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Utilisation of community healthcare services among older adults with disabilities in Luohu district, Shenzhen: a community-based survey

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ABSTRACT

Objective China faces the challenge of an ageing population with disabilities. Community healthcare centres (CHCs) serve as frontline community healthcare providers for older adults with and without disabilities. Despite their significance, there is a lack of literature examining the utilisation of CHC services among older adults. This study aims to examine and compare the utilisation and satisfaction of CHC healthcare services among older adults with and without disabilities.

Setting Data from the 2019 Community Health Diagnosis Questionnaire, which interviewed 259 older adults residing in the Luohu district of Shenzhen, were used in the current study.

Primary outcome measures Participants self-reported outcomes including use of CHCs, use of home health services from CHCs and satisfaction with CHCs. Five different disability types and an integrated disability variable were assessed as independent variables. Linear probability models were used to determine the relationship between disability types and outcome variables.

Results Among 259 older adults aged 60 years and older, 70.66% self-identified as having a disability. No statistically significant associations were found between the use of CHCs, the use of home health services from CHCs and satisfaction with CHCs, and disability status. However, older adults with mobility and cognitive disabilities were more likely to receive home health services from CHCs.

Conclusion Community health promotion policies should be implemented to improve access to health services for older adults with and without disabilities. In addition, CHCs should implement effective health management plans to ensure the health needs of older adults with disabilities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Community-level data covering older adults living in a megacity in China.
⇒ Data focus on older adults with and without disabilities living in a city with an integrated healthcare system.
⇒ Outcomes investigated included the use of primary healthcare centres in China as well as outcomes pertaining to satisfaction with use of healthcare services among older adults with and without disabilities.
⇒ Data were self-reported and could be influenced by recall and social bias.

INTRODUCTION

China is experiencing a rapidly ageing society, and the degree and depth of this ageing process continue to escalate.[1] China's seventh census in 2020 found that 264 020 000 (18.70%) people were aged 60 years or older, which increased from 177 648 705 (13.26%) in 2010.[1] With a growing population of older adults, a meta-analysis by Zheng *et al* that included 97 studies, found a high prevalence of disability among older adults living in China.[2] It was estimated that around 26.2% (95% CI: 23.7% to 28.6%) of Chinese older adults reported living with disabilities. With the increasing number of older adults, there has been a rapid increase in the population of individuals with disabilities.[3] According to the fourth sampling survey on the Living Conditions of Urban and Rural Residents in China, 18.3% of older adults reported experiencing at least one form of disability.[3] With the rapid increase of older adults with disabilities in China, it is necessary for individuals, families and society to develop efficient healthcare service and community service infrastructure to support this vulnerable population.[2 4]

Older adults with disabilities in China faced challenges in accessing the already limited healthcare resources.[5] The undesirable consequences of the one-child policy contributed to the expansion of the 'empty nest' phenomenon in the city.[6] Without sufficient family support, both older adults with and without disabilities experienced a significant decrease in the ability to access healthcare services.[7] In fact, one of the primary barriers preventing older adults from using healthcare services is the inconvenience in movement, particularly mobility disabilities.[5] This suggests

that older adults with disabilities rely on assistance with transportation to access healthcare services. Another challenge confronting older adults with disabilities is the economic burden of healthcare services, compounded by the concentration of professional healthcare services in inpatient settings. Older adults with late-onset disability were more likely to use higher-cost inpatient healthcare services.[8 9] However, community healthcare providers are not equipped to provide efficient and effective services to the older adult population. Previous studies have shown that a lack of understanding of dementia by healthcare providers and family members limits access to essential healthcare services for older adults with dementia,[10 11] and other non-communicable chronic diseases and disabilities. Therefore, to provide supportive and efficient healthcare services and decrease the pressure on families, more efficient social support and healthcare services should be explored and introduced to society.

