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Mobile health van as an intervention to provide clinical support and health promotion to street children and marginalised populations in the National Capital Region of Delhi: a mixed-methods evaluation

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ABSTRACT

Background Urban health challenges, particularly for street and slum-dwelling children and families, have emerged as one of the most significant health concerns in India. While there is little published on effective healthcare delivery to these populations, mobile health vans (MHV) have been proposed as a proactive pathway to providing outreach healthcare. Our aims were to evaluate the impact of Bal Umang Drishya Sanstha (BUDS) MHV in providing health and support services to the urban slum populations in Delhi National Capital Region (NCR), focusing on benefits to children.

Methods This was a mixed-methods evaluation, using routinely collected data. We collated and reviewed available data recorded by the BUDS staff in their health record system from June 2017 to December 2023. Qualitative data were provided by two recent focus group discussions carried out in the community; one with 18 mothers and another with a mixed group of 12 adults—all had used MHV clinics for children in their families. We chose two typical case studies that were reported to the funding bodies.

Results Between 2017 and 2023, there were a total of 41 062 clinic visits for children<18 years, with visits increasing steadily and peaking at 8864 in 2023. Just under 10% of encounters were referred to specialist services, 122 children were diagnosed with disability. Health education sessions were provided mainly in group settings, to over 70 000 children. Themes extracted from focus group discussions were enhanced access to healthcare, quality of care, value adds from MHV and suggestions for improvement. Families expressed overwhelming appreciation of BUDS MHV. Case studies illustrated the benefits of facilitated access to tertiary healthcare.

Conclusions MHV can serve as a valuable source of primary healthcare for street and slum-dwelling children and their families. Other benefits are empowering communities with health literacy and negotiating pathways to tertiary care.

WHAT IS KNOWN ABOUT THE SUBJECT

⇒ Street and slum-dwelling children and their families face significant health challenges.
⇒ Street children and young people in particular experience many rights violations and struggle with access to quality healthcare.
⇒ Mobile health vans (MHVs) have been mooted as an innovative approach to accessing underserved and hard to reach populations.

WHAT THIS PAPER ADDS

⇒ MHVs, in this urban setting of Delhi National Capital Region, provided much needed clinical services to street and slum-dwelling children and their families.
⇒ Families valued enhanced access to healthcare, they also appreciated access to health education.
⇒ An added benefit was the support provided to navigate specialist and tertiary healthcare services.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Governments need to respond proactively and appropriately to the pressing healthcare needs of the urban poor in India.
⇒ This non-government run service shows how MHVs can overcome barriers in providing access to primary healthcare to marginalised children in the urban setting.
⇒ MHVs need to be adequately resourced to respond to the substantial needs of urban street and slum-dwelling children and their families.

INTRODUCTION

India has the largest child and youth population in the world. The urban population in the country, which was 32%in 2011, is expected to increase to 38% by 2036.[1] Many of the mega cities in India have migratory rural populations, who work in the informal sector. The

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livelihoods of these slum and street-dwelling populations are precarious at the best of times, but COVID-19 put a significant added stress, with many thousands having to move back to their rural homes during lockdown. At the peak of the pandemic, an unprecedented 1.6 billion children globally were out of school, with concerns that widespread economic insecurity would increase rates of children's exploitation, labour, maltreatment and teenage pregnancy.[2 3]

Urban health in India is challenging, not in the least part due to the very large number of street and slum-dwelling children and their families.[4 5] The rise in the number of the urban poor in India has been exponential.[6] Many slum-dwelling populations comprised of internal migrants, often without birth certificates or legal identities; many are not even enumerated. Access to basic services such as clean water, toilets and decent education is a daily struggle. According to the report compiled by Save the Children and PwC India, as per Census 2011, there are 13.7 million households in India that live in urban slum conditions with inadequate basic amenities, poor access to healthcare, poor health outcomes, insecurity and unstable incomes.[6] Certain health indices for the urban poor, especially those living in slums and informal settlements show large differentials from the mainstream population, including under-five mortality rates, proportion of stunted children and proportion of households with no piped water.[5] There is little published research on effective healthcare service delivery to these populations.[7] In terms of universal health coverage, India's health system ranked in the bottom third decile of 204 countries in 2019; with fragmented architecture and lack of accountability contributing to poor quality of care in both public and private sectors.[8] Mobile health vans (MHVs) have been used in many jurisdictions around the world, as a cost effective approach to accessing underserved and difficult to reach populations, including during the COVID-19 pandemic.[9–11] While mobile health services have been utilised in a range of settings in India and from as early as the 1950s,[12 13] there is a lack of robust evaluation of their effectiveness, especially with respect to street and slum-dwelling children and families.

