Recollections

Implementation of Universal Newborn Hearing Screening and Analysis of School Enrollment Among Hearing-Impaired Students in China

Zhili Wang[1,&]; Yunge Gao[2,&]; Yuzhang Huang[3,&]; Wenying Nie[4]; Yun Li[1,2]; Haibin Sheng[1,2]; Jie Chen[1,2]; Yuzhu Guo[5]; Kun Han[1,2]; Zhiwu Huang[1,2]; Fan Jiang[6]; Jun Zhang[7]; Hao Wu[1,2,#]; Ying Chen[8,#]

ABSTRACT

Universal newborn hearing screening (UNHS) is recognized as the most effective strategy for early detection of congenital hearing loss; however, screening coverage remains inadequate in many countries. In China, newborn hearing screening has been implemented for over two decades. To evaluate our policies and practices during this period and assess resource equity, health impacts, and future challenges, we conducted a nationwide survey focusing on newborn hearing screening coverage, the number of special schools for deaf-mutes, and the proportion of hearing-impaired students in mainstream education. From 2001 to 2020, China's UNHS program coverage increased from 10.9% to 94.3%, while the proportion of hearing-impaired students in mainstream education rose from 24.8% to 57.5%. Concurrently, the number of hearing-impaired students in special schools decreased from 76,554 to 34,945, and the number of special schools for deaf-mutes declined from 639 to 389. Through the implementation of the UNHS program, China has made substantial progress in improving newborn hearing health, yielding long-term benefits for those with congenital hearing loss. However, targeted resource allocation and the establishment of a national platform remain priorities for future development. Our experience may provide valuable insights for similar settings.

Congenital hearing loss represents a critical public health challenge, affecting 1 to 3 per 1,000 neonates in the general population (*1*), with prevalence rates escalating to 2% to 4% among those with established risk factors (*2*). Early-onset hearing impairment significantly impacts speech and language development. Without early intervention, congenital hearing loss frequently progresses to profound deafness, leading to substantial learning difficulties and emotional and social developmental challenges (*3*–*4*). However, when detection, diagnosis, intervention, and rehabilitation are implemented early, individuals with hearing impairment can achieve developmental outcomes comparable to their normal-hearing peers, facilitating social integration and reducing both familial and societal burden.

Universal Newborn Hearing Screening (UNHS) has emerged as the most effective strategy for early detection of congenital hearing loss (*5*). While some developed nations have achieved UNHS screening rates as high as 97.7% (*6*), the global landscape reveals significant disparities. Only 41 countries have attained coverage exceeding 85%, while at least 64 countries report coverage rates below 1% (*7*). As UNHS systems mature, an increasing number of hearing-impaired children receive timely interventions, enabling their integration into mainstream educational settings rather than specialized institutions. This shift in mainstream school enrollment patterns reflects various social, economic, and educational reforms, corresponding to UNHS development and serving as an indicator of intervention outcomes.

China, as a developing nation with one of the world's largest populations, has made remarkable progress in UNHS coverage through sustained governmental initiatives over two decades. The country established its first national technical specification for newborn hearing screening in 2004, followed by the launch of a targeted national newborn disease screening project in 2014 to enhance screening rates in economically disadvantaged regions (Supplementary Figure S1, available at https://weekly.chinacdc.cn/). This study examines the policy implementation and practical outcomes of UNHS in China across the past two decades, with particular emphasis on resource equity, health impacts (including screening coverage

and mainstream education integration of hearing-impaired students), and future challenges. The insights gained from this experience may prove valuable for similar healthcare contexts globally.

This study encompassed 31 provincial-level administrative divisions (PLADs), excluding Hong Kong Special Administrative Region (SAR); Macau SAR; and Taiwan, China, due to data unavailability. Data on the UNHS program were collected in 2021 through questionnaires distributed to 31 provincial health committees by the National Health Commission (NHC) of China. Educational data were obtained from the Ministry of Education (MOE) of China website (http://www.moe.gov.cn/jyb_sjzl/moe_560/). The study received approval from the ethics committee of Shanghai Ninth People's Hospital Shanghai Jiao Tong University (SH9H-2022-T377-1).

History and Policy of UNHS in China

China initiated the UNHS program in the late 1990s, achieving comprehensive coverage across all PLADs by 2014. According to the National Center for Birth Defects Monitoring of China, national coverage increased substantially from 29.9% in 2008 to 86.5% in 2016 (*8*). The program's development can be categorized into three distinct phases: the exploration and pilot stage (1989–2000), the launch and promotion stage (2001–2014), and the nationwide implementation stage (2015-present) (Supplementary Figure S1).

