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Elevated C-Reactive Protein among Older Adults in India: Implications for Healthy Ageing and NCD Prevention

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Background

Non-communicable diseases (NCDs) are the dominant cause of mortality and morbidity worldwide, responsible for approximately 43 million deaths annually, which accounts for around 75% of all global non-pandemic deaths. This burden is especially high in low- and middle-income countries, where over 80% of premature NCD deaths occur due to inequities in risk exposure and access to health care (WHO, 2023). Chronic low-grade systemic inflammation has emerged as a critical biological pathway underlying the development and progression of major NCDs, including cardiovascular disease, type 2 diabetes, frailty, and cognitive decline. Elevated circulating C-reactive protein (CRP), a widely recognised marker of systemic inflammation, is associated with increased risk of mortality and adverse health outcomes in ageing populations in diverse global settings (Franceschi et al., 2018; Kuo et al., 2006). Despite this compelling evidence, inflammatory risk is seldom incorporated into routine public health surveillance or prevention programmes particularly in resource-limited contexts.

In India, rapid demographic ageing, urbanisation, and lifestyle changes contribute to rising NCD prevalence, yet public health programmes addressing NCDs, anaemia, and elderly health largely function in isolation, overlooking common upstream biological vulnerabilities such as inflammation. Evidence on the prevalence and social patterning of elevated inflammation among older adults in India remains elusive. This study fills a critical evidence gap by quantifying inflammatory risk and identifying high-risk subgroups, generating actionable evidence to inform integrated and preventive policy responses aimed at healthy ageing and as a pre-cursor in NCD prevention.

Data and Approach

This brief uses nationally representative data from the Longitudinal Ageing Study in India (LASI), Wave 1 (2017–18), covering 57,682 adults aged 45 years and above. C - reactive protein (CRP) levels were classified into risk categories, and high CRP prevalence was examined across demographic, behavioural, biological, and geographic factors. Associations were verified using descriptive statistics, chi-square tests, and adjusted odds ratios to identify attributes of elevated inflammatory risk.

IIPS Research Brief

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Key Findings

Nearly one in ten older adults in India (9.9%) has elevated C-reactive protein, indicating a substantial inflammatory burden. This has a positive age-gradient reaching a level of 10.7 and 11 per cent respectively among women and men aged 60+ (Table 1). Adjusted results confirm higher odds among older adults (OR: 1.07; 95% CI: 1.01-1.14). Although prevalence is slightly higher among women, sex differences are not statistically significant (OR: 0.96; 95% CI: 0.90-1.02), indicating age as the primary driver.

Physical activity shows a strong gradient. Among late age adults aged 60+, high CRP reaches 12.5% in men and 12.2% in women who hardly ever engage in moderate activity, compared to 7.8% and 5.6% among those with engaged in regular physical activity (Table 1). Adjusted analysis (Table 1) shows 1.5 times higher odds among physically inactive individuals (OR: 1.50; 95% CI: 1.39-1.62).

Anaemia too depicts a strong association with inflammation. Among adults aged 60+, high CRP (14%) is experienced among anaemic men and 13.4% among anaemic women in contrast of 9.8% and 9.4% among non-anaemic men and women (Table 1). Adjusted results show 1.3 times higher odds of CRP among those with anaemia (OR: 1.30; 95% CI: 1.22-1.38).

Table 1: Age- and Gender-Specific Distribution and Determinants of High C-Reactive Protein (CRP) Across Selected Background Characteristics, Longitudinal Aging Survey of India, 2017-18.

