

Twenty-year trends in the prevalence of disability in China

Xiaoying Zheng,^a Gong Chen,^a Xinming Song,^a Jufen Liu,^b Lijing Yan,^c Wei Du,^a Lihua Pang,^a Lei Zhang,^a Jilei Wu,^a Bingzi Zhang^a & Jun Zhang^d

Objective To evaluate changes in the age-adjusted prevalence of disability in transitional China from 1987 to 2006.

Methods Data from nationally representative surveys conducted in 1987 and 2006 were used to calculate age-adjusted disability prevalence rates by applying appropriate sample weights and directly adjusting to the age distribution of the 1990 Chinese population. Trends were assessed in terms of average annual percentage change.

Findings The estimated number of disabled people in China in 1987 and 2006 was 52.7 and 84.6 million, respectively, corresponding to a weighted prevalence of 4.9% and 6.5%. The age-adjusted prevalence of disability decreased by an average of 0.5% per year (average annual percentage change, AAPC: -0.5%; 95% confidence interval, CI: -0.7 to -0.4) during 1987–2006. However, it increased by an average of 0.3% (AAPC: 0.3%; 95% CI: 0.1 to 0.5) per year in males and by an average of 1.0% (AAPC: 1.0%; 95% CI: 0.8 to 1.2) per year among rural residents, whereas among females it showed an average annual decrease of 1.5% (AAPC: -1.5%; 95% CI: -1.7 to -1.3) and among urban residents, an average annual decrease of 3.9% (AAPC: -3.9%; 95% CI: -4.3 to -3.5). Despite significant declining trends for hearing and speech, intellectual and visual disabilities, the annual age-adjusted prevalence of physical and mental disabilities increased by an average of 11.2% (AAPC: 11.2%; 95% CI: 10.5 to 11.9) and 13.3% (AAPC: 13.3%; 95% CI: 10.7 to 16.2), respectively.

Conclusion In China, the age-adjusted prevalence of disability has declined since 1987, with inconsistencies dependent on the type of disability. These findings call for continuing and specific efforts to prevent disabilities in China.

Abstracts in **عربي**, **中文**, **Français**, **Русский** and **Español** at the end of each article.

Introduction

Disability is common in both developed and developing countries.¹ An estimated 650 million people worldwide live with some form of disability.² The way that disability is conceived has changed substantially in recent years, the current focus being on three areas of impairment: bodily functions and structures, activities and participation.² In this study, disability is defined as one or more abnormalities in anatomical structure or the loss of a particular organ or function (either physical or psychological) affecting a person's ability to carry out a normal activity and to participate fully in study, work, and community and social life. In the United States of America, about 50 million adults suffer from various forms of disability, including hearing loss, visual impairment, cognitive impairment and limited mobility.³ In China, about 85 million people have a disability or another condition that affects their daily lives and social activities.⁴ Furthermore, disability can lead to limited access to education, health care and rehabilitation services, to the detriment of the disabled people, their families and local communities, health-care systems and social security systems.^{1,5} Therefore, specific strategies, policy initiatives and sustainable programmes are needed to improve the health status of the disabled population.

Several studies have explored trends in disability among different populations. According to prevalence estimates, in the United States 51.2 million people aged 6 years or older (18.1% of the age group) reported having a disability in 2002, compared with 54.4 million (18.7%) in 2005.⁶ Freedman et al.⁷ systematically reviewed cross-sectional and cohort studies and reported a general decrease in the age-adjusted prevalence of

disability in the population aged 65 years of age or older in the United States. A similar decrease in disability prevalence was reported for Spain's population aged 65 years or older.⁸ In terms of life expectancy, the Netherlands reported an increase in the number of years lived with minor disabilities⁹ and Japan reported a decrease in the number of years lived with severe disabilities.¹⁰ These mixed findings may be attributable to different indicators, disability contexts and study populations.¹¹

In China, two large-scale nationally representative household surveys were conducted from 1 April to 30 May in 1987 and 2006.^{12,13} The resulting figures have been used in epidemiological studies to conduct specific analyses of different types of disabilities,^{14–21} rural/urban disparities in disability prevalence⁴ and disability-free life expectancy.²² Using different survey series, Phillips et al.²³ described the prevalence of mental disorders in four provinces, and Chou and Leung²⁴ evaluated self-reported disability among the elderly in Hong Kong Special Administrative Region. These studies have primarily provided a demographic profile of people with disability in China. However, there is no scientific evidence of the magnitude of the problem of disability across the entire nation that will allow for complex survey designs and age-adjusted analysis of trends in disability prevalence nationwide.

