic environmental stressor influencing mental health through biological pathways (such as neuroinflammation and oxidative stress) as well as psychosocial mechanisms, including restricted mobility, reduced outdoor activity, and persistent exposure-related anxiety. Psychological well-being is assessed using three key indicators—**anxiety, perceived stress, and sleep disturbance**—which are sensitive to environmental conditions and widely validated in public health research. The study adopts a longitudinal analytical design, tracking the same cohort of participants across three major pollution seasons—winter (peak pollution), summer (moderate pollution), and monsoon (lowest pollution). A total sample of approximately 300 participants, comprising children (10–17 years) and adults (18–45 years), will be recruited from four environmentally distinct zones of Delhi NCR: traffic corridors, industrial clusters, high-density residential areas, and green-buffered zones. Ambient air pollution exposure will be assessed using multi-pollutant data (PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO, and O<sub>3</sub>) obtained from CPCB, DPCC, and SAFAR monitoring networks, supplemented by spatial and seasonal exposure matching. Psychological health data will be collected using validated instruments, including the GAD-7, PSS-10, and PSQI. By integrating spatial variation, seasonal exposure patterns, and age-based vulnerability, the study aims to generate robust evidence on the cumulative psychological impacts of air pollution in Delhi NCR. The findings are expected to contribute to environmental health geography by expanding the understanding of air pollution beyond physical morbidity and highlighting psychological well-being as a critical component of urban environmental health. The study also holds policy relevance by informing urban planning, air quality management, and public health strategies in pollution-affected megacities.

### **Urban EcoScore Index-Based Assessment of Biophilic Conditions and Natural Habitability of Kolkata Metropolitan Area using Enhanced Indices and Machine Learning**

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Urban sustainability assessment is vital given the accelerating pace of urbanisation and environmental strain, especially in the Kolkata Metropolitan Area (KMA), where land-use changes drive ecological degradation. This research assesses the Urban EcoScore Index (UESI) as a method for evaluating biophilic conditions and the natural habitability of the KMA, integrating spectral indices of environmental quality (SR, ERS, MRSEI) with anthropogenic stressor metrics (HDI, BEI, PII). The assessment employs remote sensing and machine learning techniques to model ecological relationships and uses explainable AI techniques, such as SHAP, to interpret these models. The UESI assessment showed spatial disparities across KMA, with 21.9% (384 km<sup>2</sup>) of the area classified as poor in urban cores. In contrast, 24.7% (433 km<sup>2</sup>) fell under the good category, while 8.6% (151 km<sup>2</sup>) achieved excellent conditions (UESI > 0.8), mainly in ecologically sensitive zones such as the East Kolkata Wetlands (EKW).



Intermediate zones, such as Fair (445 km<sup>2</sup>, 25.4%) and Moderate (339 km<sup>2</sup>, 19.3%), indicate transitional areas where restoration could enhance ecological function.

**Keywords:** Biophilic urbanism, Kolkata Metropolitan Area (KMA), machine learning, Natural Habitability, Urban EcoScore Index

## **Impact of Changing Food Habits on Different Age Groups in Urban Area: A Case Study of Siwan Town**

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Food habits in urban areas are continuously changing due to evolving economic, social, and cultural conditions. People often consume food based on availability rather than nutritional requirements, leading to differences in food habits across age groups, social classes, and economic groups. These changes directly affect health and contribute to various diseases. Siwan town in Bihar is a medium-sized 'B' grade town where residents of different age groups show varying food preferences. Increasing fast food consumption among all age groups has caused a rise in nutrition-related health problems. This study aims to examine changes in traditional food habits, assess health-related issues among age groups, and identify diseases linked to dietary changes. The study is based on primary data collected via a questionnaire schedule. Siwan town, located at 26°21'15" N latitude and 84°21'48" E longitude, covers about 15 sq km with a population of 1,35,066 (2011 Census). The town has 38 wards. For analysis, the town was divided into five functional areas, and 250 respondents (50 from each area) were selected using purposive sampling. Data were collected to identify patterns of food habit changes and their health impacts. Educational Centre Area (6.5% of town): Children showed higher intake of junk food, leading to worm infections, dental problems, malnutrition, and obesity. Administrative Area (1.5%): Adults aged 20–65, especially below 45, showed significant dietary changes, causing gastric problems, fatty liver, obesity, and hypertension. Commercial Area (3.2%): Middle-aged adults faced stress-related unhealthy diets, resulting in high blood pressure, diabetes, and heart disease. Industrial Areas (6%): High snack consumption led to adverse health effects. Residential Areas (55%): Younger residents (below 20) had notable diet changes due to living alone, causing gastric issues and obesity. Changes in food habits are affecting different age groups differently, with junk food consumption increasing rapidly. Health hazards are becoming epidemic-like. Government interventions, policy support, and awareness campaigns are essential to promote traditional diets and reduce growing health risks.

**Keywords:** Food Habits, Health, Urban Town, Disease

### **Session 1**

#### **Parallel Session 3: Gender and Health**



## Gender Differences in Bone Health: A Geographical and Lifestyle Perspective

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Bone health is a significant indicator of overall health and an important factor in quality of life over a long period of time. It is affected by a complicated combination of biological, environmental, and lifestyle factors that differ by gender and location. This paper analyses gender disparities in bone health from the perspective of health geography, emphasizing the roles of lifestyle, physical activity, and environmental exposure that generate differences between male and female populations in India. The research expands on empirical data investigating athletes and non-athletes aged 22–25 years, incorporating physiological indicators including serum calcium, vitamin D, parathyroid hormone (PTH), phosphate, alkaline phosphatase (ALP), and bone mineral density (BMD). The findings indicate that consistent engagement in sports activities, especially aerobic and strength-oriented disciplines, enhances bone strength and mineral composition. However, the results also show that gender-based inequalities still exist. Women who are from cities and don't get much exercise tend to have lower BMD and vitamin D levels than men. These disparities can be ascribed to a confluence of cultural constraints on outdoor pursuits, nutritional deficiencies, restricted exposure to sunlight, and sociocultural attitudes towards women's physical activity. From the perspective of geography, disparities in climate, food intake, and socio-economic status among various Indian regions significantly impact bone health outcomes. Regions characterized by diminished sunlight exposure or diets deficient in calcium correlate with decreased bone density, particularly in women. The incorporation of geographical data into biomedical research underscores the influence of regional environments on gender-specific health trajectories. The study highlights the necessity of implementing a gender-sensitive and geographically contextualized framework for public health policy. Raising awareness about bone health, getting women to exercise regularly, and making sure they get enough vitamin D and calcium are all important steps toward closing the gender gap in skeletal health. Moreover, the study illustrates the importance of health geographers in delineating spatial health disparities and formulating regionally suitable interventions. This study provides a comprehensive understanding of bone health disparities by integrating perspectives from physical education, endocrinology, and health geography. It calls for researchers, healthcare workers, and policymakers to work together to improve skeletal health for people of all genders and in all parts of India.

**Keywords:** Bone Health, Gender Differences, Health Geography, Vitamin D, Lifestyle, Physical Activity, India

## Role of antenatal care on safe delivery and neonatal health among tribal women in Dakshin Dinajpur district, West Bengal

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Pregnancy, childbearing and motherhood are considered as joyful moment for married women. However, they face increased risks of illness and mortality during this period. To ensure the health and safety of both mother and infant, maternal healthcare is very important. Antenatal care (ANC) is one of them, which plays a vital role in ensuring safe delivery and promoting newborn health. It refers to the education, supervision, treatment and care that is given to an expected mother from the time of conception until the beginning of the labour. It may not prevent all causes of mother and infant deaths, but it may facilitate the early detection and prevention of many existing diseases. In Dakshin Dinajpur, the tribal women face barriers like lack of education, economic instability, poor transport etc. which can hinder them to access ANC services. This study area was selected to find out the impact of antenatal care on safe delivery and birth outcome. Simple random sampling and statistical analysis such as Z-score, chi-square test, and binary logistic regression is used to assess relationships and significance. Majority of deliveries occur in government institutions (89.73%) and attended by doctors (62.70%). Women aged 25-34 years (55.14%), married 18 years or above (74.05%), having primary education (40%), lower birth order (63.24%), high mass media exposure, enough amount of income (68.42%) show four or more ANC visits (77.30%) from skilled health professionals, which is linked with better birth outcomes, significantly reduced risk of preterm births and low birth weight babies. Moreover, women belong to rural area (70.81%), nuclear family structure (53.51%), living far from the hospitals (66.49%) are lagged behind. Policymakers and healthcare providers are urged to address the identified barriers and strengthen community health programs, which is essential to promote safe childbirth and enhance maternal and neonatal health outcomes among tribal women.

### Exploring the Roles of Male Involvement and ASHA in Antenatal Care Utilization: A Case Study of Tribal Women in Dakshin Dinajpur District, West Bengal, India

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The utilization of antenatal care (ANC) services plays a vital role for women during their pregnancy. Male involvement refers to the active participation, engagement, and support of men in all activities related to maternal health, encompassing pregnancy, childbirth, and postpartum period (WHO, 2016). This study aims to explore different determining factors of ANC services utilization among the tribal women and contribution of male involvement & ASHA worker to the uptake of ANC. In this study for conducting field survey among tribal women aged 15-49 with at least one child under 5 years have been selected as sample, using a simple random sampling technique and statistical analyses include Z-scores, chi-square tests, and binary logistic regression and software-based analysis. In this study shows almost 80% men go to health facility for an ANC with their wife. The results show that men aged 40-49 years [AOR 2.206, 95% CI (1.783-2.846),  $p < 0.01$ ] have more probability of involvement, age at marriage after 18 years [AOR 3.682, 95% CI (1.073 – 5.617),  $p < 0.05$ ], men's higher education [AOR 5.694, 95% CI (3.249-6.642),  $p < 0.01$ ], high standard of living [AOR 3.572,

95% CI (1.768 – 4.576),  $p < 0.05$ ], age at marriage after 18 years [AOR 3.682, 95% CI (1.073 – 5.617),  $p < 0.05$ ], full mass media exposure [AOR 3.270, 95% CI (2.057 – 4.848),  $p < 0.05$ ] has more probability of involvement and rural area's [AOR 0.726, 95% CI (0.349 – 1.678),  $p < 0.01$ ], joint family [AOR 0.834, 95% CI (0.345-1.496),  $p < 0.1$ ], 4th birth order [AOR 0.367, 95% CI (0.124-1.207),  $p < 0.01$ ] has less probability of involvement in antenatal care than reference category. In this area ASHA worker has high influence on maternal health care services (72%) like-maternal & child mortality, institutional delivery, problem of home delivery, hygiene practices, impact of child marriage on health etc. The research explores the critical importance of ANC services in improving maternal and neonatal health through male involvement and roles of ASHA worker among tribal women.

**Keywords:** ANC, ASHA worker, Maternal health, Maternal mortality, Child Mortality, AOR= Adjusted odds ratio, CI= Confidence interval.

## Maternal Educational Inequalities and Child Undernutrition among the Muslim Community in Bankura District, West Bengal

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Maternal education is a fundamental social determinant that influences a child's nutritional status. The present study aims to examine educational inequalities in child undernutrition in relation to maternal education among the Muslim community in Bankura district. This cross-sectional study was conducted among 12 to 59-month-old preschool children. A total of 800 preschool children were investigated. The children were selected using a systematic sampling method. Child undernutrition was assessed using the WHO standard guidelines, and inequality was measured using the concentration index. The prevalence of undernutrition (stunting-23.00%; wasting-30.60%; underweight-36.00%; CIAF-48.75%; and thinness-28.75%) is very high among Muslim preschool children. The study examines that children of mothers with a lower educational level show a substantially higher prevalence of wasting (40.24%), underweight (43.90%), CIAF (55.85%) and thinness (38.05%) compared to those whose mothers have a higher level of education, with the difference being statistically significant. Finally, the concentration index estimates significant pro-poor inequality in most indicators of child undernutrition. Wasting (-0.16372951), underweight (-0.1125), CIAF (-0.07467949), and thinness (-0.16576087) exhibit negative and statistically significant concentration indices ( $p < 0.001$ ), indicating that these nutritional deprivations are disproportionately concentrated among children of less-educated mothers. No significant educational effect was observed for stunting. Overall, these findings indicate that maternal education plays a critical role in shaping childhood nutritional outcomes, particularly for acute forms of undernutrition. Policy efforts should therefore prioritise education-focused and equity-oriented nutrition interventions, strengthening nutrition awareness among less-educated mothers while integrating targeted support within existing child nutrition programs.

