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在线全文

四川省城乡医疗机构婴幼儿营养服务能力现况研究*

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【摘要】 目的 调查分析四川省城乡医疗机构婴幼儿营养服务能力现状及问题。**方法** 于2022年通过问卷调查收集四川省医疗机构婴幼儿营养服务内容（喂养指导、体格生长评价、微量营养素缺乏风险筛查）、人员及工具等信息，分析其营养服务现状及城乡差异。**结果** 共调查了2 206所医疗机构（城市29.1%、农村70.9%）。3类营养服务均开展的医疗机构占比35.8%。营养服务总开展率分别为喂养指导94.6%、体格生长评价85.0%和微量营养素缺乏风险筛查37.4%，农村体格生长评价和微量营养素缺乏风险筛查总开展率均低于城市（P<0.05）。各喂养指导内容开展率为70.6%～93.2%，回应性喂养指导开展率最低（70.6%）且农村低于城市（P<0.05）；各体格生长评价和各微量营养素缺乏风险筛查内容开展率分别为75.3%～81.8%、23.6%～35.7%，且均农村低于城市（P<0.05）。营养服务人员主要为护士（52.3%）和临床执业医师（43.4%）。膳食评估工具配备率为7.7%～15.9%且农村低于城市（P<0.001），体格测量工具配备率为94.6%～98.5%。**结论** 目前四川省医疗机构婴幼儿营养服务内容不完善，喂养指导和体格生长评价开展不充分，微量营养素缺乏风险筛查开展不足，缺乏专业人员及工具，农村尤为突出。建议整体提高四川省婴幼儿营养服务能力，且需重点提高农村地区。

【关键词】 婴幼儿 营养服务 医疗机构 城乡

Cross-Sectional Study of Nutritional Service Capacity for Infants and Toddlers in Urban and Rural Medical Facilities in Sichuan Province

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【Abstract】 Objective To investigate and analyze the current status and challenges of infant and toddler nutritional services in urban and rural medical facilities in Sichuan Province. **Methods** In 2022, a questionnaire survey was conducted to collect data on infant and toddler nutritional services, including feeding guidance, physical growth assessment, and micronutrient deficiency screening, as well as information on personnel and tools in medical facilities throughout Sichuan Province. The provision of nutritional services was analyzed and the urban-rural disparities were assessed. **Results** A total of 2206 medical facilities (29.1% from urban areas and 70.9% from rural areas) were investigated. Only 35.8% of medical facilities provided all three types of nutritional services. Specifically, the overall service provision rates were high for feeding guidance (94.6%) and physical growth assessment (85.0%), but lower for micronutrient deficiency screening (37.4%). Rural facilities exhibited significantly lower rates than their urban counterparts for both physical growth assessment and micronutrient deficiency screening (P<0.05). The provision rates of feeding guidance ranged from 70.6% to 93.2%, with responsive feeding guidance being the least implemented (70.6%), particularly in rural areas compared to urban areas (P<0.05). Rates for physical growth assessment and micronutrient deficiency screening ranged from 75.3% to 81.8% and 23.6% to 30.8%, respectively, both showing lower rates in rural settings compared to urban ones (P<0.05). Nutrition service providers were predominantly nurses (52.3%) and clinical practitioners (43.4%). The availability of dietary assessment tools ranged from 7.7% to 15.9%, significantly lower in rural areas compared to urban areas (P<0.001), while physical measurement tools were widely available at rates of 94.6% to 98.5%. **Conclusion** At present, the infant and toddler nutritional service provisions of medical facilities in Sichuan Province are incomplete, particularly so in the implementation of feeding guidance, physical growth assessment, and micronutrient deficiency screening. There is a notable shortage of personnel and necessary tools, with rural areas facing more significant challenges. Enhancing the overall capacity of infant and toddler nutritional services in Sichuan Province

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is essential, with specific attention needed for rural healthcare settings.

