PREVALENCE AND PREDICTORS OF GESTATIONAL DIABETES MELLITUS IN INDIA: A SECONDARY DATA ANALYSIS OF NFHS (NFHS-1 to NFHS-5)

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Abstract

Background: Gestational Diabetes Mellitus (GDM) is a pregnancy-associated glucose intolerance linked to adverse maternal and neonatal outcomes and a higher lifetime risk of type 2 diabetes. Objective: To examine GDM patterns in India across NFHS rounds—with primary analysis of NFHS-4 and NFHS-5—and discuss implications for policy and practice. Methods: A secondary analysis using NFHS data was undertaken; NFHS-1 to NFHS-3 did not include a specific GDM indicator, hence, trend analysis focuses on NFHS-4 v/s NFHS-5. Descriptive statistics, simple trend charts, and inter-state comparisons are presented; contextual comparison with pooled research estimates illustrates potential underestimation in self-reported survey data. Results: National prevalence increased from 0.53% (NFHS-4) to 0.80% (NFHS-5); selected states such as Goa (4.88%) and Kerala (3.06%) reported higher prevalence. Conclusion: Self-reported NFHS data indicate a rising trend, though the true burden likely exceeds survey estimates; strengthening screening, data quality, and program integration is recommended.

Introduction

Gestational Diabetes Mellitus (GDM) contributes to maternal morbidity, adverse perinatal outcomes, and heightened non-communicable disease risk. India's demographic and nutritional transition necessitates robust surveillance and policy action. The National Family Health Survey (NFHS) series, conducted since 1992, is a key source of population-level health indicators. While NFHS-1 to NFHS-3 did not capture a direct GDM indicator, NFHS-4 and NFHS-5 include self-reported measures relevant to GDM, enabling preliminary trend and distribution analysis.

Literature Review (Brief)

Multiple Indian studies report higher GDM prevalence (typically 10–18%) when based on clinical screening using IADPSG or WHO 1999 criteria. These estimates exceed NFHS self-reported figures, indicating under-detection in household surveys. Urban residence, higher maternal age, pre-pregnancy overweight/obesity, and family history of diabetes are consistent risk factors identified across studies.

Objectives & Research Questions
Primary Objective: To analyze GDM prevalence patterns in India using NFHS data, with a focus on NFHS-4 vs NFHS-5.

Research Questions:

• How has self-reported GDM prevalence changed between NFHS-4 and NFHS-5 at the national level ?

• What are the inter-state differences in NFHS-5 ?

• How do NFHS figures compare with pooled research estimates, and what does this imply for surveillance and program design?

Conceptual Framework & Variables

Outcome: Self-reported GDM among pregnant women (NFHS). Exposure/Correlates (conceptual): Demographic (age, parity), socio-economic (education, wealth), residence (urban/rural), and health system factors (access to ANC and screening). Given data constraints herein, the report focuses on aggregate prevalence.

Study Design & Data Sources

Design: Secondary data analysis of NFHS rounds (NFHS-1 to NFHS-5); GDM-specific analysis limited to NFHS-4 and NFHS-5. Data Sources: NFHS published tables and indicators relevant to GDM; contextual triangulation with peer-reviewed syntheses for comparison.

Sampling & Inclusion/Exclusion

NFHS employs a stratified, two-stage sampling design to ensure representativeness. Inclusion for this analysis: women reporting on pregnancy-related conditions corresponding to the GDM indicator in NFHS-4/5. NFHS-1 to NFHS-3 lacked a GDM measure and are excluded from GDM-specific estimates.

Data Collection & Quality

NFHS-4/5 data on GDM are self-reported during household interviews; clinical validation is limited. Potential biases include recall and access-to-diagnosis bias, likely leading to underestimation relative to clinical screening studies.

Statistical Analysis Plan

Descriptive statistics are used to summarize national and state-level prevalence. A simple two-point trend (NFHS-4 vs NFHS-5) is presented. Where appropriate, contextual comparisons with pooled research estimates illustrate gaps. Advanced regression modeling is recommended for future work once microdata with appropriate weights and covariates are accessed.