**Keywords:** Education, Inequality, Undernutrition, Muslim



## Session 1

### Parallel Session 4: Health Geography

#### Health Inequality and Patient Mobility: Assessing the Outflow of Healthcare Seekers from West Bengal to Other Indian States

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Health inequality continues to drive large-scale medical migration in India, particularly from states like West Bengal, where persistent disparities in healthcare accessibility force patients to seek treatment outside the state. This study integrates secondary datasets—NSSO 75th Round (2017–18), NFHS-5 (2019–21), Census of India (2011), with an online primary survey (n = 100) conducted across the patient parties, focusing on the health-care disparities and out-migration. A comprehensive geospatial assessment was performed using GIS-based spatial analysis to map district-level variations in hospital density, doctor–population ratios, mean travel-time to the nearest tertiary hospital, and spatial clustering of healthcare shortages using Global Moran’s I (0.231,  $p < 0.05$ ). Hotspot analysis reveals statistically significant healthcare-deficit clusters in the underdeveloped districts of the rural areas, indicating spatially entrenched inequality. Binary logistic regression shows that income disparity, perceived treatment quality, and treatment cost burden significantly predict outward medical mobility. Factor analysis explains 72.4% of total variance, identifying infrastructural deficit, service-quality perception, and economic burden as dominant dimensions. The Theil index value of 0.312 reflects moderate-to-high inter-district inequality. Outward migration intensity is highest in Medinipur. Jhargram (38–46%) and in Jalpaiguri and Malda (33–41%). Even Kolkata records 27% outward movement, particularly towards Chennai, Delhi, Bengaluru, and Mumbai for advanced neurology, oncology, cardiology, and organ-specific care. Overall findings confirm that medical migration is not a voluntary choice but a spatial reflection of deep structural inequities. Strengthening district-level tertiary infrastructure, reducing spatial accessibility gaps, and improving referral systems are essential for promoting healthcare justice.

**Keywords:** health migration; healthcare inequality; west bengal; integrated analysis; theil index

#### The Uneven Geography of Healthcare in Maharashtra, India: A Socio-Spatial Analysis of Inequalities

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Healthcare inequalities remain a major barrier to achieving inclusive human development, particularly in countries like India. These disparities are shaped by intertwined socio-economic, demographic, and spatial factors, resulting in uneven access to healthcare services across regions. Maharashtra despite being one of India's economically advanced states exhibits pronounced internal disparities, making it a critical site for examining the uneven geography of healthcare access. This study utilizes cross-sectional secondary data and multivariate statistical methods to develop a Composite Healthcare Index (CHI) incorporating dimensions of availability, amenities, and affordability. The results reveal marked socio-spatial inequalities: while districts in Konkan and Western Maharashtra show relatively high levels of healthcare access, large parts of Vidarbha, Marathwada, and North Maharashtra experience significant deficits in services and infrastructure. Hotspot analysis (Getis-Ord  $G_i^*$ ) highlights clustered patterns of advantage and disadvantage, with high-access clusters concentrated in the west and persistent cold spots in the interior regions. Regression analysis identifies per capita income and literacy as major determinants of healthcare outcomes, emphasizing the influence of economic capacity and human capital. The study suggests that generalized policy strategies are inadequate and advocates for region-specific planning aligned with Sustainable Development Goals to address these entrenched disparities.

**Keywords:** Healthcare, Spatial, Inequalities, Hotspot analysis, Sustainable Development.

## Pattern and Determinants of Patient Mobility from Malda District of West Bengal in India

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Patient mobility refers to the mobilizations of patients from their residential places to other places for better health care services. There shows that patients are mobile for several causes such as longer waiting times, prescribed huge medicine, bad quality of care, wrong diagnosis tests, advancement of technology and skill to other places etc. It mainly occurs due to changes of people's perception of their local healthcare services. To show the pattern of patient mobility, identify socio-economic and demographic determinants affecting patient mobility, access the impact of health infrastructure on patient mobility, show the satisfaction level after treatment and highlight the problems faced by patients during mobility. Data have been collected from both primary and secondary sources. The primary data have been collected using of simple random sampling technique by the use of Google form and face-to-face personal interview from the Malda district. And to fulfil the objectives of the study different methods have been used such as binary logistic regression, chi-square etc. This study shows that, the patient mobility pattern from Malda to other districts or states. This pattern depends on socio-economic & demographic determinants of patients (such as – Place of residence, Types of family, Total number of family members, Religion, Social category, Patients education, Family income, Monthly savings, and Standard of living etc.) and availability of different health infrastructural facilities (Such as – Availability of bed in hospital, Availability of doctors in hospital, Available of specialist doctors, Availability of medicines in local medical store, and Diagnostic test results.) in their localities. Also, some negative factors (Such as – doctor prescribed huge medicines, Unavailability of specialist doctors, etc in their localities.) and positive factors (Such as – Better treatment, Better infrastructural facilities in other places, Feedback of previous patients etc.) control the patient mobility pattern from Malda to other districts or



states. During the time of mobility and after reaching the place where they are going for treatment, they are faced several problems, such as transport problems, lack of people attendants, language problems etc. This study says the treatment of patients and different health care services in Malda districts is not so good. And in the present day, patient mobility is a serious issue for Malda district in West Bengal.

**Keywords:** Patient mobility, Prescribed huge medicine, Social discrimination, Accommodation, Lack of people attendant.

## Does unhygienic disposal of children's feces increase the risk of diarrhea among rural Indian children? Findings from the 5<sup>th</sup> National Family Health Survey

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**Background:** Despite the significant decline of open defecation practices with the implementation of several sanitation programs in India, the unhygienic disposal of children's feces in rural areas continues to pose a risk by facilitating the transmission of infectious diseases such as diarrhea. Therefore, the current study seeks to identify the association between unhygienic disposal of children's feces and increased risk of diarrhea among rural Indian children.

**Methods:** The dataset for the present study has been derived from the 5<sup>th</sup> National Family Health Survey (NFHS-5) conducted during 2019-21. Bivariate and multivariable logistic regression have been employed to execute the analysis.

**Result:** In rural India, 68.39% of children's feces is disposed of in an unhygienic manner. The result of multivariable logistic regression indicates that there is a significant association between unhygienic disposal of children's feces and occurrences of diarrhea among children. The odds of diarrhea occurrence is 1 time higher in areas where unhygienic children's feces disposal is practiced than in areas where those feces are disposed of hygienically. Moreover, child's age, sex of child, mother's age, age at marriage, wealth index, and sanitation are significantly associated with the increasing risk of diarrhea among children.

**Conclusion:** So, the study findings suggest that the government should prioritize the complete elimination of unhygienic disposal of children's feces to combat the outbreak of detrimental diseases among children.

### Session 1

#### Parallel Session 5: Gender and Health

## Health, Environmental Sustainability, and Period Poverty: An Analysis of Contemporary Menstrual Hygiene Solutions

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### **Introduction:**

Since antiquity to present day, menstrual products have evolved according to the needs. In this context, the transformation from papyrus to modern period panties represents tremendous change, which can be analyzed from an environmental sustainability perspective.

### **Methodology:**

By combining pertinent research and empirical data, a systematic review was carried out. The evolution of menstrual products within a sustainability framework was investigated using a comparative study, which reviewed conventional, disposable, and reusable solutions such as menstrual cups and period panties from the standpoint of sustainable development.

### **Result and Discussion**

According to the study, commercial disposable pads are a major source of non-biodegradable waste and pose health risks due to their up to 36% plastic and chemical additive content. Menstrual cups and period panties are promising sustainable options that will reduce waste and expenses over time, but period poverty is sustained by upfront expenditures, a lack of awareness, and limited access to WASH infrastructure.

### **Conclusion:**

A crucial component of women's sanitary issues that begin with adolescence and progress to menopause is menstrual hygiene management (MHM). Menstrual cups and period pants are examples of technological advancements in MHM that call for a multifaceted strategy that supports and promotes diversity and choice. In this aspect it is crucial to use environmental approaches in order to accomplish the SDGs and improve the WASH infrastructure.

**Keywords:** Menstrual Hygiene Management (MHM); Sustainable Development Goals (SDGs); Environmental Sustainability; Menstrual Cups; Period Panties; Waste Management; Period Poverty

## **Urbanization and Mental Health of Women in Delhi**

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Urbanisation has evolved into a complicated socio- spatial change in the Global South that modifies daily living, social interaction, and economic engagement while also producing new forms of structural inequality and psychosocial vulnerability. Gendered social hierarchies, dispersed urban administration, and unequal access to material and symbolic resources collide with rapid urban growth in Delhi and other Indian metropolitan areas. Long-term exposure to structurally embedded stresses that extend beyond individual illness and have their origins in the political economy of urban development has an increasing impact on women's mental health in this urban environment. This study investigates the relationship between urbanisation and women's mental health in the National Capital Territory (NCT) of Delhi using an intersectional and socio- spatial analytical framework. Mental health is a complex and socially constructed phenomenon that includes social functioning, psychological distress, emotional well-being, and adaptability in everyday urban environments. The Breeder Hypothesis, which places mental distress within the cumulative effects of urban stressors, and feminist

intersectionality theory, which highlights how overlapping social positions—such as gender, class, caste, age, and migratory status—mediate differential experiences of vulnerability and resilience, serve as the foundation for the study's theoretical framework. The study employs a qualitative, interpretive methodology supported by secondary epidemiological, institutional, and policy data. Primary data is produced through in-depth, semi-structured interviews with women from a range of residential and socioeconomic contexts, including teenage students, working women in the formal and informal sectors, homemakers in informal settlements, migrant women workers, urban homeless women, and senior women residing in assisted living facilities and private homes. This comparative approach enables a thorough examination of how mental discomfort is generated, experienced, and handled differently across different urban subjectivities. The findings show that social factors and geographic disparities have an impact on the unequal distribution of women's mental health in Delhi. Anxiety and depression symptoms associated with economic instability, social exclusion, and environmental pressures are most common among women who work in informal labor markets and live in precarious housing. On the other hand, women from middle-class and upper-class backgrounds experience psychological distress as a result of social isolation, performance expectations, work-family conflicts, and growing emotional labor. The ongoing dual burden of paid and unpaid responsibilities, fear of public violence, gender-based mobility restrictions, and the deterioration of community support networks are all recognized as structural causes of mental distress in all groups. A significant treatment gap results from stigma, financial obstacles, systemic flaws, and a lack of culturally competent services, all of which contribute to the continued extreme inequality in access to mental health services. In its theories and assumptions, the study asserts the structural and spatial dimensions of mental distress to remain insufficiently addressed within dominant models of public health and urban governance strategies that emphasize the use of individualized clinical practice and that address women as a homogeneous whole. In its findings, the study draws the conclusion that the matter of women's mental health has to be recognized as a critical dimension of urban justice and should be perceived as being complexly related to more general models of uneven urban development, relations between the genders, and social inequality. Thus, the current study seeks to promote intersectional and gender-responsive community-level strategies to address urban mental health within the framework of an urbanization slowdown.

