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Evaluating the family adoption program as a noncommunicable disease surveillance tool in India: A systematic review

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ABSTRACT

India faces a rising noncommunicable disease (NCD) burden, highlighting the need for effective surveillance. The family adoption program (FAP), a medical education initiative engaging students with communities, presents potential for data collection. This systematic review evaluated FAP's effectiveness as an NCD surveillance tool. Following PRISMA guidelines, relevant databases were searched (2020–2025) for FAP studies reporting prevalence data on obesity, anemia, diabetes, or hypertension. Three FAP studies, including the National Medical Commission FAP Survey Report 2024, were compared against five national reports. While FAP-derived obesity prevalence closely matched National Family Health Survey −5 data, significant discrepancies were found for hypertension, anemia, and diabetes estimates. These were attributed to methodological inconsistencies, lack of population representativeness, and variations in training and equipment calibration within FAP compared to standardized national surveys. FAP data showed moderate–high bias risk. Although valuable for experiential learning and local health initiatives, FAP currently lacks the methodological rigor and representativeness for reliable national/state NCD surveillance without significant standardization and quality improvements.

Key words: Family adoption program; Noncommunicable diseases; Medical education India; Public health surveillance; Systematic review

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INTRODUCTION

India faces a growing public health crisis from non-communicable diseases (NCDs) such as cardiovascular diseases (CVDs), diabetes, obesity, chronic respiratory conditions, and anemia.[1] These ailments represent 63% of all deaths, showing a shift from infectious to chronic diseases.[2] Globally, NCDs cause 41 million deaths yearly, particularly affecting low- and middle-income nations like India.[3] In India, CVDs account for 28–45% of NCD deaths, chronic respiratory diseases for 11–22%, cancers for 8–12%, and diabetes for 3%. The rise in risk factors like poor diets, physical inactivity, tobacco and alcohol use, obesity, high blood pressure, and dyslipidemia stems from urbanization, globalization, and aging populations.[2] NCDs create economic strain through productivity losses and healthcare costs, potentially costing India $4.6 trillion by 2030, necessitating urgent monitoring and intervention.[4]

Effective surveillance systems are essential for tracking NCDs, identifying high-risk populations, guiding policy decisions, and evaluating interventions. India's NCD surveillance includes the National Family Health Survey (NFHS) for health and nutrition data, the ICMR-India Diabetes (ICMR-INDIAB) study for metabolic NCDs, and input from the National Nutrition Monitoring Bureau (NNMB).[5] The National NCD Monitoring Survey (NNMS) and NPCDCS data further support surveillance.[6] However, challenges in data coverage, quality, and integration remain, creating an urgent need

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for innovative strategies to strengthen NCD surveillance at the community level.[7]

The Family Adoption Program (FAP) is an initiative in Indian medical education, required by the National Medical Commission under the Competency-based Medical Education (CBME) framework.[8] First-year MBBS students adopt three to five families from rural or underserved regions and maintain engagement throughout their studies.[9] FAP's main goals are educational, providing students exposure to community environments, improving communication skills, and fostering community-focused healthcare.[10] Students collect sociodemographic data, conduct health assessments, screen for health issues, and implement health education initiatives.[11] With health-related data generated across institutions and communities, questions arise about FAP's potential role in NCD surveillance, particularly for local health information needs.

This systematic review assesses FAP's potential as an instrument for determining major NCD prevalence in India, focusing on obesity (measured by body mass index (BMI) and Waist-to-Hip Ratio, anemia (assessed through hemoglobin levels), diabetes mellitus (evaluated via blood glucose tests), and hypertension (monitored through blood pressure). It investigates alignment between FAP prevalence rates and those from national surveys such as NFHS, NNMB, and ICMR-INDIAB, while examining methodological, population-based, and implementation factors that might explain observed differences. The review evaluates whether FAP, in its current educational and varied implementation form, can serve as a dependable surveillance tool for these conditions within Indian communities.

METHODS

This review examines research from India (2019–2025) presenting prevalence data from FAP interventions for identified health conditions. The review follows PRISMA guidelines for systematic reviews and meta-analyses, including quality assessment using suitable tools for observational research. The protocol was registered on the Open Science Framework (https://doi.org/10.17605/OSF.IO/5JGW9).

ESTABLISHED FRAMEWORK OF NCD SURVEILLANCE IN INDIA AND PICO FRAMEWORK

Understanding India's NCD monitoring framework is crucial for evaluating new initiatives like the FAP. Key national efforts, including the NFHS, ICMR-INDIAB study, NNMB surveys, NNMS, and NPCDCS form the surveillance foundation.[12-15] NFHS-5 (2019–2021) expanded clinical evaluations for national representation, while ICMR-INDIAB assessed diabetes and metabolic disorders across India.[16] Although NNMB surveys provided nutrition-related NCD insights, recent updates are limited. NNMS established NCD risk factor baselines, and NPCDCS offered programmatic data without statistical representation.

Methodological variations exist across surveys. NFHS-5 used the World Health Organization (WHO) obesity and anemia cutoffs, utilizing Seca stadiometers and HemoCue analyzers with capillary sampling. For diabetes, NFHS-5 measured random blood glucose, while ICMR-INDIAB followed WHO standards using fasting glucose or glycated hemoglobin.[15] Blood pressure protocols varied, with different thresholds affecting prevalence estimates. These systems reported prevalence rates for overweight/obesity (24–28%), anemia (25–57%), diabetes (11–16%), and hypertension (21–35%). This review used these surveillance data as primary comparators for FAP findings, enabling assessment of FAP's methodology and utility within India's NCD surveillance framework.

