

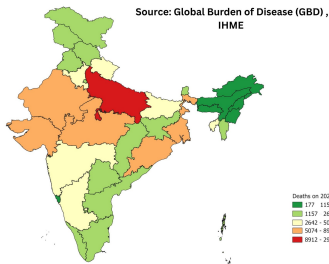
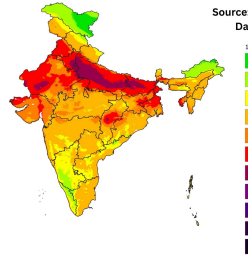
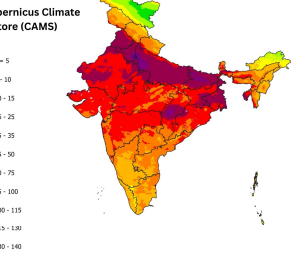
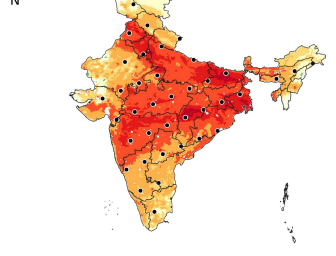
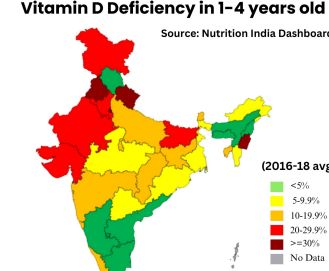
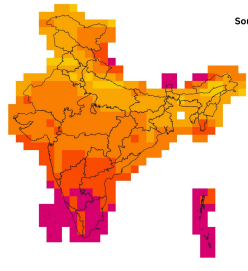
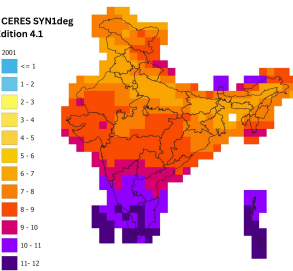
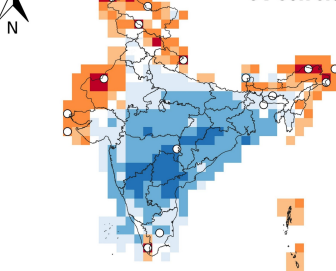
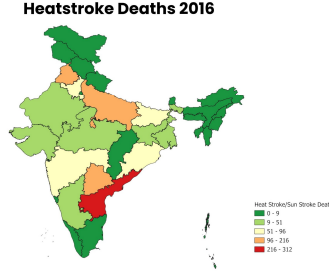
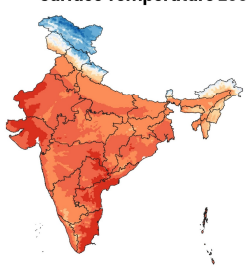
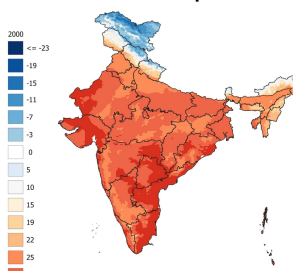
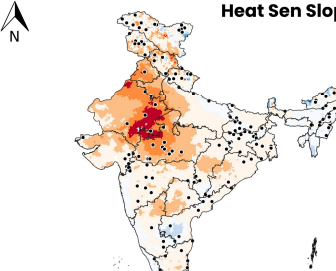
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Presented by: S. Satheesh MBA HHM (29) 2071

Vision: Harness, sustain and augment space technology for national development, while pursuing space science research and planetary exploration

PROBLEM STATEMENT	SWOT		METHODOLOGY									
- India's rising population faces increasing exposure to PM2.5, heat, and UV radiation - These environmental factors are linked to respiratory illness, heatstroke, and Vitamin D deficiency - There is a lack of long-term spatial-temporal analysis integrating all three variables - This research bridges that gap using satellite data to support evidence-based health planning	STRENGTHS Satellite-driven data mapping used to visualize PM2.5, heat, and UV trends over 25 years	WEAKNESS Health data was not available at district or city level	Data Sources ERA5 - (Surface Temperature) (ECMWF atmospheric reanalysis) CAMS (PM2.5) (Copernicus Atmosphere Monitoring Service) OMI/NASA (UV Radiation) (Ozone Monitoring Instrument)	Analysis Steps - Annual mean computation (1998-2024) - Seasonal trend analysis (PM2.5 only) - Sen's Slope + Mann-Kendall for trend significance (95% CI)	Tools Used - Python, VSC (xarray, rasterio, pandas)  - QGIS (Spatial Visualization, Sen Slope + Mann-Kendall test)  - ArcGIS (Map exports) 							
OBJECTIVES	ANALYSIS AND MAPPINGS											
- To assess long-term trends of PM_{2.5}, surface temperature, and UV radiation across India using satellite and reanalysis data - To identify spatial hotspots and seasonal variations in exposure - To apply Sen's Slope and Mann-Kendall test for trend significance - To visualize patterns through GIS maps for public health relevance - To compare environmental trends with mortality and Vitamin D deficiency data for risk insight	PM2.5 Deaths 2021 Source: Global Burden of Disease (GBD), IHME 	PM2.5 1998 Source: Copernicus Climate Data Store (CAMS) 	PM2.5 2023 Source: Copernicus Climate Data Store (CAMS) 	PM2.5 Sen Slope 95% 	Vitamin D Deficiency in 1-4 years old Source: Nutrition India Dashboard 	UV Radiation 2001 Source: CERES SYN1deg Edition 4.1 	UV Radiation 2023 Source: CERES SYN1deg Edition 4.1 	UV Sen Slope 95% 	Heatstroke Deaths 2016 Source: Data.gov.in (Deaths due to natural force, Heatstroke / Sunstroke) 	Surface Temperature 2001 Source: ERA 5 Satellite Re-analysis Data 	Surface Temperature 2016 Source: ERA 5 Satellite Re-analysis Data 	Heat Sen Slope 95% 
KEY FINDINGS	- Maps showed consistently high PM2.5 levels across the Indo-Gangetic Plain, with a steady rise in pollution-linked deaths peaking above 140,000 annually, especially in Uttar Pradesh and Bihar. - Warming trends were strongest in central and western India (up to +0.06°C/year), aligning with heat-related deaths that peaked in 2016 and 2019, notably in Telangana and Andhra Pradesh - Despite high UV levels in the south, northern and northeastern states had low seasonal UV exposure, correlating with widespread Vitamin D deficiency, especially in children aged 0-19 years											