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FROM POLICY TO PRACTICE: A MULTI-STAKEHOLDER QUALITATIVE PROCESS EVALUATION OF DIABETES CARE UNDER INDIA'S NATIONAL NON-COMMUNICABLE DISEASE PROGRAMME IN SIDDIPET DISTRICT, TELANGANA

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ABSTRACT

Background: Diabetes care in India's public sector is delivered mainly through the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD), but little is known about how its diabetes component is experienced across the health system. We explored stakeholders' perceptions of implementation, access and patient experience in Siddipet district, Telangana.

Methods: This qualitative descriptive process evaluation (October–December 2025) used purposive sampling: three key informant interviews with programme officers, ten in-depth interviews (eight medical officers, two community leaders) and three focus group discussions (one with junior public health nurses, two with patients). Telugu transcripts were translated and analysed inductively, with triangulation across groups and methods; registration data gave context.

Results: Thirteen themes and 43 sub-themes emerged. Strengths were integrated early detection, trusted frontline workers, and free medicines including insulin, which sustained treatment among vulnerable groups. Gaps were intermittent stock-outs linked to forecasting and procurement; workforce and laboratory shortages with one-to-two-minute consultations; non-functional screening equipment (56 of 220 non-mydriatic cameras functional, per programme officers); no standard operating procedures for complication screening; poor reach into working-age adults; and, among patients, a knowledge–practice gap, fear of medicines and fragmented care-seeking. Diabetes accounted for 57.9% of NCD clinic registrations in eight sampled facilities.

Conclusions: The programme has widened access to detection and free treatment, but access is not reliably converted into sustained glycaemic control or prevention of complications. Priorities are assured medicine supply, staffing and equipment aligned with expansion, protocol-guided complication screening, flexible outreach for working-age adults and patient-centred behavioural support.

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INTRODUCTION

Non-communicable diseases (NCDs) cause roughly three of every four deaths worldwide, and most premature NCD deaths occur in low- and middle-income countries [1]. India is a major centre of the diabetes epidemic: the ICMR-INDIAB survey estimated 101 million people with diabetes (11.4%) and 136 million with prediabetes (15.3%), with a high burden across the southern states including Telangana [2]. National survey data show losses at every step of the care continuum: among adults with diagnosed diabetes, 59.4% reported taking medication and, among those treated, 65.5% achieved glycaemic control, with wide variation between districts [3].

India's principal public-sector response is the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD), which evolved from the programme for cancer, diabetes, cardiovascular diseases and stroke launched in 2010 [4]. It aims to strengthen early diagnosis through population-based screening, assure diagnostics and medicines, and provide follow-up through primary health care, increasingly via Health and Wellness Centres [5,6]. In Siddipet district these services are delivered through a General Hospital, a Taluk Hospital, Community Health Centres (CHCs), Family Health Centres (FHCs) and Urban Primary Health Centres (UPHCs).

Evidence on how diabetes services perform in routine practice comes largely from facility-preparedness assessments and situational analyses [7–9]. These describe the availability of medicines, equipment and staff, but say less about how services are experienced along the pathway by managers, clinicians, frontline workers, communities and people living with diabetes. Qualitative process evaluation can explain how and why services succeed or fail [10]. To our knowledge, multi-stakeholder qualitative evidence on the diabetes component of NP-NCD in Telangana is limited.

We therefore evaluated the diabetes component of NP-NCD in Siddipet district through multiple stakeholder perspectives. Our objectives were to (1) describe the services offered; (2) explore stakeholders' perceptions of implementation; (3) explore accessibility, availability and utilisation of prevention and screening services; and (4) explore the experiences of people living with diabetes in accessing care and managing their condition.

METHODS

Study design

We used a qualitative descriptive design11 with a process-evaluation orientation to explore service delivery, early detection, follow-up, access to care and the challenges of diabetes prevention and management, from the perspective of those who plan, deliver and use services. Reporting follows the Standards for Reporting Qualitative Research (SRQR) [12], (Supplementary Table S2). Figure 01 summarises the design.

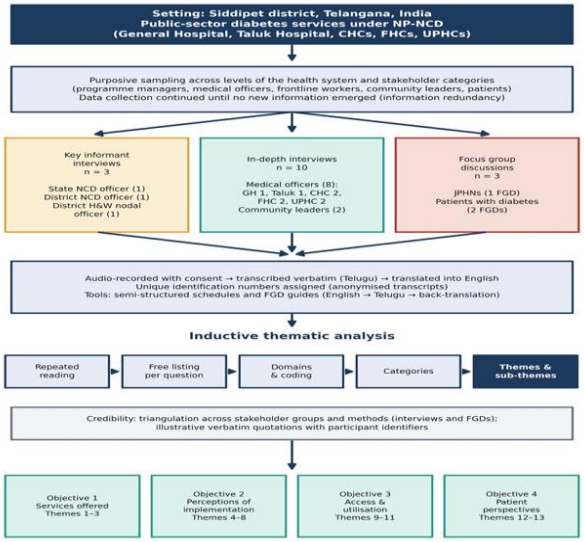

Figure 01: Study design, sampling, data collection and analytic pathway. CHC, Community Health Centre; FHC, Family Health Centre; FGD, focus group discussion; GH, General Hospital; JPHN, Junior Public Health Nurse; UPHC, Urban Primary Health Centre; H&W, Health and Wellness; NP-NCD, National Programme for Prevention and Control of Non-Communicable Diseases.