【Key words】 Infants and toddlers Nutritional service Medical facilities Urban and rural

婴幼儿期(0～36月龄)是人类生长发育的"窗口期",此时的营养状况可影响近期体格和智力的发育以及远期患慢性病的风险[1]。尽管近年来我国婴幼儿营养水平已得到极大提升,但由于四川省各市/自治州间经济发展与医疗资源配置较不均衡[2-3],婴幼儿生长迟缓率、低体质量率、消瘦率仍均高于全国水平[4-5],婴幼儿营养改善工作仍面临极大挑战。为此我国已出台多项政策,要求医疗机构为婴幼儿提供喂养与营养指导、体格生长评价以及营养相关疾病的筛查等营养服务来改善婴幼儿营养状况[6-11]。国家卫生健康委员会2021年发布的《健康儿童行动提升计划(2021–2025年)》进一步强调要缩小城乡医疗机构间儿童营养服务能力差异[9]。医疗机构作为我国婴幼儿营养服务的主要阵地,其营养服务能力(包括营养服务的内容数量、人力资源配置及服务工具配备三方面)对婴幼儿喂养指导和健康促进具有重要意义。但目前我国尚缺乏有关医疗机构婴幼儿营养服务能力的调查研究报道,因此,本研究通过对四川省城乡医疗机构开展婴幼儿营养服务能力基础调研,分析本地区婴幼儿营养服务现状及问题,为制定我国西部地区婴幼儿营养改善政策和标准提供科学依据。

1 资料与方法

1.1 研究对象

根据四川省行政区划及《2022年中国卫生健康统计年鉴》[12]将四川省医疗机构按城乡性质分为城市和农村两类,采用普查法对全省21市/自治州开设儿童保健科、儿科或营养科的不同类别和等级的城乡医疗机构进行调查(医疗机构类别与等级划分标准均参考《2022年中国卫生健康统计年鉴》[12])。

1.2 研究方法

1.2.1 问卷调查

通过文献查阅及专家讨论自行设计问卷,于2022年4–5月对四川省医疗机构进行线上问卷调查。调查内容包括婴幼儿营养服务内容、人员及工具等。服务种类包括喂养指导、体格生长评价以及微量营养素缺乏风险筛查3类。喂养指导包括母乳喂养、辅食添加、合理膳食、营养素补充和回应性喂养指导5项;体格生长评价包括年龄别体质量、年龄别身长(身高)、年龄别头围、身长(身高)别体质量、年龄别体质量指数(body mass index, BMI)评价5项;微量营养素缺乏风险筛查包括维生素A、维生素D和铁缺乏风险筛查3项。服务人员包括临床执业医师、公共卫生执业医师、护士和医技人员4类。服务工具包括膳食评估工具和体格测量工具。

1.2.2 指标及定义

①回应性喂养:在喂养过程中,喂养者能及时识别婴幼儿进食需求并迅速做出回应,逐步引导正确的进食行为[13]。

②营养服务总开展率为该类服务中至少开展一项服务内容的医疗机构数量占医疗机构总数百分比。

③营养服务内容开展率为开展该项服务内容的医疗机构数量占医疗机构总数百分比。

1.3 质量控制

调查前通过文献查阅及专家讨论制订问卷,并附有填写说明;调查中通过政府渠道发放电子问卷;调查后对全部问卷进行双人复核并处理异常值。

1.4 统计学方法

采用Excel 2020整理数据,采用SPSS 26.0进行统计分析。定性资料采用频数(百分比)描述,婴幼儿营养服务开展及工具配备情况的城乡差异比较采用χ^2检验。检验水准$\alpha_{双侧}=0.05$。

2 结果

2.1 基本信息

共调查了2 206所医疗机构,其中城市644所(29.1%)、农村1 562所(70.9%);基层医疗卫生机构1 743所(79.0%)、综合医院253所(11.5%)、妇幼保健院133所(6.0%)、其他医院77所(3.5%);三级医疗机构164所(7.4%)、二级医疗机构308所(14.0%)、一级医疗机构1 055所(47.8%)、未定级医疗机构679所(30.8%)。

2.2 营养服务内容

2.2.1 总体开展情况

表1显示,三类营养服务均开展的医疗机构占比

表 1 四川省城乡医疗机构婴幼儿营养服务种类开展数量构成情况

Table 1 Composition of urban and rural medical facilities providing different numbers of nutritional services for infant and toddler in Sichuan Province

Number of nutritional service	Urban	Rural	Total
0	18 (2.8)	60 (3.8)	78 (3.5)
1	58 (9.0)	198 (12.7)	256 (11.6)
2	264 (41.0)	819 (52.4)	1 083 (49.1)
3	304 (47.2)	485 (31.1)	789 (35.8)

The types of infant and toddler nutritional services include feeding guidance, physical growth assessment, and micronutrients deficiency risk screening. Data show as number (%).

