International Journal of Community Medicine and Public Health
Bhargavi A et al. Int J Community Med Public Health. 2026 May;13(5):2424-2430
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20261431

Original Research Article

Coverage gaps in child health screening under Rashtriya Bal Swasthya Karyakram: a Tanahashi framework analysis using national and state-level data from India

Alajangi Bhargavi[1]*, Nibash Konkada[2]

[1]Department of Community Medicine, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Visakhapatnam, Andhra Pradesh, India
[2]Department of Community Medicine, Hitech Hospital and Medical college, Bhubaneswar, Odisha, India

Received: 23 March 2026
Revised: 20 April 2026
Accepted: 21 April 2026

***Correspondence:**
Dr. Alajangi Bhargavi,
E-mail: bhargavialajangi10@gmail.com

ABSTRACT

Background: Childhood conditions, including congenital anomalies and developmental delays, are significant contributors to morbidity in India. To address these challenges, the Rashtriya Bal Swasthya Karyakram (RBSK) was initiated under the national health mission for the early detection and management of health issues through widespread screenings of children aged 0 to 18 years. However, limited evidence exists regarding the program's overall effectiveness. This study aims to assess coverage gaps in the implementation of RBSK using the Tanahashi model and to evaluate key program indicators at both national and state levels.
Methods: We conducted a secondary data analysis based on reports from the ministry of health and family welfare, the national health mission, and parliamentary records. Program indicators were mapped according to the Tanahashi coverage stages: availability, accessibility, contact coverage, detection, and care, with a particular focus on Andhra Pradesh.
Results: Between 2014 and 2024, approximately 160.84 crore screenings were performed under RBSK, achieving coverage of nearly 60% of the target population. The detection rate stood at 7.4%, revealing that 11.90 crore children were identified with health issues; however, only 5.64 crore (47.4%) received further care, indicating a significant treatment gap. Furthermore, there were 430 district early intervention centres (DEICs) across approximately 53.75% of districts. In Andhra Pradesh, while screening trends were observed, data regarding referrals and treatments were insufficient.
Conclusions: Although RBSK has realized considerable screening coverage, substantial gaps persist in service availability and effective care delivery. It is essential to strengthen referral pathways and enhance diagnostic and treatment capacities to ensure that children identified through screenings receive timely and appropriate care.

Keywords: RBSK, Tanahashi model, Child health services, Program evaluation, Coverage gap, India

INTRODUCTION

Child health remains a significant public health priority in India, as congenital anomalies, developmental disorders, and nutritional deficiencies considerably contribute to childhood morbidity and long-term disability. Globally, congenital anomalies are among the leading causes of neonatal mortality and childhood disability, accounting for nearly 295,000 neonatal deaths annually. It is estimated that congenital anomalies affect approximately 18 to 20 per 1,000 births in India, accounting for nearly 9 to 10% of neonatal deaths and playing a substantial role in childhood disability and the ongoing healthcare needs

of affected individuals. Similarly, developmental delays and disabilities affect nearly 10% of children, yet a large proportion remain undetected due to the absence of systematic screening mechanisms.[1] Research indicates that the early identification and prompt management of conditions such as congenital heart disease, congenital hypothyroidism, hearing impairment, developmental delays, severe anemia, and nutritional deficiencies can greatly enhance functional outcomes, prevent irreversible disabilities, and alleviate the long-term socioeconomic burden on families and the healthcare system. Early intervention services-including medical treatment, corrective surgery, nutritional supplementation, physiotherapy, speech therapy, and developmental stimulation-are most effective when initiated during early childhood, a period when brain development is particularly receptive to therapeutic interventions.[2-4]