Setting

The study was conducted in Siddipet district, Telangana, across the levels of the public system that deliver the diabetes component: the General Hospital, Taluk Hospital, CHCs, FHCs and UPHCs, which provide screening, diagnosis, treatment and follow-up. Data were collected from October to December 2025.

Participants and sampling

We sampled (i) programme managers and officials, (ii) medical officers at different levels, (iii) frontline workers and community leaders, and (iv) patients with diabetes attending public facilities. Purposive sampling ensured representation across levels of care and stakeholder categories. Recruitment continued until later interviews added no new themes, an approach consistent with the concepts of information power and thematic sufficiency.13,14 In total we conducted three key informant interviews (KIIs), ten in-depth interviews (IDIs) and three focus group discussions (FGDs) (Table 01).

Table 01: Stakeholder categories and data collection activities (16 sessions)

Method	Stakeholder category	Participants (facility/role)	n
Key informant interview	Programme implementers	State programme officer, NCD	1
Key informant interview	Programme implementers	District programme officer, NCD	1
Key informant interview	Programme implementers	District Health and Wellness nodal officer	1
In-depth interview	Medical officers	General Hospital	1
In-depth interview	Medical officers	Taluk Hospital	1
In-depth interview	Medical officers	Community Health Centres	2
In-depth interview	Medical officers	Family Health Centres	2
In-depth interview	Medical officers	Urban Primary Health Centres	2
In-depth interview	Community leaders	Member of Legislative Assembly	1
In-depth interview	Community leaders	Ward member	1
Focus group discussion	Frontline workers	Junior Public Health Nurses (JPHNs)	1 FGD
Focus group discussion	Beneficiaries	Patients with diabetes	2 FGDs
Total		3 KIIs + 10 IDIs + 3 FGDs	16

KII, key informant interview; IDI, in-depth interview; FGD, focus group discussion; NCD, non-communicable disease. Participants are cited by role and number: PO, programme

officer; MO, medical officer; CL, community leader; FGD I, JPHNs; FGD II and III, patients.

Data collection

Semi-structured interview schedules and FGD guides were developed from the study objectives and knowledge of NP-NCD processes (Supplementary Table S1). Tools were drafted in English, translated into Telugu and back-translated. After administrative permission and written informed consent, sessions were held at mutually convenient times and places and audio-recorded with separate consent. Recordings were transcribed verbatim in Telugu and translated into English; each transcript received a unique identification number. To describe the service context, monthly NCD clinic registration data for November 2025 (total NCD beneficiaries, number registered with diabetes, and sex and age distribution) were extracted for the eight facilities represented in the qualitative sample.

Data analysis

We used inductive thematic analysis.15 Transcripts were read repeatedly for familiarisation. Responses to each guide question were free-listed to capture the range of views across groups, grouped into domains and coded, with multi-idea responses coded under more than one domain. Codes were organised into categories and refined into themes and sub-themes aligned with the four objectives, and illustrative verbatim quotations were selected. To show the relative prominence of each theme by stakeholder group, we summarised the narrative frequency descriptors used during synthesis (few, some, many/most, almost all; unquantified statements treated as 'some'; for themes with several sub-themes the highest-ranked sub-theme set the cell). This matrix is interpretive, not statistical. Registration data were summarised as counts and percentages, with no inferential testing.

Trustworthiness

Credibility was supported by data triangulation across stakeholder groups, method triangulation (interviews and FGDs) and the use of participant identifiers with each quotation. Quotations were translated from Telugu.

Ethical considerations

The Institutional Ethics Committee of Surabhi Institute of Medical Sciences approved the study (IEC/SIMS/2025/12). Written informed consent was obtained from all participants, with separate consent for audio recording. Participants were told that data would be used for academic purposes including thesis submission and publication. Transcripts were anonymised and confidentiality was maintained.

RESULTS

Participants and service context

Sixteen sessions were completed: three KIIs, ten IDIs and three FGDs (Table 1). Key informants were state- and district-level managers, mostly middle-aged with over 15 years of public health experience. The eight medical officers represented primary and secondary levels and combined outpatient care with supervision of NP-NCD delivery. The junior public health nurse (JPHN) group comprised mostly middle-aged women with over five years' experience who support screening, follow-up and health education. Patient participants were predominantly middle-aged and older adults.

November 2025 registers listed 3,158 NCD beneficiaries across the eight facilities, of whom 1,828 (57.9%) were registered with diabetes (Table 2, Figure 2). The diabetes share was lowest at the UPHCs (26.5% and 41.6%), about 64% at FHCs and CHCs, and highest at the Taluk Hospital (84.7%). Women were the majority of patients with diabetes in seven of eight facilities (52.3–64.9%), and 33.0–55.2% were aged 60 years or older. These descriptive data provide context only and are not prevalence estimates.

