

Postprint: Implementation Progress and Trends of Basic Public Health Services in Shenzhen, 2017-2022

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Abstract

Background Since the launch of the National Essential Public Health Services Program in 2009, various services have been widely implemented nationwide. Due to differing economic development levels across provinces and municipalities, the implementation status and progress of essential public health service projects vary considerably. Shenzhen, as a national economic center and innovative city, ranks at the forefront of information technology among Chinese cities.

Objective To systematically review and summarize the implementation progress and trends of essential public health services in Shenzhen from 2017 to 2022, thereby providing a reference for further advancing the high-quality development of essential public health services in Shenzhen.

Methods From July 2022 to April 2023, we collected 54 evaluation indicators for essential public health services in Shenzhen from 2017 to 2022 across three dimensions: project input, project implementation, and project outcomes, and analyzed the changing trends of each indicator over the six-year period from 2017 to 2022.

Results (1) The actual allocated funds for Shenzhen's essential public health services project increased from 80.71 yuan in 2017 to 144.86 yuan in 2022, the total number of community health service center staff grew from 9,992 to 13,758, and the proportion of public health physicians among primary-level medical personnel rose from 5.39% to 5.94%. (2) The average annual growth rates of electronic health record establishment rate, newborn visit rate, 0-6 years child health management rate, early pregnancy registration rate, postpartum visit rate, maternal systematic management rate, elderly health management rate, severe mental disorder patient standardized management rate, tuberculosis patient standardized

medication rate, elderly traditional Chinese medicine health management rate, and 0-36 months child traditional Chinese medicine health management service rate were 6.27%, 0.32%, 2.61%, 1.06%, 0.07%, 0.62%, 8.34%, 2.11%, 0.51%, 9.53%, and 5.01%, respectively, while health record utilization rate, standardized hypertension patient management rate, and standardized diabetes patient management rate decreased from 77.40%, 72.48%, and 72.09% in 2017 to 36.58%, 64.14%, and 66.32% in 2022, respectively. (3) The average annual growth rates of residents' health literacy rate, physical exercise participation rate, and exclusive breastfeeding rate among infants within 6 months were 23.75%, 15.86%, and 5.35%, respectively, while the average annual growth rates of neonatal mortality rate, infant mortality rate, and under-5 mortality rate were -1.71%, -4.25%, and -1.63%, respectively; management population blood pressure control rate and management population blood glucose control rate decreased from 70.84% and 67.41% in 2017 to 69.33% and 60.82% in 2022, respectively, and the average annual growth rates of cesarean section rate, birth defect incidence rate, low birth weight rate, under-5 low weight rate, under-5 anemia prevalence rate, and under-5 obesity rate were 0.74%, 1.87%, 3.97%, 3.85%, 11.03%, and 33.50%, respectively. From 2018 to 2022, public awareness rate decreased from 86.26% to 68.77%, while resident satisfaction increased from 88.51% to 91.00%.

Conclusion From 2017 to 2022, Shenzhen' s essential public health services achieved remarkable results, characterized by continuously strengthened organizational management and fiscal expenditure, implementation of primary responsibilities, and an expanding human resources team; broad coverage across various population groups, with initial effectiveness of health education, however, record utilization needs to be strengthened, requiring further promotion of high-quality development of elderly, hypertension, and diabetes patient management, and continuous improvement of residents' awareness and sense of gain.

Full Text

Progress and Trends in the Implementation of Essential Public Health Services in Shenzhen, 2017-2022

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Abstract

Background: Since the launch of the National Essential Public Health Service Program in 2009, various services have been widely implemented across China. However, the implementation progress and outcomes vary considerably among provinces and municipalities due to differences in economic development levels. As a national economic center and innovative city, Shenzhen ranks at the forefront of information technology adoption among Chinese cities.

Objective: This study aims to systematically review and summarize the implementation progress and trends of essential public health services in Shenzhen from 2017 to 2022, providing evidence to support high-quality development of these services in the future.

Methods: From July 2022 to April 2023, we retrospectively collected 54 evaluation indicators spanning three dimensions—program input, implementation, and outcomes—related to Shenzhen's essential public health services from 2017 to 2022, and analyzed the trends of each indicator over this six-year period.