Recognizing the significance of early detection and intervention, the Government of India initiated the RBSK in 2013 as part of the national health mission. This program aims to screen children from birth to 18 years for four categories of conditions collectively referred to as the "4 Ds": defects at birth, diseases, deficiencies, and developmental delays, including disabilities. Screening is implemented through a multi-tiered approach, which encompasses newborn screening at delivery points, home visits by community health workers, and assessments of preschool and school-aged children conducted by mobile health teams. Children suspected of having health conditions are subsequently referred to DEICs for further diagnosis, management, and rehabilitation services.[5]

RBSK represents one of the largest child health screening initiatives globally, targeting approximately 270 million children from birth to 18 years across India through systematic screening for the four categories of conditions-defects at birth, deficiencies, diseases, and developmental delays including disabilities (4Ds). However, despite extensive screening coverage, a detection-treatment gap persists in many settings.[6] Evidence suggests that a considerable proportion of children identified during screening do not complete the referral pathway or receive definitive care due to constraints such as weak referral linkages, inadequate diagnostic infrastructure, shortage of specialists, limited functionality of DEICs, and socioeconomic barriers faced by families. These challenges can result in delays in confirming a diagnosis and initiating treatment, thereby reducing the potential benefits of early detection. Furthermore, variations in program implementation across states, gaps in follow-up mechanisms, and inadequate monitoring of referral outcomes have been reported as important operational issues affecting programme effectiveness. Strengthening referral systems, improving diagnostic and treatment capacity at DEICs, and ensuring effective follow-up are therefore crucial to bridging the detection–treatment gap and maximizing the impact of RBSK in reducing childhood morbidity and disability.[7,8]

The evaluation of health programs necessitates an assessment not just of service coverage, but also of the degree to which targeted individuals receive appropriate care. The Tanahashi model offers a conceptual framework for evaluating health service coverage across various stages, including availability, accessibility, acceptability, contact coverage, and effective coverage.[9] This framework has been extensively utilized in public health to identify bottlenecks in the delivery of health services and the implementation of programs.

Despite achieving significant screening coverage nationally, the RBSK program lacks sufficient publicly available evidence regarding its performance across the entire care cascade, particularly in terms of referral completion and treatment outcomes. Additionally, state-level reporting tends to prioritize screening coverage, providing limited insight into the following stages of care.

Consequently, this study aims to evaluate implementation of RBSK in India through a cascade approach guided by the Tanahashi framework. It will also assess availability of key program indicators at both the national and state levels, with a particular emphasis on Andhra Pradesh.

METHODS

Study design

This study was a descriptive secondary data analysis of publicly available program data related to the implementation of the RBSK in India.

Data sources

Data were obtained from publicly available government documents and reports including: Ministry of Health and Family Welfare (MoHFW) program reports and press releases, national health mission publications, parliamentary responses related to RBSK implementation and official program guidelines and reports.

These sources provide aggregated information on screening coverage, detection of health conditions, and service utilization under the program.

Study setting

The study examined RBSK implementation at two levels: National level (India) and state level (Andhra Pradesh). India has implemented RBSK across all states and union territories through mobile health teams and DEICs. Andhra Pradesh was selected as an example state for examining publicly available data on program implementation trends.

Study variables

Program indicators were extracted and categorized according to stages of the care cascade: Number of

children screened, number of children identified with health conditions under the four categories (4Ds), number of children receiving secondary or tertiary care services.

For the state-level analysis, available indicators on the number of children screened annually were extracted.

Analytical framework

The analysis was informed by the Tanahashi model, which conceptualizes health service delivery as a sequence of coverage stages, including: Availability of services, accessibility of services, acceptability of services, contact coverage and effective coverage.

Program indicators were mapped to relevant stages of this framework to examine potential bottlenecks in service delivery under RBSK.

Data analysis

Data were analyzed using descriptive statistics. Frequencies and proportions were calculated to construct a screening-to-treatment cascade illustrating the progression from screening to identification of health conditions and receipt of care.

State-level data were summarized to examine trends in screening coverage over time. Availability of indicators across different stages of the cascade was also assessed to identify gaps in program reporting. No inferential statistical analysis was performed as the study was based on aggregated program-level data.