China has undergone rapid social, economic, political, institutional and demographic transitions. Thus, understanding the magnitude of the burden of disability and its trends over time is essential for improving the health of the population and enhancing the lives of people with disabilities.

In this study, our primary objective was to assess changes in the prevalence of disability in China during the 20-year period from 1987 through 2006. We also aimed to investigate

^a Institute of Population Research/WHO Collaborating Centre on Reproductive Health and Population Science, Peking University, Beijing 100871, China.

^b Institute of Reproductive and Child Health, Peking University, Beijing, China.

^c China International Centre for Chronic Disease Prevention, Beijing, China.

^d China Disabled Persons' Federation, Beijing, China.

Correspondence to Xiaoying Zheng (e-mail: xzheng@pku.edu.cn).

(Submitted: 28 April 2011 – Revised version received: 3 July 2011 – Accepted: 3 July 2011 – Published online: 14 July 2011)

Table 1. Study definitions for different disability types and their corresponding survey questions

Disability type	Survey question	Definition
Visual	Do you or your family members have visual problems?	Visual disability refers to poor vision or constriction of the visual field in both eyes from any cause and is not correctable. It consists of two categories: blindness and weak vision.
Hearing and speech	Do you or your family members have hearing or speech problems?	Hearing disability refers to permanent hearing loss of varying degrees from any cause or the inability to hear at all or to hear clearly any nearby sound or voice. These deficits affect daily life and social activities. Speech disability refers to any type of language disorder. Because successful treatment takes more than 1 year and the disability is generally present for more than 2 years, the patient cannot take part in normal language exchanges, which undermines his or her daily life and participation in social activities.
Physical	Do you or your family members have any difficulty walking, standing, squatting, climbing the stairs, grasping, washing and rinsing, or dressing?	Physical disability refers to a loss of motor function of varying degrees or to limitations in movements or activities resulting from deformed limbs or body paralysis (palsy) or from deformity caused by damage to the structure or function of those body parts involved in mobility.
Intellectual	Do you or your family members have any difficulty studying?	Intellectual disability refers to lower than normal intellectual ability and is accompanied by adaptive behaviour disorders. This kind of disability results from impairment of the structure and functions of the nervous system, limits individual activity and participation, and requires all-round, extensive, limited, or intermittent support.
Mental	Are you or your family members forgetful? Or do you have difficulty concentrating? Or can you not control your moods? Or do you have strange behaviour that is out of the ordinary? Or are you addicted to alcohol or drugs?	Mental disability refers to psychiatric disorders lasting more than 1 year that manifest as cognitive, affective, and behaviour disorders affecting the daily life and social participation of the patient.

any changes in the leading causes of disability that may have occurred over that time and that could potentially explain the changes in overall prevalence. Since 80% of all those who are disabled live in developing countries,²⁵ most of which are going through an epidemiologic and sociodemographic transition, the findings from this study may be broadly reflective of disability trends in the developing world at large.

Methods

Data source

We obtained data from the 1987 and 2006 national surveys of the non-institutionalized population of China.^{12,13} Both surveys used multistage, stratified random cluster sampling, with probability proportional to size, to derive nationally representative samples. The surveys were approved by the State Council and conducted in all province-level administrative regions of mainland China by the Leading Group of China National Sample Survey on Disability and the National Bureau of Statistics. Within each region, sampling strata were defined based on subordinate administrative areas, local geographical characteristics or local gross domestic product, where

appropriate, to allow for anticipated regional variability. Within each stratum, a four-stage sampling strategy was followed involving four natural administrative units (i.e. county, town, village and community), and sampling was conducted with probability proportional to cluster size. The sampling interval (i.e. the total population divided by the number of units at each stage) used the most up-to-date population and address information from the Ministry of Civil Affairs and Public Security in Beijing. Both surveys excluded the institutionalized population and together comprised a total of 424 counties (3169 communities) in 1987 and 734 (5964) in 2006.^{12,13} The final sample size was 1 579 316 in 1987 and 2 526 145 in 2006, figures representing 1.5 and 1.9 per 1000 non-institutionalized inhabitants of China, respectively. All survey respondents provided consent to participate to the Chinese government.