35.8%, 城市和农村分别占比47.2%和31.1%。未开展营养服务的医疗机构占比3.5%。

表2显示, 营养服务总开展率分别为喂养指导94.6%、体格生长评价85.0%和微量营养素缺乏风险筛查37.4%。体格生长评价(χ^2=8.601, P=0.003)和微量营养素缺乏风险筛查(χ^2=45.699, P<0.001)总开展率农村均低于城市。

2.2.2　各项开展情况

表3显示, 各项喂养指导开展率为70.6% ~ 93.2%, 回应性喂养指导开展率最低(70.6%)且农村低于城市(χ^2=26.608, P<0.001)。各项体格生长评价和微量营养素缺乏风险筛查开展率分别为75.3% ~ 81.8%和23.6% ~ 35.7%, 且农村均低于城市(P<0.05)。

2.3　营养服务人员

表4显示, 城市和农村营养服务人员均主要为护士(48.0%、55.7%)和临床执业医师(47.7%、40.1%)。

2.4　营养服务工具

表5显示, 膳食评估工具总配备率为7.7% ~ 15.9%, 各膳食评估工具配备率均农村低于城市(P<0.05)。体格测

表 2　四川省城乡医疗机构婴幼儿营养服务内容总体开展情况

Table 2　Overall status of infant and toddler nutritional services in urban and rural medical facilities in Sichuan Province

Category of nutritional service	Urban	Rural	Total	χ^2	P
Feeding guidance	617 (95.8)	1 470 (94.1)	2 087 (94.6)	2.574	0.109
Physical growth assessment	570 (88.5)	1 306 (83.1)	1 876 (85.0)	8.601	0.003
Micronutrients deficiency risk screening	311 (48.2)	515 (32.9)	826 (37.4)	45.699	<0.001

Data show as number (%).

表 3　四川省城乡医疗机构各婴幼儿营养服务内容开展情况

Table 3　Detailed status of infant and toddler nutritional services in urban and rural medical facilities in Sichuan Province

Nutritional service contents	Urban	Rural	Total	χ^2	P
Feeding guidance					
Breastfeeding	602 (93.4)	1 454 (93.0)	2 056 (93.2)	0.111	0.739
Complementary feeding	603 (93.6)	1 444 (92.4)	2 046 (92.7)	0.962	0.327
Proper diet[a]	585 (90.8)	1 392 (89.1)	1 977 (89.6)	1.453	0.228
Nutrient supplements	609 (94.5)	1 442 (92.3)	2 051 (93.0)	3.526	0.060
Responsive feeding	505 (78.4)	1 053 (67.4)	1 558 (70.6)	26.608	<0.001
Physical growth assessment					
Body mass-for-age	537 (83.3)	1 193 (76.3)	1 730 (78.4)	13.237	<0.001
Length (Height)-for-age	554 (86.0)	1 250 (80.0)	1 804 (81.8)	11.013	0.001
Head circumference-for-age	528 (81.9)	1 164 (74.5)	1 692 (76.7)	14.229	<0.001
Body mass-for-length (height)	547 (84.9)	1 209 (77.4)	1 756 (79.6)	15.953	<0.001
BMI-for-age	511 (79.3)	1 150 (73.6)	1 661 (75.3)	8.032	0.005
Micronutrient deficiency risk screening[b]					
Vitamin A	202 (31.1)	319 (20.4)	521 (23.6)	30.275	<0.001
Vitamin D	257 (39.9)	414 (26.5)	671 (30.4)	38.699	<0.001
Iron	301 (46.7)	486 (31.1)	787 (35.7)	48.514	<0.001

[a] For toddlers aged 25-36 months, proper diet guidance include 5 aspects: drinking milk every day, adequate intake of water, healthy snacks, proper cooking, and dietary diversity. [b] Micronutrients deficiency risk screening including 2 forms: laboratory detection and high-risk factor screening. Data show as number (%).

表 4　四川省城乡医疗机构婴幼儿营养服务人员类别构成

Table 4　Composition by category of infant and toddler nutritional service providers in urban and rural medical facilities in Sichuan Province

Category of providers	Urban	Rural	Total
Clinical practitioner			
Child health care physician	484 (14.2)	446 (10.8)	930 (12.3)
Pediatrician	864 (25.3)	741 (17.9)	1 605 (21.2)
General practitioner	280 (8.2)	471 (11.4)	751 (9.9)
Public health physician	76 (2.2)	111 (2.7)	187 (2.5)
Nurse	1 637 (48.0)	2 308 (55.7)	3 945 (52.3)
Medical technician[a]	73 (2.1)	62 (1.5)	135 (1.8)

[a] Medical technicians include registered nutritionist. Data show as number (%).