**Keywords:** Urbanisation, Mental Health, women, Society Differences, Gender, chronic Mental health and well-being.

### **A Cross-Sectional Study Of Menstrual Hygiene Practices and Beliefs Among Adolescent Girls at Higher Secondary Level in Selected Schools of Rural, Semi Urban and Urban Regions of Palakkad District, Kerala, India**

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Adolescent period is one of the important phases of life which involves a transition from childhood to adulthood. Menstrual hygiene is one of the most important parts of adolescent health yet it is poorly addressed in many parts of the world. Cultural beliefs and practices, inadequate facilities are the reasons for inadequate menstrual hygiene practices among girls. Kerala is one of the most forward societies in India in many aspects. Yet the taboos around menstruation and related practices are still at large. This cross-sectional study examines the menstrual hygiene practices among adolescent girls across rural, semi urban and urban regions



of Palakkad district. The aims of the study are as follows: to assess the knowledge and change in menstrual hygiene practices at different regions. To examine the beliefs and taboos related to menstruation. To examine the basic facilities at home and school for maintaining hygiene. Methodology: Primary data was collected by providing a semi structured questionnaire to random students at higher secondary level of a selected school from rural, semi urban and urban regions of Palakkad district. The data were collected on socioeconomic status, awareness of menstrual hygiene, practices and beliefs and facilities at both home and school for maintaining proper hygiene. Secondary data involved maps of Palakkad district from various government sites. Interpretation of both primary and secondary data done and suitable graphs and tables were used to represent detailed analysis. Locational maps were created using open-source software. The study emphasizes the difference in menstrual hygiene awareness and practices among adolescent girls across rural, semi urban and urban regions of Palakkad district. The study stresses on the need for more awareness classes at school level to improve menstrual health knowledge, better hygiene facilities and practices and to reduce social stigma and beliefs related to menstruation. The study also discusses the role of parents, schools, healthcare workers and media in ensuring safe and well-informed menstrual hygiene management for adolescent girls. In conclusion, the study underscores the necessity for proper educational intervention to improve menstrual hygiene knowledge and practices and to address the cultural and social restrictions and dispel beliefs and taboos to promote healthy practices.

**Keywords:** menstrual hygiene, adolescents, rural, semi urban, urban, Palakkad district.

## Effect of water crisis on rural women: a review of Indian perspectives

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The study examines the profound impact of the water crisis on rural women in India. This paper aims to underscore the health and educational challenges faced by rural women in India. The study used electronic search engines, such as Google Scholar, PubMed, ResearchGate, ScienceDirect, and others, with a set of keywords to examine various aspects of the effects of the water crisis on rural women. The impact of the water crisis on Indian rural women has been evaluated using more than 150 published articles and reports from 2010–2024. The investigators then evaluated the full papers and screened them in greater detail against eligibility criteria. The study results illustrated that women who carry large loads are more likely to suffer from back and neck pains, bone deformities, repeated miscarriages, and difficulties during pregnancy and delivery. The water shortage worsens these health problems, leading to several water-related diseases. Water and food shortages due to drought conditions lead to malnutrition among women and increased infant mortality rates, particularly when women are compelled to fetch water shortly after childbirth. The burden of water collection has a profound negative impact on their education; water crises force women to spend more time collecting water, reducing the time available for educational activities. The lack of adequate water and sanitation facilities causes many girls to miss school, significantly disrupting their learning opportunities. Besides that, travelling long distances to gather water, especially when the water sources are in distant locations, puts them at risk of harassment,



assault, and other sorts of violence. Long hours of water collection lead to stress and exhaustion, which exacerbate mental health conditions and diminish their quality of life. The research emphasizes the urgent need for gender-sensitive water policies that expand access to water, empower women, and promote gender equality in water management.

**Keywords:** Water crisis, Rural women, Drought, Groundwater



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## Session 2

### Parallel Session 1: Health Geography

## Utilization of Ante Natal Care Services among hilly and non-hilly areas of India: Evidence from National Family Health Service-5

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**Background:** Antenatal care (ANC) is a critical component of maternal health, aiming to reduce pregnancy-related risks through timely check-ups and early detection of complications. Despite improvements in India's maternal healthcare coverage, substantial disparities exist across geographic regions, particularly between hilly and non-hilly areas. Understanding the determinants of ANC 4+ utilization in such settings is essential for targeted programmatic interventions. **Objectives:** This study examines:

1. The overall prevalence of ANC 4+ utilization in Hilly and Non-Hilly states in India 2. The influence of predisposing, enabling, and need factors—guided by Andersen's Behavioural Model on ANC 4+ uptake across hilly and non-hilly regions using NFHS-5 State Module data.

**Data and Methods:** Data were drawn from the NFHS-5 State Module, comprising 26,983 households and 15,935 women who received at least four ANC visits and 11,048 women who received fewer than four visits. The dependent variable, ANC 4+, was dichotomized ( $\geq 4$  visits vs  $< 4$ ). Predictor variables were classified into predisposing, enabling, and need factors following Andersen's framework. Weighted descriptive statistics, bivariate associations, and multivariable logistic regression were used to identify significant determinants.

**Results:** Preliminary analysis shows notable geographic contrasts: women residing in non-hilly regions had higher ANC 4+ utilization compared to those in hilly areas. Predisposing factors such as maternal age, caste, religion, mass media exposure, and birth order displayed significant associations with ANC coverage. Enabling factors—including wealth index, health insurance, place of delivery, and distance to health facility—were strongly predictive of ANC 4+ uptake. Need factors such as presence of non-communicable diseases (NCDs) also influenced utilization patterns. Regression results indicate that women from hilly regions have lower odds of receiving ANC 4+, even after adjusting for socioeconomic and demographic factors, highlighting the role of geographic accessibility.

**Conclusion:** The study underscores persistent inequities in ANC utilization between hilly and non-hilly regions in India. Strengthening healthcare accessibility, enhancing insurance coverage, and improving transport and outreach services in hilly terrains may substantially increase ANC 4+ uptake. Tailored interventions, grounded in Andersen's model, are essential to ensure equitable maternal healthcare across diverse geographies.

## Socio-Economic condition and Occupational Health hazards among the Rag-Pickers Workers in Malda district of West Bengal: A Micro Level Analysis



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Rag picking is severe and worst form of manual labour works, they have no identity cards, no pension, lack of access of health care facilities etc. Rag picking is a dead- end job pursuing by a number of poor Childs and adults due to poverty, unemployment, Indebtness etc. In our country India, a near about 1.5 and 4 million rag-pickers are work without social security, health insurance, minimum wages or basic protective gear. Rag picking also known as “Waste Picking” or “Scavenging” or “Safai Saathis” is the backbone of traditional waste management in most Indian cities. The main objective of this research paper is to assess the socio-economic condition and major causes of Rag-Picking works, to highlight the major health problems among rag-pickers in Malda district of West Bengal. The study is based on both primary and secondary sources of data. Malda district of West Bengal has been selected as the study area. The results of the study shows that majority of Rag-Pickers are not used any kinds of shoes, gloves and mask for the safety and protection during the working hours and many of them suffered from skin diseases infection, eye problems, injuries etc. The researcher suggested that Ministry of Health and Family Welfare, Government of West Bengal and Youth Red Cross Society, NGOs should awareness regarding occupational health among Rag-Pickers in the study area. Rag-Pickers workers are one of the most vulnerable and marginalized communities in Indian society. Thus, there is an urgent need for social concern to frame measures to improve the living and socio-economic and good working conditions among Rag- Pickers workers for inclusive growth in Malda district of West Bengal.

**Keywords:** Dumping Sites, Health, Manual Work, Rag-Picking, Poverty, Income

**Investigating the Unfair Concentration of Unskilled Birth Attendants among Lower Wealth Households in India: A Study of Predictors and Wealth-Based Disparities**

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**Background:** Unskilled birth attendants are individuals who help a mother give birth and who first learned how to do so by giving birth themselves or by being trained by other traditional birth attendants. It is significantly linked with maternal and infant mortality. In India, over the past two decades, the unskilled birth attendance rate has decreased, but slowly. The study first analyses the predictors and then aims to explore the inequality in the prevalence of unskilled birth attendance and determine whether it is due to unequal concentration among particular households in India.

**Methodology:** This study uses a cross-sectional quantitative approach and NFHS-5 (2019-21) data (n=232,920). First, Pearson's chi-square statistics were used, and then a multivariable binary logistic regression model was applied to identify predictors of unskilled birth attendance. To quantify the degree of concentration or inequality in unskilled birth attendants, Erreygers' Concentration Index (ECI) was used. Lastly, to assess the factors contributing to

the concentration of unskilled birth attendants among individual households, a decomposition analysis was employed.

**Results:** The analysis (ECI= -0.1633; p-value <0.001) shows that unskilled birth attendants were unfairly concentrated in lower-wealth households. The concentration of unskilled birth attendants was mostly contributed by factors like wealth (36.57%), region (20.51%), education (8.69%), birth order (8.42%), place of residence (6.32%), number of ANC visits (2.58%), religion (2.33%), media exposure (2.08%), age of women at 1<sup>st</sup> birth (1.63%), marriage (1.26%) and timing of ANC visits (1.06%), in low-income households.

**Conclusions:** Unskilled birth attendants are significantly concentrated among lower-wealth households in India. Wealth, region, education, birth order, residence, ANC service utilization, religion, and media exposure largely contributed to this concentration. These findings are important for policy implementation to mitigate the concentration of unskilled birth attendants among vulnerable women who reside in economically disadvantaged households.

**Keywords:** Unskilled birth attendants, Wealth, Unfair concentration, Inequality, India

## Decomposing the Spatial Inequalities of Child Full Immunization Coverage Among Children Aged 12-23 Months in India: A Fairlie Decomposition Analysis

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Despite significant advancements under the Universal Immunization Programme (UIP), substantial spatial disparities in child full immunization coverage are still present across the districts in India. Even though the national average has improved significantly compared to the earlier periods, the gap between high- and low-performing geographic clusters remains a critical challenge for achieving Sustainable Development Goals. Therefore, the present study seeks to examine spatial heterogeneity in child full immunization coverage and to identify the key factors driving these disparities. Using the data from the nationally representative cross-sectional survey (NFHS 5), the study classifies Indian districts into “high-to-high” and “low-to-low” groups based on district-level weighted full immunization coverage. A Fairlie decomposition analysis was employed to examine the contribution of various socio-economic, demographic, and healthcare-related factors to the observed coverage gap between these two groups. The findings of our study reveal that the factors such as four or more ANC visits (14.41%), Institutional delivery (18.98%), had health card (48.44%), health insurance (1.33%), PNC visit (7.44%), and watching television at least once a week (9.43%) significantly contribute to the spatial inequalities in the child full immunization coverage. If these factors were distributed equally between the “high-to-high” and “low-to-low” cluster regions, the disparity would be substantially reduced. To address the spatial variability in child full immunization coverage, priority should be given to not only geographically targeted interventions that address both socioeconomic disadvantages and gaps in health-care access, but also improving both maternal and child health care services, along with raising awareness about the importance of vaccination, which can play a critical role in reducing spatial inequality in child full immunization coverage in India.

**Keywords:** Immunization; Child; Decomposition; NFHS; India

## Session 2

### *Parallel Session 2: Migration and Health & One Health*

#### Impact of Migration on Physical and Mental Health

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Every time someone leaves a home behind, something shifts inside them - money struggles, unstable work, warming weather, danger, private dreams pushing the move. Shaking up where you live might lift paychecks, grow cities, yet it also digs into health, both physical and mental. Old data gets pulled out here to trace those impacts over time. What really matters? Conditions at work, whether shelter feels safe, if clinics are nearby, loneliness that lingers, stress worn like an old coat. Each of these pieces bends the experience in ways not always seen. Where folks settle affects life chances just like reasons for moving. This study uses what's already gathered - census tallies, government files, national surveys, reports from WHO and IOM, plus academic studies and earlier reviews. Patterns come clear when working with data on hand: those who relocate run higher dangers, facing workplace injuries, lack of food, sickness, poor support in pregnancy, skipped health visits. Hazardous labor, crowded homes, limited clinic access abroad - that's behind most struggles seen again and again. Out here, past the physical grind, settling into a new place dig into your head more than anyone admits. It is not only brief moments of low mood, yet a steady restlessness grows once someone leaves their homeland behind. Since surroundings change overnight, known touchpoints disappear - and that rattles both feelings and thinking. Being far from kin drags down the spirit; likewise, not knowing if there will be work each week adds pressure. When daily interactions bring subtle slights, confidence slowly erodes. Here lies the question. Pressure on feelings does not strike without reason - it moves in steps shaped by uprooting. A single finding reveals loneliness mixing into dread, stretching stress over years. Healing fades when frameworks overlook how people live and speak. Old records show unequal care reaching across nations. Inside national lines, too, those who have moved face help that feels foreign. What splits up support isn't lack of will - it's how systems are built. Where embarrassment steers actions, quiet about suffering gets heavier. Rules stay rigid for people living at the margins, so hurts go unnoticed. Females in motion shoulder more weight, tucked under routines just to get by. Kids hold puzzles grownups avoid putting into words. Hidden from law and medicine, some workers vanish twice over. Pressure builds slow, then cracks appear out of nowhere. Systems ignore them, trapping people in loops nobody picks but all must carry. Beyond statistics, past reports point to just health policies, stronger work options, stable homes - mental help stitched into aid networks for newcomers.

