

Bridging the Care Gap: Evaluating a Hub-and-Spoke Model for School-Based Neurodevelopmental and Mental Health Interventions in Rural India

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Introduction

Child and adolescent healthcare is one of the primary goals of the healthcare infrastructure of our nation. Nowadays, the rising prevalence of Neurodevelopmental Disorders (NDDs) and mental health conditions is a big concern in the urban as well as rural regions. While mental health conditions often encompass emotional and behavioural disorders, NDDs—including Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), and Specific Learning Disabilities (SLD)—are characterized by early-onset impairments in personal, social, and academic functioning. Globally, the World Health Organization (WHO, 2021) estimates that one in seven adolescents experiences a mental health condition, while NDDs contribute to a significant and often permanent share of disability-adjusted life years (DALYs).

The Indian Context and Policy Mandate

In India, the National Mental Health Survey (NMHS) reports a staggering treatment gap exceeding 70%, with rural geographies facing an even steeper deficit (Gururaj et al., 2016). The National Education Policy (NEP) 2020 marks a pivotal shift in addressing this by merging health and education priorities (Kazmi & Singh, 2023). It emphasizes "Equitable and Inclusive Education," specifically mandating the early identification of NDDs to ensure "Zero-Rejection" in schooling. The NEP 2020 advocates for a holistic approach where schools are not just centers of learning, but hubs for the "well-being and psychological health" of students, utilizing school complexes for resource sharing (Kazmi & Ali, 2021).

The PRASHAST Tool and the Referral Paradox

To operationalize these mandates, the NCERT introduced the PRASHAST tool (2022), a school-based screening mechanism designed for "task-shifting"—empowering teachers to identify 21 categories of disabilities, including various NDDs. However, screening in rural areas often leads to a "Referral Paradox": identification without an accessible pathway to clinical intervention. For a child in rural India, a "positive" screen for ID, SLD or ASD often hits a dead end due to the absence of specialized therapists. This study evaluates a decentralized Hub-and-Spoke model—linking a metropolitan expert center to a rural wellness outpost—designed to bridge the gap between classroom screening and specialized clinical care for both NDDs and mental health conditions.

Methods

Study Design and Locale

This implementation research utilized a pre-post evaluation design. The study was conducted in Meerpur village, within the Balrampur district of Uttar Pradesh. Balrampur is characterized by significant socio-economic barriers and a critical lack of specialized healthcare infrastructure for neurodevelopmental support.

Setting and Participants

The study focused on 10 rural government schools in the Balrampur district. The sample consisted of N=453 school going children (age 6–11 years) identified through a dual-gate process: preliminary teacher observation of academic/behavioural lag followed by formal PRASHAST screening for NDD and mental health "red flags."

The Hausla Connect: Hub-and-Spoke Model of Intervention

The study utilized a "Resource Sharing" model to bring tertiary-level care to a primary care setting:

- *The Hub (Hausla Early Intervention Centre, Lucknow)*: Located 180 km from the site, this centre served as the clinical anchor. Its multidisciplinary team (Clinical Psychologists, Special Educator, Speech Therapist, Occupational Therapist and counsellors) provided the detailed case work-ups, including screening, identification and diagnosis (if needed) followed by intervention planning.

- *Under the Hausla Connect initiative, the Spoke (Hausla Wellness Centre, Meerpur):* Located within the rural heart of District Balrampur, this centre acted as the primary intervention site. It was staffed by special educators and therapists who delivered face-to-face therapy while receiving real-time tele-supervision from the Lucknow Hub.

Statistical Analysis

Quantitative data were analysed using SPSS v26. A paired t-test compared pre- and post-intervention scores. A Chi-square test assessed the association between condition types (NDDs vs. Mental Health) and intervention uptake.

Results

Screening and Diagnosis

General school teachers engaged in primary schools were trained to administer the PRASHAST tool, afterwards these teachers screened 453 students using PRASHAST part-1 tool from their respective schools. Out of 453 screened students, 142 school children (32.6%) were identified as 'suspected case' and referred for the screening using the part-2 of PRASHAST tool by Special educators who further reported at risk cases as 38 children.