Considering the challenges of accessing healthcare services among older adults with disabilities, it is important for the Chinese government to develop, establish and evaluate efficient community service infrastructure that supports and provides non-hospitalisation healthcare services to older adults with disabilities. Shenzhen, a megacity in southern China, has implemented a series of policies to promote primary healthcare system.[12] Luohu, a district within Shenzhen, serves as a pilot district for establishing a primary healthcare network with integrated management, shared responsibilities and common interests.[13] The integrated healthcare system (Luohu Hospital Group) helps the integration of medical care and pension in the Shenzhen community and aims to provide comprehensive and improved services.

With the implementation of the Luohu Hospital Group model, community health centres (CHCs) are expected to provide supportive and preventive healthcare services, improving access to healthcare for older adults with disabilities. The Luohu Hospital Group model included 5 district-run hospitals and 23 CHCs in 2015. According to the Summary of Shenzhen Health Statistics in 2019, the utilisation of CHCs in Shenzhen was 36.15 per million persons.[14] The Shenzhen government provides home-based care service subsidies, subsistence allowances and key preferential care to city residents aged over 60 years with specific needs and those unable to self-care.[15] Furthermore, the Shenzhen government also promotes the establishment of day care institutions, family doctors and telehealth to support healthcare services for older adults.[15] Luohu district is forming a comprehensive medical and nursing care system that pioneers the integration of medical and nursing care for the elderly.[16] All Shenzhen residents who are older adults and covered by social health insurance are eligible to access healthcare services from CHCs. The reimbursement rate for older adults aged above 60 years in CHCs can reach 80% or higher. Among older adults aged 60 years, reimbursement for out-of-province expenses is convenient.[17] Taken together, the Luohu model was conceptually establishing a strong healthcare support network for older adults.

Limited literature has been conducted to provide evidence on appropriate evaluations and responses to the utilisation of healthcare services from CHCs among older adults with disabilities. As Luohu, Shenzhen is the pilot city to implement the integrated management of primary healthcare, including CHCs, it is essential to evaluate the utilisation of CHCs among older adults with disabilities in the community, as this population could benefit from the utilisation of healthcare services provided by CHCs. The aim of this study was to examine and compare the utilisation and satisfaction with healthcare services provided by CHCs among older adults with and without disabilities.

METHODS

Design

This study used data from the Community Health Diagnosis Questionnaire, which was conducted in Luohu, Shenzhen in 2019 by the Luohu Center for Disease Control and Prevention.[13 18] The Community Health Diagnosis Questionnaire was modelled after the survey in Community Appropriate Health Diagnosis Technical Manual.[19 20] The current questionnaire used in the current study had been used in other Community Health Diagnosis Questionnaires within China, such as Tian Jin, Chong Qin, Ji Man and Chang Chun.[19 20] Furthermore, more than 10 communities in different cities in China have been selected to validate and implement the survey.[19 20] The questionnaires are attached in the online supplemental tables. Multistage sampling was used to conduct face-to-face interviews. Participants from 116 community networks in Luohu, Shenzhen were included in the study. The following sampling method was used in the survey: 200 households were recruited from a randomly selected community grid with >2 million people, 150 households for communities with 1–2 million people, 100 households for communities with 0.5–1 million people and 50 households for communities with <0.5 million people. Participants aged 60 years or older were included in this analysis. Two hundred sixty-one older adults with and without disabilities were included in the survey, and two participants were excluded due to missing data.

Patient and public involvement

No patient was involved.

Variables

Utilisation of CHCs, utilisation of home health services from CHCs and satisfaction with CHCs served as outcomes for this study. Utilisation of CHCs was estimated by the question, 'Have you visited a CHC in the past 6 months?'. Utilisation of home health services provided by CHCs was estimated by the question, 'Within the past 6 months, did you receive home health services, including door to door or by phone, from community health workers?'. Satisfaction with CHCs was estimated by asking, 'Within the past

6 months, were you satisfied with the services provided by the centre?'. All responses were binary with either a 'yes' or 'no' response.