Table 02: NCD clinic beneficiaries and patients registered with diabetes by facility, November 2025

Facility	Total NCD beneficiaries (n)	Registered with diabetes, n (%)	Male (%)	Female (%)	Aged ≥60 years (%)
UPHC I	396	105 (26.5)	50.4	49.5	55.2
UPHC II	243	101 (41.6)	45.5	54.4	39.6
FHC I	300	193 (64.3)	47.6	52.3	48.1
FHC II	275	175 (63.6)	42.8	57.1	38.8
CHC I	511	327 (64.0)	46.1	53.8	40.6
CHC II	489	311 (63.6)	41.1	58.8	42.1
Taluk Hospital	300	254 (84.7)	39.7	60.2	33.0
General Hospital	644	362 (56.2)	35.0	64.9	50.5
All facilities	3,158	1,828 (57.9)	42.2a	57.7a	43.2a

UPHC, Urban Primary Health Centre; FHC, Family Health Centre; CHC, Community Health Centre. Percentages of diabetes registrations were recalculated from registered counts. Sex and age percentages are as recorded in facility registers and refer to patients registered with diabetes. aPooled estimates weighted by number registered with diabetes (approximate, derived from rounded register percentages). Descriptive data; not tested statistically and not prevalence estimates.

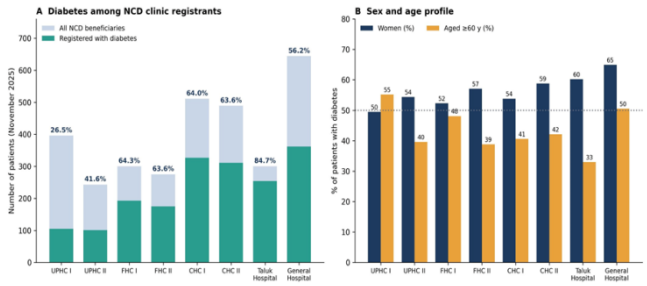

Figure 02: Facility-level distribution of NCD clinic beneficiaries, November 2025. (A) Patients registered with diabetes (teal) among all registered NCD beneficiaries; labels give the percentage with diabetes. (B) Proportion of women and of adults aged ≥60 years among patients with diabetes; dotted line marks 50%. UPHC, Urban Primary

Health Centre; FHC, Family Health Centre; CHC, Community Health Centre.

Overview of themes

Thirteen themes and 43 sub-themes were organised under the four objectives (Table 3). Early detection, opportunities for strengthening and the lifestyle knowledge–practice gap were raised by nearly all groups; programme officers dominated accounts of supply-chain and quality problems, JPHNs and community leaders those of reaching working-age adults, and patients and secondary-level medical officers those of free medicines (Figure 03). Illustrative quotations are in Table 04.

Table 03: Themes and sub-themes by study objective

No.	Theme	Sub-themes	Obj.
1	Integrated early detection	–	1
2	Role of the frontline workforce	–	1
3	Continuity of care and follow-up	3.1 Identification and recall of defaulters; 3.2 Conditional follow-up and referral practices; 3.3 Programme monitoring and decentralised follow-up systems; 3.4 Community-supported follow-up; 3.5 Family support and caregiver gaps	1
4	Perceived programme relevance	–	2
5	Gaps in medicine availability and quality	5.1 Treatment disruption due to stock-outs; 5.2 Coping strategies during shortages; 5.3 System-level causes of stock-outs and delays; 5.4 Quality concerns and responses; 5.5 Role of facility-level stock practices	2
6	Human resource constraints	6.1 Manpower shortage and workforce instability; 6.2 High workload and limited consultation time; 6.3 Laboratory staff shortage; 6.4 Infrastructure expansion without proportionate manpower; 6.5 Task distribution across levels of care	2
7	Gaps in early detection and prevention of complications	7.1 Routine and level-wise screening practices; 7.2 Financial constraints influencing investigation frequency; 7.3 Low awareness and symptom-based care-seeking; 7.4 Burden of complications and lifestyle-related factors; 7.5 System constraints in screening coverage; 7.6 Vision for integrated and preventive diabetes care	2
8	Opportunities for strengthening diabetes prevention and care	8.1 School-based prevention; 8.2 Life-course approach; 8.3 Comprehensive and integrated care models; 8.4 Digital health integration; 8.5 Training needs; 8.6 Information, media influence and public awareness; 8.7 Community and workplace-based prevention; 8.8 Challenges of voluntary participation; 8.9 Prevention to reduce long-term costs	2
9	Accessibility and utilisation	–	3
10	Challenges in reaching the working-age population	10.1 Stigma among younger adults; 10.2 Urban mobility and access barriers; 10.3 Work-related constraints and wage loss; 10.4 Limited use of public facilities by working groups; 10.5 Marginalised and hard-to-reach populations	3
11	Free availability of medicines	–	3
12	Lifestyle knowledge–practice gap	12.1 Poor adherence to dietary recommendations; 12.2 Cultural and household barriers to lifestyle change; 12.3 Changing food environment and lifestyle patterns; 12.4 Lifestyle interventions under NP-NCD	4
13	Poor treatment adherence and self-modification of therapy	13.1 Financial barriers and medicine-related challenges; 13.2 Behavioural and knowledge-related non-adherence; 13.3 Fragmented care-seeking and fear of modern medicine; 13.4 Forgetfulness and daily-life constraints	4

Obj., study objective: 1, services offered; 2, stakeholder perceptions of implementation; 3, accessibility and utilisation; 4, patient perspectives and self-management. Total: 13 themes and 43 sub-themes. NP-NCD, National Programme for Prevention and Control of Non-Communicable Diseases.