Ethical considerations

The study utilized aggregated data available in the public domain, and no individual-level or identifiable information was used. Therefore, formal ethical approval was not required.

RESULTS

National implementation of RBSK in India

Since its launch in 2013, the RBSK has implemented large-scale screening of children aged 0-18 years through mobile health teams in Anganwadi centres, schools, and health facilities.

Tanahashi model analysis

Availability coverage

Availability refers to whether the required health infrastructure exists.

RBSK requires district early intervention centres (DEICs) for diagnosis and management.

India currently has: 430 DEIC operational nationwide.[10] Approximately 800 districts in India

Availability coverage calculation

Availability coverage ≈ 430 / 800 districts ≈ 53.75% district availability

Table 1: Availability coverage.

Indicator	Value
Total districts in India	~800
Operational DEICs	430
Availability coverage	≈53.75%

Only about half of the districts have operational DEICs, indicating substantial infrastructure gaps in the availability of specialized child health services under RBSK.

Accessibility coverage

Accessibility refers to the target population that the program intends to reach.

RBSK targets: ≈27 crore children aged 0-18 years annually.[10]

Table 2: Accessibility coverage.

Indicator	Value
Target population (0-18 years)	~27 crore
Screening strategy	Schools, anganwadis, newborns

This stage represents potential coverage of services.

Contact coverage

Contact coverage refers to the actual service utilization, in this case, the number of children screened.

Total screenings: 160.84 crore from 2014-2024, program duration: ≈ 10 years

Annual screening: 160.84/10 ≈ 16.08 crore screenings per year

Contact coverage: 16.08/27 ≈ 59.6% annual contact coverage

Table 3: Contact coverage.

Indicator	Value
Total screenings (2014-2024)	160.84 crore
Average annual screenings	16.08 crore
Target population	27 crore
Contact coverage	≈59.6%

RBSK targets approximately 27 crore children annually across India. Based on available data, an average of approximately 16 crore screenings occur each year, corresponding to around 59% of estimated target population.[11,12]

Detection coverage

Children identified with health conditions: 11.90 crore. Detection rate: 11.90/160.84=7.39%

Table 4: Detection coverage.

Indicator	Value
Children screened	160.84 crore
Children identified	11.90 crore
Detection rate	7.4%

Approximately 7.4% of screened children were identified with conditions under the 4 Ds category.

Care coverage

Children receiving secondary/tertiary care: 5.64 crore, care coverage=5.64/11.90=47.4%.

Less than half of identified children appear to receive definitive care, indicating substantial detection–treatment gap.

Table 5: Care coverage.

Indicator	Value
Children identified	11.90 crore
Children receiving care	5.64 crore
Care coverage	47.4%

Tanahashi cascade for RBSK

Table 6: Tanahashi model applied to RBSK national level.

Tanahashi stage	Indicator	Value
Availability	Operational DEICs	430 (~53.75% district coverage)
Accessibility	Target population	27 crore children
Contact coverage	Annual screenings	16.08 crore
Detection coverage	Children identified	7.4% of screened
Care coverage	Children receiving care	47.4% of identified
Effective coverage	NA (not reported)	-