Five separate disability types and one integrated disability status were evaluated as independent variables. The five disability types included independent living disability, mobility disability, speech impairments, hearing impairment and cognitive disability. Independent living disability was based on the question, 'Within the past 6 months, can you live independently without others' help?'. If participants responded 'yes,' they were considered to have no independent living disability. Mobility disability was based on the question, 'Within the past 6 months, do you have any of the following mobility issues: (1) immobilised, (2) walk with assistive devices (eg, walker, canes) and walk slowly, (3) difficulty in walking but without assistive devices, (4) no issues with mobility and (5) other?'. If participants responded with 'no problem', they were considered as not having mobility disability; otherwise, they were considered to have mobility disability. Speech impairment was based on the question, 'Within the past 6 months, do you have any problem speaking?'. If participants responded 'yes', they were considered to have speech impairments. Hearing impairment was based on the question, 'Within the past 6 months, do you have any of the following hearing problems: (1) difficulty in hearing, (2) need others to raise their voices and (3) no difficulty in hearing?'. If participants responded 'yes, I could hear clearly', they were considered as not having hearing impairments; otherwise, they were considered having hearing impairments. Cognitive disability was based on the question, 'Within the past 6 months, do you consider (or others told you) your memory declined significantly?'. If participants responded 'no', they were considered as not having cognitive disability; otherwise, they were considered having cognitive disability. If participants reported experiencing any of the disabilities (ie, independent living disability, mobility impairments, speech impairments, hearing impairments and cognitive disability), they were identified as having a disability.

The covariates included in the analysis were age (60–69 years old, 70–79 years old and above 80 years old), sex (male, female), chronic disease status (yes, no), insurance status (yes, no), income sources (self-supported, not self-supported), Shenzhen hukou status (Shenzhen hukou, non-Shenzhen hukou), self-rated health status (good, normal, poor and unknown), annual physical examination (yes, no) and the number of household members. Participants were considered to have chronic disease status if they reported having a diagnosis with at least one of the following conditions: hypertension, diabetes, stroke, chronic bronchitis, chronic hepatitis B, hyperlipaemia, cataract, osteoporosis, benign prostatic hyperplasia, cervical spondylopathy, chronic enteritis, chronic rhinitis, renal calculus, psychosis, benign tumours, malignant tumours, coronary disease and asthma. Income sources were based on the question, 'What is your source of income?'. Response options included: me or partner, children, grandchildren, relatives, friends, society or government support, and others. Participants who reported 'me or partner' were coded as self-supported; otherwise, they were not self-supported. Shenzhen hukou is a binary variable of having Shenzhen hukou or not having Shenzhen hukou. Annual physical examination is a binary variable of reporting having an annual physical examination and not having an annual physical examination. An annual physical examination can help prevent disease and promote health in older adults.[21] Self-rated health status was assessed by the following question: 'How would you rate your current health status?'. Response options included: good, normal, poor and unknown.

Analysis

Analyses were conducted for each of the outcome variables, CHC utilisation, utilisation of home healthcare services provided by CHCs and satisfaction with CHCs with the main regressors of independent living disability, mobility impairments, speech impairments, hearing impairments and cognitive disability using linear probability models (LPMs) via ordinary least squares. Also, the relationship between outcome variables and disability status was estimated using LPM. LPM was also used to estimate the relationship between outcome variables and disability status. Covariates were included in the analysis to adjust for all regression models. All analyses were conducted using Stata/SE V.16 (StataCorp, College Station, Texas, USA).

RESULTS

Table 1 shows the characteristics of the included sample. Among the older adults, 70.66% reported experiencing at least one form of disability, while 11.97%, 20.08%, 9.27%, 23.94% and 63.71% identified themselves as having independent living disability, mobility disability, speech impairments, hearing impairments and cognitive disability, respectively. Among the older adults, 56% were female, 57.5% had chronic diseases, 95.4% reported having insurance and 53.3% had self-supportive income. Nearly half (43.3%) of the older adults were migrants (non-Shenzhen hukou). Only 11.2% of older adults reported having poor health.