The Chinese UNHS protocol follows a two-step screening process: initial screening after birth and repeat screening within 42 days. Distortion product otoacoustic emissions (DPOAE) serve as the primary screening method, followed by hearing diagnosis within 3 months, intervention within 6 months, and rehabilitation from 6 months to 6 years of age, culminating in enrollment for compulsory education for ages 6–14 (Supplementary Figure S2, available at https://weekly.chinacdc.cn/). China's compulsory education law, enacted in 1986, mandates nine years of schooling, encompassing elementary (grades 1–6) and middle school (grades 7–9). Educational options for hearing-impaired students include special education schools, attached classes, regular classes, and 'home delivery' teaching (http://www.moe.gov.cn/). With UNHS implementation, an increasing number of hearing-impaired students now attend regular classes rather than special schools or classes. However, to our knowledge, the enrollment proportion among hearing-impaired students in China has not been previously documented in the literature.

Resource Equity

The Gini coefficient and Lorenz curve, well-established metrics for quantifying inequality, were employed to evaluate the distribution equity of healthcare services (including screening institutions and pediatric hearing diagnosis and treatment centers) and educational resources (including rehabilitation institutions and specialized schools for deaf-mutes) (Figure 1). Using each PLAD as an analytical unit, we conducted a nationwide equity assessment. The X-axis represents the cumulative proportion of births (in 2020, stratified by PLADs), while the Y-axis represents the cumulative proportion of corresponding resources.

The Gini coefficient ranges from 0 to 1, with higher values indicating greater inequality. Conventionally, coefficients below 0.2 indicate absolute equality, 0.2–0.3 relative equality, 0.3–0.4 adequate equality, 0.4–0.5 relative inequality, and above 0.5 severe inequality. Graphically, the coefficient represents the ratio between two areas: the area between the Lorenz curve (blue) and the line of perfect equality (green), and the total area beneath the line of perfect equality. A lower Gini coefficient indicates more equitable resource distribution relative to birth population across PLADs. As of 2020, China's infrastructure comprised 14,648 screening institutions, 273 diagnosis and treatment centers, 865 hearing and speech rehabilitation institutions, and 389 special schools for deaf-mutes. The corresponding Gini coefficients were 0.21, 0.36, 0.29, and 0.26, respectively (Figure 1), indicating relative to adequate equality in resource distribution.

Health Impacts

Screening coverage of Newborn Hearing Screening in China: Initial data collection in 2005 revealed that only nine PLADs reported newborn hearing screening cases, with a coverage rate of 10.9%. Following program implementation and promotion efforts, coverage expanded significantly, with 30 PLADs (excluding Xizang Autonomous Region) reporting data in 2010, achieving 37.8% newborn coverage. This rate subsequently increased substantially to 81.5% by 2015 (Figure 2, Supplementary Table S1, available at https://weekly.chinacdc.cn/).

By 2020, China had achieved a 94.3% initial hearing screening completion rate among newborns. Of those who failed the initial screening, 87.2%