Results: (1) The actual per capita funding for Shenzhen's essential public health services increased from ¥80.71 in 2017 to ¥144.86 in 2022, the total number of community health center staff grew from 9,992 to 13,758, and the proportion of public health physicians among primary care medical personnel rose from 5.39% to 5.94%. (2) The average annual growth rates were 6.27% for electronic health record filing rate, 0.32% for newborn visit rate, 2.61% for health management rate of children aged 0-6 years, 1.06% for early pregnancy registration rate, 0.07% for postpartum visit rate, 0.62% for maternal system management rate, 8.34% for elderly health management rate, 2.11% for standardized management rate of patients with severe mental disorders, 0.51% for standardized medication rate of tuberculosis patients, 9.53% for elderly TCM health management rate, and 5.01% for TCM health management service rate of children aged 0-36 months. Conversely, health record utilization rate, standardized management rate of hypertensive patients, and standardized management rate of diabetic patients decreased from 77.40%, 72.48%, and 72.09% in 2017 to 36.58%, 64.14%, and 66.32% in 2022, respectively. (3) The average annual growth rates of health literacy rate, proportion of residents participating in physical exercise, and exclusive breastfeeding rate among infants under 6 months were 23.75%, 15.86%, and 5.35%, respectively, while the average annual growth rates of neonatal mortality, infant mortality, and under-5 mortality were -1.71%, -4.25%, and -1.63%, respectively. The blood pressure control rate among managed populations decreased from 70.84% in 2017 to 69.33% in 2022, and the blood glucose control rate declined from 67.41% to 60.82%. The average annual growth rates of cesarean section rate, birth defect incidence, low birth weight rate, under-5 low weight rate, under-5 anemia prevalence, and under-5 obesity rate were 0.74%, 1.87%, 3.97%, 3.85%, 11.03%, and 33.50%, respectively. Public awareness of the program decreased from 86.26% in 2018 to 68.77% in 2022, while resident satisfaction increased from 88.51% to 91.00%.

Conclusion: Shenzhen's essential public health services achieved remarkable progress from 2017 to 2022, with strengthened organizational management, increased financial investment, and expanded human resources. Service coverage for various target populations was broad, and health education demonstrated initial effectiveness. However, health record utilization requires improvement, and there is a need to further enhance the quality of health management for the elderly, hypertensive, and diabetic populations ("the elderly, high blood pressure, and diabetes" program), while continuously improving public awareness and residents' sense of benefit.

Keywords: Public health surveillance; National Essential Public Health Service Program; Performance assessment; Evaluation study; Shenzhen

Introduction

The National Essential Public Health Service Program represents the most fundamental public health services provided free of charge by the Chinese government to all residents, targeting major health problems among urban and rural populations with a focus on pregnant women, children, the elderly, and patients with chronic diseases [1]. This program is crucial for building a public health system and promoting equitable access to essential public health services. Since its launch in 2009, the program has been widely implemented nationwide, though its implementation and progress vary across provinces and municipalities due to differing economic development levels [2-10]. As a national economic center and innovative city, Shenzhen leads Chinese cities in information technology development. To comprehensively understand the implementation progress and effectiveness of essential public health services in Shenzhen, this study employs a structure-process-outcome framework to compile and analyze 54 evaluation indicators across three dimensions—program input, implementation, and outcomes—from 2017 to 2022, aiming to summarize experiences, identify existing problems, and provide direction for improving service quality and efficiency in the next phase.

Methods

1.1 Effectiveness-Oriented Comprehensive Evaluation System for National Essential Public Health Services The evaluation indicator system was developed by our research team [11] using a structure-process-outcome framework, comprising 3 first-level indicators, 20 second-level indicators, and 54 third-level indicators covering program input, implementation, and outcomes. (1) Second-level indicators for program input include organizational management, fund management, and human resources; (2) Second-level indicators for program implementation encompass the 12 service categories; and (3) Second-level indicators for program outcomes include health education effectiveness, chronic disease patient management outcomes, maternal health management

outcomes, child health management outcomes, and awareness and satisfaction rates.