Bal Umang Drishya Sanstha (BUDS) is a non-for-profit organisation working to advance the health, well-being and welfare of vulnerable children in India, focusing on those experiencing extreme poverty. Current sites of activity include urban settlements in three states of India-New Delhi, Uttarakhand and Uttar Pradesh and one marginalised rural district Nuh, Haryana, India. The PwC report highlighted the issues faced by the children living in urban India with respect to healthcare.[6] Drawing from the findings of this report, BUDS collaborated with PwC India Foundation and launched a mobile healthcare van (MHV) in June 2017 to provide access to healthcare in two urban slums of Delhi National Capital Region (NCR) and marginalised regions of Nuh District, Haryana. The mobile van operates on three principles: to prevent disease, provide prompt treatment and promote health (box 1). Most of the patients who access MHV services belong to vulnerable, street-based and marginalised groups, most families are migrants and adults work as daily wage labourers, vendors or rickshaw pullers. While the MHV provides primary healthcare services to adults and children, BUDS as an organisation has an explicit focus on children and young people. Given the paucity of research and evaluation on mobile health services for street and slum-dwelling children and young people, our aims were to evaluate the impact of the MHV in providing health, welfare and health promotion services to the urban slum populations in Delhi NCR, and explore the flow on benefits for street and slum-dwelling children and their families, by using routinely collected data for monitoring purposes.

Box 1 Buds operation of Mobile Health Van in Delhi NCR

The Mobile Health Van (MHV) programme delivered by BUDS in Delhi NCR is managed by a team of five members (programme coordinator, community outreach/mobilisation coordinator—who himself grew up on the streets, a counsellor—a female whose presence provides an element of comfort to the female patients, a paramedic—a male who manages the stock of medicines and records of patients and the van driver). On different days of the week and as per the roster, general physicians, paediatricians and gynaecologists provide clinical services. The MHV operates every day from Monday to Friday (9.30 am to 4.30 pm) in different urban slum locations of Delhi NCR, on set days of the week. Approximately 80 consultations are provided in these clinics. Clinicians provide rapid assessments, aided by simple tools, however clinical records are not detailed. Diagnosis of developmental disabilities is made clinically, on the basis of the child's developmental history, developmental milestone assessments, clinical examination and input from parents or caregivers—no standardised assessment tools are used. Besides free of cost preventive and curative healthcare, trained counsellors provide health education to the families of children, young women are empowered to deal with their menstrual hygiene and reproductive health. The MHV utilises audio-visual tools, featuring a large screen for educational films on family planning, oral and dental care, communicable and non-communicable diseases. The MHV clinic further connects patients with social services and healthcare systems through referrals, fostering a comprehensive approach to health promotion, disease prevention and treatment.

BUDS, Bal Umang Drishya Sanstha.

METHODS

We used a mixed-method approach for this evaluation.

Quantitative: we collated and reviewed routinely collected quantitative data for children under 18 years of age, in terms of number of paediatric patients assessed, number of patients referred for specialised medical care, number of individuals who received health education. Information was extracted from the secondary data recorded by the BUDS healthcare professionals in their health record system from June 2017 to December 2023. MHV maintains a daily record of patient count each day: male/female distribution, some sociodemographic

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details, referrals made and health education sessions imparted. Information from clinical records was not able to be collated, due to the shorthand nature of the handwritten notes by the clinicians.

Qualitative: two focus group discussions (FGD) were conducted by TG to assess the impact, accessibility and quality of primary healthcare services provided by BUDS MHV.

1. With 18 mothers aged between 22 and 36 years, whose children aged between 1 month and 17 years received treatment from the BUDS MHV in Shiv Vihar Community.
2. With a mixed group of 12 adult participants aged 22–50 years, including four mothers, one grandfather, one grandmother, three fathers, one brother and two other caregivers/community members whose children, grandchildren or siblings had received treatment from the MHV.