	% of high CRP of Age 45-59, N=30,221		**% of high CRP of Age 60 & above, N=27461**		**Total Population**	**Adjusted OR (95% CI)**
Covariates	***Male***	***Female***	***Male***	***Female***		
Age						
45-59					30,221	
60 & above					27,461	1.07 [1.01-1.14]*
Sex						
Male					26,720	
Female					30,962	0.96 [0.90-1.02]
Engage in moderate activities						
Every day	6.1	7.4	7.8	5.6	13,890	
More than once a week	8.3	9.2	6.2	8.2	4,058	1.04 [0.90-1.19]
Once a week	8.3	7.6	6.5	14.7	21,30	1.27 [1.08-1.50]**
One to three times a month	7.7	7.1	13.3	7.5	2,926	1.24 [1.07-1.44]**
Hardly ever or never	9.1	10.6	12.5	12.2	34,678	1.50 [1.39-1.62]***
Anaemia level						
Not anaemic	7.2	9.1	9.8	9.4	42,959	
Any anaemia	11.0	10.2	14	13.4	14,723	1.30 [1.22-1.38]***
Living arrangements						
Living alone	17.1	11.4	15.9	8.5	1,930	
Living with spouse or others	9.1	9.8	9.8	12.0	8,869	1.00 [0.85-1.18]
Living with spouse and children	7.2	9.2	9.9	9.2	34,002	0.92 [0.78-1.08]
Living with children and others	10.1	10.2	13.8	12.7	11,004	1.02 [0.87-1.20]
Living with others only	8.3	9.6	15.0	9.9	1,877	0.94 [0.76-1.17]
Place of residence						
Rural	7.6	8.3	11	9.0	38,072	
Urban	7.5	12.0	9.8	15.4	19,610	1.36 [1.28-1.45]***
Total	7.6	9.7	10.7	11.0	57,682	

*Adjusted for age, sex, year of schooling, wealth quintiles and castes, N=57,682

Living alone is also associated with higher crude prevalence (17.1% among men aged 45-59 and 15.9% among men aged 60+), but loses its significance following adjustment (Table 1). Urban-rural disparities in this parameter are evident, especially among older women (15.4% vs 9.0%). Adjusted results indicate 1.36 times higher odds among urban residents (OR: 1.36; 95% CI: 1.28-1.45), suggesting an independent urban effect.

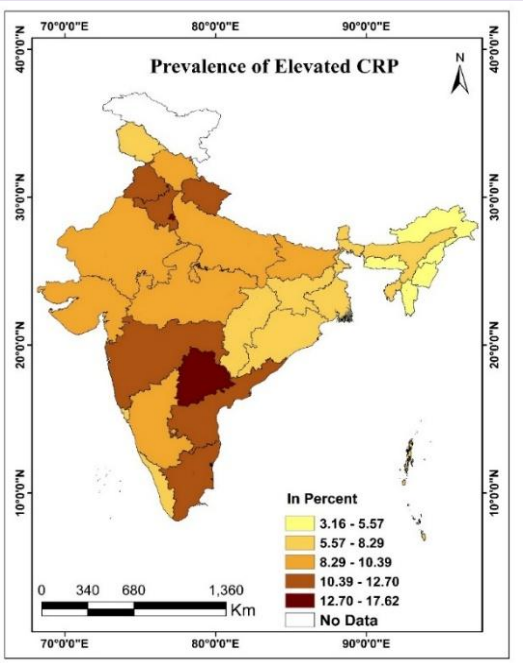

Figure 1: State-level prevalence of elevated C-reactive protein among adults aged 45 years and above in India, Longitudinal Aging Survey of India, 2017-18.

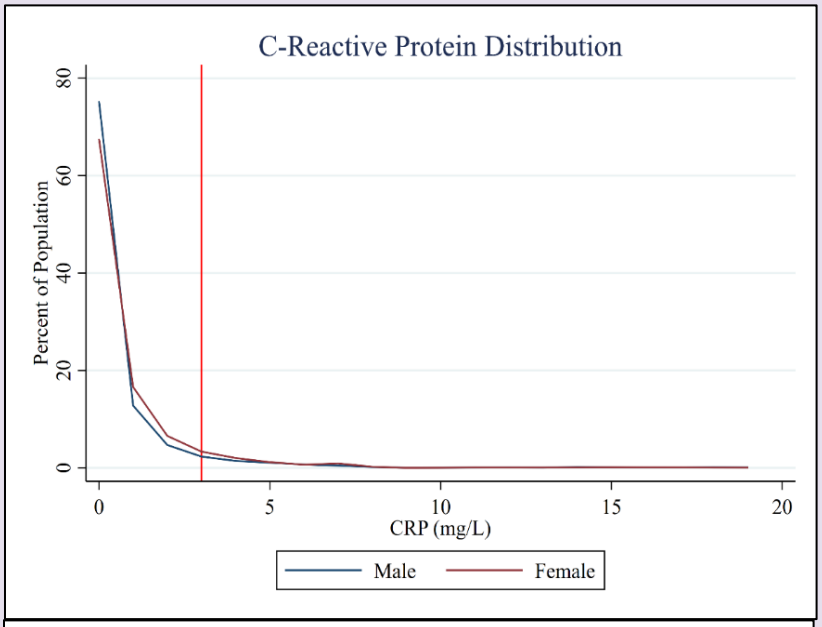

Figure 2: Distribution of C-Reactive Protein (CRP) by Gender, Longitudinal Aging Survey of India, 2017-18.