Sample characteristics for CHC use, use of home health services provided by CHCs and satisfaction with CHCs by disability status among older adults are shown in table 2. 32.4% and 17.4% of older adults with disabilities used CHCs and used home health services provided by CHCs. In addition, 3.9%, 8.5%, 2.7%, 10.0% and 30.9% of older adults with independent living disability, mobility disability, speech impairments, hearing impairments and cognitive disability used CHCs. Only 3.1%, 7.0%, 2.3%, 6.6% and 16.6% of older adults with independent living disability, mobility disability, speech impairments, hearing impairments and cognitive disability used home health services provided by CHCs. 27.0% of older adults with disabilities were dissatisfied with CHCs.

Table 1 The demographics of older adults in Dongmen community, Luohu district, Shenzhen, China (2019), n=259

	N	Percentage
Age categories		
60–69	139	53.67
70–79	67	25.87
80+	53	20.46
Gender		
Male	113	43.63
Female	146	56.37
Chronic disease		
No	110	42.47
Yes	149	57.53
Insurance status		
No	12	4.63
Yes	247	95.37
Income self-supportive		
No	121	46.72
Yes	138	53.28
Shenzhen hukou		
No	113	43.3
Yes	148	56.7
Self-evaluated health situation		
Good	98	37.98
Normal	131	50.78
Bad	29	11.24
Annual physical examination		
No	86	33.20
Yes	173	66.80
Household number	253	–

n=sample size.

The association between CHC services and disability status was estimated using LPM, as shown in table 3. No statistically significant differences were found in the use of CHCs, use of home health services provided by CHCs and satisfaction with CHCs between older adults with and without disabilities by each disability type.

The association between CHC services and all types of disability status was estimated using LPM as shown in table 4. The results found that older adults with independent living disability were 21.4 percentage points (p=0.048) less likely to use CHCs, compared with those who did not have independent living disability. In addition, the results showed that older adults with mobility disability were 19.6 percentage points (p=0.026) more likely to use home health services provided by CHCs, compared with those who did not have mobility disability. Also, older adults with cognitive disability were 12.3 percentage points (p=0.023) more likely to use home health services provided by CHCs.

DISCUSSION

Using the recently developed community-based questionnaire for a pilot evaluation, this study compared the use of and satisfaction with community-based health services among older adults with and without disabilities living in the community. Overall, 44.4% of older adults reported experiencing at least one form of disability. No statistically significant difference was found in the use of CHCs, use of home health services and satisfaction with CHCs between older adults with and without disabilities. Older adults with independent living disabilities were less likely to use CHCs, whereas older adults with mobility and cognitive disabilities were more likely to use home health services provided by CHCs.

As society grapples with the multifaceted challenges of an ageing population, a longitudinal study using the China Health and Retirement Longitudinal Study found a 26% increase in physical functioning limitations from 2011 to 2015 among participants over the age of 50 years.[4] The same study also found an increase in older adults experiencing difficulties in performing activities of daily living (ADLs) and instrumental activities of daily living (IADLs).[4] People with ADL and IADL difficulties can be viewed as having self-care, independent living or functional disabilities.[22 23] Based on the Survey Report on the Living Conditions of China's Urban and Rural Older Persons in 2018, 80.1% of older adults reported that they were diagnosed with at least one chronic disease, and nearly 30% of older adults reported that they have visual impairments.[24] Furthermore, 41.0% of older adults indicated that they needed supportive healthcare services.[24] Additionally, between 16 and 41 million Chinese older adults were living with disability.[24 25] Older adults with and without disabilities required additional help in managing their overall health. However, based on the results from this study, CHCs were not playing a large role in supporting the health of older adults with disabilities as suggested by the low number of participants reporting using CHCs. CHCs should have the ability and resources to provide affordable and accessible primary healthcare services to older adults, both with and without disabilities, living in the community.