Figure 03: Theme-by-stakeholder matrix showing the relative prominence of each theme. Summarised from the frequency descriptors used in the narrative synthesis (few, some, many/most, almost all; dash = not raised by the group). Medical officers are grouped by primary and secondary level of care; community leaders, n = 2. This is an interpretive summary, not a statistical measure. JPHN, Junior Public Health Nurse.

Table 04: Illustrative verbatim quotations by theme (translated from Telugu)

Theme	Quotation	Source
1	"Population-based survey of adults aged 30 years or more is done by ASHA workers by going house to house leading to early detection."	PO-01
1	"Many of these common people are living with sugar without being detected and without knowing."	CL-02
2	"Earlier, diagnosis was made and patients were left alone; now grass-root follow-up has come."	PO-03
2	"People trust the advice of ASHA workers and JPHNs more."	MO-05
3	"Earlier, referral and follow-up were a gap; we didn't know what happened after referral but now referral slips, colour-coded registers, and ASHA follow-up are used."	PO-02
3	"For patients who don't come regularly, we give medicines only for five days and ask them to come again."	MO-03
3	"If a neighbour forces them to eat their tablets or to go see the doctor, they will listen to them without any hesitation."	FGD I (JPHNs)
3	"We don't have people to look after us and no one is there to give medicine on time."	FGD II (patients)
4	"For someone leading a life on daily wages, it is very difficult to treat and follow such long-term conditions if medicines and investigations are not supplied by the government."	MO-02
5	"The shortage is not due to lack of funds but due to improper estimation of annual drug requirements."	PO-01
5	"We go six months without medicines, and then in the last three months they dump everything on us just before expiry."	MO-07
5	"They went without taking their medicines for about five days when it was not available here!!"	FGD I (JPHNs)
6	"Manpower is the major challenge, not funds."	PO-01
6	"Doctors can hardly spare even two minutes per patient in PHC or Taluk Hospital."	PO-03
6	"This UPHC was made a hub, but manpower was not sanctioned accordingly."	MO-07
7	"HbA1c and microalbumin facilities are not here; we collect blood and send it to higher centres."	MO-05
7	"If patients cannot afford the lab investigation, we change the monitoring period from three months to six months."	MO-03
7	"We don't check kidney or eyes regularly and only when my vision became blurred, I checked my eyes."	FGD II (patients)
7	"Only 56 non-mydriatic cameras are currently functional out of 220 cameras."	PO-01
8	"There is no point in educating staff alone; patients must be educated."	MO-02
8	"We are planning to implement a 360-degree metabolic centre. Patients will see the dietician, undergo screening, counselling, and then go to the pharmacy in one flow."	MO-02
8	"We need awareness like COVID mask advertisements."	MO-08
8	"Strict control is not required in an 85-year-old, but strict control in a 30-year-old can prevent complications by 20 years."	PO-02
9	"It is easy for us to come here because buses and autos are available nearby… Everything gets done in one stretch, so it is convenient."	FGD III (patients)
10	"For younger people, there is embarrassment. They hesitate because they think medicine has to be taken lifelong."	FGD I (JPHNs)
10	"In urban areas, especially in flats, access for health workers is difficult, and reaching people for screening and follow-up becomes a challenge."	PO-03
10	"The working class from 35–50 years are difficult to get for review. They lose a day's wage, so they don't come."	MO-08
11	"We are providing drugs as per protocol including insulin up to the primary care level, free of cost."	PO-01
11	"If medicines are available here, patients will definitely continue	MO-04

	treatment."	
12	"Out of 100 patients, maybe 50 people follow the diet plan."	MO-04
12	"This sugar and BP are not a disease that goes away… so sometimes we give up controlling the food."	FGD II (patients)
12	"Even if I tell my mother to eat oats, the family says rice is needed for strength."	MO-08
12	"There are minimum fifty bakeries in an area where earlier there were only three or four."	PO-02
13	"If insulin is not available, some patients won't take insulin and continue only tablets."	MO-02
13	"If they eat more, they take extra tablets or insulin."	PO-01
13	"People fear modern medicine and keep shifting from one doctor to another."	PO-03
13	"After doing all the housework and then going for work, there is no time left… I often forget taking my sugar and BP medicines…"	FGD III (patients)

PO, programme officer; MO, medical officer; CL, community leader; FGD, focus group discussion; JPHN, junior public health nurse; ASHA, Accredited Social Health Activist; UPHC, Urban Primary Health Centre; PHC, primary health centre.

Objective 1: services offered under the diabetes component

Participants described a pathway that begins in the community and escalates by severity (Figure 04).