Ethical Considerations

This study uses publicly available, de-identified secondary data. No individual consent procedures are required for this report. When using NFHS microdata, ethical approval and data-use agreements should be followed as per DHS Program policies.
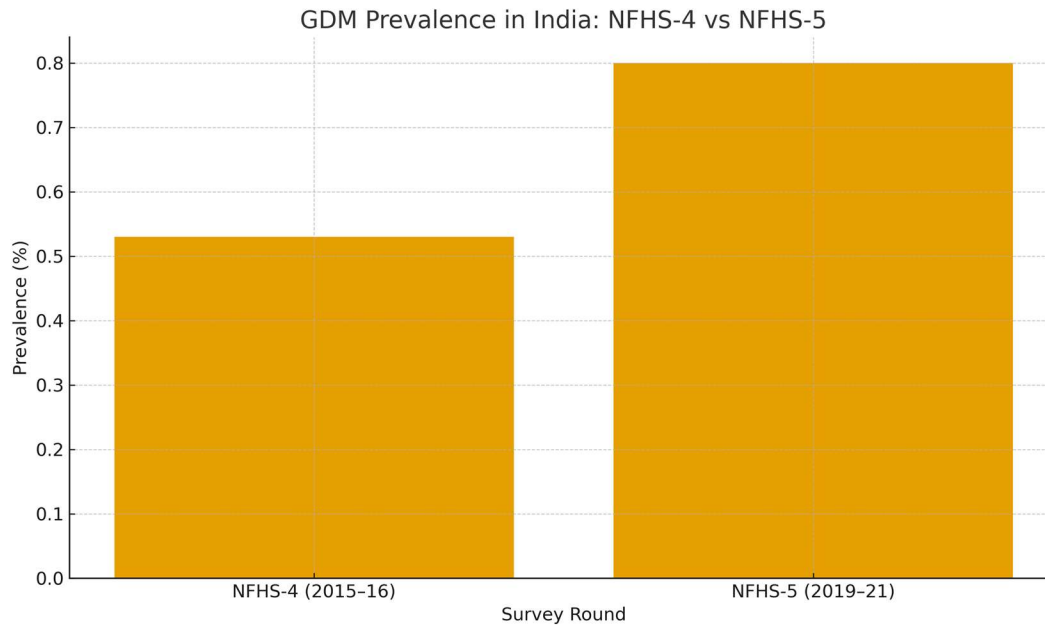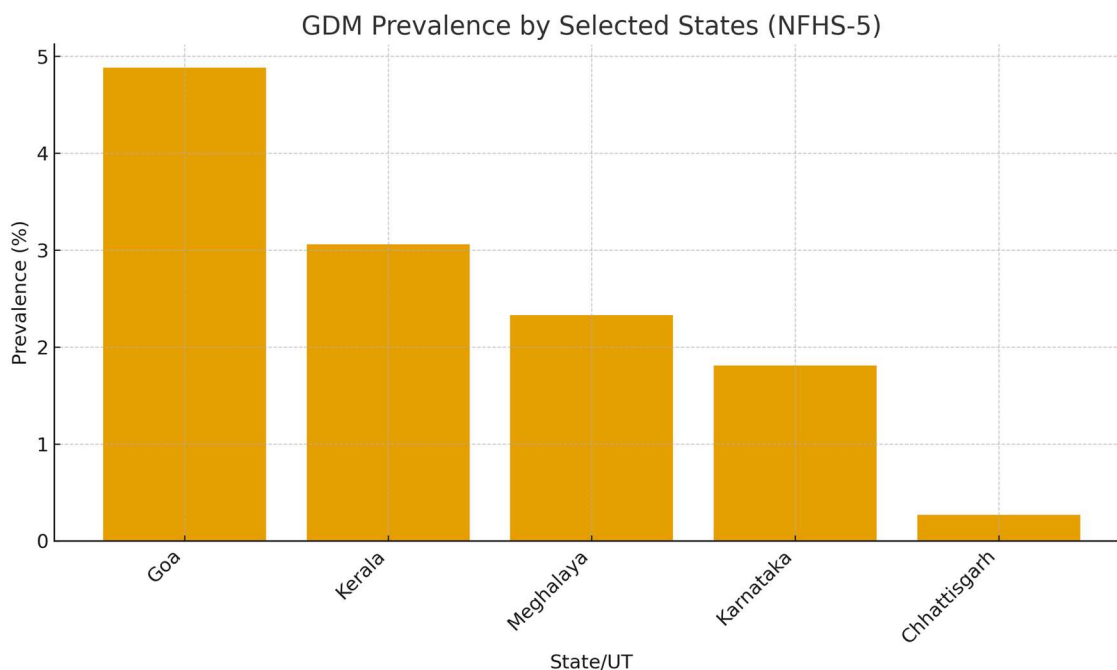
Results
10.1 National Trend (NFHS-4 to NFHS-5)

GDM Prevalence in India: NFHS-4 vs NFHS-5

National self-reported GDM prevalence increased from 0.53% in NFHS-4 (2015–16) to 0.80% in NFHS-5 (2019–21).

10.2 Inter-state Comparison (NFHS-5 Selected States)

GDM Prevalence by Selected States (NFHS-5)

Selected states show wide variation, with Goa (4.88%) and Kerala (3.06%) higher than Karnataka (1.81%) and Chhattisgarh (0.27%). Such differences may reflect both true epidemiologic variation and differences in screening and diagnosis.