表 5 四川省城乡医疗机构婴幼儿营养服务工具配备情况

Table 5 Status of tools for infant and toddler nutrition services in urban and rural medical facilities in Sichuan Province

Nutritional service tools	Urban	Rural	Total	χ^2	P
Dietary assessment tools					
Dietary questionnaire	109 (16.9)	194 (12.4)	303 (13.7)	7.812	0.005
Food model/brochure	135 (21.0)	216 (13.8)	351 (15.9)	17.347	<0.001
Standard tableware	77 (12.0)	93 (6.0)	170 (7.7)	23.101	<0.001
Professional nutrition book	102 (15.8)	134 (8.6)	236 (10.7)	25.156	<0.001
Nutritional analysis software	74 (11.5)	114 (7.3)	188 (8.5)	10.280	0.001
Physical measurement tools					
Height measuring scale	632 (98.1)	1 528 (97.8)	2 160 (97.9)	0.219	0.640
Weighing scale	636 (98.8)	1 533 (98.1)	2 169 (98.3)	1.044	0.307
Tape ruler	638 (99.1)	1 534 (98.2)	2 172 (98.5)	2.227	0.136
Horizontal bed	611 (94.9)	1 475 (94.4)	2 086 (94.6)	0.176	0.675

Data show as number (%).

量工具总配备率为94.6%～98.5%，城乡差异无统计学意义(P>0.05)。

3 讨论

3.1 四川省医疗机构婴幼儿营养服务能力不足，城乡差异大

喂养指导、体格生长评价和微量营养素缺乏风险筛查是国内外指南与政策中推荐开展的婴幼儿营养服务项目[6-11,13]，医疗机构同时开展这3类服务可以从食物摄入、体格生长和微量营养素营养状况3方面整体加强婴幼儿营养管理力度，从而较全面地提高婴幼儿营养水平。然而，四川省城乡未全部开展3类营养服务的医疗机构占大多数，分别占52.8%(340所)和68.9%(1 077所)，且其中共有3.5%(78所)未开展任何一类营养服务；城乡营养服务总开展率分别为喂养指导95.8%和94.1%、体格生长评价88.5%和83.1%、微量营养素缺乏风险筛查48.2%和32.9%，提示四川省城乡医疗机构婴幼儿营养服务整体开展情况均较差，主要是由微量营养素缺乏风险筛查服务开展不足导致，需重点提高该服务的开展率，尤其是农村；喂养指导和体格生长评价服务作为婴幼儿营养服务中最基础的内容，各医疗机构均应开展，但四川省部分农村医疗机构仍不提供该服务，需进一步加强。此外，营养服务工具中膳食评估工具配备率(7.7%～15.9%)较低也是四川省医疗机构需重点解决的问题。因此，目前四川省医疗机构婴幼儿营养服务能力不足，城乡差异明显。

3.2 婴幼儿微量营养素缺乏风险筛查体系亟待建立

微量营养素缺乏会对婴幼儿体格生长、神经心理发育等方面造成不良影响[14]。研究显示，我国0～3岁婴幼儿维生素A、维生素D缺乏率及缺铁性贫血患病率约为4%～25.1%[15-17]。鉴于婴幼儿是上述微量营养素缺乏的高危人群[14]，中华预防医学会2024年发布的《中国儿童维生素A、维生素D临床应用专家共识》等指南特别指出需对婴幼儿维生素A、维生素D、铁缺乏风险进行筛查[14,18]。然而，四川省微量营养素缺乏风险筛查服务总体开展率较低，且农村维生素A、维生素D和铁缺乏风险筛查服务开展率(20.4%～31.1%)均显著低于城市(31.1%～46.7%)，说明四川省医疗机构不重视该服务的开展，农村更为突出。导致该结果的原因可能是由于营养服务人员专业水平不足，微量营养素缺乏风险筛查相关知识储备较少，无法提供相应服务。这可能会导致婴幼儿夜盲症、佝偻病、缺铁性贫血等营养性疾病的发病率上升，整体加重社会与家庭负担，同时也会使农村婴幼儿营养水平进一步低于城市，加剧我国城乡发展不平衡的问题。因此，建议四川省医疗机构加速建立和完善维生素A、维生素D和铁缺乏风险筛查体系，尤其是农村，以促进婴幼儿微量营养素缺乏的防治。