The facilitator collaborated with BUDS community mobilisers to reach out and recruit community members who had received medical care services from BUDS MHV. The FGDs were held at the BUDS Drop-In-Centre, a familiar and convenient location for the participants. Using a discussion guide covering various themes, TGG conducted the sessions in Hindi, audio recorded it with prior consent, and took detailed notes. The recordings were transcribed and translated into English. Thematic analysis was carried out on the qualitative data.

There were short clinical narratives and case studies that were reported to the funding bodies. In these reports, the names and identities of patients seen were kept confidential. We present two such case studies.

Patient and public involvement

Given that BUDS is a grassroots non-government organisation, the research questions and outcome measures were directly informed by patients' priorities, experience and preferences. All of BUDS programming is responsive to community needs, and formative research and evaluation informed by community members, is built into every intervention at the outset. Community mobilisers are part of BUDS staff and were involved in the qualitative research that engaged with the consumers directly about their experiences and expectations of MHV in delivery healthcare to their community. Results of the FGDs have already been fed back to the community. The whole evaluation will be summarised and translated into Hindi for feeding back to the community in BUDS Annual Report and delivered in BUDS annual celebrations. The BUDS team sincerely thanks all the patients' advisors and caregivers for their support.

RESULTS

Quantitative

Healthcare coverage

Between 2017 and 2023, BUDS MHV provided clinical services to >41 000 children and young people 0–18 years, 52% overall were male; and referred 3353 children to receive specialised medical care as per individual need, to hospitals and specialist medical institutions (see table 1). Referrals to specialist and tertiary services rose from 2% in 2017 to 16% of the children seen in 2023. Despite the volume of patients seen, clinicians also newly identified 122 children with developmental disabilities and referred to necessary early intervention services. Common reasons for attending MHV included upper and lower respiratory illness, Otitis Media, viral fever, gastrointestinal symptoms such as vomiting, diarrhoea, abdominal pain, constipation, nutritional concerns including malnutrition and anaemia; skin conditions such as pyoderma and scabies.

BUDS health education programme reached a substantial number of children, with >70 600 children benefiting from these sessions; some of these sessions were provided in local municipal schools, therefore included children who did not attend MHV for a clinic visit. Health education sessions were provided to parents, equipping them with knowledge to better care for their children's health as well as to children, encouraging healthier lifestyles to reduce disease prevalence. Health education and promotion activities included sessions on early childhood development, breast feeding, immunisation, prevention of seasonal influenza (referred to as 'influenza'), nutrition, disease prevention, hygiene, and sanitation.

Qualitative

The two FGDs conducted with mothers and a mixed group of adult participants, comprised community members, all from low socioeconomic backgrounds and working in occupations such as tailors, artisans, daily labourers, and bakers.

Themes

Enhanced access to appropriate health services: 'Earlier, we had to spend an entire day waiting for our turn at the government hospital'

Participants from both focus groups learnt about the BUDS MHV services through word of mouth, either through community mobilisers, counsellors, neighbours or friends. They highly valued the ability to attend much needed clinical services in their own community. As this grandmother said, 'We are so thankful to —— (BUDS community mobilizer) who informed us about the MHV services in our community'. The ease of access to MHV services, being closer to their homes, and requiring less waiting time compared with government hospitals, were highly appreciated by both groups.

> 'Waiting so long time to be seen was hard, especially during the winter and monsoon seasons' (grandmother)

Service utilisation and quality of care: 'The health education provided by MHV is very helpful for us as it helps prevent diseases'.