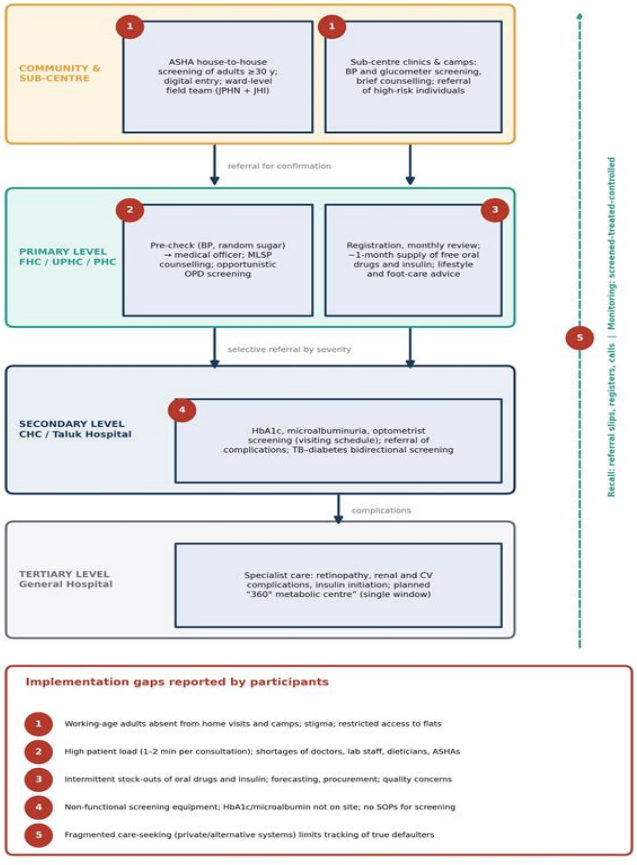

Figure 04: Diabetes service pathway under NP-NCD in Siddipet district as described by participants, with implementation gaps. Numbered red markers show implementation gaps at the level where they were reported. ASHA, Accredited Social Health Activist; JHI, Junior Health Inspector; JPHN, Junior Public Health Nurse; MLSP, Mid-Level Service Provider; SOP, standard operating procedure; PHC, primary health centre.

Theme 1: Integrated early detection. Managers described early detection as the core NP-NCD task: adults aged 30 years and above are screened universally by house-to-house visits of Accredited Social Health Activists (ASHAs), with digital entry and dashboard monitoring, replacing earlier selective screening. Medical officers described complementary facility screening: pre-check stations measuring blood pressure and random sugar before consultation, opportunistic outpatient testing and testing of family members. JPHNs described ward-wise household selection, field glucometers and mobile applications for recording and referral. Community leaders felt that many people still seek care only when diabetes is severe.

Theme 2: Role of the frontline workforce. ASHAs were the main link for community screening, and mid-level service providers (MLSPs; nurses with clinical experience) spent more time on counselling and follow-up. Medical officers said people trust frontline workers as familiar neighbours more than a busy hospital, and community leaders proposed using the three-tier Panchayat system for local support. Some medical officers felt that supervisory field visits had declined as reporting demands rose.

Theme 3: Continuity of care and follow-up. Almost all managers and JPHNs described improved tracking through referral slips, colour-coded registers and ASHA-led recall (3.1). Primary-level officers said systematic tracking was limited by patient load, relied on informal phone calls, and that some patients who missed visits were treated elsewhere. Follow-up was severity-based, with routine cases reviewed monthly and complicated cases referred; some officers gave shorter supplies to irregular attenders as a nudge (3.2). Managers described monthly review on three indicators (screened, treated, controlled), ward-level field teams (one JPHN and one junior health inspector per ward), integration of screening and follow-up in one electronic system, and bidirectional TB–diabetes screening (3.3). JPHNs enlisted neighbours and respected community members to encourage reluctant patients (3.4), whereas some older patients lacked any caregiver (3.5).

Objective 2: stakeholders' perceptions of implementation

Theme 4: Perceived programme relevance. Almost all managers regarded the diabetes component as highly relevant, estimating that diabetes and hypertension affect 30–40% of adults, and stressed that prevention deserves equal weight with care. Secondary-level medical officers and JPHNs said free medicines and investigations make long-term care possible for daily-wage and low-income households. Patients described public facilities as accessible, with approachable doctors and reasonable waiting times. Some officers worried that good glycaemic control remained hard to achieve despite wide implementation.

Theme 5: Gaps in medicine availability and quality. Medical officers at both levels, JPHNs, patients and community leaders reported occasional shortages that interrupted treatment, with missed doses when insulin was unavailable, private purchase (feasible only for those who can afford it) and prescriptions adjusted to stock (5.1–5.2). Many managers attributed stock-outs to planning rather than

funds: inaccurate annual estimation, incorrect facility indenting and a financial cap in procurement. Medical officers described restocking delays of weeks to months, quantities well below those indented, and bulk deliveries close to expiry (5.3). Almost all managers raised concerns about the quality of some commonly used drugs and described stopping suspect batches and sending samples for testing, while secondary-level officers reported no proven complaints and some primary-level officers had seen discoloured or crumbling tablets (5.4). Facilities with vigilant pharmacy staff were less affected (5.5).