The Chinese government implemented several strategies to improve healthcare services for older adults.[26] China's 13th Five-Year Forward Plan announced the development direction for older adults, including those with disabilities.[27 28] With the increasing number of older adults with and without disabilities in China, the pressure of providing affordable and effective healthcare services for them has grown, not only within families but also in society. Compared with expensive institutional healthcare services, services provided by CHCs, including home care services, should play a more fundamental role in the policy system for providing healthcare services to older adults in China. This is further underscored by the affordability of healthcare services provided by CHCs within local communities. Meanwhile, the advantages of CHCs'

Table 2 Characteristics of community healthcare centres (CHCs) for older adults with disability in Dongmen community, Luohu district, Shenzhen, China (2019)

	Utilisation of CHCs			Utilisation of home health services provided by CHCs			Satisfaction with CHCs		
	No	Yes	P value	No	Yes	P value	No	Yes	P value
Disabilities, n									
No	45	99	0.45	64	138	0.12	6	11	0.58
Yes	31	84		12	45		70	172	
Independent living disability, n									
No	123	21	0.15	179	23	0.59	15	2	0.98
Yes	105	10		49	8		213	29	
Mobility disability, n									
No	114	30	0.73	168	34	0.01	12	5	0.32
Yes	93	22		39	18		195	47	
Speech impairments, n									
No	127	17	0.12	184	18	0.71	15	2	0.71
Yes	108	7		51	6		220	22	
Hearing impairments, n									
No	108	36	0.65	157	45	0.24	10	7	0.09
Yes	89	26		40	17		187	55	
Cognitive disability, n									
No	59	85	0.08	80	122	0.04	7	10	0.67
Yes	35	80		14	43		87	155	

location and density within the city provide residents an easy access to these centres for quick healthcare services.

With the implementation of People's Republic of China's Elderly Rights and Protection Law in 1996, family members were responsible for supporting the healthcare, mental health, housing and income of older adults.[29] Developments and changes in the economy and society have stimulated the reform of public policies related to older adults. Although there is substantial increase in government support and private older adult care institutions, the gap in professional older adult care institutions remained significant in both urban and rural areas. Furthermore, the lack of support from national healthcare insurance services has increased the out-of-pocket spending of individuals living in long-term care institutions or professional healthcare centres.[30] Therefore, the government should aim at supporting family caregiving and long-term care by promoting community-based services such as day care, home health services, recreation centres and support groups. This government-provided community service infrastructure will serve as an important community support for the increasing number of older adults.

Unfortunately, the existing healthcare delivery model in China has significant weaknesses. Older adults typically rely on professional healthcare institutions, such as hospitals, for treatment rather than preventive services. Chronic disease management is an important part of the 14 essential health services provided by CHCs.[31] To efficiently establish an age-friendly society for older adults with and without disabilities, an effective and efficient policy or programme should be implemented. This could involve a home care-centred approach supported by community care, with institutional healthcare providing additional support.[32] Caring for older adults with disabilities, including cognitive disabilities, imposes heightened physical, psychological and financial challenges for families. Therefore, community service infrastructure, community support and primary healthcare support were important for families with older adults with disabilities. To support these families, a model of ageing-in-place was proposed, explored and implemented in some urban areas in China.[32–34] This model required collaboration between families, volunteer social workers and community healthcare providers. In addition, community health providers should introduce disease-prevention programmes for older adults with and without disabilities. Prevention of chronic diseases proves to be a cost-effective strategy compared with the expenses associated with treating diseases.[13 18] Chronic disease management can be achieved through primary care and home healthcare. The future community-based service delivery system should consider transforming community organisations into quasi-governmental support organisations.[35]

This study has several limitations. The first concern was the nature of the data, which were self-reported. The data

Table 3 Linear probability models examining factors associated with community healthcare centre (CHC) services by disability status among older adults in Dongmen community, Luohu district, Shenzhen, China (2019)