**Keywords:** Migration, Physical Health, Mental Health, Migrant Population, Health Inequality woman stress.



## Determinants of Functional Decline Among Older Adults in India: A Comprehensive Analysis of ADL and IADL Difficulties by using LASI Wave 1 Data

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**Introduction:** Global projections indicate that between 2000 and 2050, the proportion of people aged 60 and above is expected to double, from 11 to 22 percent. The aging process occurs, evolving more quickly in emerging nations like India and more slowly but steadily in industrialized ones. India has an old population of 8.6% as per the 2011 Census, and by 2050, that percentage is predicted to rise to 19.1%. ADL and IADL limitations pose major health risks for India's rapidly ageing population, yet national-level evidence on their sociodemographic and chronic disease determinants remains limited. The objective of this study is to assess the prevalence of functional decline and identify its major predictors among older adults in India using LASI Wave 1 data (2017–18).

**Methods:** This cross-sectional study used data from the Longitudinal Ageing Study in India (LASI) Wave 1 (2017–18). The analysis was restricted to older adults aged 60 years and above. After excluding missing observations, the final analytic samples included 30,280 respondents for ADL and 30,249 respondents for IADL analyses. Outcome variables included self-reported difficulty in six ADLs and seven IADLs. Background characteristics, health conditions, and behavioral factors were analyzed using descriptive statistics and multivariable binary logistic regression to identify factors significantly associated with ADL and IADL difficulty.

**Results:** Findings showed that 21.36% of older adults reported ADL difficulty and 33.33% reported IADL difficulty. Functional decline was significantly higher among women, rural residents, those with no schooling, individuals from poorer households, and the oldest-old (75+ years). State-level patterns revealed substantial geographic variation, with consistently higher limitations observed in West Bengal, Maharashtra, Karnataka, Tamil Nadu, Telangana, and Bihar. Multivariable results showed strong associations between functional difficulty and chronic diseases. Stroke survivors had the highest odds of disability, followed by individuals with joint pain/bone disorders, hypertension, lung disease, and heart disease. Poor self-rated health, depressive symptoms, and physical inactivity further increased the likelihood of ADL and IADL limitations. Conversely, higher education, better economic status, urban residence, and engagement in physical activity substantially reduced these risks.

**Conclusion:** Functional limitations among older Indians are shaped by a combination of sociodemographic disadvantages, unhealthy behavioral patterns, and chronic health conditions. The findings underscore the urgent need for targeted interventions to reduce functional decline—especially among socioeconomically disadvantaged groups, women, rural residents, and those with chronic illnesses. Strengthening community-based geriatric care, promoting physical activity, improving chronic disease management, and addressing mental health concerns are essential to enhance functional well-being and healthy ageing in India.



**Keywords:** Older adults; Functional decline; Disability; Activities of Daily Living (ADL); Instrumental Activities of Daily Living (IADL); Chronic diseases; India.

## One Health Spatial Analytics for Antimicrobial Resistance in Indian Watersheds: A Systematic Review

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Antimicrobial resistance (AMR) represents an escalating global health concern, primarily due to the intricate interconnections among humans, animals, and the environment. In the context of India, rivers play a pivotal role in the dissemination and persistence of AMR genes. However, it is imperative to integrate data from diverse disciplines and regions to fully comprehend the complexities involved. This manuscript consolidates information derived from studies conducted in accordance with PRISMA guidelines to investigate the transmission of AMR through India's principal rivers, with a particular emphasis on the influence of hydrological and geographical data. We examined 85 studies from significant riverine regions, including the Ganga, Yamuna, Cauvery, Godavari, as well as several urban rivers. The findings indicate consistent patterns: contamination arising from healthcare facilities and wastewater treatment plants initiates issues in upstream areas, while riverine water and sediment perpetuate the challenges in midstream, and agricultural practices exacerbate the situation downstream. River sediments and aquaculture operations appear to act as reservoirs for AMR genes over extended periods, with monsoonal precipitation facilitating their dispersal. Furthermore, the review elucidates that geospatial data tools, such as Geographic Information Systems (GIS) and mapping techniques, significantly outperform singular site assessments in identifying AMR hotspots and vulnerable populations. Such methodologies enable the quantification of risk across river systems and inform appropriate intervention measures. In conclusion, AMR in India propagates throughout riverine zones and influences public health in multifaceted ways. It is essential to transition from isolated site evaluations to comprehensive monitoring of entire river systems to effectively manage AMR and safeguard population health.

**Keywords:** Antimicrobial resistance, One Health, Watershed-scale analysis, Spatial analytics, watershed, Geographic Information Systems (GIS).

## Knowledge, Attitudes, and Health Impacts of Long COVID in Rural Ballia, Uttar Pradesh: A Cross-Sectional Analysis

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Long COVID, characterized by persistent symptoms post-acute SARS-CoV-2 infection, poses ongoing challenges to health and well-being, especially in rural areas like Ballia district, Uttar Pradesh, with limited healthcare infrastructure and socioeconomic vulnerabilities. A community-based cross-sectional study surveyed 150 adults (aged 18- 65 years) with confirmed or suspected prior COVID-19 in Ballia district (March-May 2025). A validated questionnaire adapted from WHO KAP tools assessed knowledge (symptoms, transmission, management of Long COVID), attitudes (perceived severity, stigma, healthcare-seeking), and impacts (physical symptoms like fatigue, mental health effects, economic burden). Multivariable logistic regression identified predictors, with analysis via SPSS ( $p < 0.05$  significance). Low knowledge levels prevailed (mean score 65%), with 72% recognizing fatigue and breathlessness as key symptoms but only 38% aware of neurological risks. Favourable attitudes were noted in 58%, though stigma affected 35% of respondents. Long COVID impacted 52%: 45% reported persistent fatigue, 48% anxiety/depression, and 40% work incapacity; rural women and low-income groups faced higher odds. Healthcare access barriers exacerbated vulnerability outcomes. Lack of Long COVID awareness in Ballia underscore the dire need for healthcare infrastructural development, targeted education, mental health support, and policy interventions to mitigate long-term rural health disparities in Uttar Pradesh.

**Keywords:** Long COVID, Knowledge, Attitude, Practice, Vulnerability, WHO KAP, Mental Health.

## Session 2

### *Parallel Session 3: Health Geography*

## **The Association Between Domestic Violence and Antenatal Care Utilisation Among Ever-Married Women in India: Evidence from NFHS-5**

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Despite sustained efforts to strengthen maternal health services in India, the utilisation of essential antenatal care (ANC) services continues to exhibit substantial inequalities. Although socioeconomic and demographic determinants of ANC utilisation are well documented,

domestic violence remains an underexplored social barrier influencing women's access to maternal healthcare. Using nationally representative data from the National Family Health Survey (NFHS-5, 2019–21), this study examines the association between different forms of domestic violence and the utilisation of key ANC services among ever-married women aged 15–49 years in India. Domestic violence was assessed using women's self-reported experiences of physical, sexual, emotional, and combined forms of spousal violence. The outcome variables included four or more ANC visits (ANC 4+), early initiation of ANC within the first trimester, consumption of 100 or more iron–folic acid (IFA) tablets, receipt of at least two tetanus toxoid (TT) injections, and full ANC coverage. Descriptive statistics and bivariate analyses were conducted to assess variations in ANC utilisation, followed by binary logistic regression models estimating unadjusted and adjusted odds ratios while controlling for husband-related characteristics, women's socio-demographic attributes, household conditions, and community-level factors. The findings indicate that nearly one-third of ever-married women experienced at least one form of domestic violence. Bivariate analyses reveal significantly lower utilisation of ANC services among women exposed to violence, particularly with respect to ANC 4+, early ANC initiation, and full ANC coverage. Multivariate results further confirm that domestic violence remains a statistically significant predictor of inadequate ANC utilisation even after adjustment for potential confounders. Women experiencing physical violence had significantly lower odds of receiving ANC 4+ (AOR≈0.79) and full ANC (AOR≈0.73), while exposure to sexual violence was associated with reduced odds of ANC 4+ and full ANC (AOR≈0.78 and 0.69, respectively). The strongest disadvantage was observed among women exposed simultaneously to physical, sexual, and emotional violence, who were substantially less likely to receive comprehensive antenatal care, including full ANC (AOR≈0.56). In addition, husband's controlling behaviour, alcohol consumption, lower educational attainment, early age at first birth, higher parity, economic disadvantage, limited media exposure, and pronounced regional disparities further exacerbated inequalities in ANC utilisation. Overall, the findings demonstrate that domestic violence functions as both an independent and reinforcing barrier to maternal healthcare access in India, underscoring the need to integrate violence-responsive and gender-sensitive interventions within maternal health programmes to improve equitable utilisation of antenatal care services and advance safe motherhood goals.

**Keywords:** Domestic violence; antenatal care utilisation; maternal health; ever-married women; NFHS-5

## Applications of GIS and Spatial Analysis in Health Research: A Comparative Systematic Review of India and China

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**Background:** Health is a fundamental right intricately linked to geographical factors, and the application of Geographical Information Systems (GIS) is crucial for disease surveillance, health risk assessment, and healthcare accessibility. The systematic review explores the evolving role of GIS and spatial analysis in addressing public health challenges and shaping healthcare strategies in China and India (2000–2022).



**Methodology:** A comprehensive search of peer-reviewed literature in databases such as PubMed, Scopus, and Web of Science was conducted following PRISMA guidelines. In the Chinese context, 93 articles were selected from 2,158 results, while the Indian context yielded 58 articles from 162 results, both categorised into three thematic domains: (i) disease surveillance and mapping, (ii) health risk assessment, and (iii) healthcare accessibility.

**Results:** The review reveals that ArcGIS is the predominant software in both countries, often supplemented by tools such as SaTScan, GeoDa, and QGIS. Frequently employed spatial analysis techniques include Moran's I for spatial autocorrelation, Getis-Ord  $G_i^*$  for hotspot detection, and Inverse Distance Weighting (IDW) for geospatial interpolation. While the Chinese research demonstrated a major focus on risk assessment (N=42), Indian studies showed a significant surge in GIS utility as a decision-making tool following the COVID-19 outbreak. Both regions utilised these tools to identify disease clusters, model environmental risks, and assess spatial inequities in healthcare access.

**Conclusion:** GIS has proven to be an indispensable instrument for understanding spatial patterns and optimising public health interventions. Despite its utility, both countries face challenges related to data quality, limited technical infrastructure, and ethical concerns regarding privacy and confidentiality. While the use of GIS in China showed a relative decline after 2015, Indian applications have gradually increased due to pandemic management. Future research in both nations is expected to integrate advanced trends such as machine learning, real-time data mapping, and big data analytics to enhance health system resilience and universal health coverage.

**Keywords:** GIS, Spatial Analysis, Disease Surveillance, Risk Assessment, Healthcare Accessibility, China, India

## Integrated health vulnerability assessment using RS-GIS and MCDA: A case study of Barrackpore - Bidhannagar subdivision, North 24 Paraganas, West Bengal

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Climatic variability, rapid urban growth and environmental stressors have increased population health risk in urban and peri-urban pockets of eastern India. The study focuses on understanding the health vulnerability of Barrackpore I, II and Rajarhat blocks of North 24 Paraganas, West Bengal due to its high population density, contrast in urban intensity, recurrent waterlogging, rising surface temperature and uneven access to health-care facilities. These regions despite being among the fastest growing fringes are underrepresented in spatially explicit health studies, limiting local planning. The study employs an integrated RS-GIS-AHP based Multi-Criteria Decision Analysis (MCDA) approach to access the variation in health vulnerability. Eight parameters indicating climate exposure (land surface temperature (LST), rainfall anomaly), environmental and urban sensitivity (Normalized Difference Vegetation Index (NDVI), Normalized Difference Built-up Index (NDBI), Waterlogging Probability Index (WPI), population density, Visible Infrared Imaging Radiometer Suite (VIIRS) night-time light intensity) and adaptive capacity (distance to health infrastructure) were selected. Analytical Hierarchy Process (AHP) pairwise comparison method was implied to assign criterion weights. The resulting Health Vulnerability Index (HVI) indicates pronounced spatial heterogeneity,



where Rajarhat and densely built-up sections of Barrackpore blocks exhibits higher vulnerability due to compound thermal stress, urban density and waterlogging susceptibility. By integrating environmental, climatic and accessibility dimension on a rapidly transforming metropolitan fringe, the study provide actionable, spatially explicit insights for targeted public health planning and climate-resilient urban development.