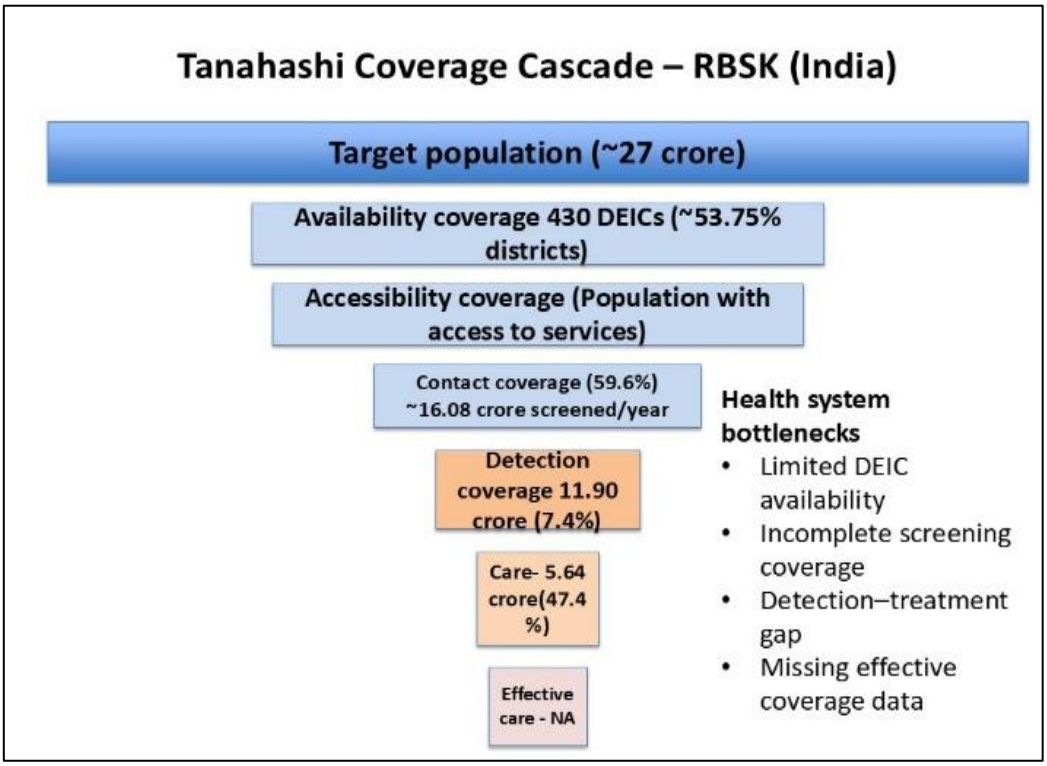

Figure 1: Tanahashi coverage cascade applied to the RBSK in India.

The Figure illustrates Tanahashi coverage stages for RBSK, highlighting gaps between screening, detection, and receipt of care. Approximately 430 DEICs are operational nationwide (~53.75% district availability).

The program targets ~27 crore children annually, with approximately 16.08 crore screenings conducted each year (~59.6% contact coverage). Around 11.90 crore children were identified with health conditions (7.4% detection rate), of whom 5.64 crore received secondary or tertiary care services (47.4% care coverage). Data on effective coverage are not publicly reported.

State-level implementation: Andhra Pradesh

State-level implementation of RBSK in Andhra Pradesh shows substantial expansion in screening coverage over time. Publicly available data from parliamentary reports indicate that the number of children screened under the program increased rapidly during the initial years following its launch.[10]

Table 7: Children screened under RBSK in Andhra Pradesh.

Years	Children screened (lakh)
2014-15	3.8
2015-16	15.2
2016-17	71.4
2017-18	74.2
2018-19	48.6
2019-20	61.3
2020-21	4.4
2021-22	7.2
2022-23	6.1
2023-24	15.8

Screening coverage expanded substantially between 2016 and 2018, reflecting program scale-up. However, a sharp decline was observed during 2020-2022, likely due to disruptions in school-based health services during the COVID-19 pandemic.

Availability of state-level cascade indicators

Although screening data are available at the state level, comprehensive information on subsequent stages of the care cascade-such as detection rates, referral completion, and treatment outcomes-is not consistently reported in publicly available sources.[10]

Table 8: Availability of RBSK cascade indicators in Andhra Pradesh.

Cascade stage	Data availability
Eligible children	NA
Children screened	Available
Children detected with 4Ds	Limited availability
Children referred to DEIC	NA
Children reaching DEIC	NA
Confirmed diagnosis	NA
Children receiving treatment	Limited availability

DISCUSSION

This study assessed the implementation of the RBSK in India utilizing the Tanahashi model, highlighting significant bottlenecks across various stages of the service delivery cascade. Although the program has achieved notable scale in screening efforts, considerable gaps remain in service availability and effective coverage.