The survey protocol and survey questions were reviewed by leading national and international experts, and the sampling scheme was reviewed by experts from the Division of Statistics of the United Nations.^{12,13} A standardized protocol was adopted in both years to ensure the comparability of the survey

results. Two pilot studies were conducted in different provinces before each survey. Strict quality control measures were implemented at every step during each survey, from the drafting of the sampling frame through field sampling, from the filling out of the questionnaires to the checking of the returned forms, and from data input to the checking of data quality.^{12,13}

Measures

In both 1987 and 2006, trained field interviewers used a structured questionnaire to inquire about visual, hearing and speech disability, physical or intellectual disability and mental disability (Table 1). Those who responded "yes" to any of the corresponding questions and all children aged 6 years or less were referred to different designated physicians for further disability screening and confirmation. A designated physician performed medical examinations and followed diagnostic manuals to make the final diagnosis and assess the severity of the disability, if any, and to confirm its primary causes. Respondents with multiple positive answers were examined by multiple specialists (a separate doctor for each disability). The primary causes of each disability were recorded.

Statistical analyses

All data were entered into a custom-designed database and analysed using SAS Version 9.2 (SAS Institute, Cary, USA). Allowing for the complex sampling design, we constructed sample weights using standard weighting procedures.²⁶ For each cause we calculated the weighted proportion of its contribution to a particular disability, and we ranked the proportions thus obtained to determine the five leading causes of each disability. We also calculated separately a given cause's contribution to different disabilities. We used the SURVEYFREQ procedure²⁷ to estimate the weighted prevalence of disability of various types, with 95% confidence intervals (CIs), for the overall population and for different population segments.

Allowing for changes in the age structure of the population over time, we calculated the age-adjusted prevalence of disability through direct standardization using the 1990 census-derived Chinese population as the standard.²⁸ We estimated the annual change in age-standardized prevalence and its associated 95% CIs using the two-point percentage change annualized estimator (PCAE), which is based on the first and last rate only, not the intervening rates, but is robust whether the annual

change in rate is linear or not.²⁹ A PCAE-associated *P*-value < 0.05 was considered indicative of statistical significance.³⁰

Results

The 1987 and 2006 surveys were nationally representative. Compared with the 1987 study population, the 2006 study population included more adults aged 18–64 (65.7% versus 57.8%), more seniors aged 65 years or older (9.9% versus 5.7%), more males (50.7% versus 50.5%) and more urban residents (33.5% versus 15.6%).

In both surveys most disability occurred among rural residents (Table 2). Hearing and speech disabilities were predominant in both years and accounted for 44.5% of all disability in 1987 and for 38.0% in 2006 (Table 2).

Table 2 shows that in 1987 the crude number of disabled people was highest in the population aged 18–44 years. Almost 20 years later, the largest estimated number of disabled people had shifted from this group to that of people aged 65–74 years (12.9 million versus 18.8 million, respectively). Despite this, an estimated 17.0 million people aged 18–44 years had a disability in 2006 (Fig. 1). The weighted prevalence of disability increased with age in 1987, and this monotonic pattern persisted

in 2006 among people 7 years of age or older (Fig. 1).

Between 1987 and 2006, the estimated number of disabled people rose from 52.7 million to 84.6 million. This corresponds to a weighted prevalence of 4.9% in 1987 and 6.5% in 2006 (Table 3). The overall age-adjusted prevalence of disability decreased significantly, by an annual average of 0.5% over the 20-year period (Table 3). It increased significantly for males and rural residents but decreased significantly for females and urban residents and in the areas of visual disability, hearing and speech disability, intellectual disability, physical disability and mental disability (Table 3).

The 20-year upward or downward trend in the prevalence of visual, hearing and speech, physical and intellectual disability did not vary by sex or place of residence (urban versus rural) (Table 4). The prevalence of mental disability increased significantly over time among males, females and rural residents but not among urban residents (Table 4).

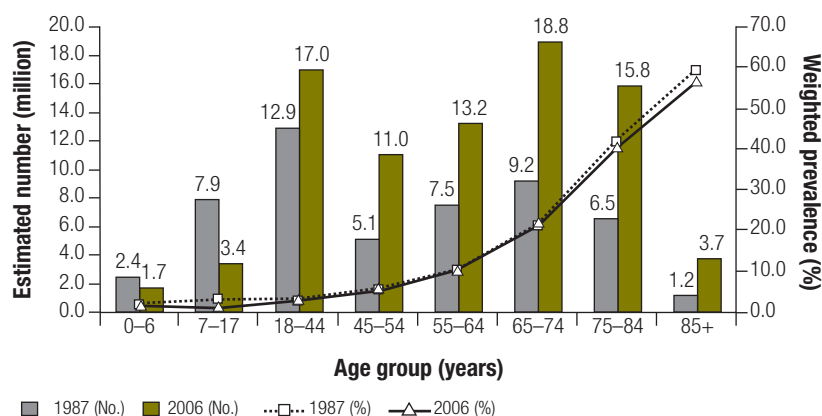
Fig. 2 shows changes in the five leading causes of disability over time. For example, some medical conditions, such as pyogenic infection and meningitis, contributed less to their associated disabilities in 2006 than in 1987. Instead, new emerging medical causes of disability became more prevalent in 2006.