1.2 Data Collection and Quality Control **1.2.1 Data Collection:** From July 2022 to April 2023, we retrospectively collected six years (2017-2022) of data on essential public health services in Shenzhen using correspondence surveys and literature review methods. The dataset included 56 indicators at three levels, comprising 52 quantitative indicators and 4 qualitative indicators. Eight indicators were sourced from the *Shenzhen Health Statistics Yearbook* [12-17]: early pregnancy registration rate, postpartum visit rate, maternal system management rate from the implementation dimension, and maternal mortality rate, neonatal mortality rate, infant mortality rate, under-5 mortality rate, under-5 low weight rate (2022), and under-5 obesity rate (2022) from the outcomes dimension. All other indicators were obtained through correspondence surveys coordinated by the Shenzhen Essential Public Health Services Technical Guidance Center, which extracted data from the Shenzhen Essential Public Health Services Statistical Information System, annual work reports, and municipal performance assessment bulletins.

1.2.2 Quality Control: A multi-layered data quality verification mechanism was established. The research team cross-checked indicator values using multiple data sources (Shenzhen Essential Public Health Services Statistical Information System, annual work reports, municipal performance assessment bulletins, and Health Statistics Yearbooks), with relevant Shenzhen health administrative departments conducting supervision and quality verification.

1.3 Statistical Analysis Data on essential public health services in Shenzhen from 2017 to 2022 were compiled and entered into Excel to create a unified database. The average annual growth rate for each evaluation indicator was calculated using the following formula [18]: Average annual growth rate (m) = $\Sigma[(B-A)/A]/n$, where A and B represent service coverage rates in year n and year n+1, respectively.

Results

2.1 Program Input **2.1.1 Organizational Management:** The “division of labor and collaboration” rating improved from “good” in 2017 to “excellent” in 2022, while “performance assessment” and “information system construction” showed substantial improvement from “medium” in 2017 to “excellent” in 2022. Program publicity efforts decreased slightly, from “excellent” in 2017 to “good” in 2022 (Table 1).

2.1.2 Fund Management: Shenzhen’s actual per capita funding for essential public health services increased from ¥80.71 in 2017 to ¥144.86 in 2022, representing an increase of ¥64.15 with an average annual growth rate of 13.50% (Figure 1 [Figure 1: see original paper]). Throughout 2017-2022, Shenzhen’s per capita funding consistently exceeded the national standard, reaching 172.45%

of the national per capita amount in 2022. From 2017 to 2022, Shenzhen's annual fund implementation rate, fund availability rate, and fund expenditure rate all reached 100.00%.

2.1.3 Human Resources: The number of community health center staff in Shenzhen increased from 9,992 in 2019 to 13,758 in 2022, adding 3,766 personnel with an average annual growth rate of 11.30%. In 2021, public health physicians accounted for 5.94% of primary care medical staff, an increase of 0.55 percentage points from 5.39% in 2020 (Figure 2 [Figure 2: see original paper]).

2.2 Program Implementation 2.2.1 Health Records and Health Education: From 2017 to 2022, the electronic health record filing rate increased from 78.24% to 97.11%, with an average annual growth rate of 6.27%, though it dropped to its lowest point of 58.86% in 2018. Health record utilization rate decreased from 77.40% in 2017 to 36.58% in 2022, with an average annual growth rate of -13.39%. During 2017-2022, Shenzhen distributed approximately 30.638 million copies of health education printed materials, broadcast 16,487 types of health education audio-visual materials totaling approximately 1.8684 million episodes, updated health education bulletin boards 51,100 times, held 51,100 health education lectures with total attendance reaching 2.3441 million people (Table 2).

2.2.2 Vaccination: From 2017 to 2022, vaccination certificate establishment rates and average vaccination rates for vaccines in the national immunization program remained above 99.00% in Shenzhen, with rates reaching 100.00% in 2018, 2020, 2021, and 2022. By 2020, the average vaccination rate for eight vaccines in the national immunization program [19] (hepatitis B, BCG, polio vaccine, DTP vaccine, measles-containing vaccine, meningococcal vaccine, Japanese encephalitis vaccine, and hepatitis A vaccine) reached 99.46%.