此外，目前微量营养素缺乏风险筛查形式包括实验室检查和高危因素筛查两种，近年来较多的指南不推荐直接采用实验室检查判断个体维生素营养状况，而是先询问个体是否存在维生素缺乏高危因素(如疾病史、饮食情况等)，再判断是否需要进行实验室检查[19-20]。同时，我国法规也禁止对婴幼儿开展微量元素检测[21]。采用高危因素筛查形式更符合“预防为主、防治结合”的原则[9]，能够更科学、高效地预防婴幼儿营养性疾病，同时减少过度

医疗的发生。因此，建议医疗机构采用高危因素筛查形式判断婴幼儿微量营养素营养状况。然而本研究的局限性在于研究结果无法了解微量营养素缺乏高危因素筛查形式的具体使用情况，因此也建议今后的研究重点关注高危因素筛查服务的开展情况。

3.3　婴幼儿喂养指导、体格生长评价服务内容有待完善

合理的喂养指导和体格生长评价对婴幼儿生长发育具有积极作用。WHO等推荐开展的喂养指导主要包括母乳喂养、辅食添加、合理膳食、营养素补充及回应性喂养5方面内容[13, 22]，体格生长评价包括年龄别体质量、年龄别身长（身高）、身长（身高）别体质量、年龄别BMI、年龄别头围5项指标的评价[23]。然而，四川省城乡各喂养指导服务内容开展率均未达到100%，其中回应性喂养指导服务开展率最低且农村（67.4%）显著低于城市（78.4%），说明城乡医疗机构喂养指导服务开展不充分，农村回应性喂养指导服务开展尤为不足。充足营养和回应性喂养是WHO与联合国儿童基金会（United Nations International Children's Emergency Fund, UNICEF）提出的养育照护这一理念中的关键组成部分[24]。在喂养过程中，婴幼儿照顾者由于缺乏专业知识会对母乳喂养、辅食添加、合理膳食及营养素补充的具体实施过程存在困惑，医疗机构需定期给予指导和干预，并且指导内容需根据不同年龄段的营养需要进行调整，以保障婴幼儿获得充足的营养。回应性喂养已被证实可以预防营养不良、发展更健康的食物偏好、促进认知发展等，且能更好地帮助其他喂养行为开展[25]，同时WHO也要求医护人员具备为婴幼儿照顾者提供回应性喂养指导的能力[13]。因此，建议四川省医疗机构补充完善喂养指导内容，农村地区需尤其重视回应性喂养指导服务，以促进喂养指导服务全面开展。

此外，应用膳食评估工具如膳食调查表、食物模型/图谱、食物量具、营养专业书籍及营养分析软件能更准确地估计婴幼儿食物摄入量并分析其营养状况，有助于喂养指导的开展[26-28]。然而四川省医疗机构膳食评估工具配备率均较低，且农村（6.0% ~ 13.8%）显著低于城市（11.5% ~ 21.0%），这一结果也侧面反映了虽然喂养指导服务开展率较高，但由于缺乏膳食评估工具的使用，使具体指导内容的准确性有待商榷。因此，四川省医疗机构也需整体加强膳食评估工具的配备，且需重点加强农村，以提高喂养指导服务质量。

四川省城乡各体格生长评价服务内容开展率分别为79.3% ~ 86.0%和73.6% ~ 80.0%，且农村显著低于城市，说明四川省医疗机构未全面开展5项体格生长评价服务，尤其是农村。由于各体格评价指标的适用情况不同，医疗机构需根据不同目的综合运用各指标才能准确评价婴幼儿体格生长情况，从而全面发现婴幼儿存在的营养问题[25, 29]。本研究也显示，四川省城乡医疗机构体格测量工具配备情况较好，具备为婴幼儿测量婴幼儿身长（身高）、体质量、头围的能力。因此，建议四川省医疗机构在已经具备体格测量工具的前提下，尽快补齐5项评价内容，尤其是农村。

3.4　研究局限性

本研究的局限性在于采用线上问卷调查，调查过程中未限制填写调查问卷的人员，可能导致报告偏倚。建议今后的研究尽可能采取实地考察法，以便获取最为准确的数据。

综上，目前四川省医疗机构普遍存在婴幼儿营养服务能力不足、内容不完善、专业人员不足及服务工具缺乏等问题。营养服务开展不完善可能导致婴幼儿某些营养问题无法被发现并解决，从而加重家庭与社会负担。农村地区由于经济落后且医疗资源匮乏，婴幼儿营养性疾病发病率高于城市[30]，需更加重视婴幼儿营养服务的开展。因此，建议政府部门加大婴幼儿营养服务相关财政投入、优化农村地区医疗资源配置，医疗机构需重视专业人员与工具的配备，从而夯实婴幼儿营养服务基础，实现城乡婴幼儿营养服务的均等化。