Theme 6: Human resource constraints. Managers considered manpower, not funds, the major challenge, citing cadre shortages and frequent transfers (6.1). Secondary-level officers described vacant physician posts, understaffed pharmacies and a single dietician for several wards; primary-level officers described outpatient departments dependent on very few doctors. Almost all key informants and secondary-level officers described consultations of one to two minutes, which crowded out counselling, and JPHNs described field and reporting workloads that prevented follow-up of everyone (6.2). Laboratory understaffing limited diagnostics (6.3), and hubs received equipment without proportionate sanctioned staff (6.4). Managers and secondary-level officers argued that screening at lower levels acts as a sieve to reduce crowding at higher centres, with only complications referred up (6.5).

Theme 7: Gaps in early detection and prevention of complications. Primary-level officers reported that complication screening was constrained by inconsistent ophthalmologist availability (optometrist referrals weekly) and by the absence of on-site HbA1c and microalbuminuria testing (7.1). Some lengthened monitoring from three to six months when patients could not pay (7.2), and patients described reactive care-seeking, with eye or kidney checks only after symptoms (7.3). Most programme officers perceived a substantial burden of retinopathy and chronic kidney disease reflecting late detection; one cited retinopathy in about 2,000 of 7,000 screened patients, and another attributed advanced kidney disease partly to alcohol and over-the-counter analgesics (7.4). These are participants' estimates, not verified against records. Programme officers reported that only 56 of 220 non-mydriatic cameras were functional, and secondary-level officers asked for standard operating procedures (SOPs) on retinopathy screening frequency (7.5). Officers described a planned '360-degree' metabolic centre offering eye, foot and neuropathy assessment at first contact (7.6).

Theme 8: Opportunities for strengthening. Almost all programme-level stakeholders identified schools as critical prevention platforms, citing reduced physical activity, screen time, junk food and earlier onset of type 2 diabetes (8.1), and managers called for age- and risk-based glycaemic targets (8.2). Medical officers described 'single-window' metabolic centres integrating dietician review, screening, counselling, consultation and medicines in one visit (8.3), and almost all programme-level respondents prioritised a single digital platform (8.4). Most medical officers argued that training providers is insufficient without structured patient education and called for refresher training (8.5), and officers wanted visible information–education–communication (IEC) in NCD clinics and public campaigns against misinformation (8.6). Most JPHNs proposed workplace-based camps (8.7); they also noted that participation is voluntary (8.8), and primary-level officers framed prevention as cost-saving (8.9).

Objective 3: accessibility, availability and utilisation

Theme 9: Accessibility and utilisation. Most JPHNs reported good community-level use, with nearby sub-centres and camps for blood pressure and sugar checks. Many patients described centres as easy to reach by bus or auto and valued a one-stop flow of tests, consultation and medicine collection in a single visit, which led some to prefer the public facility.

Theme 10: Challenges in reaching working-age adults. Working-age adults were consistently described as the group least reached. Younger adults were embarrassed to be labelled with a lifelong illness and feared lifelong medication (10.1). Managers described restricted access to residential flats and frequent mobility of urban residents (10.2). Managers, primary-level officers and almost all JPHNs said adults aged 35–50 years are away at work during field visits and lose a day's wages if they attend, so reviews are irregular and some return mainly to buy medicines (10.3). Secondary-level officers estimated that about 60% of patients use the government programme and the rest private care, and primary-level officers said financially secure people find queues unattractive (10.4). Most community leaders noted that people in colonies and tribal settlements are hard to reach through camps held in working hours (10.5).

Theme 11: Free availability of medicines. Managers reported that diabetes medicines, including insulin, are free up to primary level, with a stated responsibility to hold at least 90 days of stock. Almost all secondary-level officers and patients described free supply as the foundation of continued treatment and monthly return visits, and JPHNs observed that even brief interruptions can lead patients to stop. Managers cautioned that free access had not by itself produced good glycaemic control.

Objective 4: experiences of people living with diabetes

Theme 12: Lifestyle knowledge–practice gap. Primary-level officers reported that only a proportion of patients follow diet, exercise and foot-care advice despite repeated counselling (12.1). Patients described the fatigue of lifelong illness, a desire for familiar starchy foods and sweets, and the effort of cooking separate meals, while household and seasonal food practices and family beliefs about food and strength limited change (12.2). Almost all managers described a changed food environment, with many more bakeries and processed foods, higher alcohol use and sedentary lifestyles (12.3). NP-NCD provides monthly peer-group classes, counselling by medical officers and JPHNs, and yoga at some facilities, but a few secondary-level officers felt that these messages do not consistently reach the grass roots (12.4).

Theme 13: Poor treatment adherence and self-modification of therapy. When insulin was out of stock some patients reportedly continued tablets alone, and medical officers cited travel, lost wages and private purchase of drugs or tests as reasons for missed visits (13.1). A few key informants described patients who adjusted doses with food intake, lacked knowledge of insulin site rotation, resisted starting insulin or stopped treatment when symptoms eased; adults below 40 were considered hardest to convince (13.2). Almost all programme-level respondents highlighted fear of modern medicine and frequent switching between public, private and alternative

providers (13.3). JPHNs and women patients described forgetting doses amid work and household responsibilities (13.4). Family reminders helped adherence, whereas older patients without caregivers were more vulnerable.