At the national level, RBSK has demonstrated impressive outreach, with over 1.608 billion screening episodes conducted since its inception, translating to approximately 160.8 million screenings annually and reaching nearly 60% of the target population. This performance in contact coverage indicates that the program has successfully established large-scale, community-based screening through anganwadis, schools, and mobile health teams. These findings align with previous evaluations that recognize RBSK as one of the largest child health screening initiatives in the world.[6]

The detection rate observed in this study was approximately 7.4%, which is consistent with the expected burden of childhood conditions in India. Congenital anomalies alone affect approximately 2% of births, while developmental delays and disabilities are estimated to affect 5-10% of children.[1] The observed detection rate therefore suggests that RBSK is effective in identifying a substantial proportion of underlying morbidity in the population. Similar findings have been reported in community-based screening programs, where systematic screening improves early identification of otherwise undiagnosed conditions.[8]

There is a significant gap between detection and receipt of care, with only 47.4% of identified children receiving secondary or tertiary services. This highlights a critical issue in effective coverage, as outlined in the Tanahashi framework. Past studies indicate that large-scale screening programs struggle to convert detection into timely treatment due to systemic barriers like weak referral linkages, inadequate diagnostic capacity, and limited specialized services.[7,8]

A key bottleneck identified in this study is the limited availability of services. With only 430 DEICs in about 800 districts, coverage is only 53.75%, leaving many districts without facilities for diagnosis and management. Furthermore, a shortage of trained professionals, including pediatricians and audiologists, hampers the health system's ability to effectively manage identified cases.[7]

There is a significant gap in contact coverage for screening, with only about 60% of the target population screened annually, leaving many children unreached. Factors like inconsistent school attendance, logistical challenges, and disruptions from the COVID-19 pandemic exacerbate this issue. Additionally, the drop in

screening coverage in Andhra Pradesh from 2020 to 2022 highlights the program's vulnerability.

The main bottleneck is the transition from detection to treatment, as less than half of identified children receive care due to poor referral systems, long distances to DEICs, financial constraints, caregiver unawareness, and limited pediatric services. To enhance effective coverage, it's crucial to strengthen referral linkages and coordination between screening teams and DEICs while expanding access to specialized services. This gap indicates that improvements in screening coverage alone are insufficient unless accompanied by strengthening of downstream health system capacity.

A key finding is the lack of data on critical stages of the care cascade at the state level. Although screening data are available, information on referral completion, diagnostic confirmation, and treatment outcomes is often missing. This lack of transparency hinders program evaluation and makes it difficult to identify points of attrition in the care pathway. The absence of data on effective coverage is particularly concerning, as it affects the assessment of program impact and the health outcomes for children receiving services.

From a broader perspective, the findings of this study must be interpreted in the context of India's epidemiological transition. With declining infectious disease mortality and improvements in neonatal survival, congenital anomalies and developmental conditions are emerging as important contributors to childhood morbidity and mortality.[3] In this context, strengthening programs such as RBSK is essential to address the evolving burden of child health conditions.[13]

The RBSK design focuses on broad population coverage through repeated screening; however, without enhancing downstream services, it may overburden the health system and widen the gap between detection and effective care. Integrating with initiatives like Ayushman Bharat-PMJAY could enhance access to specialized care for children.[14] Strengthening digital health systems for tracking referrals and follow-ups may improve continuity of care and reduce loss to follow-up. Addressing access inequities, particularly between rural and urban areas, is essential for improving program effectiveness.[15]

Limitations

This study is based on secondary analysis of publicly available aggregated data and is subject to several limitations. The absence of individual-level data limits detailed analysis of patient pathways. In addition, cumulative screening figures represent screening episodes rather than unique individuals. Key indicators such as referral completion, diagnostic confirmation, and treatment outcomes were not available in the public domain, limiting comprehensive assessment of effective coverage.