Figure 1 shows substantial inter-state variation in elevated C-reactive protein among adults aged 45 years and above in India. Higher prevalence (above 12%) is observed in several southern and western states and highly urbanised Union Territories, while many northeastern and eastern states show lower levels. Central and northern states fall in the intermediate range, indicating its widespread but uneven distribution shaped by urbanisation, lifestyle, and regional contexts.

Figure 2 presents the distribution of CRP levels by gender. The distribution is strongly right-skewed, with most individuals clustered below 1 mg/L. The high-risk threshold (≥3 mg/L) captures a smaller proportion of the population. Gender differences are modest, with slightly higher proportions among women at intermediate levels, but overall patterns are similar, consistent with findings that gender is not an independent predictor of elevated CRP.

Missing focus

Inflammatory risk generally remains overlooked in routine public health screening. Despite its strong connect with cardiovascular disease, disability, and mortality, it is not emphasised in geriatric or NCD programmes, missing many at-risk.

Rapid urbanisation and population ageing are likely to further increase inflammation-related morbidity, driven by sedentary lifestyles, dietary changes, stress, and environmental exposures.

Fragmented intervention for NCDs, anaemia, and ageing limit effective risk reduction, as current programmes operate in silos and overlook shared biological pathways such as inflammation.

Socially vulnerable older adults, including widowed and isolated individuals and disadvantaged groups, face compounded biological and psychosocial risks, which are inadequately addressed by existing health systems.

Policy Pathways and Course Correction

1. Integrate inflammatory risk into ageing and NCD strategies
Incorporating inflammation-focused assessment for adults aged 60+ within existing screening systems can improve early identification and prevention.

2. Prioritise urban and large-burden states
Urban programmes and high-prevalence regions may be prioritised with context-specific prevention strategies addressing lifestyle and environmental risks.

3. Promote physical activity for older adults
Strengthening community-based and primary care-led physical activity initiatives can reduce inflammation and support healthy ageing.

4. Link anaemia control with chronic disease prevention
Integrating anaemia management with NCD care can improve recognition of broader biological vulnerability.

5. Address social vulnerability
Strengthening outreach and community support can reduce risks among socially isolated and disadvantaged older adults.

6. Move beyond income-only targeting
Policies should prioritise biological and functional risk rather than focusing on economic vulnerability alone.

Conclusion

Elevated C-reactive protein affects nearly one in ten older adults in India and exhibits pronounced age, residential, social, and regional disparities. These patterns highlight systemic inflammation as a critical but under-recognised determinant of healthy ageing and future NCD burden. Integrating inflammatory risk into existing health programmes, promoting physical activity, addressing anaemia, and targeting socially vulnerable populations can substantially strengthen India's response to ageing-related health challenges and support healthier longevity.

Note:

International Institute for Population Sciences (IIPS), National AIDS Research Institute (NARI), and Ministry of Health and Family Welfare (MoHFW), Government of India. *Longitudinal Ageing Study in India (LASI), Wave 1 (2017–18): India Report*. Mumbai: IIPS; 2020.

International Institute for Population Sciences (IIPS), ICMR-NITVAR, Harvard T.H. Chan School of Public Health (HSPH), University of Southern California (USC). *Longitudinal Ageing Study in India (LASI) Wave 1: Report on biomarkers based on dried blood spot assays*. Mumbai: IIPS; 2025.

World Health Organisation. (2023). *Noncommunicable diseases: Key facts*. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

Franceschi, C., Garagnani, P., Parini, P., Giuliani, C., & Santoro, A. (2018). Inflammaging: A new immune-metabolic viewpoint for age-related diseases. *Nature Reviews Immunology, 18*(10), 622–636. https://doi.org/10.1038/s41577-018-0069-2

Kuo, H. K., Bean, J. F., Yen, C. J., & Leveille, S. G. (2006). Linking C-reactive protein to late-life disability in older adults. *Journal of Gerontology: Series A, Biological Sciences and Medical Sciences, 61*(4), 380–387. https://doi.org/10.1093/gerona/61.4.380