DISCUSSION

Principal findings

In this multi-stakeholder evaluation, the diabetes component of NP-NCD in Siddipet was seen as relevant, financially protective and increasingly patient-centred. Its strengths were integrated early detection built on trusted frontline workers, decentralised follow-up with simple recall tools and growing digital integration, and free medicines that underpin utilisation among older adults and low-income households. Participants also described a consistent set of gaps: stock-outs rooted in forecasting and procurement, workforce and laboratory shortages with very short consultations, idle screening equipment, absent SOPs for complication screening, poor reach into working-age adults, and a persistent gap between knowledge and practice. Together (Figure 5), the findings suggest that the programme has been more successful in widening access than in converting access into sustained control and prevention of complications.

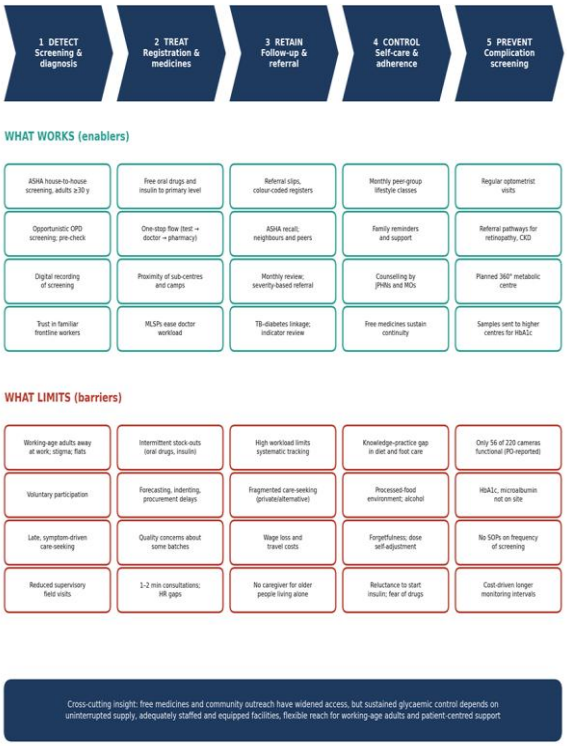

Figure 05: Integrative model of enablers and barriers along the diabetes care continuum under NP-NCD in Siddipet district. Derived from the thirteen themes. PO, programme officer; CKD, chronic kidney disease; SOP, standard operating procedure; MLSP, Mid-Level Service Provider; JPHN, Junior Public Health Nurse; MO, medical officer; HR, human resources.

Comparison with existing evidence

The emphasis on ASHAs, JPHNs and MLSPs is consistent with evidence that task-sharing with trained, supported frontline workers can strengthen NCD screening and follow-up where health workers are scarce,16 and that client trust underpins acceptance of their advice.17 It fits the team-based, community-linked primary care pursued in Kerala's reforms.18 Our finding that supervision had declined as reporting demands rose suggests this workforce needs protected supervision and time. Leaders' perception of late presentation echoes surveys showing that many people with diabetes remain undiagnosed19 and analyses of gaps in patient education and care-seeking.20

Participants valued free medicines as the enabler of long-term care, consistent with evidence that public provision is central to affordable diabetes medicines,21 while intermittent stock-outs mirror the incomplete availability found in preparedness assessments.7,9 The mechanisms described (inaccurate estimation, indenting errors, a procurement cap, delay and bulk supply near expiry) correspond to documented weaknesses in public drug procurement,22 and quality concerns matter because they shape trust in public services and can push patients to private purchase.23 Managers' observation that free medicines alone had not produced good control accords with the attrition across the national care continuum:3 access is necessary but not sufficient.

The workforce constraints reported here reflect broader primary care capacity gaps24 and the uneven distribution of India's health workforce,25 and consultations of one to two minutes leave little room for the counselling that lifestyle management requires.26 Reports of late-stage retinopathy and kidney disease are plausible given the prevalence of diabetic retinopathy, including among people with previously undiagnosed diabetes,27 and diabetes as a major driver of chronic kidney disease.28 Non-functional cameras, off-site tests, cost-based lengthening of monitoring intervals and low awareness parallel barriers identified in a systematic review of retinopathy screening access.29 The call for SOPs on frequency and responsibility for complication screening is, in our view, among the most readily actionable findings.

Wage loss, time constraints and reliance on private care among working adults resemble constraints reported by urban poor patients in south India.30 Participants' proposals for school- and workplace-based approaches are supported by evidence that structured education improved diabetes health literacy in school-going adolescents,31 that worksite diabetes-prevention programmes have been adapted and scaled in India32 and that a stepwise lifestyle approach was cost-effective in modelling.33 The envisaged single-window metabolic centre resembles integrated public-sector care models34 and the chronic care model.35 Finally, the gap between awareness and practice, shaped by food culture, household dynamics and a changing food environment, fits risk-factor patterns in Kerala36 and the broader literature on poor adherence.37 Provider-switching, fear of modern medicine and dose self-adjustment are invisible in facility records, which may explain why true defaulters were hard to identify.