Table 2. Characteristics of disabled people, by sex, residence and type of disability, China, 1987 and 2006

Characteristic	Males ^a		Females ^a	
	1987 (n = 38 701) No. (%)	2006 (n = 83 342) No. (%)	1987 (n = 38 662) No. (%)	2006 (n = 78 137) No. (%)
Age group (years)				
0–6	1 903 (4.9)	1 917 (2.3)	1 619 (4.2)	1 298 (1.7)
7–17	6 497 (16.8)	3 840 (4.6)	5 061 (13.1)	2 797 (3.6)
18–44	10 236 (26.5)	18 787 (22.5)	8 725 (22.6)	13 824 (17.7)
45–54	3 884 (10.0)	11 870 (14.2)	3 668 (9.5)	9 451 (12.1)
55–64	5 564 (14.4)	13 380 (16.1)	5 524 (14.3)	11 914 (15.3)
65–74	6 302 (16.3)	17 953 (21.5)	7 156 (18.5)	17 831 (22.8)
75–84	3 772 (9.8)	13 226 (15.9)	5 728 (14.8)	16 351 (20.9)
85+	543 (1.4)	2 369 (2.8)	1 181 (3.1)	4 671 (6.0)
Residence				
Rural	32 823 (84.8)	60 316 (72.4)	32 567 (84.2)	56 380 (72.2)
Urban	5 878 (15.2)	23 026 (27.6)	6 095 (15.8)	21 757 (27.8)
Disability type^a				
Visual	5 950 (15.4)	12 980 (15.6)	9 995 (25.9)	19 541 (25.0)
Hearing and speech	17 402 (45.0)	32 987 (39.6)	17 028 (44.0)	28 305 (36.2)
Physical	8 344 (21.6)	32 279 (38.7)	6 109 (15.8)	26 894 (34.4)
Intellectual	10 474 (27.1)	10 604 (12.7)	9 536 (24.7)	8 614 (11.0)
Mental	1 774 (4.6)	7 405 (8.9)	2 126 (5.5)	8 523 (10.9)

^a Percentages may add up to less than 100 because of rounding or to more than 100 because an individual can have several disabilities.

Fig. 1. **Estimated number of disabled people and weighted prevalence of disability, by age group, China, 1987–2006**



Osteoarthritis and workplace injury, for example, became greater contributors to physical disability, and asphyxia to intellectual disability.

Discussion

This study demonstrates that many people suffer disabilities, and their numbers will increase because of the rapid changes occurring in everyday life in China. Although the prevalence of disability in China (6.5%) is much lower than in countries such as the United States (18.7%), more people with disabilities would probably be identified in China if national surveys measured disability in terms of the activities of daily living and instrumental activities

of daily living, instead of the more narrowly defined impairments confirmed by a physician examination. The current findings could be only the tip of the iceberg; hidden beneath the surface could be millions of other lives affected by disability in China.

The weighted prevalence of disability increased over 20 years in China, as it did in the United States.⁶ This finding could be attributable primarily to the increase in the life expectancy of the disabled population over time.^{4,9,10,22} After controlling for such an ageing effect, we found that the adjusted prevalence of disability has decreased significantly over time in China. This finding is consistent with the decreasing trend observed in people aged 65 years and

over in the United States⁷ and Spain⁸ and fills a knowledge gap in the existing literature on China.

Trends in disability in different population segments have been studied widely. The present study identified an increase in the age-adjusted prevalence of disability among males and an opposite trend among females in China. Such a disparity in disability by sex is not in line with previous findings.⁶⁻⁸ After systematically reviewing published studies that assessed disability trends among Americans aged either 65 years or older or 70 years or older, Freedman et al.⁷ indicated that the evidence for such disparity by gender and race was limited and mixed. Sagardui-Villamor et al.⁸ observed a greater reduction in disability prevalence among males aged 65 and over than among females in the same age group in Spain. Brault⁶ used United States census data to report that more females (prevalence: 20.1%) than males (prevalence: 17.3%) had some form of disability in 2005, whereas the 2006 survey in China showed a weighted prevalence of disability of 6.6% in males and 6.4% in females. Using life expectancy indicators for 2004, Hashimoto et al.¹⁰ reported more years without disability among females (73.0 years) than among males (69.7 years) in Japan. This similarity between Japan and China, both of which differ from the United States, suggests that the sex disparity in disability could be the result of cultural influences.