		Utilisation of CHCs		Utilisation of home health services provided by CHCs		Satisfaction with CHCs	
		Percentage point change (robust SE)	P value	Percentage point change (robust SE)	P value	Percentage point change (robust SE)	P value
Disabilities							
No	Ref						
Yes		3.62 (7.09)	0.610	9 (5.74)	0.118	1.88 (3.59)	0.602
Age categories							
60–69	Ref						
70–79		0.89 (7.48)	0.906	3.4 (6.84)	0.619	4.8 (3.17)	0.131
80+		–2.65 (9.11)	0.771	–1.16 (7.4)	0.876	2.76 (4)	0.490
Gender							
Male	Ref						
Female		5.61 (6.3)	0.374	–4.18 (5.37)	0.437	6.68 (3.25)	0.041*
Chronic disease							
No	Ref						
Yes		5.99 (6.78)	0.378	–8.85 (5.49)	0.108	7.45 (3.83)	0.053
Insurance status							
No	Ref						
Yes		13.9 (13.34)	0.298	14.17 (9.17)	0.124	9.29 (10.26)	0.366
Income self-supportive							
No	Ref						
Yes		1.56 (6.72)	0.817	–8.91 (5.73)	0.121	–0.16 (3.92)	0.967
Shenzhen hukou							
No	Ref						
Yes		12.88 (7.26)	0.077	12.53 (5.59)	0.026*	–0.03 (3.92)	0.994
Self-evaluated health situation							
Good	Ref						
Normal		1.63 (6.91)	0.814	–4.61 (5.77)	0.425	–7.34 (3.51)	0.037*
Bad		–6.95 (11.46)	0.545	1.53 (10.87)	0.888	–13.98 (6.87)	0.043*
Annual physical examination							
No	Ref						
Yes		26.6 (6.62)	<0.001*	20.96 (4.83)	<0.001*	0.38 (3.74)	0.918
Household number		–0.01 (1.63)	0.994	–0.16 (1.35)	0.905	–2.51 (1.25)	0.045*

*P<0.05.
Ref, reference group.

could be affected by recall and social bias. Because a questionnaire was used to collect data on healthcare needs in the community, the questionnaire was not designed to collect information only from older adults. This results in a panel definition of disability. Compared with previous studies that concentrated on disability of older adults, this study did not estimate the disability status by professional index, such as Katz Activities of Daily Living Scale or Barthel Index.[3 36–38] In addition, this study used a cross-sectional questionnaire that could not identify the causal effect of disability status and use of CHCs. Further follow-up community health diagnoses should be conducted in broader communities. In addition, the samples were recruited from one region of Shenzhen, which may lead to a lack of generalisability. Future studies should try to collect more samples from multiple communities or districts and find a better way to increase access to primary healthcare to reduce the unmet needs of older adults.

Table 4 Linear probability models examining factors associated with community healthcare centre (CHC) services by all categories of disability among older adults in Dongmen community, Luohu district, Shenzhen, China (2019)

		Utilisation of CHCs		Utilisation of home health services provided by CHCs		Satisfaction with CHCs	
		Percentage point change (robust SE)	P value	Percentage point change (robust SE)	P value	Percentage point change (robust SE)	P value
Independent living disability							
No	Ref						
Yes		−21.38 (10.77)	0.048*	−0.05 (8.93)	0.996	1.13 (4.85)	0.816
Mobility disability							
No	Ref						
Yes		−1.54 (10.56)	0.884	19.61 (8.78)	0.026*	−4.8 (4.81)	0.320
Speech impairments							
No	Ref						
Yes		−19.34 (11.5)	0.094	7.5 (9.75)	0.443	−2.73 (5.64)	0.629
Hearing impairments							
No	Ref						
Yes		−0.98 (8.02)	0.903	3.85 (6.82)	0.573	−4.88 (4.43)	0.272
Cognitive disability							
No	Ref						
Yes		10.59 (6.83)	0.122	12.33 (5.38)	0.023*	1.02 (3.55)	0.774

*P<0.05.
Ref, reference group.

CONCLUSION

China is facing challenges in establishing and addressing efficient and supportive systems for older adults' care. With the increasing policies and programmes concentrated on social service and community-based service delivery model, the local government needs to balance and organise the capacity of community-based services targeting older adults with and without disabilities. The provincial government must support the family of older adults with regard to their care. This study indicated insufficient community support for older adults with disabilities in Shenzhen. Moreover, this study provided supportive evidence to establish a local policy to enrich the community-based support for older adults and encourage older adults to use community healthcare services, especially home healthcare services. In the future, the social service delivery model should fit with the local environment and address the development of society.