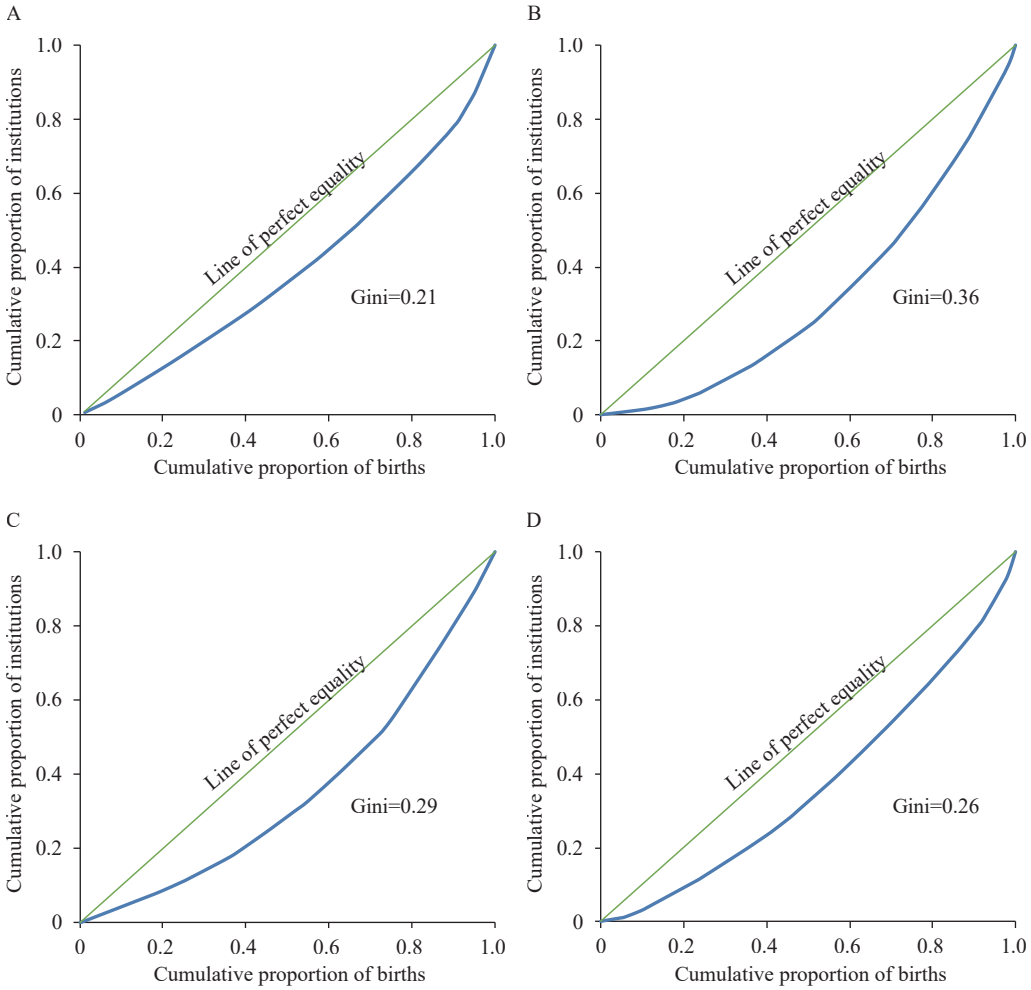

FIGURE 1. Distribution of health services and educational resources in China, 2020. (A) Lorenz curve for hearing screening institutions; (B) Lorenz curve for hearing diagnosis and treatment centers; (C) Lorenz curve for rehabilitation institutions; (D) Lorenz curve for special schools.
Note: The green line represents perfect equality. The deviation between the two curves reflects the magnitude of inequality in resource distribution. The Gini coefficients are 0.21, 0.36, 0.29, and 0.26, respectively.

completed the repeat screening protocol. Among infants who failed the repeat screening, 62.0% received comprehensive audiological diagnosis, resulting in a congenital hearing loss detection rate of 1.6 per 1,000 newborns (Supplementary Table S2, available at https://weekly.chinacdc.cn/).

Special schools for deaf-mutes and hearing-impaired students in special schools: Students with hearing impairments may attend one of three educational settings: regular schools, comprehensive special schools that serve multiple types of disabilities, or specialized schools exclusively for deaf-mutes. In 2001, before the widespread implementation of UNHS, specialized schools for deaf students comprised 41.7% (639/1,531) of all special schools in China. This proportion decreased to 31.7% (541/1,706) by 2010, and further declined to 17.3% (389/2,244) in 2020, six years after achieving national UNHS coverage (Supplementary Figure S3, available at https://weekly.chinacdc.cn/).

Concurrent with this institutional shift, enrollment of hearing-impaired students in special schools has shown a marked decline over the past two decades. From 2001 to 2020, the number of hearing-impaired students in special schools decreased by 54.4%, from 76,554 to 34,945 (Supplementary Figure S3).

Mainstream education proportion among hearing-impaired students: In China, hearing-impaired students who achieve satisfactory rehabilitation outcomes typically integrate into mainstream schools. The mainstream education proportion was calculated as the ratio of hearing-impaired students in mainstream schools to the total number of hearing-impaired students in both mainstream and special schools.

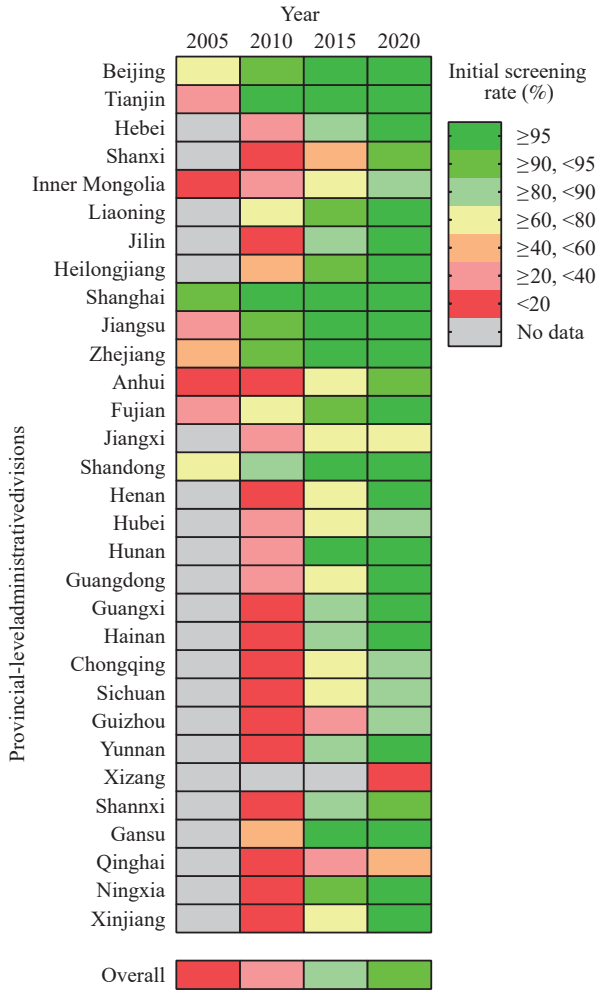

FIGURE 2. Heat map of UNHS coverage across 31 PLADs in China for 2005, 2010, 2015, and 2020.
Note: Overall screening coverage rates for 2005, 2010, 2015, and 2020 were 10.9%, 37.8%, 81.5%, and 94.3%, respectively. The heat map employs a color gradient to represent screening rates across divisions, with green indicating higher coverage and red indicating lower coverage. Gray-shaded areas represent unavailable data.
Abbreviation: UNHS=Universal newborn hearing screening; PLADs=provincial-level administrative divisions.