Table 3. **People with disability, prevalence of disability (weighted and age-standardized) and average annual percentage change in prevalence, by sex, residence and disability type, China, 1987–2006**

Characteristic	People with disability (millions)		Weighted prevalence (%)		Age-standardized prevalence (%)		AAPC (95% CI)
	1987	2006	1987	2006	1987	2006	
Sex							
Male	26.3	43.6	4.9	6.6	4.9	5.0	0.3 (0.1 to 0.5)
Female	26.4	41.0	5.0	6.4	4.7	4.3	-1.5 (-1.7 to -1.3)
Residence							
Rural	44.4	63.5	4.9	7.0	4.9	5.2	1.0 (0.8 to 1.2)
Urban	8.3	21.1	5.0	5.2	4.7	3.7	-3.9 (-4.3 to -3.5)
Disability type^a							
Visual	11.0	17.2	1.0	1.3	1.0	0.8	-3.7 (-4.4 to -2.9)
Hearing and speech	23.5	32.6	2.2	2.5	2.2	1.6	-4.6 (-4.9 to -4.2)
Physical	9.6	30.3	0.9	2.3	0.9	1.7	11.2 (10.5 to 11.9)
Intellectual	13.7	10.0	1.3	0.8	1.2	0.8	-7.1 (-7.8 to -6.5)
Mental	2.6	8.4	0.2	0.6	0.3	0.5	13.3 (10.7 to 16.2)
Total	52.7	84.6	4.9	6.5	4.8	4.7	-0.5 (-0.7 to -0.4)

AAPC, average annual percentage change; CI, confidence interval.

^a The numbers of people with each disability may not add up to the total given because multiple disabilities in a single individual were counted separately.

Table 4. **Age-standardized prevalence and average annual percentage change (AAPC) in prevalence of various types of disability, by sex and residence, China, 1987–2006**

Characteristic by disability type	Age-standardized prevalence (%)		AAPC (95% CI)
	1987	2006	
Visual			
Sex			
Male	0.8	0.7	−2.2 (−3.5 to −0.9)
Female	1.2	0.9	−4.7 (−5.6 to −3.8)
Residence			
Rural	1.0	0.9	−1.7 (−2.7 to −0.7)
Urban	1.0	0.6	−8.2 (−10.2 to −6.0)
Hearing and speech			
Sex			
Male	2.3	1.8	−4.0 (−4.5 to −3.5)
Female	2.0	1.4	−5.8 (−6.3 to −5.2)
Residence			
Rural	2.2	1.8	−3.3 (−3.7 to −2.8)
Urban	2.1	1.3	−7.7 (−8.7 to −6.7)
Physical			
Sex			
Male	1.1	2.0	10.5 (9.6 to 11.3)
Female	0.8	1.5	11.0 (9.9 to 12.3)
Residence			
Rural	0.9	1.9	13.3 (12.3 to 14.3)
Urban	0.9	1.5	8.9 (6.6 to 11.3)
Intellectual			
Sex			
Male	1.3	0.9	−5.9 (−6.8 to −5.1)
Female	1.2	0.7	−8.6 (−9.6 to −7.6)
Residence			
Rural	1.2	0.9	−4.7 (−5.5 to −3.8)
Urban	1.2	0.5	−13.6 (−15.5 to −11.7)
Mental			
Sex			
Male	0.2	0.5	16.5 (12.0 to 21.7)
Female	0.3	0.6	12.2 (9.1 to 15.7)
Residence			
Rural	0.2	0.6	20.1 (15.7 to 25.1)
Urban	0.3	0.4	4.9 (−1.3 to 12.7)

CI, confidence interval.