Contributors All authors contributed to the conception of this study. LS, QZ, GL and WZ made substantial contributions to the design and acquisition of data. LS, TP and WL performed the statistical analysis and interpreted the results. LS was responsible for drafting the articles and acting as guarantor of the study. All authors contributed to the review and edits of the manuscript, and approved the final manuscript for publication.

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Patient consent for publication Not required.

Ethics approval All participants provided written and informed consent before participating in the monitoring system. The current study was conducted in accordance with the Declaration of Helsinki, and ethical approval was obtained from the Institutional Review Board of Oregon State University. However, Institutional Review Board approval was waived because the current study is a secondary data analysis.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Due to legal and participant confidentiality, data will only be available upon request. The data underlying the results presented in the study are available from Shenzhen Luohu Disease Prevention and Control Center (Luohu Social Science Research Project: LX20191107) via contacting Weihong Chen, director of Shenzhen Luohu Disease Prevention and Control Center, at moc.qq@0679253341.

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REFERENCES

1 State Office of Statistics of the People's Republic of China. Main data report of the seventh national population census in 2020. 2021. Available: http://www.stats.gov.cn/tjsj/zxfb/202105/t20210510_1817176.html
2 Zheng P-P, Guo Z-L, Du X-J, *et al*. Prevalence of disability among the Chinese older population: A systematic review and meta-analysis. *Int J Environ Res Public Health* 2022;19:1656.
3 Liang Y, Xu X, Yin M, *et al*. A more comprehensive investigation of disability and associated factors among older adults receiving home-based care in rural Dongguan, China. *BMC Geriatr* 2018;18:158.
4 Liu N, Cadilhac DA, Kilkenny MF, *et al*. Changes in the prevalence of chronic disability in China: evidence from the China health and retirement longitudinal study. *Public Health* 2020;185:102–9.
5 Mai S, Cai J, Li L. Factors associated with access to healthcare services for older adults with limited activities of daily living. *Front Public Health* 2022;10:921980.
6 Zhang H-H, Jiang Y-Y, Rao W-W, *et al*. Prevalence of depression among empty-nest elderly in China: a meta-analysis of observational studies. *Front Psychiatry* 2020;11:608.
7 Hao L, Xu X, Dupre ME, *et al*. Adequate access to healthcare and added life expectancy among older adults in China. *BMC Geriatr* 2020;20:129.
8 Xiao J, Shi Z, Fang Y. Association between disability trajectory and health care service utilization among older adults in China. *J Am Med Dir Assoc* 2021;22:2169–76.
9 Loyalka P, Liu L, Chen G, *et al*. The cost of disability in China. *Demography* 2014;51:97–118.
10 Wu C, Gao L, Chen S, *et al*. Care services for elderly people with dementia in rural China: a case study. *Bull World Health Organ* 2016;94:167–73.
11 Wang J, Xiao LD, Li X, *et al*. Caregiver distress and associated factors in dementia care in the community setting in China. *Geriatric Nursing* 2015;36:348–54.
12 Li X, Krumholz HM, Yip W, *et al*. Quality of primary health care in China: challenges and recommendations. *The Lancet* 2020;395:1802–12.
13 Zheng Q, Shi L, Pang T, *et al*. Utilization of community health care centers and family doctor contracts services among community residents: a Community-Based analysis in Shenzhen, China. *BMC Fam Pract* 2021;22:100.
14 Health Commission of Shenzhen Municipality. Summary of Shenzhen health statistics in 2019. 2021. Available: http://wjw.sz.gov.cn/jksz/sjjd/content/post_7789540.html
15 Shenzhen government. "Shenzhen's 'thirteenth five-year plan' for the development of the elderly care service industry". 2016. Available: http://mzj.sz.gov.cn/cn/xxgk_mz/ghjh/gh/content/post_2923907.html