10.3 Contextual Comparison (Survey vs Clinical Estimates)

NFHS-5 Self-reported vs Research Pooled Estimate (Context)
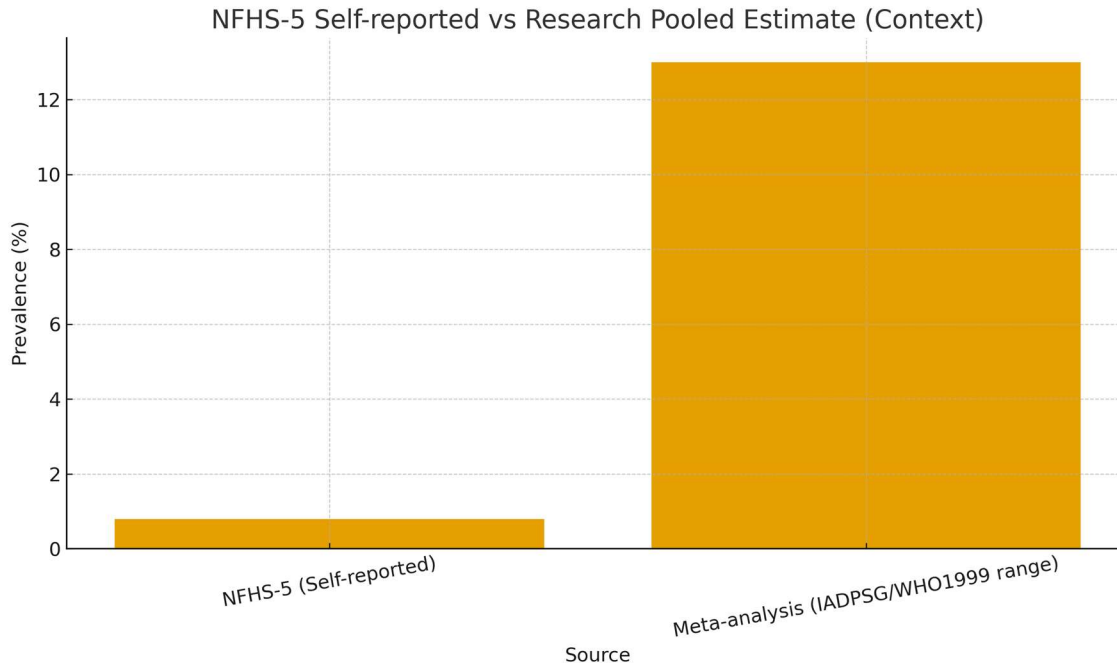
A pooled research estimate (~13%) using clinical diagnostic criteria (IADPSG/WHO 1999) considerably exceeds NFHS-5's self-reported 0.80%, suggesting under-detection in household surveys and underscoring the need to strengthen ANC-based screening.

Discussion

The upward national trend between NFHS-4 and NFHS-5, coupled with substantial inter-state variation, indicates both evolving epidemiology and improvements in detection/reporting. The divergence between NFHS self-reports and clinical-study estimates points to a probable underestimation in surveys that rely on recall and access to testing. Programmatically, universal ANC screening using standardized criteria, better referral pathways, and robust data systems are essential. State-specific strategies should address urbanization, lifestyle risks, and health system readiness.

Limitations

• NFHS-1 to NFHS-3 lacked a GDM indicator; trend analysis is limited to NFHS-4 vs NFHS-5.
• NFHS GDM is self-reported and may underestimate true prevalence.
• This report uses aggregated published figures; advanced analyses would require access to microdata and survey weights.

Conclusion

GDM poses an increasing public health challenge in India. NFHS-4 to NFHS-5 shows a rising trend, with notable inter-state variation. Given the likely underestimation in self-reported surveys, strengthening universal screening and improving data systems should be prioritized.

Recommendations

1) Integrate universal, quality-assured GDM screening into routine ANC, with standardized protocols (e.g., IADPSG/WHO 1999).
2) Build capacity of ANMs/Staff Nurses/ObGyns for early detection, counseling, and follow-up.
3) Enhance data capture of GDM in HMIS/U-WIN and ensure regular data quality audits and triangulation with facility records.
4) Develop state-specific action plans addressing high-burden districts and urban hotspots.
5) Strengthen postpartum follow-up and lifestyle counseling to mitigate future T2DM risk.
6) Promote operational research and periodic validation studies comparing survey and clinical data.

References

• NFHS-4 (2015–16) and NFHS-5 (2019–21) published reports/tables on maternal conditions.
• Peer-reviewed Indian studies/meta-analyses on GDM prevalence using IADPSG/WHO criteria.
• WHO and Government of India guidelines on GDM screening and management.