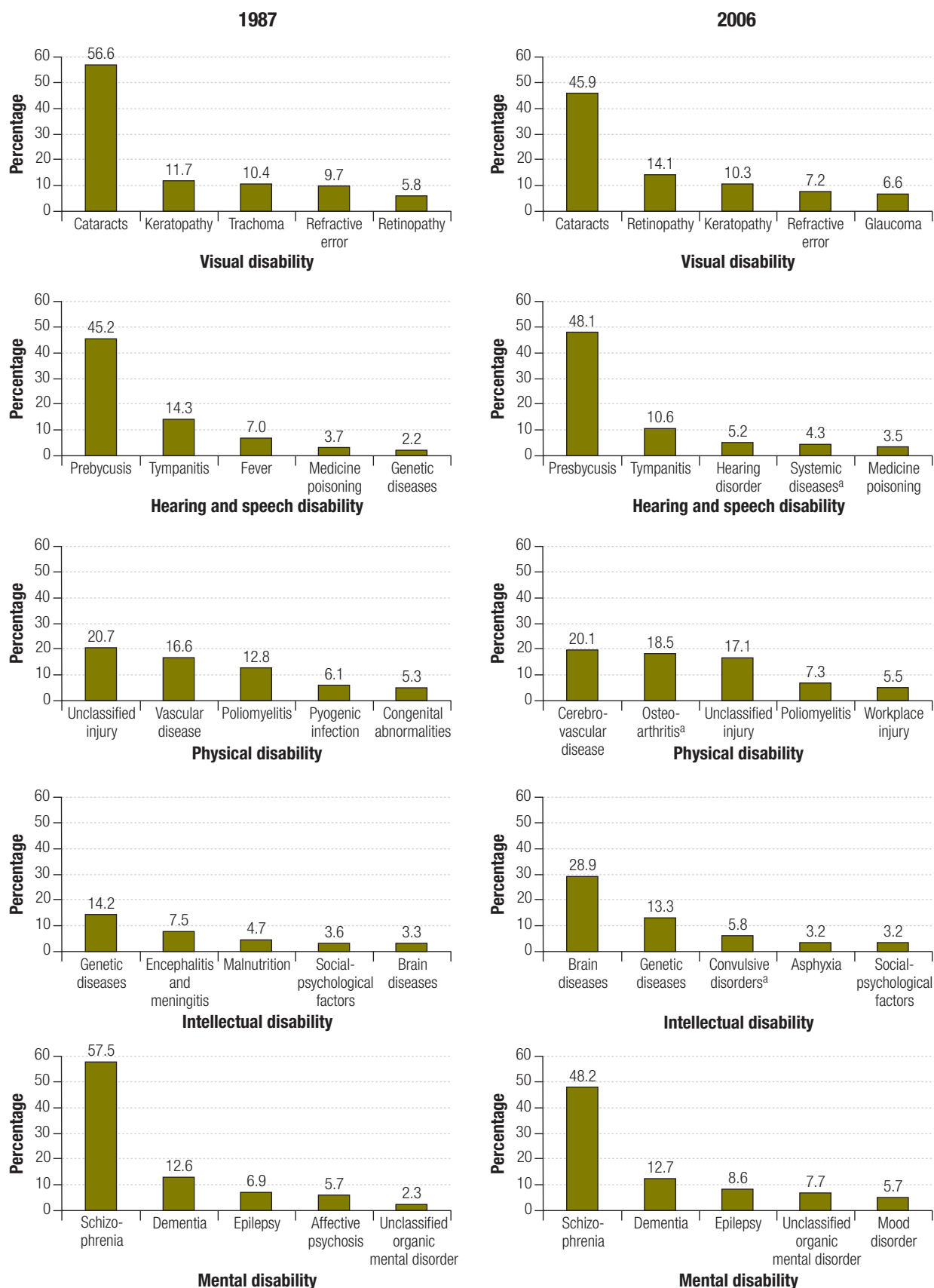
Furthermore, Whitson et al.³¹ analysed cross-sectional data from 5888 community-dwelling people and suggested that sex-based causal differences (e.g. a higher prevalence of obesity in women) might explain 12.9% of the disparity in disability between the sexes. Similarly, it is possible that the dissimilar distribution of causal factors in males and females in the present study explains the observed disparity by sex. Nevertheless, such observed disparity highlights the need for further investigation among different population segments.

This study revealed that both physical and mental disabilities have increased significantly in China over the past two decades, whereas disabilities in vision, hearing and speech as well as intellectual disabilities have decreased significantly. This finding is consistent with those of previous descriptive Chinese studies.^{15,18–21,23} In a study that examined the epidemiological distribution of physical disability, Luan and Liu²¹ reported that its prevalence varied among different regions in China. In describing the epidemiological profile of disability associated

with mental disorders in four provinces of China, Phillips et al.²³ indicated that this problem is being overlooked and suggested an urgent analysis of the situation. Like these studies, the current one enriches the literature by providing data on the magnitude of the change in the burden of different disabilities over time. Because mental disability is more prevalent among socioeconomically disadvantaged populations³² and physical disability is more prevalent among rural populations,²¹ the current findings alert experts to the importance of taking actions specifically designed for each target population to relieve the burden of disability in the community.