This review examined Indian communities involved with medical colleges through the FAP from 2020 to 2025, comparing them with aforementioned national health survey samples. Undergraduate medical students in their first three MBBS years collected health indicators, including anthropometric data, blood pressure, blood glucose, and hemoglobin levels from adopted families. FAP data were compared against national surveillance systems like the NFHS-5, 2019–2021, ICMR-INDIAB study (up to 2020), NNMB reports, and NNMS. The study assessed agreement between NCD prevalence rates – focusing on obesity/overweight, anemia, diabetes mellitus, and hypertension – from FAP versus national surveys, explored discrepancy factors, evaluated FAP's potential as an NCD surveillance tool, and identified methodological limitations.

ELIGIBILITY CRITERIA

Eligible studies were empirical investigations focused on FAP implemented by Indian medical colleges during January 2020–April 2025. Studies required health data collection by undergraduate medical students (years 1–3), including anthropometric measurements, blood pressure, glucose levels, or hemoglobin. Inclusion criteria covered: prevalence of overweight/obesity, hypertension, diabetes, or anemia from FAP data; comparisons with national surveys (NFHS, NNMS, INDIAB, NNMB); or methodological assessment of FAP's reliability. Peer-reviewed articles and institutional reports with original analyses were included.

Studies excluded were those unrelated to FAP, outside 2020–2025, focused on other outcomes, or lacking NCD prevalence analysis or methodological evaluation. Non-empirical works, narrative reviews, conference abstracts, non-English publications, and inaccessible full texts were excluded. For multiple publications using the same data, the most comprehensive version was selected.

INFORMATION SOURCES AND SEARCH STRATEGY

A search was performed using PubMed, Embase, and Google Scholar databases to locate articles meeting predetermined inclusion and exclusion criteria from April 1st to April 25th, 2025. The manuscript's conclusion includes the search strategy with keywords and Boolean operators. The evidence flow process was charted following PRISMA guidelines and is illustrated in Figure 1.

STUDY SELECTION/SCREENING PROCESS

The study selection involved two stages: Screening of titles/abstracts and evaluation of full texts. Two reviewers independently conducted screening using Rayyan QCRI, following eligibility criteria.[17] Disagreements were resolved through discussion. Zotero was used for managing the citations.[18] This approach ensured methodological rigor and minimized selection bias.

DATA EXTRACTION

Information was gathered using a standardized form created for this review. Variables included study design, scope, sample size, target population, purpose, and key outputs, including prevalence estimates and methodological observations. Two reviewers conducted the extraction independently, with discrepancies resolved through discussion.

DATA SYNTHESIS

A narrative synthesis method combined findings from included studies. Due to diverse methodologies, results were summarized descriptively rather than using meta-analysis. The synthesis compared prevalence estimates of NCD such as obesity, anemia, diabetes, and hypertension

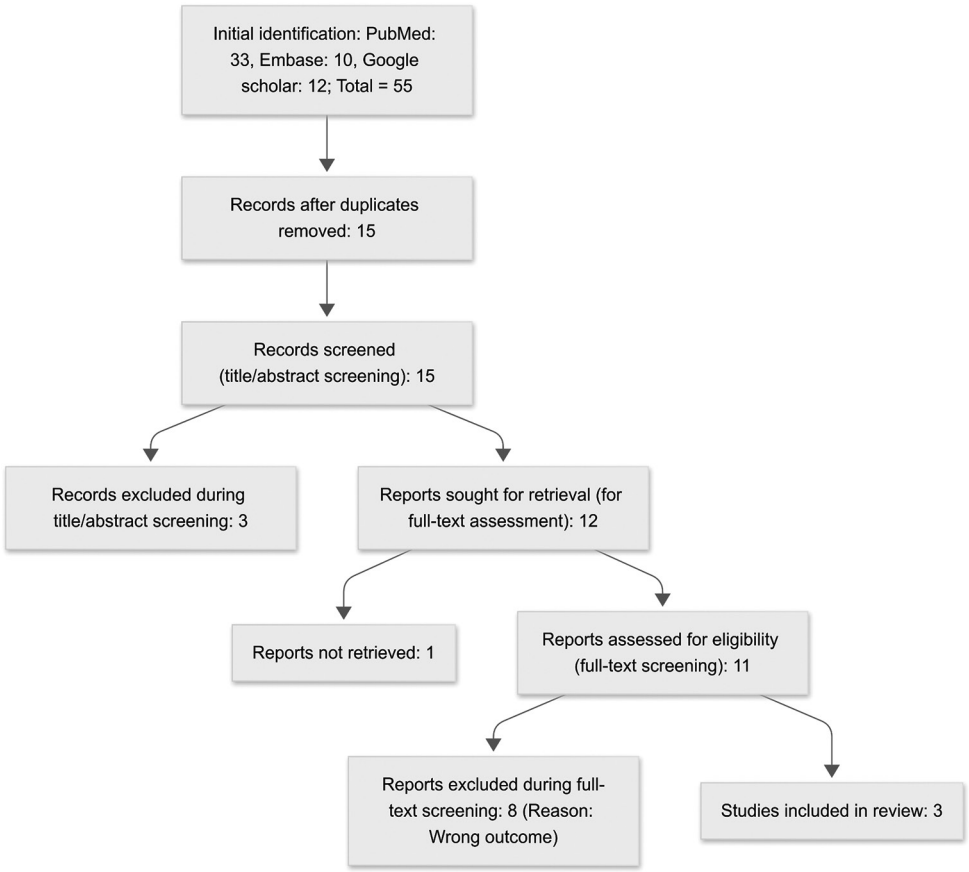

Figure 1: PRISMA flow diagram: Screening phase steps

from FAP initiatives with national surveys such as NFHS-5 and ICMR-INDIAB. It also examined methodological and implementation factors explaining observed differences, placing FAP-derived data's reliability within NCD surveillance context.