Implications for policy and practice

Participants' recommendations are mapped to findings and levels of action in Table 5. Three seem most urgent. First, assured supply: forecasting, indenting and replenishment of oral drugs and insulin should be timely and auditable, because a few days without insulin can undo the benefit of free provision. Second, capacity that matches expansion: staff, laboratory technicians and dieticians should be sanctioned alongside new hubs and metabolic centres, and screening cameras repaired and maintained. Third, a defined complication-screening pathway: SOPs should specify who screens for retinopathy, nephropathy and neuropathy, how

often and where patients are referred, so that screening becomes routine rather than symptom-triggered.

Table 05: Recommendations derived from participant accounts, mapped to findings and level of action

Domain	Recommendation	Linked themes	Level of action
Medicine supply and quality	Timely forecasting, indenting and replenishment of oral drugs and insulin; strengthen quality assurance to sustain confidence in government-supplied drugs	5, 11, 13	State / District
Equipment	Repair, maintain and keep non-mydriatic cameras and other screening devices functional at all facilities	7	State / District
Clinical guidance	SOPs for retinopathy, nephropathy and neuropathy screening, including frequency, responsibility and referral of complicated cases	7, 8	State
Workforce	Fill vacant posts of doctors, laboratory technicians and dieticians; align staffing with service expansion	6	State
Capacity building	Regular refresher training for doctors, nurses, MLSPs, JPHNs and ASHAs on diabetes management, complication screening and counselling	2, 8	District
Patient flow	Use JPHNs and MLSPs for pre-checks (BP, blood sugar, BMI) and basic lifestyle counselling before consultation	2, 6	Facility
Follow-up	Standardise defaulter tracking: monthly NCD register review and ASHA-supported recall of missed visits across facilities	3	Facility / Community
Reaching working-age adults	Workplace-based screening and awareness; school health programmes; camps and services outside working hours	8, 10	District / Local government
Communication	Regular IEC sessions at sub-centres and primary centres, modelled on immunisation clinics, to counter misinformation	8, 12	Facility
Lifestyle risk	Community interventions on processed-food and alcohol consumption with local self-government support	12	Local government
Digital integration	Single-window digital documentation of screening, follow-up, referral and medicine dispensing	3, 8	State

SOP, standard operating procedure; MLSP, mid-level service provider; JPHN, junior public health nurse; ASHA, Accredited Social Health Activist; IEC, information–education–communication; BP, blood pressure; BMI, body mass index; NCD, non-communicable disease.

Strengths and limitations

The study captured perspectives from state-level managers to patients across all facility levels, used triangulation across groups and methods, and gives a service-pathway view that facility checklists cannot. Its findings translate into actions at identifiable levels of the system. Limitations should be considered. Findings reflect participants' views and may not transfer to other districts or to states with weaker public systems. They concern perceptions rather than measured outcomes, and several figures cited by participants (functional cameras, retinopathy and dialysis estimates, the 60% public-sector use) were not verified against programme records. Patient voices came from two FGDs of people attending public facilities, so those who left or never used the system are under-represented, and working-age adults' experiences were reported largely by providers. Only two community leaders were interviewed. Participants may have been reluctant to criticise their own programme, and translation from Telugu may have lost nuance. The theme-by-group matrix is an interpretive summary, not a measure of frequency.

CONCLUSIONS

The diabetes component of NP-NCD in Siddipet has strengthened early detection, community-based follow-up

and access to free treatment, and is regarded as relevant by those who deliver and use it. However, intermittent stock-outs, workforce and laboratory shortages, non-functional screening equipment, the absence of complication-screening SOPs, poor reach into working-age adults and a persistent knowledge–practice gap limit its effect on sustained glycaemic control and prevention of complications. Assured supply chains, staffing and equipment aligned with expansion, SOP-guided complication screening, workplace- and school-linked outreach, digitally integrated single-window care and patient-centred behavioural support are the priorities. Quantitative evaluation of the care cascade (screened, treated, controlled) and of complication-screening coverage would complement these findings.

ABBREVIATIONS

ASHA, Accredited Social Health Activist; CHC, Community Health Centre; FGD, focus group discussion; FHC, Family Health Centre; HbA1c, glycated haemoglobin; IDI, in-depth interview; IEC, information–education–communication; JHI, junior health inspector; JPHN, junior public health nurse; KII, key informant interview; MLSP, mid-level service provider; NCD, non-communicable disease; NP-NCD, National Programme for Prevention and Control of Non-Communicable Diseases; SOP, standard operating procedure; SRQR, Standards for Reporting Qualitative Research; UPHC, Urban Primary Health Centre.

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Conflict Of Interest

None declared

ETHICAL APPROVAL

Approved by the Institutional Ethics Committee, Surabhi Institute of Medical Sciences (IEC/SIMS/2025/12). Written informed consent was obtained from all participants, with separate consent for audio recording.

CONSENT FOR PUBLICATION

Not applicable; all qualitative data are anonymised.

DATA AVAILABILITY

Transcripts are not publicly available because they may contain identifiable information; de-identified quotations are provided in the manuscript.

AUTHOR CONTRIBUTIONS

AGA: conception, methodology, investigation, data collection, analysis and drafting. KK and RVT: methodological input, interpretation, critical review and revision. AA and MK: critical review and revision of the manuscript. JR and PS: Manuscript revision. All authors approved the final manuscript and agree to be accountable for all aspects of the work.

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