This study also demonstrates changes over time in the leading causes of disability in China. The fact that fewer infectious and genetic diseases were causes of disability in 2006 than in 1987 may point to improvements in public health in China during the 20-year period. For example, polio vaccination schemes³³ may have contributed to a reduction in poliomyelitis, which causes physical disability. However, the finding of increasing trends in physical disability may further imply that the success of public health efforts such as polio vaccination could be outweighed by new challenges stemming from rapid modernization, industrialization and urbanization in transitional China, such as workplace injuries and other types of injuries.³⁴ In 2004, about half a million industrial fatalities occurred in China, a figure representing one fourth of the fatalities worldwide.³⁵ Therefore, it is not surprising that workplace injuries have become a leading cause of disability. Since the 1980s, large numbers of rural residents in China have migrated to cities to look for jobs.³⁶ These migrant workers are at high risk of suffering workplace injuries that may result in disability or loss of life owing to a lack of labour force experience and to high financial stress.³⁷ Once migrant workers are disabled due to workplace injury, they are more likely to move back to their rural homes because they become socioeconomically disadvantaged.³⁶ Since increasing disability in the rural population goes hand in hand with a higher risk of physical disability,²¹ we speculate that injuries to migrant workers may be more or less attributable to the observed increase in disability in the rural population in China. However, we do not have sufficient data to confirm

Fig. 2. Leading classified causes of each type of disability and corresponding weighted proportion, China, 1987 and 2006



^a New classified causes introduced into the 2006 survey.

this speculation. Future research may help to determine whether workplace injuries have a greater impact on the rural than on the urban population. Nevertheless, the changes in causality found in this study underline the importance of continuing public-health efforts and developing specific programmes to eliminate various causes of disability.

The reported time trends in disability and the epidemiological transition to different new causal factors for various disabilities are expected to occur in settings in transition where health-care system reform, rapid economic growth and population ageing are taking place, as they are in China. The current findings may trigger actions to improve prevention and treatment efforts worldwide, especially in developing countries in transition. Furthermore, the findings point to the need to combat emerging challenges in addition to securing the success of population-wide measures such as polio vaccination. For example, occupational disability in China may be reduced through sustained commitment and initiatives to improve workplace safety within a framework of primary prevention (e.g. job training and safety education), secondary prevention (e.g. workplace hazard identification and prompt emergency response) and tertiary prevention (e.g. pharmacological treatment to delay complications).

The definition of disability and its operational measurement vary greatly among studies.^{7-10,23,24} In studies that rely on self-reported disability, uncontrolled factors such as different levels of participation in disability education and intervention programmes may influence reporting behaviour. Because the current study used medical confirmation instead of self-reporting, its findings are probably robust against this possibility. Moreover, this study was based on two

representative nationwide population-based surveys with large sample sizes and standardized quality control measures, resulting in reliable prevalence estimates with small sampling errors.^{2,13} Although the 1987 survey used the *International classification of impairments, disabilities, and handicaps*³⁸ and the 2006 survey used the *International classification of functioning, disability and health*³⁹ to classify disability, both surveys employed the Chinese word *canji*,^{12,13} meaning both handicap³⁸ and disability,³⁹ which is consistent with the definition used in this study. A detailed comparison of the methods used in these two surveys is available elsewhere.²²

Many factors could have contributed to the observed changes in the prevalence of disability, including a reduction in risk factors and changes in the availability of social security programmes among different populations, since such programmes provide people with the opportunity to get appropriate treatment and avoid disabling outcomes.⁴⁰ For example, the fact that fewer rural than urban residents are covered by social security programmes because of the *hukou* (population registration) system^{4,36} may have resulted in the urban-rural disparity in the prevalence of disability observed in this study. However, the use of cross-sectional data limited our ability to investigate the possible underlying causes of the observed trends. Survey data included extensive demographic information but lacked details on exposure, such as access to medical care. Thus, to control for exposure instead of person-time we used population-level exposure, a somewhat more robust approach given that dramatic changes have taken place across the entire nation. The significant change

in the overall prevalence of disability in China may therefore reflect the social, economic and environmental changes taking place in the country.

Conclusion

Although overall prevalence has dropped, the absolute number of disabled people continues to increase in China. There are disparities in rates of disability among certain population segments and new causes of disability are emerging. Thus, the health-care system, the community and individuals themselves are faced with an increased burden of disability and new challenges. Sustained efforts should be made to improve the prevention and treatment of disabilities in China and throughout the world. ■

Acknowledgements

We thank the provincial and municipal federations of disabled people for their support in data collection and management, and Iris Chi and Marilyn Flynn for their helpful comments and assistance.

Funding: Support for this study was obtained from: key National Project (973) of Study on the Mechanisms of Interaction between Environment and Genetics of Birth Defects in China (No. 2007CB5119001); key State funds for social science project (Research on Measuring Disability Prevention in China, No. 09&ZD072); National Baby Health Promotion Programme (No. FP2000NO13); Education Ministry Key Programme (No. 02185); National Yang Zi Scholar Programme, and projects 211 and 985 of Peking University (No. 20020903).