Students enrolled in attached special education classes within mainstream schools, though relatively few, were excluded from this calculation. The overall mainstream education proportion for hearing-impaired students from grades one through nine increased substantially from 24.8% in 2001 to 57.5% in 2020 (Table 1). When analyzed by educational stage within China's nine-year compulsory education system, which comprises elementary school (grades one through six) and middle school (grades seven through nine), the mainstream education proportion showed differential growth. From 2001 to 2020, elementary school integration increased from 26.8% to 62.2%, while middle school integration rose from 16.5% to 48.2%.

Challenges and Prospects

This nationwide study demonstrates that China's UNHS program coverage increased substantially from 10.9% to 94.3%, while concurrent mainstream school enrollment for hearing-impaired students rose markedly from 24.8% to 57.5% over the past two decades.

The UNHS program, as a proactive public health initiative, has profoundly impacted early diagnosis, etiological identification, and timely intervention for pediatric hearing loss. China's remarkable progress in screening coverage from 10.9% in 2005 to 94.3% in 2020 was facilitated by technical advancements, enhanced training implementation, and particularly the development of the maternal and child health system. The dramatic increase in hospital delivery rates from 76.0% in 2001 to 99.2% in 2012 enabled the integration of newborn screening as standard hospital protocol (*9*). However, significant regional disparities persist, with some PLADs reporting screening rates substantially below the national average. The Gini coefficient for diagnosis and treatment centers (0.36) exceeds those of other resources (0.21, 0.29, and 0.26 for screening institutions, rehabilitation facilities, and special schools, respectively), likely reflecting the higher staffing and equipment requirements for diagnostic facilities. These disparities highlight potential areas for UNHS system improvement. Despite the establishment of a preliminary UNHS management framework, many specialists advocate for developing a nationally integrated informatics platform to enhance screening, diagnosis, and intervention rates while addressing regional inequities.

Historically, hearing-impaired children were predominantly enrolled in specialized schools for the deaf and hard of hearing (*10*). Contemporary approaches now emphasize mainstream education integration, supported by early diagnosis and comprehensive hearing interventions. For instance, in the Netherlands, 61% of hearing-impaired children attend mainstream elementary education (*11*). Modern mainstream schools increasingly provide inclusive educational environments through various formats, including regular classes, resource rooms, and separate classes. In mainland China, the proportion of hearing-impaired students in regular mainstream classes has risen substantially from 24.8% in 2001 to 57.5% in 2020. Within mainstream schools, hearing-impaired

TABLE 1. Number and proportion of hearing-impaired students in mainstream education in China, 2001–2020.

Year	Compulsory Education Stage (grade 1st–9th)		Elementary School Stage (grade 1st–6th)		Middle School Stage (grade 7th–9th)	
	N	Proportion (%)	*N*	Porportion (%)	*N*	Proportion (%)
2001	25,520	24.8	22,327	26.8	3,193	16.5
2002	27,408	25.2	22,308	26.4	5,100	21.1
2003	26,558	24.2	21,353	25.8	5,205	19.3
2004	27,060	24.0	21,122	25.2	5,938	20.4
2005	27,781	24.1	21,733	25.8	6,048	19.6
2006	26,444	22.8	20,620	24.5	5,824	18.4
2007	28,268	24.9	21,111	25.3	7,157	23.7
2008	26,727	23.9	19,427	24.1	7,300	23.5
2009	25,412	23.3	17,865	23.0	7,547	23.9
2010	23,980	22.6	17,189	22.9	6,791	22.1
2011	21,389	21.2	14,866	21.1	6,523	21.6
2012	19,244	20.5	13,674	20.7	5,570	19.9
2013	17,189	20.8	12,334	21.2	4,855	19.7
2014	20,095	24.4	14,469	25.1	5,626	22.8
2015	24,432	29.3	17,784	30.4	6,648	26.6
2016	28,425	33.8	20,846	35.4	7,579	29.9
2017	34,000	40.3	24,959	43.0	9,041	34.3
2018	35,348	44.0	25,576	47.7	9,772	36.6
2019	42,900	51.9	30,907	56.7	11,993	42.6
2020	47,251	57.5	33,853	62.2	13,398	48.2

Note: Source from public data released by the Ministry of Education of China, at http://www.moe.gov.cn/jyb_sjzl/moe_560/.

students are primarily integrated through two approaches: attached special classes (dedicated classes for hearing-impaired students) and full integration into regular classes, with the latter being the predominant model. Future research should focus on tracking the academic performance of hearing-impaired students, given the long-term developmental impact of hearing loss. Additionally, an integrated service system encompassing both medical treatment and education is anticipated.