2.2.3 Maternal and Child Health Management: Newborn visit rates remained above 95.00% from 2017 to 2022, peaking at 97.98% in 2022 with an average annual growth rate of 0.32%. The health management rate for children aged 0-6 years increased from 86.77% to 98.45%, reaching its highest point of 99.30% in 2020 with an average annual growth rate of 2.61% (Table 3). Early pregnancy registration rate grew from 90.30% in 2017 to 94.46% in 2022, peaking at 99.88% in 2020 with an average annual growth rate of 1.06%. Postpartum visit rate increased from 97.04% in 2017 to 97.72% in 2022, with an average annual growth rate of 0.07%. Maternal system management rate rose from 95.50% in 2017 to 98.47% in 2022, with an average annual growth rate of 0.62% (Table 3).

2.2.4 Elderly and Chronic Disease Health Management: The standardized management rate for hypertensive patients decreased from 72.48% in 2017 to 47.70% in 2018, then increased to 64.14% in 2022. The standardized management rate for type 2 diabetic patients decreased from 72.09% in 2017 to 52.76% in 2018, then rose to 66.32% in 2022 (Figure 3 [Figure 3: see original

paper]). The elderly health management rate fluctuated significantly, dropping to 48.92% in 2018 and peaking at 80.17% in 2020, then reaching 77.60% in 2022, representing an increase of nearly 10 percentage points from 2021.

2.2.5 Management of Patients with Severe Mental Disorders and Tuberculosis: The standardized management rate for patients with severe mental disorders increased from 88.92% in 2017 to 98.45% in 2022, a gain of 9.53 percentage points with an average annual growth rate of 2.11%. The tuberculosis patient management rate increased from 99.25% in 2017 to 99.48% in 2022, while the standardized medication rate for tuberculosis patients rose from 96.05% in 2017 to 98.51% in 2022 (Figure 4 [Figure 4: see original paper]).

2.2.6 Traditional Chinese Medicine (TCM) Health Management: The elderly TCM health management rate in Shenzhen increased from 54.16% in 2017 to 77.26% in 2022, a gain of 23.10 percentage points with an average annual growth rate of 9.53%. The TCM health management service rate for children aged 0-36 months grew from 68.47% in 2017 to 87.12% in 2022, an increase of 18.65 percentage points with an average annual growth rate of 5.01% (Figure 5 [Figure 5: see original paper]).

2.2.7 Infectious Disease and Public Health Emergency Reporting and Health and Family Planning Supervision Coordination Services: From 2017 to 2022, Shenzhen's infectious disease epidemic reporting rate and timely reporting rate both exceeded 99.00%, while the health and family planning supervision coordination information reporting rate reached 100.00%.

2.3 Program Outcomes 2.3.1 Health Education Outcomes: Health literacy rate among residents increased from 17.27% in 2017 to 47.63% in 2022, a gain of 30.36 percentage points with an average annual growth rate of 23.75%. The proportion of residents regularly participating in physical exercise grew from 23.56% in 2017 to 42.90% in 2022, an increase of 19.34 percentage points with an average annual growth rate of 15.86%. Adult smoking rate decreased from 20.73% in 2017 to 19.10% in 2022 (Figure 6 [Figure 6: see original paper]).

2.3.2 Chronic Disease Management Outcomes: The blood pressure control rate among managed populations in Shenzhen decreased from 70.84% in 2017 to 69.33% in 2022, peaking at 71.22% in 2019 and dropping to 67.5% in 2018. The blood glucose control rate among managed populations declined from 67.41% in 2017 to 60.82% in 2022, a decrease of 6.59 percentage points with an average annual growth rate of -2.01%, peaking at 68.13% in 2019 (Figure 7 [Figure 7: see original paper]).