**Keywords:** Health vulnerability index, RS-GIS, MCDA, Climate stressors, Urban-peri urban health.

## Prevalence of Hypertension and Risk Factors Among Women of Reproductive Age Group (15-49 Years) in Flood-Affected Districts of India

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In India's flood-prone heartlands, silent killers like hypertension threaten mothers' futures more than the waters they survive. Hypertension is a serious medical condition, which is characterised by an increased pressure in the arteries, and is the largest contributor to death and disease in India, which can be cured. The main aim of this study is to find out the prevalence and key socio-economic and demographic factors affecting hypertension among women of reproductive age group in flood-prone districts in India. This analysis was based on a total of 32,319 samples collected from flood-prone districts during the NFHS-5 survey. The impact of different socio-demographic variables on the prevalence of hypertension was investigated using multivariable logistic regression analysis. Prevalence reached 12.6%, exceeding national figures. Some significant factors ( $p < 0.05$ ) included age 35-49 years (aOR 4.90, 95% CI 4.20-5.72), overweight or obesity (aOR 2.32, 95% CI 2.15-2.51), diabetes (aOR 1.95, 95% CI 1.67-2.26), widowhood (aOR 1.39, 95% CI 1.20-1.61), and healthcare distance barriers (aOR 1.20, 95% CI 1.20-1.29). Some protective factors comprised higher education (aOR 0.68, 95% CI 0.59-0.79) and richest wealth (aOR 0.81, 95% CI 0.69-0.96). Hypertension in flood-prone districts is strongly linked to advancing age, high BMI, and barriers to healthcare access. Targeted screening, obesity management, and climate-resilient health systems are essential for achieving SDG 3 (Good Health and Well-being) and SDG 13 (Climate Action), and to promote maternal well-being and equity.

**Keywords:** Hypertension; Women of Reproductive Age Group; Flood-prone Districts; NFHS; India

### Session 2

#### *Parallel Session 4: Gender and Health*

## Uneven Health Landscapes: Spatial Vulnerability to Anaemia among Women (Age 15-49 years) in Bihar

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Anaemia among women remains a persevering public health issue in India, with Bihar being one of the highest burden states. However, the burden of anaemia is uneven within the state. This paper analyses the spatial vulnerability of anaemia among women of reproductive age (15-49 years) in Bihar through the lens of Health geography, emphasising how region-specific socio-cultural practices, institutional factors and dietary patterns shape differential health outcomes. Rather than entirely focusing on clinically diagnosed prevalence, the study conceptualises the differential vulnerability of anaemia, rooted within uneven social and spatial landscapes. The study is based on fieldwork conducted in two districts of Bihar- Bhagalpur and Muzaffarpur- selected to capture socio-cultural and infrastructural contrasts. The primary survey is supplemented by secondary data from the National Family Health Survey (NFHS) and Census of India. A comparative spatial approach is applied to examine the inter-district variation of the vulnerability of anaemia. The findings reveal a clear inter-district variation in anaemia. Bhagalpur, being culturally significant, a higher prevalence of vegetarian dietary practices, seasonal fasting and food taboos contributes to the lower intake of heme iron, increasing the vulnerability of anaemia. In contrast Muzaffarpur, characterised by relatively higher animal-based food consumers, continues to exhibit substantial anaemia vulnerability, reflecting that diet alone do not solely explain spatial differences. The study also identifies significant institutional gaps, notably within the Anganwadi system. Inadequacy of infrastructure, restricted food provision, limited awareness of Anganwadi centres and insufficient knowledge of anemia among the frontline workers point to shortcomings in last mile nutrition delivery. The poor dietary diversity heavily dominated by the cereal-based diets and limited consumption of iron rich foods, further exacerbates vulnerability. Women of reproductive age (15-49 years) with lower education, belonging to socio-economically disadvantaged households and limited access to healthcare services, emerge as the most vulnerable group. The paper contributes to existing literature by demonstrating how sub regional analysis can provide more calibrated insights into women's health disparities. The findings suggest the need for greater spatial sensitiveness in nutrition and health research, particularly when addressing intra state inequalities.

**Keywords:** Health Geography; Anaemia; Women; Diet; Bihar; National Family Health Survey

## Abortion as a reproductive justice among unmarried women in Maharashtra- a narrative analysis

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The high rate of abortion in India has always been a complex public health issue. Abortion has been permitted by law under the MTP Act of 1971 for more than fifty years. Yet, the social



stigma, combined with the lack of reproductive education among young unmarried women, makes it more difficult to access the already existing reproductive health services. Maharashtra, despite its developmental status, faces a stark obstruction in access to reproductive healthcare systems due to its socio-economic, cultural, and geographical diversities. In this scenario, this study aims to highlight the unpleasant experiences of young unmarried women and the kind of medical support provided to them by the government while accessing safe abortion options. It also focuses on the barriers related to safe abortions and reproductive rights of women, and the implications of abortion restrictions on maternal health and economic stability. To achieve these objectives, a primary survey was conducted with a sample size of 70 participants within the 18-30 age group of unmarried young women. Personal interviews were conducted for these 70 participants, and questionnaires were prepared accordingly for a more detailed narrative analysis. To maintain their anonymity, the participants were coded according to the area they belonged to. The results of this study were found to be conflicting, as women from urban areas faced a considerable amount of social stigma and moral policing, while women from rural and tribal areas found it extremely difficult to access abortion because of a lack of confidentiality and fear of social exclusion. Besides the lack of reproductive education being a major cause, the absence of exposure to legal guidance and knowledge worsened their situation. This study highlights the need for an immediate shift from the patriarchal medicinal system to an abortion care system that includes dignity, bodily autonomy, privacy, and choice. Legal literacy, respectful care, and post-abortion counselling must be an integral part of abortion to achieve reproductive autonomy in Maharashtra.

**Keywords:** Reproductive health, reproductive autonomy, abortion, reproductive justice, Maharashtra.

### **Socio-demographic correlates of adequate menstrual health and hygiene practices among young tribal women in India**

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Menstruation still remains a taboo topic, leading to a vicious cycle of misinformation and negligence in developing countries, particularly in India. While prior studies have explored the uses of hygienic period products and their determinants among young women and adolescent girls. They often ignore or examine separately the influence of supportive environments, such as access to sanitation and social hygiene practices, that enable individuals to manage menstruation safely and with dignity. Hence, this study is an attempt to provide a comprehensive understanding of menstrual health and hygiene (MHH) practices by combining water, sanitation, and hygiene (WASH) services with the use of hygienic menstrual products and their socio-demographic correlates among young tribal women (15-24 years) in India. A sample of 42,445 young tribal women has been drawn from the National Family Health Survey-5 (NFHS-5, 2019-21). Descriptive statistical techniques have been utilised to

summarise the background characteristics of the sample population. Chi-squared tests have been performed to understand the relationships between variables. Binary logistic regression has been employed to examine the influence of socio-demographic correlates on adequate MHH. Results indicate that one-third of women use hygienic period products and more than half of the households have access to drinking water on premises, an improved unshared toilet, and the presence of soap or detergent near hand wash. However, only 26.03% of respondents reported having access to all four essential menstrual resources. Logistic estimation shows that tribal women who have better education, live in an urban and affluent society, have higher access to mass media, and face no difficulties in seeking medical help, enjoy better access to adequate MHH resources than their peers. Undoubtedly, despite continued and improving government efforts, access to adequate MHH resources remains a question for this marginalised group. Therefore, policymakers may design context-specific policies, such as the distribution of cost-effective modern hygienic materials, along with the expansion of sanitation and hygiene services in socially and economically marginalised populations. Additionally, improvements in girls' education and the organisation of workshops using audio-visual aids may increase awareness of the value and effectiveness of hygienic period product use and the importance of supportive environments.

## Emotional Intimate Partner Violence as an Under-Recognized Risk Factor for Hypertension Among Women of Reproductive Age in India

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Intimate partner violence (IPV) is a prevalent public health and human rights concern in India, with emotional violence being the most common yet least acknowledged type. While physical and sexual IPV have been thoroughly examined, evidence linking emotional IPV to hypertension among women of reproductive age remains sparse. Hypertension is one of the top risk factors for cardiovascular disease among women. In addition to clinical considerations, psychosocial stressors, including Intimate Partner Violence (IPV), are widely acknowledged as potential contributors to chronic physiological stress. This study seeks to examine the correlation between different types of intimate partner violence (IPV) and hypertension in women of reproductive age (15-49 years) in India. This analysis utilized a total of 56,387 samples gathered during the NFHS-5 survey. Logistic regression was employed to calculate Odds Ratios (OR) for hypertension, while controlling for age, residency, religion, education, BMI, intimate partner violence (physical, sexual, and emotional), and several socio-economic and demographic variables. Emotional violence was substantially correlated with elevated risks of hypertension (OR = 1.10; 95% CI: 1.00-1.21;  $p < 0.05$ ) across the different forms of IPV examined, while there were no statistically significant links between physical and sexual violence and hypertension. The most important clinical indicators were age (35-49 years: OR = 4.89) and BMI (Obese: OR = 4.12; Overweight: OR = 2.46). Additionally, higher levels of education were linked to protective benefits (OR = 0.82;  $p < 0.01$ ). There were big



differences between regions, with a higher risk in the Central area and for people who live in states that aren't EAG. Age and BMI are still the main things that cause high blood pressure, but these results show that public health programs should include IPV screening, mental health support, and maternal programs that support SDG 3 (Good Health and Well-being) and SDG 5 (Gender Equality) to lower cardiovascular burdens and improve women's health equity.

**Keywords:** Hypertension, Intimate Partner Violence (IPV), Women of Reproductive Age, India, NFHS

## Session 2

### *Parallel Session 5: Environment and Health*

#### Environment and Health

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The relationship between the environment and human health is deeply interconnected, with environmental quality serving as a key determinant of public well-being. Rapid industrialization, urban expansion, unsustainable resource use, and climate change have accelerated environmental degradation, leading to significant health risks globally. Air pollution is a major contributor to respiratory illnesses, cardiovascular diseases, neurological disorders, and increased mortality, particularly in urban areas with high population density. Similarly, contaminated water and inadequate sanitation drive waterborne diseases, disproportionately affecting vulnerable populations such as children, the elderly, and low-income communities. Climate change exacerbates health challenges through rising temperatures, frequent heatwaves, altered disease vectors, and extreme weather events including floods and droughts. These shifts increase the spread of infectious diseases, threaten food security, and worsen malnutrition. Concurrently, biodiversity loss and ecosystem degradation weaken ecological resilience, exposing humans to pathogens and reducing access to clean air, safe water, and nutritious food. This paper explores the complex linkages between environmental factors and health outcomes. It examines major pollution sources, their biological impacts, and the role of socioeconomic disparities in shaping environmental vulnerability. The study highlights how urbanization, industrial waste, pesticide use, and unsustainable agricultural practices contribute to long-term health burdens. Mental health impacts from environmental stressors, such as noise pollution, overcrowding, and climate-related anxiety, are also addressed, underscoring the psychological dimension of environmental health. Effective environmental governance, sustainable development strategies, and policy interventions are crucial for mitigating pollution and enhancing public health. Strategies such as transitioning to clean energy, improving waste management, restoring ecosystems, implementing green infrastructure, and promoting community awareness are vital for integrating environmental protection with human health objectives. The paper emphasizes that safeguarding the environment is not only an ecological responsibility but also a fundamental necessity for human health. Multidisciplinary, collaborative approaches are essential for



building long-term resilience, reducing health disparities, and promoting healthier, more equitable societies.