The reduction in special schools for deaf-mutes from 679 in 2001 to 389 in 2020 can be attributed to several key factors. First, the expanded UNHS coverage and enhanced early intervention protocols have played a crucial role. Second, systematic educational reforms have significantly influenced this transition. Third, the comprehensive service system for hearing-impaired children has evolved to integrate screening, diagnosis, intervention, rehabilitation, and education through coordinated efforts among the Health Commission, the Disabled Persons' Federations, and the Ministry of Education. This multi-departmental collaboration has effectively reduced both the number of specialized schools and their enrollment rates. However, the shift toward mainstream education cannot be solely attributed to increased UNHS coverage, as multiple factors influence this trend, including health and educational policies, financial support mechanisms, and broader socioeconomic considerations. For example, more than 10 PLADs (including Shanghai, Jiangsu, Zhejiang, etc.) have progressively included cochlear implants in their basic medical insurance coverage. Furthermore, the first centralized procurement program will significantly reduce cochlear implant costs from over 200,000 CNY (27,400 USD) to approximately 50,000 CNY after March 2025, substantially improving intervention accessibility for hearing-impaired newborns. Additionally, as part of the educational reform, many special schools for deaf-mutes are transitioning into rehabilitation schools for preschool children with hearing aids and/or cochlear implants, focusing on preparing them for future mainstream society integration. Consequently, many teachers of the deaf are undergoing specialized training

to become speech and language therapists (SLTs).

Over the past two decades, China has achieved remarkable progress in expanding newborn hearing screening coverage and increasing mainstream school enrollment among hearing-impaired students. To address persistent challenges, including regional disparities in screening and diagnostic rates, the establishment of a comprehensive national informatic platform for the UNHS system remains essential.

Conflicts of interest: No conflicts of interest.

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[#] Corresponding authors: Ying Chen, drevonne@shsmu.edu.cn; Hao Wu, wuhao@shsmu.edu.cn.

[1] Department of Otolaryngology-Head and Neck Surgery, Shanghai Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China; [2] Ear Institute, Shanghai Jiao Tong University School of Medicine; Shanghai Key Laboratory of Translational Medicine on Ear and Nose Diseases, Shanghai, China; [3] Department of Health Policy Management, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, USA; [4] Jinan Maternal and Child Care Hospital Affiliated to Shandong First Medical University, Jinan City, Shandong Province, China; [5] School of Public Health, Shanghai Jiao Tong University, Shanghai, China; [6] Department of Developmental and Behavioral Pediatrics, National Children's Medical Center, Shanghai Children's Medical Center, School of Medicine, Shanghai Jiao Tong University, Shanghai, China; [7] Ministry of Education-Shanghai Key Laboratory of Children's Environmental Health, Xinhua Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China; [8] Department of Audiology & Speech-Language Rehabilitation, College of Health Science and Technology, Shanghai Jiao Tong University School of Medicine, Shanghai, China.

[&] Joint first authors.