CRITICAL APPRAISAL

The methodological quality of included studies was evaluated using the STROBE checklist[19] for observational studies and JBI checklists for descriptive studies.[20] Two reviewers independently performed evaluations, resolving disagreements through discussion. Critical appraisals were synthesized narratively for FAP-related studies and comparator sources as well, to provide context and to guide the interpretation of findings based on study quality differences.

CRITICAL SYNTHESIS AND DISCUSSION

Table 1 lists the summary characteristics of FAP data sources. A summary of the comparator material is included for context and perspective.

The FAP, mainly an educational component of CBME curriculum, includes activities that produce health data at community level, indicating its potential role in surveillance. First-year MBBS students engage with 3–5 families, focusing on health evaluations, data gathering, and community interaction, positioning them as "first doctors" building trust. FAP begins with sociodemographic surveys using tools like EpiCollect5, followed by anthropometric measurements, clinical exams, and basic NCD screenings.[26] BMI calculations are common, but details about standardized equipment and calibration are often missing. Hemoglobin estimation through capillary sampling at health camps resembles NFHS-5's method but lacks detail on devices and quality control.[9,23] Diabetes screening uses random blood sugar (RBS) testing with portable glucometers, applying thresholds like >140 mg/dL, similar to NFHS-5 but different from ICMR-INDIAB standards.[26,27] Blood pressure measurements lack consistent protocols. Health assessments by students and supervised staff show variations in training and technique, risking data quality.[9]

REPORTED NCD PREVALENCE DATA FROM FAP INITIATIVES

Data on NCDs prevalence from FAP activities are scarce and vary methodologically. The FAP Survey Report 2024 provides comprehensive data from 496 medical colleges

Table 1: Summary characteristics of comparator and FAP data sources

S. No.	Citation	Study design	Scope	Sample size	Target population	Purpose	Key outputs
1	Anjana et al. (2016), ICMR-INDIAB Phase I Report	Cross-sectional (population-based)	4 regions in India	~57,000	Urban and rural adults (≥20 years)	To estimate prevalence of diabetes and other metabolic NCDs	Prevalence of diabetes, hypertension, obesity, and dyslipidemia
2	ICMR-NCDIR (2020), NNMS 2017–2018	Cross-sectional (National monitoring survey)	National	~12,000 adults+adolescents	Adolescents (15–17) and adults (18–69)	Track national NCD risk factors	Tobacco, alcohol use, obesity, BP, diabetes, physical activity
3	IIPS and ICF (2021), NFHS-5 India Report (Vol I and II)	Cross-sectional household survey	National and state-level	>610,000 households	Women (15–49), men (15–54), children	Population health and family welfare indicators	Fertility, mortality, nutrition, NCDs, domestic violence
4	NMC (2024), Family Adoption Programme Survey Report	Cross-sectional descriptive survey	National (496 Medical Colleges)	1.2 million+individuals	Families adopted under FAP	Evaluate FAP implementation and NCD surveillance	Prevalence of HTN, DM, nutrition status, community health activities
5	Mehta et al. (2024), Community As A Classroom	Cross-sectional observational study	Government Medical College, Surat	1072 BP, 535 RBS screened	Families adopted by 250 MBBS students	Evaluate FAP implementation and student learning	Hypertension and diabetes prevalence, educational impact
6	Dr. BVP Rural Medical College (2024), Loni Khurd Report	Descriptive field report	Loni Khurd village	899 families, 2,851 individuals	Adopted rural families	Comprehensive family health assessment	NCD screening, BMI, anemia, ABHA enrollment

FAP: Family Adoption Programme, ICMR-INDIAB: ICMR-India Diabetes, NCDs: Non-communicable disease, NNMS: National non-communicable disease Monitoring survey, BP: Blood pressure, NFHS: National Family Health Survey, HTN: Hypertension, DM: Diabetes mellitus, BMI: Body mass index, RBS: Random blood sugar. This table provides a consolidated overview of the core characteristics of national-level health surveys and institutional Family Adoption Programme reports used for comparative analysis.[14,21-25]

and 1.2 million people. Prevalence rates include high blood pressure (17%), irregular blood sugar (14%), obesity (24% women, 22% men), underweight (14% of women, 12% of men), anemia in children (31%), pregnant women (38%), non-pregnant women (39%), and men (19%), and child stunting (15%) and wasting (10.5%). Studies from institutions in Surat and Loni Khurd show fragmented reporting with varying age groups and inconsistent screening definitions. These variations in denominators and methods make direct comparisons with national surveys like NFHS or ICMR-INDIAB difficult, requiring careful interpretation until better methodological clarity emerges.

The inconsistency in FAP implementation across institutions raises concerns about its effectiveness as a surveillance tool. These differences stem from institutional type, visit timing, student deployment methods, family assignments, and community site selection. Key challenges include limited transportation, insufficient supervisory staff, equipment shortages, and demanding CBME academic schedules. Faculty dedication, availability of experienced supervisors, and student participation-affected by absenteeism and language barriers-impact program quality. Building community trust remains challenging, with issues of member availability and cultural barriers commonly reported. Consequently, FAP functions more as varied institutional projects than a unified national effort, with methodological differences affecting data consistency. This variability limits FAP's potential as a surveillance platform, as meaningful data aggregation requires greater standardization.

COMPARATIVE ANALYSIS: CONCORDANCE AND DISCREPANCIES

When comparing prevalence estimates of NCDs from FAP initiatives with national surveys, similarities and differences emerge due to methodological variations. The FAP Survey 2024 showed obesity/overweight rates of 24% for women and 22% for men, matching NFHS-5 figures of 24.0% and 22.9%. For hypertension, FAP's data (17%) was lower than NFHS-5's findings (21.3% for women, 24.0% for men) and ICMR-INDIAB's estimate (35.5%). The South Gujarat study reported 16.8% among adults over 30 years. FAP's diabetes prevalence (14% abnormal RBS) aligned with NFHS-5 (13.5% for women, 15.6% for men) but differed from ICMR-INDIAB (11.4%). Anemia prevalence in FAP (38–39% in women, 19% in men) was lower than NFHS-5's findings, where over half of women and a quarter of men were anemic. While obesity indicators align, others like anemia show significant divergence.