2.3.3 Maternal and Child Health Management Outcomes: Maternal mortality rate decreased from 5.61 per 100,000 in 2017 to 1.91 per 100,000 in 2021, then increased to 7.21 per 100,000 in 2022. Neonatal mortality rate declined from 0.80‰ in 2017 to 0.61‰ in 2021 (a reduction of 0.19‰ with an average annual growth rate of -5.42%), then increased to 0.69‰ in 2022. Infant mortality rate fell from 1.50‰ in 2017 to 1.06‰ in 2021 (a reduction

of 0.44‰ with an average annual growth rate of -8.14%), then rose to 1.18‰ in 2022. Under-5 mortality rate decreased from 1.80‰ in 2017 to 1.36‰ in 2021 (a reduction of 0.44‰ with an average annual growth rate of -6.45%), then increased to 1.60‰ in 2022 (Table 4). The incidence of birth defects, low birth weight rate, and under-5 low weight rate remained relatively stable, with birth defect incidence ranging between 2.1%-2.4%, low birth weight rate around 5.00%, and under-5 low weight rate around 1.50%. Cesarean section rate increased from 35.73% in 2017 to 37.17% in 2021, a gain of 1.44 percentage points with an average annual growth rate of 1.04%. The exclusive breastfeeding rate for infants under 6 months rose from 63.56% in 2017 to 77.75% in 2021, an increase of 14.19 percentage points with an average annual growth rate of 5.35%. Under-5 anemia prevalence increased from 4.49% in 2017 to 7.16% in 2021, a gain of 2.67 percentage points with an average annual growth rate of 14.00%. Under-5 obesity rate grew from 1.63% in 2017 to 5.21% in 2022, an increase of 3.58 percentage points with an average annual growth rate of 33.50% (Table 4).

2.3.4 Awareness and Satisfaction: Public awareness of the National Essential Public Health Service Program decreased from 86.26% in 2018 to 68.77% in 2022, a reduction of 17.49 percentage points with an average annual growth rate of -4.96%. Resident satisfaction increased from 88.51% in 2018 to 91.00% in 2022, peaking at 95.23% in 2021 and dropping to 87.63% in 2019 (Figure 8 [Figure 8: see original paper]).

Discussion

This evaluation collected six years of data (2017-2022) on essential public health services in Shenzhen, providing significant insights into longitudinal trends. The findings indicate that despite the impact of COVID-19 since 2019, Shenzhen's essential public health services have generally maintained steady growth, supported by substantially increased investment from central and local governments that ensured normal operations of primary healthcare institutions. The city's per capita municipal funding for essential public health services increased from ¥92.75 in 2019 to ¥131.30 in 2020. However, coverage rates and outcomes for some services declined during the pandemic period. For instance, health record utilization dropped from 67.93% in 2019 to 60.01% in 2020 and continued falling to 36.58% in 2022. The variety of health education audio-visual materials plummeted from 5,490 types in 2019 to 671 in 2020. Vaccination rates in 2020 decreased compared to 2019, and blood glucose control rates among managed populations fell from 68.13% in 2019 to 65.01% in 2020, further declining to 60.82% in 2022. The following sections discuss these findings in greater detail.

3.1 Program Input: Strengthened Principal Responsibility and Enhanced Financial Support From 2017 to 2022, Shenzhen's essential public health services showed continuous strengthening across organizational management, fund management, and human resources, with only 2018 showing lower

per capita funding than the previous year. At the organizational management level, “division of labor and collaboration” improved from “good” in 2017 to “excellent” in 2022, while “performance assessment” and “information system construction” advanced substantially from “medium” to “excellent.” In March 2019, the Shenzhen Municipal Health Commission and Finance Bureau issued the *Shenzhen Essential Public Health Services Management Measures* [20], clarifying the scope and content of services for each community health center and coordinating district-level dynamic adjustments to program leadership structures and management offices. Building upon the annual notices issued by the National Health Commission regarding national essential public health services [21-26], Shenzhen and its districts developed annual implementation plans tailored to local conditions, specifying annual work objectives, tasks, indicators, and service delivery methods. Through government-enterprise partnerships, Shenzhen gradually improved its information systems, with a unified municipal information platform now covering the entire city, effectively resolving the previous challenge of independent business systems that could not share information.

Based on the *Guangdong Province Essential Public Health Services Subsidy Fund Management Implementation Details* [27], which standardizes program funding guarantees, Shenzhen developed a disbursement model featuring “mid-year prepayment and settlement based on actual expenditures,” “allocation by volume and assessment by quality,” and “full guarantee and dedicated use,” ensuring implementation and availability of annual special budget funds. According to Shenzhen’s annual performance assessment bulletins, cumulative investment in essential public health services reached ¥10.535 billion from 2017 to 2022, with 86.17% from district-level subsidies and 13.83% from central subsidies. Substantial financial investment from central and particularly local governments fundamentally underpinned the continuous improvement and achievements of essential public health services in Shenzhen.