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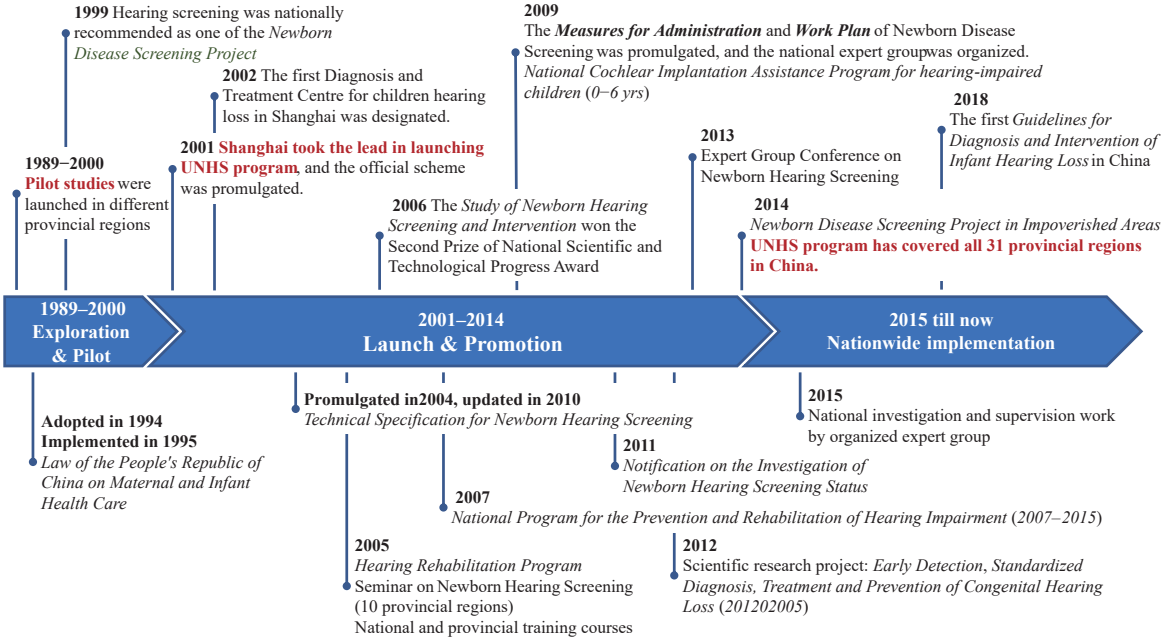
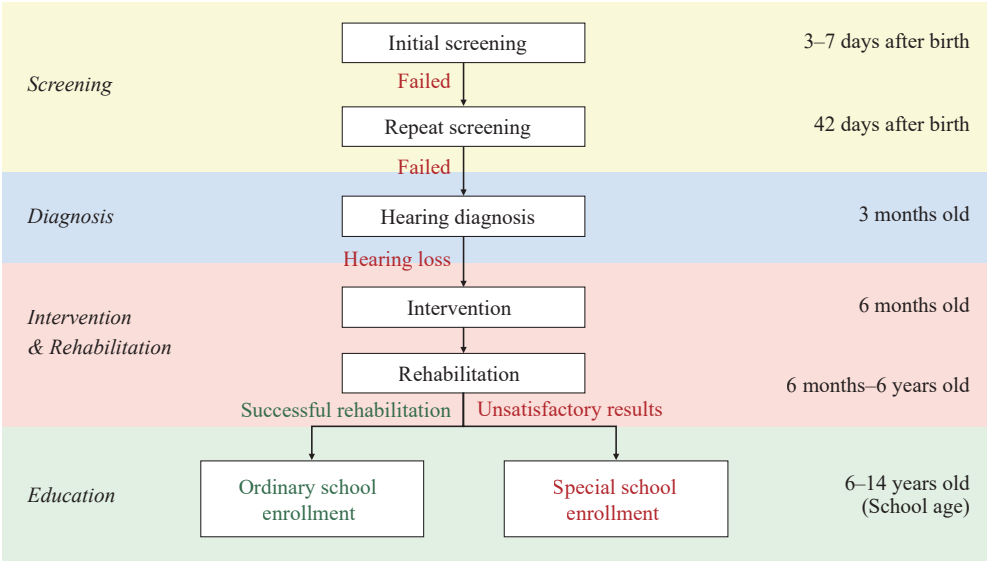
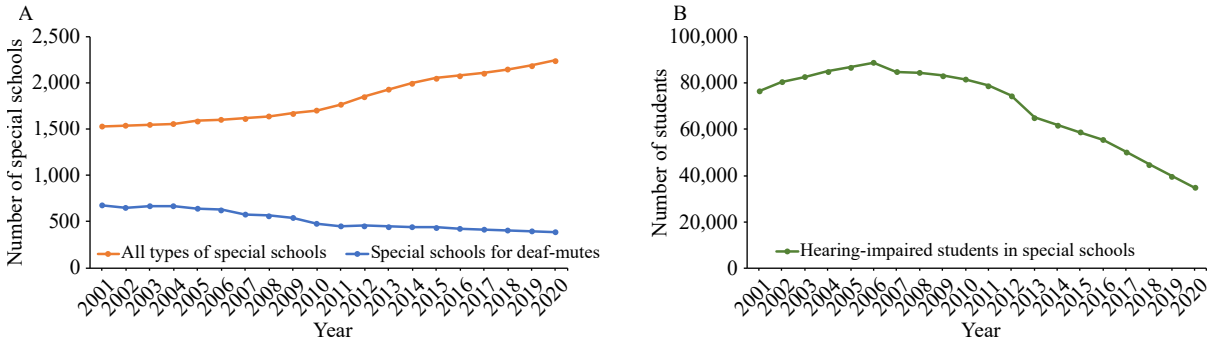
SUPPLEMENTARY MATERIALS



SUPPLEMENTARY FIGURE S1. History of UNHS program in China.
Note: The launch of the UNHS program in Shanghai in 2001 marked the beginning of the launch and promotion stage. The nationwide coverage of the UNHS program in 2014 marked the beginning of the nationwide implementation stage.
Abbreviation: UNHS=Universal newborn hearing screening.



SUPPLEMENTARY FIGURE S2. The current Process of UNHS in mainland China.
Note: The process comprises four sequential phases: Screening, Diagnosis, Intervention and Rehabilitation, and Education, with corresponding age ranges indicated.
Abbreviation: UNHS=Universal newborn hearing screening.



SUPPLEMENTARY FIGURE S3. Trends of special schools and hearing-impaired students in mainland China from 2001 to 2020. (A) Number of all special schools and special schools for deaf-mutes; (B) Number of hearing-impaired students in special schools.

SUPPLEMENTARY TABLE S1. Initial screening, repeat screening, and diagnosis data in 31 provincial regions of China in 2020.