The similarity in obesity rates between FAP and NFHS-5 may reflect the simplicity of anthropometric measurements rather than true methodological consistency. Standardized techniques for measuring height and weight are technically less complex than biochemical tests or blood pressure measurements, allowing reliable execution despite varying student training and equipment calibration. Complex measurements such as hemoglobin, blood glucose, and blood pressure show greater variability due to logistical and technical challenges in FAP. The notable differences in anemia, hypertension, and diabetes prevalence likely stem from measurement method variations and population characteristics such as age distribution and socioeconomic status. While NFHS surveys use rigorously trained personnel and standardized instruments, FAP's diverse field implementations restrict direct comparisons and necessitate methodological scrutiny before drawing epidemiological conclusions. The comparison is detailed in Table 2.

ANALYSIS OF METHODOLOGICAL DIFFERENCES

The differences between FAP data and national surveys stem from methodological variations. National surveys like NFHS-5 use standardized, calibrated tools and rigorously trained personnel to ensure consistency.[21] FAP activities rely on institutional equipment that often lacks calibration and faces maintenance challenges.[9] While surveys like NFHS and ICMR-INDIAB follow standardized procedures, FAP shows greater variability, with assessments conducted by medical students with varying supervision. Diagnostic criteria differ: National surveys follow WHO guidelines, while FAP often uses simplified cut-offs like RBS >140 mg/dL 48, with issues like capillary blood use for anemia estimation affecting comparability.[21,25] These factors-instrument variability, procedural inconsistencies, non-standardized diagnostics, and varying personnel expertise-reduce the reliability of FAP prevalence estimates compared to national surveillance systems (Table 3).

ASSESSMENT OF POPULATION COMPARABILITY

It is challenging to compare NCDs prevalence between FAP populations and national surveys like NFHS and ICMR-INDIAB due to significant differences in population characteristics and sampling. NFHS and ICMR-INDIAB use multi-stage stratified random sampling to obtain nationally and state-representative samples across demographic and geographic groups.[29] In contrast, FAP populations are selected based on convenience and institutional preferences, targeting specific villages or urban slums. This selection method, with voluntary participation by families willing to interact with students, creates selection bias by excluding less accessible households.[30] FAP samples typically include socioeconomically unique populations from underserved rural areas, with varying poverty, literacy,

Table 2: Comparison of NCD prevalence estimates (%) from FAP studies versus National surveys (NFHS-5, ICMR-INDIAB)

Condition	FAP source	FAP prevalence (%)	NFHS-5 (2019–21) prevalence (%)	ICMR-INDIAB (2021 Est.) prevalence (%)	Notes
Obesity/overweight (BMI ≥25.0 kg/m^2)	FAP Survey 2024	W: 24, M: 22	W: 24.0, M: 22.9 (15–49 years)	Gen. Obesity: 28.6% (≥20 years)	FAP age group/criteria unspecified. NFHS uses WHO criteria. ICMR-INDIAB uses WHO Asia Pacific criteria. Apparent concordance between FAP Survey and NFHS-5.
High-risk WHR	FAP survey 2024	Not reported	W (≥0.85): 56.7, M (≥0.90): 47.7 (15–49 years)	Abd. Obesity: 39.5% (≥20 years)	FAP data lacking. NFHS and ICMR-INDIAB use different metrics/criteria (WHR vs. Abdominal Obesity diagnosis).
Anemia (WRA 15–49 years)	FAP survey 2024	Non-Preg: 39, Preg: 38	Non-Preg: 57.2, Preg: 52.2 (All WRA: 57.0)	Not Available	Significant discrepancy. FAP estimates much lower. Both likely use capillary method, but FAP methodology less standardized. NFHS-5 showed increase from NFHS-4.
Diabetes (elevated glucose/diagnosis)	FAP survey 2024	Abnormal RBS: 14	RBG >140/Meds: W: 13.5, M: 15.6 (≥15 years)	Diagnosed DM: 11.4% (≥20 years)	FAP (RBS) closer to NFHS-5 (RBG) than ICMR-INDIAB (Dx). Highlights RBG versus FBG/Dx criteria difference. South Gujarat FAP study: 24.8% raised RBS (>30 years, incl. known)
Hypertension (Elevated BP/ diagnosis)	FAP Survey 2024	Elevated BP: 17	≥140/90/Meds: W: 21.3, M: 24.0 (≥15 years)	≥140/90/Meds (JNC8): 35.5% (≥20 years)	FAP estimate lower than both NFHS-5 and ICMR-INDIAB. ICMR-INDIAB estimate notably higher. South Gujarat FAP study: 16.8% raised BP (>30 years, incl. known) Differences likely due to age, criteria, measurement protocol.

W: Women, M: Men, WRA: Women of reproductive age, Preg: Pregnant, Non-Preg: Non-pregnant, BMI: Body mass index, WHR: Waist-to-hip ratio, RBS: Random blood sugar, RBG: Random blood glucose, DM: Diabetes mellitus, Dx: Diagnosed, BP: Blood pressure, SBP: Systolic blood pressure, DBP: Diastolic blood pressure. Sources: Family Adoption Program Survey Report 2024[25]; National Family Health Survey Report (NFHS-5) 2019–2021[21]; ICMR-INDIAB based on study publications[14]; South Gujarat FAP study[28]

and healthcare access levels.[31] While NFHS allows analysis across wealth quintiles, FAP data are localized and non-representative, limiting direct prevalence comparisons with national datasets.