*　　*　　*

作者贡献声明　丁彦曦负责论文构思、数据审编、正式分析、研究方法、初稿写作和审读与编辑写作，张诗雨负责论文构思、研究方法和审读与编辑写作，杨梦彤和陈思佳负责调查研究、研究项目管理和审读与编辑写作，张琚、张飘和李鸣负责提供资源和监督指导，苏丹萍负责调查研究和审读与编辑写作，董洪利负责经费获取和监督指导，郭怡杉负责审读与编辑写作，阴文娅负责监督指导，曾果负责经费获取、研究项目管理、提供资源、监督指导和审读与编辑写作。所有作者已经同意将文章提交给本刊，且对将要发表的版本进行最终定稿，并同意对工作的所有方面负责。

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参 考 文 献

[1] 中华预防医学会儿童保健分会. 婴幼儿喂养与营养指南. 中国妇幼健康研究, 2019, 30(4): 392-417. doi: 10.3969/j.issn.1673-5293.2019.04.001.
China Preventive Medicine Association, Society of Child Health. Guide to infant feeding and nutrition. Chin J Woman Child Health Res, 2019, 30(4): 392-417. doi: 10.3969/j.issn.1673-5293.2019.04.001.

[2] 蒋君芳. 超千亿元市州18个. 四川日报, 2024-02-05(005). doi: 10.28672/n.cnki.nscrb.2024.000534.
JIANG J F. 18 cities/states over 100 billion yuan. Sichuan Ribao, 2024-02-05(005). doi: 10.28672/n.cnki.nscrb.2024.000534.

[3] LIU H, FANG C, FAN Y. Mapping the inequalities of medical resource provision in China. Regional Studies, Regional Science, 2020, 7(1): 568–570. doi: 10.1080/21681376.2020.1848615.

[4] 国家卫生健康委员会疾病预防控制局. 中国居民营养与慢性病状况报告(2020年). 北京: 人民卫生出版社, 2021:148.
National administration of disease prevention and control, National Health Commission. Report on nutrition and chronic diseases status in China (2020). Beijing: People's Medical Publishing House, 2021: 148.

[5] 李玲玲, 吴洋洋, 雷普超, 等. 四川省多民族农村地区婴幼儿首次辅食添加行为与其营养状况的关联研究. 四川大学学报(医学版), 2021, 52(4): 655–661. doi: 10.12182/20210760507.
LI L L, WU Y Y, LEI P C, *et al*. Study on the relationship between first-time complementary feeding practice and the nutritional status of infants and young children in the multi-ethnic rural areas of Sichuan Province. J Sichuan Univ (Med Sci), 2021, 52(4): 655–661. doi: 10.12182/20210760507.

[6] 健康中国行动推进委员会. 健康中国行动(2019–2030 年). (2019-07-09)[2024-07-19]. https://www.gov.cn/xinwen/2019-07/15/content_5409694.htm.
Healthy China initiative Promotion Committee. Healthy China initiative(2019-2030). (2019-07-09) [2024-07-19]. https://www.gov.cn/xinwen/2019-07/15/content_5409694.htm.

[7] 国务院. 中国儿童发展纲要(2021–2030年). (2021-09-08) [2024-07-19]. https://www.gov.cn/gongbao/content/2021/content_5643262.htm.
State Council. Outline for the development of children (2021-2030). (2021-09-08) [2024-07-19]. https://www.gov.cn/gongbao/content/2021/content_5643262.htm.

[8] 国务院办公厅. 国民营养计划(2017–2030年). 营养学报, 2017, 39(4): 315-320. doi: 10.13325/j.cnki. acta. nutr.sin.2017.04.003.
General Office of the State Council. National nutrition program (2017-2030). Acta Nutri Sinica, 2017, 39(4): 315-320. doi: 10.13325/j.cnki. acta. nutr.sin.2017.04.003.

[9] 国家卫生健康委员会. 健康儿童行动提升计划(2021–2025年). 中国食品安全报, 2021-11-30(C01). doi: 10.28737/n.cnki.nspzl.2021.002309. doi: 10.28737/n.cnki.nspzl.2021.002309.
National Health Commission. Healthy child action enhancement programme (2021-2025). J Chin Instit Food Sci Technol, 2021-11-30 (C01). doi: 10.28737/n.cnki.nspzl.2021.002309.