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Table 1 Occasions of service and clinic outcomes for children 0–18 years, BUDS Mobile Health Van 2017–2023

Year	Clinic visits for healthcare			Referrals made			Developmental disability identified			Health education session provided		
	Male (%)	Female (%)	Sub total	Male (%)	Female (%)	Sub total (%)	Male (%)	Female (%)	Sub total (%)	Male	Female	Sub total
2017	1573 (56)	1188 (43)	2761	32 (2)	19 (2)	51 (2)	14 (1)	7 (1)	21 (1)	1137	1205	2342
2018	1490 (55)	1226 (45)	2716	25 (2)	27 (2)	52 (2)	11 (1)	4 (0.3)	15 (0.5)	5441	5470	10 911
2019	2979 (50)	2970 (50)	5949	57 (2)	51 (2)	108 (2)	19 (1)	11 (0.3)	30 (0.5)	6558	6477	13 035
2020	3270 (54)	2779 (46)	6049	39 (1)	30 (1)	69 (1)	8 (0.2)	6 (0.2)	14 (0.2)	4721	6963	11 684
2021	4137 (53)	3734 (47)	7871	268 (6)	286 (8)	554 (7)	11 (0.2)	14 (0.3)	25 (0.3)	5365	7369	12 734
2022	3418 (50)	3434 (50)	6852	506 (15)	634 (18)	1140 (17)	7 (0.2)	4 (0.1)	11 (0.2)	4646	6033	10 679
2023	4644 (52)	4220 (48)	8864	626 (13)	753 (18)	1379 (16)	2 (0.04)	4 (0.09)	6 (0.07)	3235	6033	9268
Total	21 511 (52)	19 551 (48)	41 062	1553 (7)	1800 (9)	3353 (8)	72 (0.3)	50 (0.2)	122 (0.3)	31 103	39 550	70 653

Both mothers and mixed group participants utilised the MHV services frequently, especially during peak illness seasons like winter and monsoon. Common treatments they reported included those for colds, coughs, fevers and other seasonal illnesses. Both groups rated the quality of care as high, appreciating the politeness, attentiveness and competence of the healthcare professionals. One young man who accompanied his sister to MHV for clinical services said, 'the doctors talked very politely… I felt like half of the disease was gone'. Participants particularly valued the follow-up care instructions and referrals. Both groups expressed a strong desire for ongoing health education sessions as well, picking topics like anaemia, malnutrition and hygiene (vernacular terms used).

What we value: MHV helped my child continue her studies by providing the appropriate treatment when she was not well'.

Participants from both groups shared that the MHV services had a positive impact on their children's health, enabling them to continue their education and activities without having to suffer prolonged illness. In their own words, they expressed that the effective treatments provided by the MHV clinicians improved the overall quality of life for their children and families. A major positive was the time saved, as this mother noted 'MHV is far better than government hospitals and dispensaries because the waiting time is much shorter'. All participants expressed high satisfaction with the MHV services, citing better accessibility, shorter waiting times and the provision of free medication as key reasons. They frequently recommended the MHV services to others in their community.

What we would like:

Both groups suggested increasing the frequency of MHV visits from once a week to 2–3 times a week to better meet healthcare needs, especially during the high illness-prone seasons, like monsoon. Mothers in particular suggested that nutritional supplements could) be provided for longer durations to prevent anaemia and nutritional deficiencies. Both groups noted the absence of diagnostic equipment needed for blood tests and X-rays in the MHV, necessitating visits to government hospitals, which they often could not get to. Participants suggested that mental health support could be added as this was a gap. The mixed group suggested incorporating more detailed explanations and role-play activities for better engagement.

Case study 1: Sonia* 15 years old

Sonia, while attending her education classes at the BUDS Drop-In-Centre, learnt about BUDS MHV from a BUDS counsellor. The counsellor informed her that the MHV provided primary healthcare services and suggested visiting the van with her mother.

On visiting the MHV, doctors treated Sonia for her cold, cough, fever and prescribed other necessary medicines. Recognising the need for further diagnostic tests, the MHV doctors referred Sonia to a super-specialty

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Government hospital for X-ray and other blood investigation tests. The MHV staff provided support and guidance to help Sonia and her mother access these diagnostic facilities at a Government Hospital.

Diagnostic tests carried out at the hospital revealed that Sonia had active tuberculosis (TB). Government Hospital staff referred her to a DOTS (Directly Observed Treatment, Short-course) centre for specialised TB treatment. However, Rani* (Mother) felt overwhelmed and helpless about navigating the DOTS treatment process at the Government hospital.

BUDS healthcare staff provided ongoing counselling and crucial support to Rani and Sonia. They assisted them in accessing DOTS and also supplied nutritional supplements to ensure Sonia's proper recovery. The staff maintained regular follow-ups to monitor Sonia's progress.