QUALITY APPRAISAL OF FAP-DERIVED DATA

When evaluated using standard criteria, data from FAP for estimating NCD prevalence show significant issues in quality and dependability. Key methodological shortcomings include lack of standardized measurement protocols, inconsistent training of student collectors, and uncalibrated equipment, which undermine data accuracy.[9] Multiple biases affect the data such as selection bias from non-random sampling, measurement bias due to equipment and observer variability, information bias from incomplete collection and recall issues, and reporting bias in gray literature sources like FAP Survey Report 2024 that may emphasize positive outcomes.[8,31] FAP studies also inadequately adjust for confounding factors like diet, physical activity, and co-morbidities. These limitations restrict FAP data's robustness for estimating NCD prevalence. A critical comparison with national survey data is presented in Table 4.

EXPLAINING THE DIFFERENCES: SYNTHESIS OF INFLUENCING FACTORS

The differences between FAP data and national surveys like NFHS and ICMR-INDIAB stem from methodological, population, and implementation factors. Key methodological variations include using random blood glucose (RBG) in FAP and NFHS-5, versus fasting blood glucose (FBG) or WHO criteria in ICMR-INDIAB, potentially inflating diabetes prevalence.[23,29] The use of capillary blood for anemia often leads to overestimation, yet FAP showed lower anemia prevalence than NFHS-5.[10,21] Blood pressure measurement inconsistencies due to protocols, equipment, and student proficiency affect hypertension estimates.[9] Lack of standardized calibration in FAP creates systematic errors. Population factors are critical: FAP samples are localized and not demographically

Table 3: Comparison of methodologies for NCD assessment in FAP versus National surveys (NFHS-5, ICMR-INDIAB)

Feature	FAP (typical/reported methods)[21]	NFHS-5 (2019–2021)	ICMR-INDIAB (Data up to 2020)
Obesity (BMI)			
Age group	Variable (often adults, sometimes specific age groups like >30 years)	15–49 years	≥20 years
Instrument	Portable scales/stadiometers (often unspecified, variable calibration)	Seca 874 digital scale, Seca 213 stadiometer (standardized, calibrated)	Standardized equipment
Procedure summary	Measurement by students/staff during visits/camps	Standardized measurement by trained investigators	Standardized measurement by trained team
Cut-offs/criteria	Often unspecified; likely aims for WHO criteria	WHO standard cut-offs (<18.5, 18.5–24.9, 25.0–29.9, ≥30.0 kg/m^2)	WHO Asia Pacific guidelines
Obesity (WHR)			
Age group	Not consistently reported	15–49 years	≥20 years
Instrument	Measuring tape (unspecified type/ calibration)	Gulick tape (standardized)	Standardized equipment
Procedure summary	Measurement by students/staff (if included)	Standardized measurement by trained investigators	Standardized measurement by trained team
Cut-offs/criteria	Often unspecified	High Risk: Women ≥0.85, Men ≥0.90	WHO Asia Pacific guidelines (potentially different cut-offs)
Anemia			
Age group	Variable (often adults, women, children)	Women 15–49, Men 15–49/54, Children 6–59 m	Not specified
Instrument	Portable hemoglobinometer (unspecified model/calibration)	HemoCue Hb 201+analyzer (standardized)	Not specified
Procedure summary	Capillary blood (finger prick) by students/technicians	Capillary blood (finger/heel prick) by trained investigators, on-site testing	Not specified
Cut-offs/criteria	Often unspecified; likely aims for WHO cut-offs	WHO cut-offs (Non-preg W <12.0, Preg W<11.0, Men <13.0 g/dL), adjusted for altitude/ smoking	Not specified
Diabetes mellitus			
Age group	Adults >30 years	≥15 years	≥20 years
Instrument	Glucometer (unspecified model/ calibration)	Accu-Chek performa glucometer (standardized)	Standardized lab tests (FBG/ OGTT) or glucometers for field screening
Procedure summary	Random blood sugar via finger prick by students/technicians, often in camps	Random Blood Sugar via finger prick by trained investigators	FBG/OGTT in lab setting or standardized field protocol; self-report/meds also considered
Cut-offs/criteria	Variable/unspecified; e.g., >140 mg/dL or 141–160/ >160 mg/dL reported	RBG>140 mg/dL (High 141–160, Very High >160) or taking medication	WHO criteria (FBG ≥126 mg/dL, OGTT ≥200 mg/dL, or HbA1c ≥6.5%) or self-report/medication
Hypertension			
Age group	Variable (often adults >30 years)	≥15 years	≥20 years
Instrument	Sphygmomanometer (digital/ aneroid unspecified, variable calibration)	Omron digital BP monitor (standardized)	Standardized BP monitor (digital or mercury)
Procedure summary	Measurement by students/residents during visits/camps; protocol variability likely	3 readings by trained investigators after rest; average of 2nd and 3rd used	Standardized protocol (e.g., multiple readings after rest) by trained team
Cut-offs/criteria	Variable/unspecified; e.g., ≥140/90 mmHg or categories like 140–159/90–99, ≥160/100 reported	SBP ≥140 mmHg or DBP ≥90 mmHg or taking medication; Pre-hypertension (120–139/80–89) also reported	JNC 8 criteria (≥140/90 mmHg or medication); ACC/AHA (≥130/80) also estimated[17]

BMI: Body mass index, BP: Blood pressure, DM: Diabetes mellitus, FAP: Family adoption programme, FBG: Fasting blood glucose, HbA1c: Glycated hemoglobin, ICMR-INDIAB: ICMR-India diabetes study, JNC8: Eighth Joint National Committee, NFHS-5: National Family Health Survey-5, RBS/RBG: Random blood sugar/glucose, WHO: World Health Organization, WHR: Waist-to-hip ratio. Sources: Family Adoption Program Survey Report 2024[25]; National Family Health Survey Report 5 2019–2021[23]; ICMR-INDIAB based on study publications[14]

representative, with different risk profiles than national surveys.[31] Variations in FAP implementation, including visit schedules, supervision, resources, and training, impact data quality.[8] The educational focus of FAP, prioritizing learning over epidemiological precision, limits its surveillance effectiveness. These factors are detailed in Table 5.