PLADs	Number of live births	Initial screening			Repeated screening			Diagnosis			Detection rate (‰)
		Involved cases		Referral cases	Involved cases		Referral cases	Involved cases		Confirmed cases	
		Number	Rate (%)		Number	Rate (%)		Number	Rate (%)		
Beijing	161,222	157,866	97.9	8,982	7,900	88.0	1,254	1,140	90.9	435	2.8
Tianjin	77,295	77,079	99.7	6,296	5,459	86.7	551	370	67.2	226	2.9
Hebei	586,662	560,457	95.5	52,138	36,486	70.0	3,678	2,659	72.3	316	0.6
Shanxi	259,983	239,219	92.0	26,326	10,710	40.7	1,478	395	26.7	147	0.6
Inner Mongolia	122,053	106,016	86.9	7,719	5,944	77.0	714	73	10.2	50	0.5
Liaoning	212,878	209,484	98.4	14,104	11,261	79.8	1,790	N/A	N/A	118	0.6
Jilin	111,660	110,401	98.9	10,644	7,951	74.7	962	877	91.2	370	3.4
Heilongjiang	116,457	114,094	98.0	6,721	4,440	66.1	681	616	90.5	133	1.2
Shanghai	136,388	133,633	98.0	N/A	N/A	N/A	1,279	1,117	87.3	249	1.9
Jiangsu	550,388	547,718	99.5	33,683	29,690	88.1	4,272	2,876	67.3	737	1.3
Zhejiang	476,657	474,730	99.6	35,605	34,561	97.1	5,268	5,157	97.9	1,099	2.3
Anhui	516,815	486,268	94.1	43,882	36,940	84.2	4,658	1,447	31.1	357	0.7
Fujian	380,098	368,062	96.8	30,926	26,979	87.2	5,362	N/A	N/A	571	1.6
Jiangxi	617,889	494,026	80.0	54,363	50,968	93.8	10,448	9,510	91.0	1,345	2.7
Shandong	864,894	856,997	99.1	64,035	80,821	126.2	7,894	7,995	101.3	1,743	2.0
Henan	991,175	960,977	97.0	80,149	62,909	78.5	10,760	1,882	17.5	841	0.9
Hubei	437,947	392,620	89.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hunan	566,400	541,536	95.6	49,567	47,211	95.2	6,759	5,400	79.9	2,134	3.9
Guangdong	1,431,585	1,389,698	97.1	71,080	N/A	N/A	N/A	6,758	N/A	1,476	1.1
Guangxi	575,303	571,536	99.3	49,255	40,229	81.7	11,908	4,543	38.2	2,447	4.3
Hainan	109,585	108,533	99.0	7,973	5,165	64.8	1,410	668	47.4	265	2.4
Chongqing	220,545	190,573	86.4	6,345	4,977	78.4	374	172	46.0	97	0.5
Sichuan	655,856	589,510	89.9	43,271	33,308	77.0	5,455	3,198	58.6	1,153	2.0
Guizhou	526,062	458,179	87.1	27,321	19,945	73.0	1,054	948	89.9	175	0.4
Yunnan	513,636	494,982	96.4	38,904	32,463	83.4	2,716	1,229	45.3	364	0.7
Xizang	54,288	5,095	9.4	174	208	119.5	6	N/A	N/A	N/A	N/A
Shannxi	360,062	339,657	94.3	30,753	25,172	81.9	2,662	2,360	88.7	168	0.5
Gansu	256,672	252,898	98.5	45,595	51,271	112.4	3,389	1,186	35.0	101	0.4
Qinghai	68,803	33,040	48.0	3,231	1,865	57.7	874	267	30.5	47	1.4
Ningxia	80,265	79,305	98.8	5,000	3,463	69.3	420	395	94.0	78	1.0
Xinjiang	185,495	180,576	97.3	13,531	15,945	117.8	1,552	827	53.3	35	0.2
Total	12,225,018	11,524,765	94.3	867,573	694,241	87.2	99,628	64,065	62.0	17,277	1.6

Note: In some of the provincial regions, the repeated screening rate or diagnosis rate were beyond 100%, mainly because of the interprovincial population mobility and the lack of a uniform UNHS information system between each provincial region. Total repeated screening rate = Total number of cases involved in repeated screening ÷ Total number of referral cases in initial screening. In this calculation, Guangdong, Hubei, and Sichuan were excluded because of the lack of data in repeated screening. Total diagnosis rate = Total number of cases involved in diagnosis ÷ Total number of referral cases in repeated screening. In this calculation, Fujian, Guangdong, Hubei, Liaoning and Xizang PLADs were excluded because of the lack of data in repeated screening or diagnosis. Total detection rate = Total number of confirmed cases ÷ Total number of involve cases in initial screening. In this calculation, Hubei and Xizang were excluded because of the lack of data in diagnosis.

Abbreviation: PLADs=provincial-level administrative divisions; N/A=means data not available.

SUPPLEMENTARY TABLE S2. UNHS coverage in 31 provincial regions of China in 2005, 2010, 2015, and 2020.