With comprehensive support from the BUDS MHV healthcare staff, Sonia made a full recovery. She is now in good health, has regained her strength and has resumed her education. Rani expressed profound gratitude for the unwavering support and guidance provided throughout her daughter's treatment and recovery. Sonia is a strong advocate for second chance education programmes for young women and is a great ambassador for the work that BUDS does in her community.

*Name changed

Case study 2: Rafik 9 years old

Nine-year-old Rafik* was born in an underserved district of Bihar. He faced numerous health challenges since early childhood. Rafik experienced multiple episodes of severe cough and respiratory distress. With limited access to quality healthcare and increasing concerns for Rafik's health, his parents decided to migrate from Bihar to Delhi to seek better medical treatment for Rafik and livelihood opportunities for themselves. They settled in a densely populated urban slum area in the southern part of Delhi. Rafik's father and his 22-year-old brother worked as manual labourers, earning a mere 300 Indian rupees (approximately $3) per day. Despite the hardships, Rafik's parents were determined to find a solution for their son's health problems. His mother got to know about the BUDS MHV through her daughter who attended education classes at the BUDS Drop-in Centre. His parents reached out to BUDS MHV where the clinician reviewed his past medical records from AIIMS (tertiary Government Hospital) and existing medical condition and found out that Rafik was suffering from congenital heart disease, specifically a ventricular septal defect, had endured multiple episodes of broncho-pneumonia and needed cardiac surgical intervention which would cost around 70 000 rupees ($850). However, due to financial constraints, the family was unable to proceed with the surgery. The onset of the COVID-19 pandemic further delayed their quest for medical care by three more years. On examining Rafik, the paediatrician at MHV immediately arranged an appointment with a paediatric cardiologist at Delhi Heart Centre (private facility). With the assistance of another non-government agency, the necessary funds for Rafik's surgery were secured. Within a week, Rafik successfully underwent heart surgery at a private hospital. He stayed in the ICU for 3 days postoperatively and received nutritional support and follow-up medical care through the MHV until his complete recovery.

*Name changed

DISCUSSION

The United Nations Convention on the Rights of the Child (UNCRC) decrees every child has an inalienable right to accessible and quality healthcare.[14] The ambitious UN Sustainable Development Goals (SDGs) provide guidance to advance the rights of vulnerable children living in street-based situations to life, and optimal survival, development and health.[15] Achieving SDG 4 which is to 'ensure inclusive and equitable quality education for all' helps to accomplish other SDGs which are of particular interest to SWC, such as eliminating the worst forms of child labour (SDG 8.7) and ending abuse, exploitation, trafficking and all forms of violence against and torture of children (SDG 16.2).[16] This evaluation of the MHV services, provided by BUDS for marginalised children and their families living in the margins in the Delhi/NCR regions, indicates that not only are children provided much needed primary healthcare, they are also provided pathways to tertiary and specialist care, given health education and their families provided wrap around services that includes practical counselling. Thus, BUDS MHV has successfully provided medical services to marginalised children and young people where medical services are scarce, ensuring that underserved populations receive necessary and timely healthcare services by breaking barriers such as distance, transportation and financial constraints. The initiative has led to early diagnosis, and treatment of diseases and early intervention for developmental disability. We posit that BUDS MHV does not just address the medical and social determinants of health but upholds children's rights by engaging them in health literacy and empowerment.

The review of mobile health clinics in the USAs concluded that these services reach vulnerable populations directly at the curb side, and as a link between clinical and community settings, address both medical and social determinants of health.[9] While other research evaluations of BUDS services have been published, including exploring children/young peoples' experiences of COVID-19,[17] and providing health and support services to those with chronic health conditions and disabilities in rural Nuh (Haryana State),[18] this is the first analysis of the role of BUDS MHV in improving access to quality healthcare for vulnerable children and their families living in street-based situations in Delhi.