EVALUATING FAP'S RELIABILITY AND UTILITY FOR NCD SURVEILLANCE

Through comparative analysis of influencing factors, it is crucial to assess the reliability and usefulness of FAP in NCD surveillance. While it has limitations as a surveillance

Table 4: Critical appraisal of comparator and FAP data sources using standardized evaluation tools

S. No.	Citation	Study design	Appraisal tool	Key domains evaluated	Assessment results	Overall rating	Strengths	Limitations
1	Anjana et al. (2016), ICMR-INDIAB Phase I Report	Cross-sectional study	STROBE	("Clear objectives," "Sampling strategy," "Measurement validity," "Bias control," "Confounders considered")	("Yes," "Yes," "Yes," "Partial," "Yes")	High	Standardized diagnostics, urban-rural design	Limited regional scope, no follow-up
2	ICMR-NCDIR (2020), NNMS 2017–2018	Cross-sectional study	STROBE	("National representativeness", "Data collection tools," "Training and QA," "Statistical reporting," "Outcome clarity")	"Yes," "Yes," "Yes," "Yes," "Yes")	High	National scope, validated tools, adolescent inclusion	Relies partly on self-reported data
3	IIPS and ICF (2021), NFHS-5 India Report	Cross-sectional survey	STROBE	("Sampling frame," "Instrument validity", "Field protocols," "Ethics approval," "Reporting standards")	("Yes," "Yes," "Yes," "Yes," "Yes")	High	Nationwide consistency, broad indicators	Missing data in some clusters
4	NMC (2024), Family Adoption Programme survey report	Cross-sectional survey	JBI Analytical Checklist	("Inclusion criteria," "Measurement tools," "Sampling breadth," "Analysis methods," "Bias control")	("Yes," "Yes," "Yes," "Yes," "Partial")	High	Large national dataset, structured reporting	Partial data from some colleges
5	Mehta et al. (2024), Community As A Classroom	Observational study	STROBE	("Research objective," "Study population," "Outcome measurement," "Bias risk," "Context description"	("Yes," "Yes," "Partial," "No," "Yes")	Moderate	Field-based data; educational integration	Small sample; lacks bias control
6	Dr. BVP Rural Medical College (2024), Loni Khurd Report	Descriptive survey	JBI Descriptive Tool	("Purpose clarity," "Sampling description," "Data completeness," "Ethical safeguards," "Use of technology")	("Yes," "Partial", "Yes," "Yes," "Yes")	Moderate to High	Digital data collection; wide-ranging indicators	Descriptive only; limited analytical depth

This table provides a critical appraisal of the core characteristics of national-level health surveys and institutional Family Adoption Programme (FAP) reports used for comparative analysis.[14,21-23,25,32] The "Assessment Results" column summarizes the evaluation outcome for each domain using standardized labels: Yes (fully addressed), Partial (partially addressed or limited detail), No (not addressed), and Unclear (insufficient information to assess). The "Overall Rating" provides a synthesis of methodological quality, categorized as High, Moderate, or Moderate to High, based on how comprehensively the study met the appraisal criteria

Table 5: Summary of factors potentially influencing prevalence differences between FAP and national surveys

Factor category	Specific factor	Potential impact on prevalence comparison
Methodological	Measurement instrument	Variable accuracy/precision due to non-standardized, potentially uncalibrated FAP equipment versus standardized national survey equipment. Introduces measurement error
	Measurement procedure/protocol	Inconsistent application of procedures (e.g., BP technique, rest periods) in FAP versus strict protocols in national surveys. Increases variability and error
	Diagnostic criteria/cut-offs	Use of different criteria (e.g., RBG vs. FBG for diabetes; capillary vs. venous for anemia; JNC8 vs. ACC/AHA for HTN) leads to systematically different estimates
	Personnel training/skill	Variable skill levels of students in FAP versus trained investigators in national surveys. Increases potential for observer bias and measurement error in FAP
Population	Sampling method	Convenience/purposive sampling in FAP versus multi-stage stratified random sampling in national surveys. FAP results are not statistically generalizable.
	Representativeness	FAP samples represent specific local communities, not state/national populations. Limits direct comparability of prevalence rates.
	selection bias	Non-random selection of sites and voluntary participation of families in FAP may lead to samples systematically different from the target population.
	Underlying population risk profile	FAP populations (often rural/underserved) may have inherently different NCD risk factor distributions compared to national averages.
Implementation	Heterogeneity across institutions	Variations in FAP design (visits, family allocation, activities) make data aggregation across colleges unreliable
	Resource availability (transport, equipment, staff)	Constraints limit the scope, frequency, and quality of FAP data collection, including screening activities
	Data quality assurance	Lack of standardized QA/QC mechanisms in FAP compared to rigorous checks in national surveys. Affects data reliability.
	Program focus (Education vs. Surveillance)	Primary educational goals of FAP may compromise the methodological rigor required for surveillance-quality data collection.

FAP: Family adoption programme, BP: Blood pressure, JNC8: Eighth Joint National Committee, RBS: Random blood sugar, RBG: Random blood glucose, NCD: Non-communicable disease

tool, FAP has inherent strengths related to its educational and community engagement goals. It provides medical students with valuable experiential learning, enhancing their empathy, communication skills, and understanding of social determinants through community interaction.[33] FAP connects underserved communities with formal health systems, offering health education and early problem identification. Its longitudinal design enables observation of health trends, and the localized data it produces, as shown in FAP Survey 2024, can be used for needs assessments, interventions like ABHA registrations, and research hypotheses.[27] However, its ability to produce reliable national or state-level prevalence estimates is limited by methodological inconsistencies and selection bias.