Overall, understanding and addressing the environmental determinants of health is critical for achieving sustainable development and improving quality of life. Protecting ecosystems and reducing pollution are indispensable steps toward ensuring the well-being of present and future generations.

### **Keywords**

Environment, Air Pollution, Ecosystem Degradation, Sustainability, Environmental Policy, Urbanization.

## **Significance of Health Geography in Mitigating the Age-Old Health Issues and Managerial Challenges in Remote Islands of Tropical Deltas: Special Reference to Sundarban Delta in India**

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Newly emerging discipline 'Health Geography' has proven the need of hour to relook the traditional epistemics of geographical knowledge with latest progress in remote sensing and geographical information system. It is only after the outbreak of corona virus pandemic which opened people's eyes how much they had to pay for the lack of knowledge in health-related geographic issues. Millions of people of developed to developing world are witnessing the lack of health-geography database to know the societal health status of geographically endangered tribal and non-tribal dwellers of the remote islands of the cyclone-prone hazardous deltas like inhabited Sundarbans' mangrove islands of 24 Pgs. (N & S) in West Bengal, India. The key objective of this research is to find out the significance of implementation of Health Geography related research works and incorporation of it as a compulsory discipline centric course in higher education sectors or organizations to build a nexus of social, cultural and allied database which are very much useful for sustainable development of rural livelihoods in the physically backward regions all over the world. Human health related databases have been collected and analysed through Data Analysis of MS Excel 2024 and SPSS statistical software and spatial data analysis has been carried through the ARC GIS (10.2), QGIS (3.44) and Google Earth Engine. The paper reveals that without proper development, introduction, culture and implementation of Health Geography, the SDGs cannot be achieved through merely immature unrealistic plannings in remotely inhabited islands of tropical deltas of the world.

**Keywords:** Health Geography, communicable and non-communicable diseases, tropical delta, mangrove island, primary health care centre, morbidity and mortality, indigenous knowledge, in-situ health practices

## **Smell and the City: A Spatial Olfactory Planning Framework**

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Every city possesses a distinct olfactory character, an invisible yet deeply influential layer that shapes how urban spaces are perceived, remembered, and inhabited. Smell operates as a powerful mediator between environment, body, and memory; however, contemporary urban planning has remained overwhelmingly visual in its orientation, privileging spatial order, form, and aesthetics over multisensory experience. This visual bias has contributed to the production of environments that are visually legible yet sensorially muted, often resulting in perceptually sterile urban landscapes that neglect embodied human experience. Within this context, the role of smell remains under-theorized and underutilized as a legitimate planning parameter. This study examines smell as a spatial, socio-cultural, and public health phenomenon, situating olfaction within the broader framework of health geography. It introduces the concept of “olfactory silence” to describe the absence, suppression, or deliberate erasure of sensory diversity through mechanisms such as excessive deodorization, industrial zoning practices, infrastructural concealment, and urban sanitization policies. While often framed as improvements to hygiene and order, these interventions frequently mask environmental degradation, displace odor-generating activities to marginalized areas, and reinforce spatial inequalities in exposure to sensory and environmental risk. By treating smell as both an environmental indicator and a marker of socio-spatial inequity, the research explores how odor landscapes intersect with land-use patterns, ecological systems, and socio-economic gradients. Odors associated with waste infrastructure, polluted water bodies, industrial emissions, or informal economies are shown to disproportionately affect vulnerable populations, thereby linking olfactory exposure to issues of environmental justice, mental well-being, and everyday health outcomes. From a health geography perspective, the study positions smell as an experiential interface through which urban residents encounter pollution, sanitation, stress, comfort, and belonging. The paper advances the argument that integrating olfactory knowledge into urban planning can contribute to more equitable, health-sensitive, and sensorially responsive cities. By incorporating olfactory mapping, community perception, and sensory justice into planning practice, urban environments can be reimagined not merely as visually efficient systems but as lived spaces that engage the full sensory spectrum of human experience. Ultimately, the study asserts that a truly livable and healthy city must be planned not only for what is seen, but also for what is smelled, and for whom.

**Keywords:** Olfactory Urbanism, Health Geography, Sensory Inequality, Environmental Justice, Urban Smellscapes

### A Study of BMI and Carbon Footprint among Students and Staff: Evidence from Government Arts and Science College, Tholanur

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Background: Health geography focuses on the spatial dimensions of health, lifestyle, and environmental impacts. In recent years, growing attention has been paid to the relationship between individual health indicators and environmental sustainability. Lifestyle choices made



at the institutional level play a crucial role in shaping both personal health outcomes and environmental impact. The present study examines the relationship between Body Mass Index (BMI), health status, and carbon footprint among students and staff of Government Arts and Science College, Tholanur. The study is based on the premise that lifestyle choices influencing health outcomes also contribute significantly to carbon emissions. The specific objectives are to assess BMI categories and associated health status, estimate individual carbon footprint levels using a carbon footprint calculator, analyze the correlation between BMI categories, health conditions, and carbon footprint, and identify key lifestyle factors such as dietary patterns, energy consumption, and transportation behaviour influencing carbon footprint within the institution. In addition, the study attempts to understand the level of awareness among the institutional population regarding BMI, carbon footprint, and sustainable lifestyle practices. **Methodology:** The study was conducted at the institutional level by considering the total strength of students and staff of Government Arts and Science College, Tholanur. The study is based on primary data collected through a structured questionnaire and a carbon footprint calculator, covering aspects such as food consumption, electricity usage, transportation modes, waste disposal practices, and daily activities. Special emphasis was given to understanding energy consumption patterns, dietary habits, use of biodegradable materials, and waste management practices within the campus. BMI is calculated using standard anthropometric indicators and classified according to World Health Organization guidelines. The methodology also included assessing respondents' knowledge and perception regarding the relationship between health, BMI, and environmental sustainability. **Results:** The expected results indicate notable variation in carbon footprint based on electricity consumption and dietary patterns. A shift towards calorie-dense and processed food is likely to increase both BMI and carbon footprint. Staff members are expected to record relatively higher carbon footprints due to greater reliance on private vehicles and higher energy consumption, whereas students residing near the college, particularly those in paid guest accommodations, are likely to exhibit lower carbon footprints. Variations in waste disposal behaviour and awareness of sustainable practices are also expected to influence individual carbon footprint levels. **Conclusion:** The study highlights the importance of integrating health promotion and sustainability strategies at the institutional level. Promoting healthier lifestyles alongside environmentally responsible practices can contribute to improved health outcomes and reduced carbon emissions within educational institutions.

**Keywords:** BMI; Health Geography; Anthropometric Indicators; Carbon Footprint; Lifestyle Patterns

### Session 3

#### *Parallel Session 1: Health Geography*

### **Spatial Disparities in Public Health Care Infrastructure and Accessibility: A District-Level Study of Jhajjar, Haryana**

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Spatial access to health care is one of the main issues of Geography of Health, as the pattern of health care infrastructure is often spatially heterogeneous and creates disparities in accessibility. Intradistrict inequalities in terms of access and availability of the public health facilities are very clear even in the comparatively developed states like Haryana. Jhajjar district, with its largely rural settlement pattern, alongside emerging urban centres, offers a suitable micro-regional setting where these spatial inequalities may be examined. The current study aims to look at the spatial differences in the infrastructure of public health care and physical accessibility in the Jhajjar district in Haryana. The analysis focuses on the primary health facilities, i.e. Primary Health Centres (PHCs), Community Health Centres (CHCs), and district hospitals as they constitute the equity-oriented and planned model of health care delivery. The interpretation of accessibility is done spatially and accessibility to health care facilities in terms of being physically near to health care facilities, but not in terms of service quality or utilisation. The study uses the secondary data collected from the official repositories like the Rural Health statistics, Health Management information system, National Health mission reports and the Census of India etc. The GIS techniques will be used to analyse the spatial distribution of the health care facilities in the district. The methodology includes descriptive spatial analysis, thematic mapping, spatial pattern analysis and proximity-based measures of accessibility. Nearest-Neighbour Analysis is an addition to the diagnostic tools used to explain general tendencies of spatial distribution, whereas distance and buffer analyses are used to assess physical accessibility. It is expected that the study will reveal and locate the intra-district differences in the distribution and access to the infrastructure of the public health care in the Jhajjar district. The spatial and proximity-based analysis is aimed at unlocking the areas with varying degrees of access to the public health facilities and also the identification of areas that do not meet optimal distance criteria of reaching health facilities. These trends will tend to highlight skewed spatial distribution of the health infrastructure even though it exists on a district level. By adopting a spatially disaggregated approach, the study aims to contribute to a clearer understanding of the uneven spatial coverage of public health infrastructure at the local level.

## **Socio-Economic and Spatial Inequalities in Cancer Incidence in Nalbari District, Assam**

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Cancer has emerged as a major public health challenge globally and in India, with pronounced regional and socio-economic disparities influencing its incidence and outcomes. The North-Eastern region of India, including Assam, exhibits a distinct cancer burden shaped by environmental, demographic, and socio-economic factors. Against this backdrop, the present study adopts a health geography perspective to examine the spatial distribution and socio-economic determinants of cancer incidence in Nalbari District, Assam. Nalbari has been selected due to its unique physical setting, flood-prone environment, predominantly rural population, and uneven health infrastructure, which together may influence disease vulnerability and access to care. The study is based on secondary data comprising cancer cases drawn from health records and relevant statistical sources. A combination of spatial analysis, Principal Component Analysis (PCA) and Analytical Hierarchy Process (AHP), survival analysis, correlation analysis, and time-series analysis has been employed to identify spatial patterns, socio-economic gradients, and temporal trends of cancer incidence. The findings reveal marked intra-district spatial variations, with higher cancer concentration associated with



lower socio-economic status, occupational exposure, and limited accessibility to health facilities. Survival outcomes also show significant associations with socio-economic conditions and early diagnosis. The study underscores the importance of integrating spatial and socio-economic dimensions in cancer research and policy formulation. The findings have important implications for area-specific health planning, strengthening cancer surveillance, improving health infrastructure, and targeting vulnerable populations in Nalbari District. By highlighting localized determinants of cancer, the study contributes to evidence-based public health interventions and regional health equity.

**Keywords:** Health Geography, Cancer, Socio-economic Determinants, Spatial Analysis, Nalbari District

## **Health care Accessibility Measures Using Network Analysis Technique of GIS –A case study of a Rural District of South India**

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The third Sustainable Development Goal (SDG 3) emphasizes ensuring healthy lives and promoting well-being for all ages, underscoring the need for strategic healthcare planning in developing nations like India, particularly at macro- and micro-levels. In resource-constrained districts, spatial access to rural health services remains a critical challenge. This study employs GIS-based network analysis to quantify geographical accessibility to health services, delineate non-catchment areas, and evaluate the suitability of proposed sites for new facilities. Network analyst tools in GIS were optimized to integrate spatial and non-spatial data, revealing variations in healthcare accessibility. This approach identifies underserved regions and informs evidence-based site selection. Findings highlight GIS's pivotal role in health planning, enabling policymakers to enhance equity in service provision and align with SDG 3 targets in resource-constrained settings.

**Keywords:** GIS, Network Analysis: Closest Facility Analysis, Location-allocation, Shortest Path Analysis, & OD Cost Matrix Analysis

## **Kernel Density Estimation in Assessing Primary Healthcare Performance and Patient Perception in Madurai District**

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Primary Health Centres (PHCs) form the backbone of rural healthcare delivery in India, but in Madurai district spanning varied urban-rural terrains equitable access remains hindered by socio-economic disparities, cultural barriers, and geographic isolation. This study integrates Kernel Density Estimation (KDE) with factor analysis and Principal Component Analysis (PCA) across 260 observations and 39 variables to map spatial patterns in PHC access, patient perceptions, and performance gaps. Factor analysis identified 13 dimensions accounting for 73.4% of total variance, while KDE with Gaussian kernels and Silverman's rule produced density surfaces. Findings show narrow, bell-shaped KDE curves peaking near zero for access and socio-economic factors, indicating low variability and moderate district-wide conditions. In contrast, broader distributions emerge for cultural status and residence/transport, pinpointing rural hotspots like Usilampatti block. These insights highlight intervention priorities and underscore KDE's advantages over boundary-constrained methods for data-driven PHC planning.