Mobile health units have long been in use in India, particularly to serve rural and tribal populations. Previous evaluations of mobile health units in Tamil Nadu and Orissa have demonstrated that overall, these

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units serve the healthcare needs of the poor by substantially reducing the geographical barriers to access in under-served areas. However, limitations were the lack of financial commitment from the government, inadequate resourcing and lack of non-government-organisations involved in running these services.[12] A recent study of government run mobile health services in the mountainous outreaches of Uttarakhand found that integrating mobile health service delivery with existing public health system in primary healthcare is a feasible, indeed necessary option to address inaccessibility in these settings.[13] The responses from families who accessed BUDS MHV services, suggested high engagement, satisfaction and trust with services received. Families were empowered enough to ask for more health education on topics they deemed important and suggest more access to mental healthcare. An earlier study assessing client satisfaction with government run mobile health clinics in urban Delhi, found that while 82% were aware of these clinics, more than two-thirds preferred private practitioners; due to having greater trust in private practitioners.[19] The case studies beautifully illustrate that young people with serious illness were identified and supported through the maze of tertiary clinical care. As the study reporting on street children's access to healthcare found, while many young people in these situations exhibit agency, there was a need for a trusted accompanying adult to help them find appropriate services and treatment.[20] Another issue that case study 1 demonstrated was that there was cross-referral and intersection between various programmes run by BUDS, in this case, the second chance education programme and the Drop-in-Centre for youth and the MHV.

A major limitation of this study was not being able to capture more granular data on the clinic population or the population serviced. While we know that there were many clinical encounters for children peaking in 2023 to well over 8500, we do not have a denominator population, nor do we have a means of measuring clinical outcomes. However, it is clear that children who would not otherwise have easy access to healthcare were provided clinical care. Most gratifyingly, the gender differentials that are so common in India in terms of healthcare access between males and females were not evident—in fact more girls were referred to specialist and tertiary services than boys. We know that slum and street-dwelling populations are poorly enumerated and in India, the urban poor comprise a mobile population of migrant workers and their families with poor health indices.[20] Clinical records for individual patients were not a viable option to analyse, due to the sheer volume of clinical encounters in a day and the records maintained by BUDS staff mainly served for monitoring and reporting purposes. Several of the challenges that street and slum-dwelling young people face in the underserved communities of Delhi NCR, including school refusal, gender-based violence, child labour and child marriages are areas of special focus for BUDS key workers. A major strength of BUDS service delivery framework is that there are cross-platform referrals and intersections between the many programmes, including the early childhood education centres, the education programmes for adolescents, the drop-in centres and the MHVs. We could not demonstrate the gains that have resulted from these intersections except through a case study. Likewise, the impact of the health education sessions is hard to measure.

CONCLUSIONS

Millions of children live largely invisible in urban slums or work on the streets of India to escape poverty, domestic abuse, violence and trafficking. Many of these children grow up deprived of their basic rights to healthcare and development, endure harsh physical, sexual and emotional abuse and face exploitation as child labourers. Our study shows that for street and slum-dwelling children and young people in India, MHVs are an essential platform for delivering primary healthcare, health promotion and linkages to secondary and tertiary care.

Public healthcare in India was in poor shape when the National Health Mission was launched in 2005, unfortunately several key indicators have further deteriorated since then, with the primary healthcare approach taking a battering.[20] Operating in this milieu, the objective of the BUDS MHV was to take healthcare to the doorstep of street children, particularly in urban slums and rural underserved areas, including the uninsured, and the undocumented. The MHV clinics provide a wide range of services to people who may not otherwise receive care, including urgent care, primary care, preventive health support and to serve as a gateway to refer and connect patients to secondary, tertiary and traditional healthcare systems. Jamir *et al*,[21] in their viewpoint article, suggested that 'till adequate accessible fixed health care facilities are made available to the underserved section of the urban population, mobile health clinics appear to be a viable option for alleviation of their suffering'. What we would add is that mobile health services should be adequately resourced, underpinned by a rights-based approach and have a strong community engagement ethos.

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Contributors RS participated in the study's conceptualisation and design, acquisition, analysis, interpretation, planning, writing, approved the final version and is responsible for overall content as guarantor. TGG and SR participated in the study's conceptualisation and design, acquisition, analysis, interpretation, planning, writing, approved the final version. IM participated in the study's analysis, interpretation, planning and writing and approved the final version. YQ took part in conceptualisation and design of the study, analysis and approved the final version. IT participated in the study's conceptualisation and design, acquisition and approved the final version.

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Competing interests No, there are no competing interests.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting or dissemination plans of this research. Refer to the Methods section for further details.

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