When assessed against standards of an effective surveillance system, FAP shows significant shortcomings that compromise its use for formal NCD monitoring. Variability among institutions in family allocation, visit timing, site selection, staff training, equipment availability, and data management results in inconsistent data. Measurement errors are likely due to early-year medical students using non-standardized equipment, and FAP's convenience-based sampling undermines comparability with national surveys. The program's educational focus detracts from the rigor needed for dependable epidemiological surveillance, while ethical and logistical issues hinder consistent data collection. Given these limitations, FAP cannot be regarded as a valid tool for producing population-level NCD prevalence estimates comparable to NFHS or ICMR-INDIAB. Nevertheless, FAP remains valuable for localized health initiatives, hypothesis generation, qualitative insights, and community-health connections, though with clear limitations in scope, reliability, and scalability for surveillance purposes.

CONCLUSION AND STRATEGIC RECOMMENDATIONS

Numerous studies on FAP are emerging from various medical colleges nationwide, primarily concentrating on the qualitative aspects of the program, such as feedback and recommendations from students, faculty, or beneficiaries. However, there is an urgent need for more published research that focuses on actual quantitative data related to NCDs stemming from FAP. This systematic review evaluated the FAP as a framework for monitoring NCDs in India by comparing its prevalence rates for obesity, anemia, diabetes, and hypertension with national standards from NFHS-5 and ICMR-INDIAB (2020–2025). The increasing burden of NCDs in India requires standardized monitoring. Although FAP integrates health evaluations into educational programs, discrepancies existed between

its results and national surveys, particularly for anemia, hypertension, and diabetes. These differences stem from methodological variations (RBG versus FBG, capillary versus venous sampling, absence of standardized protocols), non-representative convenience sampling, and variability in FAP's implementation across institutions. FAP remains in early stages, with published material focusing on qualitative student and community experiences rather than NCD prevalence data. Limited systematically published prevalence data remains a significant limitation for future research. Currently, despite producing datasets like the FAP Survey Report 2024, FAP cannot be considered valid for NCD surveillance at state or national levels.

To boost FAP's role in health surveillance, strategic changes are needed. Key suggestions include standardized health evaluation procedures, structured training for students and faculty, adequate resources like transportation, equipment, and supervision, and quality assurance systems. FAP should focus on local health initiatives-identifying high-risk individuals, promoting health education, and connecting communities to government services-while serving as a platform for generating hypotheses and conducting qualitative research. Future studies should examine FAP implementation models, verify student-conducted health screening accuracy, evaluate long-term effects on students and families, and explore incorporating standardized surveillance elements. While FAP is a promising addition to India's medical education system, ensuring standardization and quality remains crucial for complementing the NCD surveillance framework.

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REFERENCES

1. Nethan S, Sinha D and Mehrotra R. Non communicable disease risk factors and their trends in India. Asian Pac J Cancer Prev. 2017;18(7):2005-2010.
   https://doi.org/10.22034/APJCP.2017.18.7.2005
2. Sharma M, Gaidhane A and Choudhari SG. A comprehensive review on trends and patterns of non-communicable disease risk factors in India. Cureus. 2024;16(3):e57027.
   https://doi.org/10.7759/cureus.57027
3. Non Communicable Diseases. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases [Last accessed on 2025 Apr 02].
4. India Hypertension Control Initiative, a High Impact and Low-Cost Solution. Available from: https://www.who.int/india/news-room/detail/02-06-2022-india-hypertension-control-initiative--a-high-impact-and-low-cost-solution [Last accessed on 2025 Apr 02].
5. Ibirogba D, Menon VB, Olickal JJ and Thankappan KR. Trends in prevalence and predictors of anemia in adolescents between the ages of 15 and 19 years in India and its States: Evidence from the national family health survey 2015-16 and 2019-21. Cureus. 2024;16(10):e70733.
   https://doi.org/10.7759/cureus.70733
6. Mathur P, Kulothungan V, Leburu S, Krishnan A, Chaturvedi HK, Salve HR, et al. Baseline risk factor prevalence among adolescents aged 15-17 years old: Findings from national non-communicable disease monitoring survey (NNMS) of India. BMJ Open. 2021;11(6):e044066.
   https://doi.org/10.1371/journal.pone.0246712
7. Cancer, Diabetes, Cardiovascular Programme (NPCDCS). National Health Mission Tamil Nadu. Available from: https://www.nhm.tn.gov.in/en/nhm-programsnon-communicable-diseases/national-programme-for-prevention-and-control-of-cancer [Last accessed on 2025 Apr 02].
8. Shah HK, Virk AK, Dongre A, Datta SS and Gupta SS. Family adoption program: An NMC-mandated initiative. Indian J Community Med. 2024;49(Suppl 2):S170-S176.
   https://doi.org/10.4103/ijcm.ijcm_750_24
9. Shah HK and Lotliker SS. Implementation of family adoption program (FAP) in medical colleges of India: A snapshot. Natl Med J India. 2025;37(5):296-297.
   https://doi.org/10.25259/NMJI_256_2024
10. Mathur M and Kumar D. Documenting the family adoption program: A reflection of society and its evolving needs; 2025. Available from: https://journals.lww.com/ijcm/fulltext/9900/documenting_the_family_adoption_program__a.186.aspx [Last accessed on 2025 Apr 15].
    https://doi.org/10.4103/ijcm.ijcm_765_24
11. Ganganahalli P, Jain A, Dongre A and Udgiri R. Development and validation of an interprofessional community-based teaching-learning module for a family adoption programme for Indian medical undergraduates. Cureus. 2024;16(8):e67150.
    https://doi.org/10.7759/cureus.67150
12. National Non-communicable Diseases Monitoring Survey - 2018. Available from: https://data.icmr.org.in/datasets/national-ncd-monitoring-survey-nnms-household-and-adult [Last accessed on 2025 Apr 02].
13. Brahmam SN. National nutrition monitoring bureau in India-an overview. Indian J Community Med. 2007;32(1):7-9.
    https://doi.org/10.4103/0970-0218.53380
14. Anjana RM, Unnikrishnan R, Deepa M, Pradeepa R, Tandon N, Das AK, et al. Metabolic non-communicable disease health report of India: The ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). Lancet Diabetes Endocrinol. 2023;11(7):474-489.
    https://doi.org/10.1016/S2213-8587(23)00119-5
15. Behera SM, Behera P, Mohanty SK, Singh RR, Patro BK, Mukherjee A, et al. Socioeconomic gradient of lean diabetes in India: Evidence from national family health survey, 2019-21. PLOS Glob Public Health. 2024;4(5):e0003172.
    https://doi.org/10.1371/journal.pgph.0003172
16. Varghese JS, Peterson EN, Ali MK and Tandon N. Advancing diabetes surveillance ecosystems: A case study of India. Lancet Diabetes Endocrinol. 2024;12(7):493-502.
    https://doi.org/10.1016/S2213-8587(24)00124-4
17. Ouzzani M, Hammady H, Fedorowicz Z and Elmagarmid A. Rayyan - a web and mobile app for systematic reviews. Syst Rev. 2016;5:210.
    https://doi.org/10.1186/s13643-016-0384-4
18. Zotero. Zotero [Computer Software]. Corporation for Digital Scholarship. Available from: https://zotero.org [Last accessed on 2025 Apr 02].