Program input forms the foundation for overall implementation, with financial support directly affecting all program components. From 2017 to 2022, per capita funding for Shenzhen’s essential public health services showed an upward trend, with the 2018 per capita funding of ¥77.06 representing the six-year low. Comparing program processes and outcomes reveals that most coverage and outcome indicators reached their lowest points in 2018, including electronic health record filing rate, maternal system management rate, elderly health management rate, standardized management rates for hypertensive and diabetic patients, as well as outcome indicators such as proportion of residents participating in regular physical exercise, blood pressure control rate among managed populations, neonatal mortality rate, and exclusive breastfeeding rate among infants under 6 months.

3.2 Initial Health Education Effectiveness with Need for Enhanced Record Utilization Health records and health education services target all permanent residents in the jurisdiction and constitute the cornerstone of the

National Essential Public Health Service Program's efforts to achieve universal health coverage. Over the six-year period, Shenzhen steadily advanced health education work, achieving initial effectiveness as evidenced by 逐年增加的居民健康素养具备率和经常参加体育锻炼人数比例, 以及呈下降趋势的成人吸烟率. According to monitoring data, Shenzhen residents' health literacy rate reached 47.63% in 2022, 19.85 percentage points higher than the national level (27.78% in 2022). The improvement in health literacy is attributable to high-quality, diversified health education initiatives, such as Futian District's "Health Spring Festival Gala," "Health Floating Station," and "Residents' Health Literacy Competition," which enhanced participation. In 2021, Futian District's health literacy rate reached 61.1% [28]. Over six years, Shenzhen's adult smoking rate continuously declined, dropping to 19.10% in 2022, achieving ahead of schedule the tobacco control target in the *Healthy China 2030 Planning Outline* [29] – "reducing smoking rate among people over 15 years old to 20% by 2030." The smoking rate reduction [30] is associated with both public smoking control policies and improved health awareness through health education. Health education work has penetrated grassroots communities through printed health manuals, internet and new media platforms, community bulletin boards, and health education lectures, significantly contributing to residents' acquisition of correct health knowledge, development of health skills, and establishment of healthy lifestyles.

However, it is noteworthy that while electronic health record filing rates continuously increased, health record utilization rates declined sharply. Shenzhen's large floating population [31] poses challenges for health record establishment and information sharing among community health centers. In 2018, community health centers systematically cleaned up invalid, duplicate, and lost-to-follow-up records, laying a solid foundation for continuous service improvement, which contributed to the steady increase in electronic health record filing rates from the low of 58.86% (2018) to 97.11% (2022). Health record utilization rate depends on both total record numbers and records with dynamic updates. While total health record numbers increased linearly from 2018 to 2022, records with dynamic updates remained around 7.5 million, leading to 逐年降低的健康档案使用率. Therefore, we recommend strengthening utilization and management of newly created records to avoid the phenomenon of "creating without managing," while introducing more adequate public health human resources [32] at primary healthcare institutions to further improve health education and management effectiveness.

3.3 Strengthening Elderly Health Management and Promoting High-Quality Development of Chronic Disease Patient Management

According to the *China Cardiovascular Health and Diseases Report 2021* [33], approximately 245 million Chinese adults have hypertension and 130 million have diabetes. With China's disease spectrum shifting and population aging deepening, hypertension and diabetes are concentrated among the elderly. In recent years, Shenzhen has prioritized "the elderly, high blood pressure, and di-

abetes” (“老高糖”) as key focus areas in its essential public health services. From 2017 to 2022, Shenzhen’s elderly health management rate fluctuated considerably, dropping to 48.92% in 2018 and peaking at 80.17% in 2020. In February 2022, the Shenzhen Municipal Health Commission issued the *Notice on Issuing Shenzhen Elderly Health Management Service Standards*, which achieved certain effectiveness in improving service quality, with the elderly health management rate reaching 77.60% in 2022, nearly 10 percentage points higher than 2021. Therefore, elderly health management should be further strengthened by solidifying foundational health examination work and maximizing the role of health examination results in early detection and diagnosis of chronic diseases among the elderly.