Provincial regions	2005			2010			2015			2020		
	Live births	Cases involved in UNHS	Coverage rate (%)	Live births	Cases involved in UNHS	Coverage rate (%)	Live births	Cases involved in UNHS	Initial screening rate (%)	Live births	Cases involved in UNHS	Initial screening rate (%)
Beijing	119,176	78,040	65.5	173,801	159,888	92.0	209,455	202,999	96.9	161,222	157,866	97.9
Tianjin	74,763	26,697	35.7	108,920	106,843	98.1	99,883	99,222	99.3	77,295	77,079	99.7
Hebei	876,972	N/A	N/A	753,010	297,669	39.5	1,112,760	893,700	80.3	586,662	560,457	95.5
Shanxi	63,533	N/A	N/A	98,911	7,970	8.1	231,581	121,299	52.4	259,983	239,219	92.0
Inner Mongolia	66,941	2,165	3.2	80,210	26,957	33.6	115092	73,211	63.6	122,053	106,016	86.9
Liaoning	295,752	N/A	N/A	308,010	237,100	77.0	295,469	273,652	92.6	212,878	209,484	98.4
Jilin	214,016	N/A	N/A	217,011	18,534	8.5	167,481	150,337	89.8	111,660	110,401	98.9
Heilongjiang	244,722	N/A	N/A	247,057	126,033	51.0	179,247	167,079	93.2	116,457	114,094	98.0
Shanghai	125,130	114,512	91.5	194,942	186,799	95.8	191,290	188,164	98.4	136,388	133,633	98.0
Jiangsu	688,400	179,754	26.1	767,233	695,190	90.6	840,604	826,743	98.4	550,388	547,718	99.5
Zhejiang	535,442	233,182	43.5	616,417	575,819	93.4	657,157	651,885	99.2	476,657	474,730	99.6
Anhui	577,686	3,205	0.6	693,728	85,922	12.4	697,955	553,335	79.3	516,815	486,268	94.1
Fujian	408,668	96,653	23.7	404,278	311,205	77.0	609,017	571,248	93.8	380,098	368,062	96.8
Jiangxi	466,061	N/A	N/A	596,270	124,081	20.8	628,241	447,773	71.3	617,889	494,026	80.0
Shandong	907,681	688,343	75.8	1,110,000	958,609	86.4	1,255,589	1,210,796	96.4	864,894	856,997	99.1
Henan	1,120,000	N/A	N/A	1,170,000	99,927	8.5	1,360,000	1,033,262	76.0	991,175	960,977	97.0
Hubei	512,426	N/A	N/A	587,292	195,738	33.3	614,172	434,011	70.7	437,947	392,620	89.7
Hunan	774,928	N/A	N/A	797,902	303,611	38.1	791,036	771,179	97.5	566,400	541,536	95.6
Guangdong	1,023,633	N/A	N/A	1,694,939	600,968	35.5	1,810,422	1,400,969	77.4	1,431,585	1,389,698	97.1
Guangxi	680,844	N/A	N/A	720,000	61,494	8.5	827,135	732,970	88.6	575,303	571,536	99.3
Hainan	120,570	N/A	N/A	127,434	2,138	1.7	137,082	119,799	87.4	109,585	108,533	99.0
Chongqing	278,240	N/A	N/A	263,362	32,619	12.4	306,455	207,899	67.8	220,545	190,573	86.4
Sichuan	821,445	N/A	N/A	724,670	89,754	12.4	787,068	490,871	62.4	655,856	589,510	89.9
Guizhou	170,992	N/A	N/A	393,137	7,819	2.0	394,561	142,308	36.1	526,062	458,179	87.1
Yunnan	652,464	N/A	N/A	600,832	10,081	1.7	524,252	428,799	81.8	513,636	494,982	96.4
Xizang	32,554	N/A	N/A	42,338	N/A	N/A	53,506	N/A	N/A	54,288	5,095	9.4
Shannxi	371,993	N/A	N/A	363,000	44,959	12.4	447,610	383,967	85.8	360,062	339,657	94.3
Gansu	328,158	N/A	N/A	282,873	125,827	44.5	278,642	276,039	99.1	256,672	252,898	98.5
Qinghai	84,937	N/A	N/A	83,664	1,404	1.7	62,601	13,459	21.5	68,803	33,040	48.0
Ningxia	94,306	N/A	N/A	77,450	6,989	9.0	94,482	88,511	93.7	80,265	79,305	98.8
Xinjiang	326,183	N/A	N/A	347,303	29,662	8.5	456,584	281,459	61.6	185,495	180,576	97.3
Total*	13,058,616	1,422,551	10.9	14,645,994	5,531,609	37.8	16,236,429	13,236,945	81.5	12,225,018	11,524,765	94.3

Abbreviation: UNHS =Universal newborn hearing screening.

* Total coverage rate = Total cases involved in UNHS ÷ Total live births. N/A means data not available.