[10] 国务院. 国家基本公共服务标准(2023年版). (2023-07-30) [2024-07-19]. https://www.gov.cn/zhengce/zhengceku/202308/content_6897591.htm.
State Council. National basic public service standards(2023). (2023-07-30)[2024-07-19]. https://www.gov.cn/zhengce/zhengceku/202308/content_6897591.htm.

[11] 国家卫生健康委员会办公厅. 3岁以下婴幼儿健康养育照护指南(试行). (2022-11-19)[2024-07-19]. https://www.gov.cn/zhengce/zhengceku/2022-11/29/content_5729421.htm.
General Office of the National Health Commission. Guideline on healthy parenting and care of infants and young children under 3 years old (Trial). (2022-11-19)[2024-07-19]. https://www.gov.cn/zhengce/zhengceku/2022-11/29/content_5729421.htm.

[12] 国家卫生健康委员会. 中国卫生健康统计年鉴—2022. 北京: 中国协和医科大学出版社, 2022: 410.
National Health Commission. Chinese health statistical yearbook 2022. Beijing: Peking Union Medical College Press, 2022: 410.

[13] World Health Organization. WHO Guideline for complementary feeding of infants and young children 6–23 months of age. (2023-10-16)[2024-07-19]. https://www.who.int/publications/i/item/9789240081864.

[14] 中华医学会儿科学分会儿童保健学组,《中华儿科杂志》编辑委员会. 儿童微量营养素缺乏防治建议. 中华儿科杂志, 2010, 48(7): 502–509. doi: 10.3760/cma.j.issn.0578-1310.2010.07.006.
The Subspecialty Group of Child Health Care, The Society of Pediatrics, Chinese Medical Association; The Editorial Board, Chinese Journal of Pediatrics. Recommendations for prevention and treatment of micronutrient deficiencies in children. Chin J Pediat, 2010, 48(7): 502–509. doi: 10.3760/cma.j.issn.0578-1310.2010.07.006.

[15] HAN L, ZHAO T, ZHANG R, *et al*. Burden of nutritional deficiencies in China: findings from the Global Burden of Disease Study 2019. Nutrients. 2022, 14(19): 3919. doi: 10.3390/nu14193919.

[16] 安娜, 赵宜乐, 张古英, 等. 2010-2020年中国健康儿童维生素D水平的Meta分析. 中国儿童保健杂志, 2021, 29(10): 1109–1114. doi: 10.11852/zgetbjzz2020-1798.
AN N, ZHAO Y L, ZHANG G Y, *et al*. Meta-analysis of vitamin D level in healthy Chinese children over the past 10 years. Chin J Child Health Care, 2021, 29(10): 1109–1114. doi: 10.11852/zgetbjzz2020-1798.

[17] 周婕, 李大威, 刘日辉. 2010–2019年中国0～3岁婴幼儿缺铁性贫血患病率的Meta分析. 中国妇幼保健, 2020, 35(7): 1356–1361. doi: 10.19829/j.zgfybj.issn.1001-4411.2020.07.059.
ZHOU J, LI D W, LIU R H. Meta-analysis of the prevalence of iron deficiency anaemia in infants and children aged 0 to 3 years in China, 2010 to 2019. Mat Child Health Care Chin, 2020, 35(7): 1356–1361. doi: 10.19829/j.zgfybj.issn.1001-4411.2020.07.059.

[18] 中华预防医学会儿童保健分会. 中国儿童维生素A、维生素D临床应用专家共识(2024). 中国儿童保健杂志, 2024, 32(4): 349-358. doi: 10.11852/zgetbjzz2024-0279.

Child Health Care Subcommittee of the Chinese Preventive Medicine Association. Expert consensus on the clinical application of vitamin A and vitamin D in Chinese children. Chin J Child Health Care, 2024, 32(4): 349-358. doi: 10.11852/zgetbjzz2024-0279.

[19] 中华医学会儿科学分会儿童保健学组, 中华儿科杂志编辑委员会. 中国儿童维生素D营养相关临床问题实践指南. 中华儿科杂志, 2022, 60(5): 387–394. doi: 10.3760/cma.j.cn112140-20211230-0109.
The Subspecialty Group of Children Health, the Society of Pediatrics, Chinese Medical Association, the Editorial Board, Chinese Journal of Pediatrics. Practical guidelines for clinical issues related to vitamin D nutrition in Chinese children. Chin J Pediatr, 2022, 60(5): 387–394. doi: 10.3760/cma.j.cn112140-20211230-0109.