19. STROBE. Checklists. Available from: https://www.strobe-statement.org/checklists [Last accessed on 2025 Apr 02].
20. JBI Critical Appraisal Tools. Available from: https://jbi.global/critical-appraisal-tools [Last accessed on 2025 Apr 02].
21. National Family Health Survey (NFHS-5) 2019-21. Vol. 1. Mumbai: IIPS and ICF; 2021. Available from: https://dhsprogram.com/pubs/pdf/fr375/fr375.pdf [Last accessed on 2025 Apr 02].
22. National Noncommunicable Disease Monitoring Survey (NNMS) 2017-18. Bengaluru: ICMR-NCDIR. Available from: https://data.icmr.org.in/datasets/national-ncd-monitoring-survey-nnms-household-and-adult [Last accessed on 2025 Apr 02].
23. Mehta P, Moitra M and Patel H. Community as a class room- family adoption programme in medical education and role of community medicine in its implementation- a cross-sectional study from South Gujarat. Asian J Biomed Res. 2024;27(3S):7145-7158.
https://doi.org/10.53555/ajbr.v27i3S.7304
24. Mandar B. Family Adoption Program - Loni Khurd Report. Loni: Dr. Balasaheb Vikhe Patil Rural Medical College, Pravara Institute of Medical Sciences. Available from: https://www.pravara.com/pdf/family_study_report.pdf [Last accessed on 2025 Apr 02].
25. Garg A, Bhardwaj P, Kumar V and Vanikar A. Family Adoption Program Survey Report 2024.
https://doi.org/net/10.13140/RG.2.2.28838.95049
26. Kowmudi SS, Govindu S and Sasikala P. Community as a classroom: The experience on family adoption programme by Indian medical graduates. J Acad Med Pharm. 2024;6(6):622-625.
https://doi.org/10.47009/jamp.2024.6.6.118
27. Dhabekar PD, Patil RN, Padhyegurjar MS, Gosavi P, Padhyegurjar B, Gujarathi AP, et al. Family adoption program implementation for undergraduate medical students at a private medical college of Maharashtra: An experience with swot & fish bone analysis. Int J Life Sci. 2024;10(5):24.
https://doi.org/10.21276/SSR-IIJLS.2024.10.5.24
28. Mehta P, Patel J, Gohil J and Moitra M. Family adoption program implementation for undergraduate medical students at a government medical college of Gujarat: An experience and SWOT analysis. Natl Q J Med. 2025;23(2):NQ15.
https://doi.org/10.48047/nq.2025.23.2.NQ15
29. Mathur P, Leburu S and Kulothungan V. Prevalence, awareness, treatment and control of diabetes in India from the countrywide national NCD monitoring survey. Front Public Health. 2022;10:748157.
https://doi.org/10.3389/fpubh.2022.748157
30. Annadurai K, Sharath U and Nachiyar SG. Family adoption program in medical education curriculum: National medical mission recommendations, challenges, and possible solutions for better implementations. BLDE Univ J Health Sci. 2023;8(1):203-204.
https://doi.org/10.4103/bjhs.bjhs_131_22
31. Yalamanchili VK, Uthakalla VK, Naidana SP, Kalapala A, Venkata PK and Yendapu R. Family adoption programme for medical undergraduates in India - the way ahead: A qualitative exploration of stakeholders' perceptions. Indian J Community Med. 2023;48(1):142-146.
https://doi.org/10.4103/ijcm.ijcm_831_22
32. Chandrachood M and Mehta S. Tapping into excellence: India's family adoption program in medical education. Res Dev Med Educ. 2023;12:13.
https://doi.org/10.34172/rdme.2023.33144
33. Ganganahalli P, Yankanchi SG, Yadavannavar M and Udgiri R. Perception and impact of the family adoption program (FAP) among Indian medical students: Benefits and challenges. Cureus. 2024;16(11):e73893.
https://doi.org/10.7759/cureus.73893

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