16 Liang D, Mei L, Chen Y, *et al*. Building a people-centred integrated care model in urban China: a qualitative study of the health reform in Luohu. *Int J Integr Care* 2020;20:9.
17 Healthcare Security Bureau of Shenzhen Municipality. Reimbursement methods for out-of-province 2017. 2017. Available: http://hsa.sz.gov.cn/ztzl/ydjyzjjs/
18 Shi L, Patil VP, Leung W, *et al*. Willingness to use and satisfaction of primary care services among locals and migrants in Shenzhen, China. *Health Soc Care Community* 2022;30:e113–25. 10.1111/hsc.13418 Available: https://onlinelibrary.wiley.com/toc/13652524/30/1
19 Dong Y, Chen B, Huang J, *et al*. Community appropriate health diagnosis technology and application strategy. 2009.
20 Dong Y, Chen B. *Community Appropriate Health Diagnosis Technical Manual*. Peking University Medical Press: Peking University Medical Press, 2009.
21 Sun X, Chen Y, Tong X, *et al*. The use of annual physical examinations among the elderly in rural China: a cross-sectional study. *BMC Health Serv Res* 2014;14:16:1–8.:.
22 Millán-Calenti JC, Tubío J, Pita-Fernández S, *et al*. Prevalence of functional disability in activities of daily living (ADL), instrumental activities of daily living (IADL) and associated factors, as predictors of morbidity and mortality. *Arch Gerontol Geriatr* 2010;50:306–10.
23 Iwaya T, Doi T, Seichi A, *et al*. Characteristics of disability in activity of daily living in elderly people associated with locomotive disorders. *BMC Geriatr* 2017;17:165.
24 Dang J, Wu Y, Liu N. *Survey report on the living conditions of China's urban and rural older persons*. Beijing, China: Social Sciences Academic Press, 2018: 21–96.
25 Peng R, Wu B. The impact of long-term care policy on the percentage of older adults with disabilities cared for by family members in China: A system Dynamics simulation. *Res Aging* 2021;43:147–55.
26 Feng Z, Liu C, Guan X, *et al*. China's rapidly aging population creates policy challenges in shaping a viable long-term care system. *Health Affairs* 2012;31:2764–73.
27 Council S. The 13th Five-Year forward plan of social and economic development. 2016. Available: https://www.gov.cn/xinwen/2016-03/17/content_5054992.htm
28 Council S. Advice on promoting the development of services for older people. 2006. Available: http://www.gov.cn/zwgk/2006-02/17/content_202553.htm
29 The Central People's Government of the Peole's Republic of China. Law of the people's Republic of China regarding the protection of the rights and interests of the elderly. 2013. Available: http://www.gov.cn/zwgk/2013-09/13/content_2487704.htm
30 Feng Z, Zhan HJ, Feng X, *et al*. An industry in the making: the emergence of institutional elder care in urban China. *J Am Geriatr Soc* 2011;59:738–44.
31 Li X, Lu J, Hu S, *et al*. The primary health-care system in China. *Lancet* 2017;390:2584–94.
32 Liu J-E, Tian J-Y, Yue P, *et al*. Living experience and care needs of Chinese empty-nest elderly people in urban communities in Beijing, China: A qualitative study. *International Journal of Nursing Sciences* 2015;2:15–22.
33 Jiang N, Lou VWQ, Lu N. Does social capital influence preferences for aging in place? evidence from urban China. *Aging Ment Health* 2018;22:405–11.
34 Zhou J, Walker A. The impact of community care services on the preference for ageing in place in urban China. *Health Soc Care Community* 2021;29:1041–50.
35 QingwenXuChow JC. Exploring the community-based service delivery model: elderly care in China. *International Social Work* 2011;54:374–87.
36 KATZ S, FORD AB, MOSKOWITZ RW, *et al*. The index of ADL: a standardized measure of biological and Psychosocial function. *JAMA* 1963;185:914–9.
37 Wu T, Lu L, Luo L, *et al*. Factors associated with activities of daily life disability among centenarians in rural Chongqing, China: a cross-sectional study. *Int J Environ Res Public Health* 2017;14:1364.
38 Mahoney FI, Barthel DW. Functional evaluation: the Barthel index: a simple index of independence useful in scoring improvement in the rehabilitation of the chronically ill. *Md State Med J* 1965.