CONCLUSION

The RBSK has achieved substantial success in expanding screening coverage and early identification of health conditions among children in India. However, significant bottlenecks remain across the care cascade, particularly in service availability and effective coverage.

While approximately 60% of the target population is screened annually, only about half of identified children receive definitive care, indicating a substantial detection–treatment gap. In addition, limited availability of DEICs and lack of comprehensive data on referral and treatment outcomes further constrain program effectiveness.

Strengthening infrastructure, improving referral and follow-up systems, expanding diagnostic and treatment capacity, and enhancing program monitoring are essential to bridge these gaps. Addressing these challenges is critical to realizing the full potential of RBSK in reducing childhood morbidity, disability, and long-term health burden in India.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. March of Dimes global report on birth defects: The hidden toll of dying and disabled children-Alignmnh. Available at: https://www.alignmnh.org/resource/march-of-dimes-global-report-on-birth-defects-the-hidden-toll-of-dying-and-disabled-children/. Accessed on 17 March 2026.
2. Shonkoff JP, Phillips DA. From neurons to neighborhoods: the science of early childhood development. Washington, DC: National Academy Press. 2000.
3. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013;382(9890):427-51.
4. World Health Organization. Birth defects: report. Available at: https://iris.who.int/handle/10665/75355. Accessed on 17 March 2026.
5. National Health Mission. Operational guidelines. Available at: https://nhm.gov.in/index1.php?Lang=1&level=5&sublinkid=1193&lid=372. Accessed on 17 March 2026.
6. National Health Mission. Rashtriya Bal Swasthya Karyakram. Available from: https://nhm.gov.in/index4.php?Lang=1&level=0&linkid=499&lid=773. Accessed on 17 March 2026.
7. S AS, R AKS, Sundar JS. Insights of Rashtriya Bal Swasthya Karyakram: a strength, weaknesses,

opportunities, and threats analysis. Int J Community Med Public Health. 2022;9:4279.
8. Kar A, Radhakrishnan B, Girase T, Ujagare D, Patil A. Community-Based Screening and Early Intervention for Birth Defects and Developmental Disabilities: Lessons from the RBSK Programme in India. Disabil CBR Inclusive Develop. 2020;31(1):30.
9. Tanahashi T. Health service coverage and its evaluation. Bull World Heal Organ. 1978;56(2):295.
10. Ministry of Health and Family Welfare, Government of India. Rashtriya Bal Swasthya Karyakram. Lok Sabha starred question no. 174. 2024.
11. Ministry of Health and Family Welfare, Government of India. Update on the Rashtriya Bal Swasthya Karyakram (RBSK). Available at: https://www.mohfw.gov.in/?Q=en/pressrelease-207. Accessed on 17 March 2026.
12. National Health Mission. Annual reports. Available at: https://nhm.gov.in/index1.php?Lang=1&level=3&sublinkid=957&lid=405. Accessed on 17 March 2026.
13. UNICEF. UN inter-agency group for child mortality estimation (UN IGME). Available at: https://data.unicef.org/resources/un-inter-agency-group-for-child-mortality-estimation-unigme/. Accessed on 17 March 2026.
14. National Portal of India. Ayushman Bharat: Pradhan Mantri Jan Arogya Yojana. Available at: https://www.india.gov.in/spotlight/details/ayushman-bharat-pradhan-mantri-jan-arogya-yojana. Accessed on 17 March 2026.
15. World Health Organization. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva: World Health Organization; 2010.

Cite this article as: Bhargavi A, Konkada N. Coverage gaps in child health screening under Rashtriya Bal Swasthya Karyakram: a Tanahashi framework analysis using national and state-level data from India. Int J Community Med Public Health 2026;13:2424-30.