Table 1: Identification of cases

Category	Frequency (n)	Percentage (%)
Total Screened	453	100%
Identified 'suspected case' (PRASHAST Part-1)	142	32.6%
Identified 'at-risk case' (PRASHAST Part-2)	58	12.8%
Referral for assessment and clinical diagnosis	58	12.8%

Table 2: Condition-wise Distribution (Confirmed n=58)

Condition	Number
Intellectual Disability	13
Specific Learning Disability (SLD)	09

Locomotor Disability	08
Hearing Impairment	07
Autism Spectrum Disorder	06
Visual Impairment	06
Speech and Language Disorder	05
Behavioural problems	04

Intervention process

The intervention domains in the present study were identified based on the items and outcomes of the PRASHAST, which was utilized as a disability screening tool in accordance with the provisions of the Rights of Persons with Disabilities Act, 2016. The tool served as a preliminary mechanism to flag children who may require further assessment and facilitated the identification of children exhibiting potential indicators of disability through a structured, teacher-driven screening process.

Subsequent to the screening, children identified as “at-risk” underwent detailed clinical evaluation and functional assessment by a multidisciplinary team. It was at this stage that specific areas of difficulty were delineated. The assessment findings consistently indicated that the majority of identified children demonstrated functional impairments predominantly in the domains of behaviour regulation, attention, and communication. These domains were found to have the most significant impact on classroom participation and learning.

Accordingly, these three domains were operationalized as the primary targets for intervention. Intervention planning was carried out through the integration of screening outcomes with comprehensive clinical assessment and therapeutic intervention planning, ensuring that support was need-based and contextually relevant. This approach aligns with best practices in disability identification and intervention, wherein screening acts as an entry point, followed by in-depth assessment to guide domain-specific intervention planning.

Significant improvements were observed across all teacher-rated functional domains following the 3-months intervention period (December 2025 to February 2026) at the Hausla Wellness Centre Meerpur (Spoke).

Table 3: Pre- vs. Post-Intervention Performance

Measure	Pre	Post	t value	p value
Behaviour Score	6.8	4.2	3.21	< 0.01
Attention Score	5.9	3.7	2.98	< 0.01
Communication	5.5	3.8	2.45	< 0.05

Discussion

The findings demonstrate that the Hausla Hub-and-Spoke model effectively mitigates the rural treatment gap for CWSN including NDDs. By utilizing the Hausla Wellness Centre, Meerpur (Spoke), families were spared the logistical and financial burden of traveling to Lucknow, effectively overcoming the "Referral Paradox" (Kazmi, 2021).

Alignment with NEP 2020

This model serves as a "proof of concept" for the NEP 2020's vision of School Complexes. By sharing the specialist resources of the Lucknow Hub across rural Spokes in Balrampur, the model circumvented the shortage of child psychiatrists. Furthermore, the focus on NDDs like ID, SLD and ASD directly supports the NEP mandate for Foundational Literacy and Numeracy (FLN).

The "Academic Entry Point"

The high uptake for NDDs ($p < 0.05$) suggests that rural families are more likely to accept care when it is delivered within the school ecosystem and framed as "educational support." This provides a strategic roadmap for scaling inclusive education—positioning NDD support as a prerequisite for academic success rather than a separate clinical issue.

Limitations and Implications

- Limitations: The small sample size and short intervention duration limit generalizability.
- Implications: The study proves that task-shifting to teachers via PRASHAST is a viable first step. Scalability can be achieved by utilizing District Early Intervention Centres (DEICs) as Hubs and local wellness centres like Hausla as Spokes to manage the lifelong needs of children with NDDs.

Conclusion

The integration of school-based screening with a decentralized Hub-and-Spoke model offers a scalable solution to the rural neurodevelopmental and mental health crisis. By anchoring rural "Spokes" in Meerpur to an expert "Hub" in Lucknow, we transition from mere identification to meaningful inclusion, ensuring that children in districts like Balrampur are not left behind.

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