Robust elderly health management also benefits chronic disease patients. Except for 2017, standardized management rates for both hypertensive and diabetic patients in Shenzhen showed increasing trends from 2018 to 2022, with corresponding blood pressure control rates fluctuating around 70% and blood glucose control rates showing a 逐年下降的趋势. As is well known, primary health-care institutions are the “main battlefield” for managing these two major chronic diseases and constitute a crucial component of cardiovascular disease primordial prevention [33]. Primary care coverage for chronic disease patient management should be continuously expanded, and the quality of chronic disease follow-up should be enhanced to leverage the advantages of TCM health guidance and improve blood pressure and glucose control rates.

3.4 Broad Maternal and Child Health Service Coverage with Significantly Improved Health Outcomes Maternal and child health forms the foundation for healthy development of the next generation and future social progress [34]. Shenzhen annually provides essential public health services to nearly 170,000 pregnant women and 1.14 million children aged 0-6 years, with coverage rates for vaccination, child health management, and maternal health management generally exceeding 90%, significantly advancing maternal and child health in the city.

In child health management, primary healthcare institutions provide necessary health management services for newborns, infants, and preschool children, including disease screening, physical examination and growth assessment, and health guidance on scientific feeding, reasonable nutrition, growth and development, and disease prevention [1]. Concurrently, routine vaccinations are administered to eligible children according to the national immunization schedule [19]. Comprehensive health management services have played a fundamental role in improving child health, with infant mortality decreasing from 1.50‰ in 2017 to 1.18‰ in 2022, under-5 mortality dropping from 1.80‰ to 1.60‰, and exclusive breastfeeding rate among infants under 6 months rising from 63.56% in 2017 to 77.75% in 2021. However, it should be noted that the service scope of Shenzhen’s child TCM health management is somewhat limited due to its reliance on child health examination and vaccination services [35], which may

restrict the initiative of TCM health management personnel. Current challenges include suboptimal intervention effectiveness for indicators such as under-5 low weight rate, anemia prevalence, and obesity rate. Future efforts should focus more on health guidance for disease prevention and reasonable nutrition to control the rapid increase in under-5 anemia prevalence and obesity rates, while fully leveraging TCM guidance on diet and daily living to help parents master knowledge and skills for balanced child nutrition.

Maternal health management services maintained high overall coverage, with early pregnancy registration rate peaking at 99.88% (2020), providing general physical examinations, maternal health checks, and supervision of prenatal screening and diagnosis for pregnant women in the jurisdiction. The vertical integration of primary healthcare institutions and maternal and child health hospitals provides full-cycle support for pregnant women, yielding significant outcomes in maternal system health management. Neonatal mortality decreased from 0.81‰ in 2017 to 0.69‰ in 2022, and birth defect incidence was controlled at 2.30% (2022). China's cesarean section rate was 36.7% in 2018, and Shenzhen's rate has been slowly increasing and remains above the national average. The WHO recommends an ideal cesarean section rate of 10%-15% based on medically indicated conditions [36]. Over the past five years, controlling non-medically indicated cesarean deliveries has been a major challenge [37]. Maternal health management should fulfill its gatekeeping role by fully utilizing prenatal follow-up to help pregnant women and their families correctly understand the advantages and disadvantages of vaginal delivery and cesarean section, thereby reducing cesarean deliveries without clinical indications and associated maternal mortality risks.

Conclusion

This study provides a comprehensive evaluation of Shenzhen's essential public health services across input, implementation, and outcome dimensions, systematically reviewing organizational management and service process indicators while incorporating population health outcome indicators directly or indirectly related to essential public health services. Overall, Shenzhen's essential public health services demonstrated steady growth trends, with continuously strengthened organizational management and financial expenditure, clarified principal responsibilities, and expanded human resources. Coverage of various priority populations was broad, and health education showed initial effectiveness. However, health record utilization requires strengthening, and further efforts are needed to promote high-quality development of health management for the elderly, hypertensive, and diabetic populations, improve maternal and child health management outcomes, and enhance public awareness and residents' sense of benefit to advance high-quality development of essential public health services in Shenzhen.

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