**Keywords:** Kernel Density Estimation, spatial analysis, factor analysis, PCA, healthcare disparities, patient perception.

### Session 3

#### *Parallel Session 2: Infectious Disease and Health Geography*

#### **Spatial Assessment of Dengue Risk Zones in Dindigul District, Tamil Nadu using the AHP Approach**

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Dengue is a viral disease transmitted by *Aedes aegypti* mosquito. Dengue has become an important public health problem worldwide. Most probably it affects urban and semi-urban areas of tropical and sub-tropical regions around the world. The present study considers the potential impact on human health from waterborne and vector-borne infections. Detecting and mapping Dengue risk areas is a complex, tiring, multifaceted, and protracted task requiring the evaluation of many criteria. It is not sure that always one single factor is liable for Dengue Fever transmission in all areas, but it differs with changing geographical locations. The study area, Dindigul District is located at 10°05' and 10°09' north latitude and 77°30' and 78°20' east longitude extensions. This study aimed to map the spatial distribution of dengue cases in the Dindigul District through the integration of the Geographical Information System (GIS) and spatial statistical analyses. This paper presents the application of the analytic hierarchy process



alongside geospatial analysis for detecting Dengue vulnerability in the Dindigul District by integrating environmental parameters. The stages to analyze synergistically to form a Spatial Decision Support System. The first stage analysis makes use of the thematic layers in the Geographical Information System in combination with environmental factors leading to support for the second stage analysis using the analytic hierarchy process in geospatial analysis. Moreover, weighted overlay analysis was used for detecting potential risk areas in Dindigul District. For the risk modeling, geo-environmental factors [Land Surface Temperature, Topographic Wetness Index, Land use/Land cover, Elevation, Water Logged Buffer area, Rainfall, Slope, Aspect, and Population Density] and demographic factors and population density have been utilized used to derive the risk zone maps developing efficient control measures and contingency programs in identifying and prioritizing their efforts ineffective dengue control activities.

**Keywords:** Dengue, GIS, Vector, Analytical Hierarchy Process, Multi-Criteria Making

## Prevalence and Determinants of Multimorbidity among Older Adults in India: Evidence from LASI Wave 1 (2017–18)

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Chronic diseases and multimorbidity pose a growing public health challenge among older adults in India, driven by rapid population ageing and ongoing socio-economic transitions. However, nationally representative evidence on the prevalence and determinants of multimorbidity remains limited. This study examines the prevalence, patterns, and socio-demographic, behavioral, and lifestyle correlates of self-reported chronic diseases and multimorbidity among older adults in India. The study uses data from Wave 1 of the Longitudinal Ageing Study in India (LASI), 2017–18, covering a nationally representative sample of adults aged 45 years and above. Chronic diseases were identified based on self-reported medical diagnosis and treatment for nine conditions: hypertension, diabetes, cancer, chronic lung disease, chronic heart disease, stroke, joint diseases, neurological conditions, and high cholesterol. Multimorbidity was defined as the presence of two or more chronic conditions. Descriptive statistics were used to assess prevalence patterns, and binary logistic regression models were employed to examine factors associated with single morbidity and multimorbidity. Hypertension (27.5%) was the most prevalent condition, followed by joint disorders (16.1%) and diabetes (12.3%). The prevalence of chronic diseases was higher among urban residents, older age groups, individuals who were not currently married, and those living alone. Multimorbidity increased sharply with age (OR: 1.65; 2.61) and was more common among urban residents (OR: 1.35; 1.95), wealthier households (OR: 1.43; 3.12), Scheduled Castes (OR: 1.00; 1.00), and Muslims (OR: 1.21; 1.62). Educational attainment showed mixed associations with chronic disease outcomes. Behavioral factors revealed counterintuitive patterns, with non-smokers and non-drinkers reporting a higher prevalence of chronic diseases, likely reflecting reverse causality. Engagement in moderate and vigorous physical activity was protective against chronic diseases, whereas yoga practice (OR: 1.18; 1.28), park visits (OR: 1.18), and sedentary activities such as reading (OR: 1.04; 1.21) and television viewing (OR:



1.23; 1.34) were positively associated with multimorbidity. Use of computers for email was associated with lower odds of multimorbidity. Chronic diseases and multimorbidity are highly prevalent among older adults in India and are shaped by complex socio-economic, demographic, behavioral, and lifestyle factors. These findings underscore the need for targeted, preventive, and integrated healthcare strategies focusing on vulnerable subgroups to address the growing burden of non-communicable diseases in India's ageing population.

**Keywords:** Multimorbidity; Chronic diseases; Older adults; Socioeconomic determinants; Lifestyle; India

## Spatial Epidemiology of Dengue in West Bengal

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Dengue outbreak is a major public health concern in tropical and subtropical climatic regions like Southeast Asia, Africa, Mediterranean region, North and South America. West Bengal is a part of the south Asian country, India which possesses favourable condition for vector transmission. The major parts of the sub-Himalayan West Bengal belong to the sub-tropical monsoon while the southern parts are tropical type. The spread of dengue virus in the state greatly influenced by the climatic and socio-economic conditions. The study aims to identify the prevalence, incidence, mortality scenario of dengue across the state West Bengal. The data regarding the mosquito borne diseases including dengue have been collected from various national and state government reports. To identify the historical trend, present scenario and spatial distribution of dengue cases, many journal articles have also been reviewed. It is found that most active cases are occurring in the districts like Kolkata, Hooghly, Howrah, North 24 Parganas, Nadia, Murshidabad, Malda. In recent decades, trend of case fatality rate of dengue is gradually declining despite rising incidence rate which highlights improvement of medical facilities. Although several measures taken by the government, but, lack of adequate health infrastructure, limited data availability and poor health information system are some key constraints in effective dengue management. The worldwide expansion and the presence of multiple serotypes contribute to its persistent and significant threat which also include recurrent outbreaks. Therefore, enhanced surveillance and integrated control measures for all mosquito-borne diseases are needed.

**Keywords-** dengue, incidence, mortality, spatial epidemiology

## Integrating Flood Susceptibility Mapping and Health Risk Zonation for Dengue and Leptospirosis in Ernakulam District

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This study examines flood susceptibility mapping and health risk zonation for vector-borne diseases, specifically Dengue and Leptospirosis, in the Ernakulam district of Kerala, which is threatened by significant flooding due to heavy monsoon rainfall. By integrating Remote Sensing (RS) and Geographic Information System (GIS) technologies, the research evaluates historical flood events against environmental factors, including slope, soil type, drainage density, rainfall, geology, and land use/land cover. Utilizing the Frequency Ratio (FR) method within ArcGIS, the study identifies flood-prone areas, revealing a strong correlation between low slope angles, specific soil types (gravelly clay and sandy soils), high drainage density, and flood occurrences. Approximately 20.9% of the population resides in very high flood vulnerable zones, with 51.1% in high flood vulnerable zones, highlighting the urgent need for government intervention in flood risk mitigation. Additionally, the study assesses the impact of environmental, socio-economic, and political factors on health care delivery, mapping spatial correlations between environmental parameters (elevation, drainage density, rainfall) and disease outbreaks. A Disease Vulnerability Index (DVI) was developed using weighted overlay analysis to quantify factors influencing disease transmission. The resulting risk zonation map categorizes the district into very high, high, moderate, low, and very low-risk zones, providing critical insights for targeted health planning, effective flood management strategies, and disease mitigation measures to protect vulnerable communities and reduce public health risks associated with flooding.

**Keywords:** Geographic Information System (GIS), Remote Sensing, Disease Vulnerability Index, Vulnerable zones.

### Session 3

#### *Parallel Session 3: Urban Health*

### **The 'Green' Prescription: Evaluating the Impact of Urban Public Spaces on Mental Well-being in Modern Cities**

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Urban public green spaces play an increasingly important role in supporting mental well-being in rapidly growing cities. This study examines how access to urban public green spaces (UPGS) influences resident's mental health with a focus on major Indian metropolitan cities such as Delhi, Mumbai, and Bangalore. A mixed-methods approach was adopted, combining a systematic review of existing literature with empirical analysis using GIS-based spatial mapping of green space availability, standardized mental health assessments (WHO-5 and GHQ-12), and qualitative interviews with urban planners. The findings reveal a consistent positive association between proximity to green and blue spaces and improved psychological well-being. Resident's particularly youth, living within 1–3 km of accessible green spaces reported significantly lower stress levels and higher well-being scores compared to those in dense built environments. Environmental factors such as biodiversity, aesthetic quality, and perceived safety were found to enhance restorative benefits and encourage physical activity. However, overcrowding and poor maintenance reduced the effectiveness of several urban green spaces. The study highlights the need for equitable distribution of high-quality green infrastructure and policy-driven nature based solutions to strengthen mental resilience and promote sustainable urban health in Indian cities.



**Keywords:** Urban Public Green Spaces, Mental Well-being, Health Geography, Urbanization, Stress Reduction, GIS-based Spatial Analysis, Indian Cities

## **Urban Waterlogging and Public Health: An Assessment of Health Awareness and Preventive Practices in Urban-Flood Areas**

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Urban waterlogging has emerged as a recurring environmental and public health challenge in Delhi, particularly during the monsoon season. Rapid urbanisation, inadequate drainage infrastructure, and extreme rainfall events have increased the frequency and duration of waterlogging in several parts of the city. Prolonged exposure to stagnant and sewage-contaminated water elevates the risk of water-borne and vector-borne diseases and disrupts residents' ability to maintain hygiene and access healthcare. While previous studies in Delhi have largely focused on disease incidence or environmental conditions, limited attention has been paid to community-level health behaviour during periods of urban waterlogging. This study aims to assess health-related knowledge, attitudes, and practices (KAP) of residents living in waterlogged urban areas of Delhi, with a focus on understanding how awareness and perceptions influence preventive health behaviour during waterlogging events. The specific objectives are to examine residents' knowledge of health risks associated with urban waterlogging, analyse their attitudes towards these risks and preventive measures, assess the preventive health practices adopted during waterlogged conditions, and explore the association between knowledge, attitudes, and practices. The study adopts a cross-sectional quantitative research design and is based on primary data collected through a structured household questionnaire. The survey will be conducted in selected waterlogging-prone urban localities of Delhi. Adult residents (18 years and above) who have lived in the selected areas for at least two years will constitute the study population. The questionnaire comprises sections on socio-demographic characteristics, experience of urban waterlogging, health knowledge, attitudes towards health risks and prevention, preventive health practices, and self-reported health problems during waterlogging. Knowledge items are assessed using dichotomous responses, while attitude and practice items are measured using a 5-point Likert scale. Composite KAP scores will be calculated to represent overall levels of knowledge, attitudes, and practices. Data analysis will involve descriptive statistics, reliability testing, and chi-square tests to examine associations between knowledge, attitudes, and preventive practices. By focusing on behavioural and preventive health aspects, this study seeks to highlight gaps between awareness and action during urban waterlogging.

## **Precarious Livelihood, Vulnerability and Health Risks among Gig Workers in Delhi**

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The rapid expansion of the gig economy has significantly reshaped urban labour markets in India, particularly in metropolitan cities such as Delhi. While digital platforms have generated



new livelihood opportunities, they have also produced highly precarious forms of work characterized by income instability, weak social protection, and heightened exposure to health risks. This study examines the interlinkages between precarious livelihoods, vulnerability, and health risks among gig workers in Delhi from a geographical perspective. It situates gig work within the broader spatial, socio-economic, and institutional contexts of the city, highlighting how urban inequalities shape workers' lived experiences. The research explores the nature of gig work across selected sectors such as ride-hailing, food delivery, and platform-based services, focusing on employment conditions, income security, and access to welfare mechanisms. Special attention is given to spatial dimensions of vulnerability, including uneven access to healthcare facilities, long working hours across congested urban spaces, exposure to environmental hazards, and the risks associated with mobility-intensive work. The study also examines how factors such as migration status, housing conditions, digital dependency, and gender intersect to intensify health and livelihood insecurities. Using a mixed-methods approach, the study draws on primary data collected through household surveys, in-depth interviews, and spatial mapping, complemented by secondary data from government reports and platform policies. Geographic Information System (GIS) tools are employed to analyse spatial patterns of work, risk exposure, and access to health infrastructure. The findings reveal that gig workers in Delhi experience multiple and overlapping vulnerabilities, including physical health issues, mental stress, occupational injuries, and lack of insurance or social security, all of which are unevenly distributed across urban space. The study contributes to urban and labour geography by foregrounding the spatial dimensions of platform-based work and health vulnerability. It offers critical insights for policymakers and urban planners by emphasizing the need for inclusive labour regulations, spatially equitable health infrastructure, and targeted social protection measures to address the growing precarity of gig workers in Indian cities.