[20] 中国营养学会健康管理分会. 维生素A营养状况评价及改善专家共识. 中华健康管理学杂志, 2023, 17(3): 180–187. doi: 10.3760/cma.j.cn115624-20230105-00008.
Health Management Branch of Chinese Nutrition Society. Expert consensus on evaluation and improvement of vitamin A nutritional status. Chin J Health Manage, 2023, 17(3): 180–187. doi: 10.3760/cma.j.cn115624-20230105-00008.

[21] 中华人民共和国国家卫生健康委员会. 国家卫生健康委办公厅关于加强儿童微量元素检测监督执法工作的通知.(2021-07-12) [2023-11-14]. http://www.nhc.gov.cn/zhjcj/s3577/202107/613f18f709694624a00a779527e919df.shtml.
National Health Commission. Notification of the General Office of the National Health Commission on Strengthening the supervision and law enforcement of children trace elements detection. (2021-07-12)[2023-11-14]. http://www.nhc.gov.cn/zhjcj/s3577/202107/613f18f709694624a00a779527e919df.shtml.

[22] World Health Organization. Essential nutrition actions: mainstreaming nutrition through the life-course. (2019-09-08)[2024-07-19]. https://www.who.int/publications/i/item/9789241515856.

[23] 首都儿科研究所, 中国疾病预防控制中心妇幼保健中心, 上海儿童医学中心, 等. 7岁以下儿童生长标准. (2022-09-19) [2024-07-19]. http://www.nhc.gov.cn/wjw/fyjk/202211/16d8b049fdf547978a910911c19bf389.shtml.
Capital Institute of Pediatrics, National Center for Women and Children's Health, China CDC, Shanghai Children's Medical Center, *et al*. Growth standard for children under 7 years of age. (2022-09-19) [2024-07-19]. http://www.nhc.gov.cn/wjw/fyjk/202211/16d8b049fdf547978a910911c19bf389.shtml.

[24] World Health Organization. Nurturing care for early childhood development: a framework for helping children survive and thrive to transform health and human potential: executive summary. (2018-05-18) [2024-04-01]. https://iris.who.int/bitstream/handle/10665/272603/9789241514064-eng.pdf?sequence=1.

[25] World Health Organization and United Nations Children's Fund. Nurturing young children through responsive feeding. (2023-05-25) [2024-04-01]. https://nurturingcare.org/wp-content/uploads/2023/05/NRF.pdf.

[26] 卫生部办公厅. 全国儿童保健工作规范(试行).(2010-01-05)[2024-07-18]. http://www.nhc.gov.cn/cms-search/xxgk/getManuscriptXxgk.htm?id=45453.
General Office of the Ministry of Health. National child health work standards (Trial). (2010-01-05)[2024-07-18]. http://www.nhc.gov.cn/cms-search/xxgk/getManuscriptXxgk.htm?id=45453.

[27] AMOUTZOPOULOS B, PAGE P, ROBERTS C, *et al*. Portion size estimation in dietary assessment: a systematic review of existing tools, their strengths and limitations. Nutr Rev, 2020, 78(11): 885-900. doi: 10.1093/nutrit/nuz107.

[28] BELLOWS L L, LOU Y, NELSON R, *et al*. A narrative review of dietary assessment tools for preschool-aged children in the home environment. Nutrients, 2022, 14(22): 4793. doi: 10.3390/nu14224793.

[29] 《中华儿科杂志》编辑委员会, 中华医学会儿科学分会儿童保健学组. 中国儿童体格生长评价建议. 中华儿科杂志, 2015, 53(12): 887–892. doi: 10.3760/cma.j.issn.0578-1310.2015.12.003.
The Editorial Board, Chinese Journal of Pediatrics, the Subspecialty Group of Children Health, the Society of Pediatrics, Chinese Medical Association. Recommendations for assessing the physical growth of Chinese children. Chin J Pediatr, 2015, 53(12): 887–892. doi: 10.3760/cma.j.issn.0578-1310.2015.12.003.

[30] 赵丽云, 丁刚强, 赵文华. 2015–2017中国居民营养与健康状况监测报告. 北京: 人民卫生出版社, 2022: 324.
ZHAO L Y, DING G Q, ZHAO W H. Monitoring Report on the Nutrition and Health Status of Chinese Residents, 2015-2017. Beijing: People's Medical Publishing House, 2022: 324.

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