## **Socio-Economic Determinants of Gender Disparities in Healthcare Access in Kolkata.**

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The present study examines gender-based disparities in access to healthcare facilities in Kolkata across different levels of urban development. It aims to analyze how physical, demographic, social, economic, and infrastructural factors influence healthcare needs, utilization patterns, and access among men and women. The study also assesses the extent of gender discrimination in healthcare access and explores the relationship between socio-economic inequalities and unequal healthcare practices within the study area. The research is based on both primary and secondary data sources. Primary data were collected through household surveys and interviews, while secondary data were obtained from census reports, health department records, and existing literature. Both quantitative and qualitative methods were employed to evaluate differences in healthcare accessibility, affordability, utilization, and decision-making autonomy across genders. The findings indicate that gender disparities in access to healthcare vary significantly with the level of urban development. Underdeveloped and slum areas exhibit pronounced gender gaps, where women face multiple barriers such as economic dependency, restricted mobility, limited health awareness, and inadequate healthcare



infrastructure. In contrast, developed urban areas demonstrate relatively lower levels of gender disparity due to better healthcare availability, higher literacy rates, and improved socio-economic conditions. The study reveals that factors such as education, income, employment status, and standard of living play a crucial role in shaping social attitudes and cultural norms related to gender and health. The study concludes that gender discrimination in healthcare access is deeply rooted in patriarchal social structures and cannot be addressed through external interventions alone. It emphasizes the need for integrated urban planning, gender-sensitive healthcare policies, widespread literacy initiatives, and sustained public discourse to promote gender equity in healthcare access. The findings offer valuable insights for policymakers and urban health planners in formulating inclusive and equitable healthcare strategies in Kolkata.

**Keywords:** Demographic, gender discrimination, gender gaps, healthcare infrastructure, patriarchal social structures.

### Session 3

#### *Parallel Session 4: Health Geography*

### **Public Health Vulnerability During 'Nautapa': An Empirical Study in East-Central India**

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Rising summer temperatures have intensified heat-related health risks across the globe. Extreme heat is no longer an occasional event but a recurring seasonal challenge that affects everyday life and public health systems. Among these periodic events, Nautapa stands out as a critical phase of extreme heat, placing growing pressure on public health systems in rapidly expanding cities. This study examines the relationship between severe heat conditions during Nautapa and its possible health related outcomes in Raipur, the capital of Chhattisgarh, with particular focus on heat-related illness and mortality. The analysis is based on secondary data collected from newspaper reports, meteorological observations, and documented heatwave events between 2014 and 2024. Media sources indicate that Raipur records approximately 6-8 heatstroke-related deaths each year during or shortly after Nautapa, with recent summers showing a noticeable increase in severity. During this period, air temperatures often approach or exceed 43°C, while ultraviolet radiation levels also remain consistently high. These extreme conditions contribute to acute health impacts, including heatstroke, dehydration, skin burns, and ocular irritation. Outdoor workers, such as daily wage labourers and traffic police personnel, along with elderly and economically vulnerable populations, bear the greatest burden of heat exposure. Prolonged heatwaves intensify physiological stress and place additional strain on public health services, particularly when combined with high humidity and delayed monsoon rainfall. The study highlights how sustained heat exposure, urban heat island effects, and limited adaptive capacity together heighten Raipur's vulnerability to extreme heat. Overall, the findings underscore the urgent need for regional heat action plans with targeted hotspots, effective early warning systems, improved occupational safety measures, and selective public awareness initiatives to reduce avoidable heat-related deaths. These measures



are essential for building urban resilience and protecting vulnerable populations under rapid climate changes events.

**Keywords:** Climate sensitivity; Environmental health risk; Population vulnerability; Thermal exposure; Urban resilience

## Perception of Menstrual Hygiene among College-Going and Non-College-Going Girls in Ara, Bihar: A Primary Survey

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Menstrual hygiene is a critical yet often neglected component of women's health, particularly in developing regions where socio-cultural taboos and lack of awareness continue to influence perceptions and practices. This study examines the perception of women regarding menstrual hygiene through a comparative primary survey of college-going and non-college-going girls in Ara town, Bihar. The research aims to assess levels of awareness, beliefs, hygienic practices, access to menstrual products, and the persistence of traditional myths associated with menstruation. A cross-sectional descriptive research design was adopted, and primary data were collected using a structured questionnaire comprising both close-ended and open-ended questions, including Likert-scale statements. The sample included respondents from different socio-economic and educational backgrounds to ensure representativeness. Quantitative data were analyzed using percentage analysis and comparative methods, while qualitative responses were thematically interpreted. The findings reveal significant differences in awareness, hygienic practices, and perception between college-going and non-college-going girls. While higher education is associated with better menstrual hygiene practices and scientific understanding, deeply rooted cultural stereotypes and restrictions persist across both groups. Limited access to affordable sanitary products and inadequate menstrual health education were identified as major challenges. The study underscores the need for comprehensive menstrual health education, community-based awareness programs, and improved access to hygienic menstrual products. The research contributes to the field of health geography by highlighting spatial and social disparities in menstrual hygiene perception within an urban-semi-urban Indian context.

**Keywords:** Menstrual Hygiene, Women's Health, Perception Study, Health Geography, Young Girls, Menstrual Socio-cultural Beliefs

## Spatial Inequality in Healthcare Access in Labpur C.D. Block of Birbhum district of West Bengal: A Geographic Overview

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Spatial disparity in healthcare access is an important issue in health geography, especially in rural India. The Labpur C.D. Block of Birbhum district, West Bengal, consists of about 179 villages, many of which are remote and isolated. Limited healthcare infrastructure, poor connectivity, and unequal distribution of medical services result in the rural population of this region being deprived of essential healthcare and having to depend on nearby urban health centers for treatment. This is why the Labpur C.D. Block has been selected for research in health geography. The aim of this research is to present a realistic picture of healthcare by analyzing the availability of village-based hospital facilities and pharmacies. The spatial distribution of healthcare facilities and challenges, such as the number of medical shops and Anganwadi centers within the block, is analyzed. The study also aims to observe the relationship between economic conditions and health risks, and to highlight the impact of drinking water on the local residents. The research was primarily conducted based on field observations and secondary data. Data was collected by observing the sanitation situation, block offices, census data, village-based data collection, health centers, and pharmacies. The research reveals that many villages lack nearby hospitals and medical shops, and problems such as long distance, poor transportation, and shortage of doctors are common. To reduce these disparities, mobile health units and village-based health planning are suggested.

**Keywords:** Health Geography, Spatial Disparity, Healthcare Accessibility, Rural Healthcare, Medical Infrastructure, Anganwadi Centers.

## Public Health Impacts of Riverine Pollution: A Demographic Study of Disease Patterns Along the Hindon River in Shimlana Village, Western Uttar Pradesh

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River pollution has emerged as a significant environmental and public health concern in many parts of India, particularly in rapidly urbanizing and industrializing river basins. The Hindon River, a major tributary of the Yamuna flowing through western Uttar Pradesh, is severely affected by untreated industrial effluents, domestic sewage, and agricultural runoff. Communities residing along its banks remain highly vulnerable to water-borne and environment-related diseases. This study examines the relationship between riverine pollution and disease burden through a demographic lens, focusing on Shimlana village located along the Hindon River. The primary objective of this research is to analyze the spatial and demographic distribution of disease patterns among households in Shimlana village and to assess how proximity to the polluted river influences public health outcomes. The study adopts a secondary-data-based methodology, using census records, health department reports, district statistical handbooks, and published literature. Demographic variables such as age, gender, occupation, household size, literacy level, and access to sanitation and drinking water have been correlated with reported disease incidences. Diseases commonly associated with contaminated water—such as diarrhoea, typhoid, skin infections, gastrointestinal disorders,



and vector-borne illnesses—form the core focus of analysis. Findings indicate a disproportionately higher disease burden among economically weaker sections, children, elderly populations, and households directly dependent on river or groundwater sources connected to the Hindon River. Occupational exposure, particularly among agricultural laborers and daily wage workers, further intensifies health risks. Poor sanitation infrastructure, lack of piped drinking water, and limited health awareness exacerbate vulnerability, reinforcing the link between environmental degradation and demographic susceptibility. Seasonal variations, especially during the monsoon, show an increase in disease prevalence due to flooding and contamination of local water sources. The study highlights the importance of integrating environmental management with public health planning. It underscores the need for effective river pollution control, improved sanitation facilities, safe drinking water supply, and targeted health interventions for riverine communities. By adopting a demographic approach, this research contributes to a deeper understanding of how environmental pollution translates into uneven health outcomes across population groups. The findings aim to support sustainable river basin management and inform policy initiatives aligned with public health and environmental sustainability goals in western Uttar Pradesh.

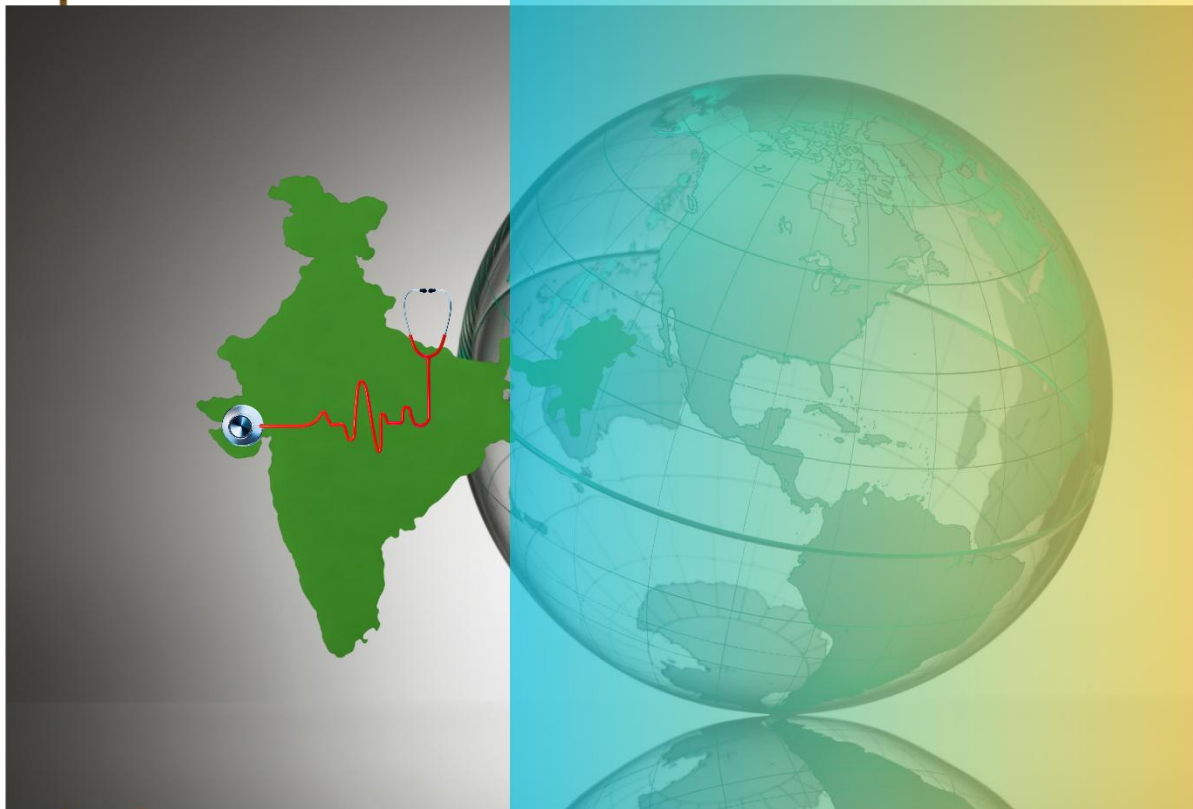


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