Competing interests: None declared.

ملخص

وهما يوازيان انتشارين موزونين قدرهما 4.9% و 6.5% وانخفض انتشار العجز المصحح بالعمر بمتوسط 0.5% سنويا (المتوسط السنوي للتغير في النسبة المئوية: -0.5%؛ فاصلة الثقة 95%: -0.7 إلى -0.4) خلال 1987-2006. إلا أنه زاد بمتوسط 0.3% (المتوسط السنوي للتغير في النسبة المئوية: 0.3%؛ فاصلة الثقة 95%: 0.1 إلى 0.5) سنويا في الذكور وبمتوسط 1.0% (المتوسط السنوي للتغير في النسبة المئوية: 1.0%؛ فاصلة الثقة 95%: 0.8 إلى 1.2) سنويا بين سكان الريف، في حين انخفض بين النساء بمتوسط سنوي قدره 1.5% (المتوسط السنوي للتغير في النسبة المئوية: 1.5%؛ فاصلة الثقة 95%: -1.7 إلى -1.3)،

اتجاهات انتشار العجز في الصين خلال عشرين سنة الغرض تقييم التغيرات في انتشار العجز المصحح وفقاً للعمر في الفترة الانتقالية للصين من عام 1987 حتى 2006. الطريقة استخدمت المعطيات المتحصل عليها من مسحين وطنيين ممثلين أجرياً في عامي 1987 و 2006 لحساب معدلات انتشار العجز المصحح بالعمر عن طريق تطبيق أوزان عينه ملائمة والتصحيح المباشر لتوزيع عمر سكان الصين في عام 1990. وجرى تقييم هذه الاتجاهات من حيث متوسط نسبة التغير السنوي. الموجودات في عام 1987، بلغ العدد التقديري للعاجزين في الصين 52.7 مليون شخص، وفي عام 2006 بلغ 84.6 مليون شخص،

فاصلة 13.3٪ (المتوسط السنوي للتغير في النسبة المئوية: 13.3٪؛ فاصلة الثقة 95٪: 10.7 إلى 16.2). الاستنتاج في الصين، انخفض معدل الانتشار المصحح للعجز منذ 1987، على نحو غير ثابت وذلك اعتماداً على نوع العجز. وتستدعي هذه النتائج مواصلة الجهود الخاصة المبذولة لمنع العجز في الصين.

وانخفاض بين سكان الحضر بمتوسط سنوي قدره 3.9٪ (المتوسط السنوي للتغير في النسبة المئوية: -3.9٪؛ فاصلة الثقة 95٪: -4.3 إلى -3.5). وبالرغم من اتجاهات الانخفاض الملحوظة في العجز السمعي، والكلامي، والفكري والبصري، فإن معدلاً الانتشار السنوي المصحح بالعمر للعجز البدني والعجز النفسي قد ازداداً بالترتيب بمتوسط 11.2٪ (المتوسط السنوي للتغير في النسبة المئوية: 11.2٪؛ فاصلة الثقة 95٪: 10.5 إلى 11.9) ومتوسط

摘要

中国残疾患病率二十年趋势

目的 旨在评估从1987到2006年中国过渡期间年龄调整残疾患病率的变化。

方法 利用1987和2006年进行的全国代表性调查中的数据来计算年龄调整残疾患病率，计算过程中运用了适当的抽样权重并直接对数据进行了调整以适应1990年中国人口的年龄分布。依据平均年百分比变化评估了变化趋势。

结果 1987和2006年中国残疾人的预计数量分别为5270万和8460万，对应的加权患病率分别为4.9%和6.5%。1987到2006年间，年龄调整残疾患病率每年平均下降0.5%（平均年百分比变化：0.5%；95%可信区间：0.7-0.4）。然而，此比例在男性群体中每年平均增加0.3%（平均年百分比变化：0.3%；95%可信区间：0.1-0.5）并且此比例在农村居民中每年平均增加1.0%（平均年百分比变

化：1.0%；95%可信区间：0.8-1.2），而在女性群体和城市居民中，此比例每年分别平均下降1.5%（平均年百分比变化：1.5%；95%可信区间：1.7-1.3）和3.9%（平均年百分比变化：3.9%；95%可信区间：4.3-3.5）。尽管听力残疾和语言障碍、智力障碍和视觉残疾呈明显下降趋势，肢体残疾和精神障碍的年龄调整患病率仍以平均每年11.2%（平均年百分比变化：11.2%；95%可信区间：10.5-11.9）和13.3%（平均年百分比变化：13.3%；95%可信区间：10.7-16.2）的比例增加。

结论 1987年以来中国的年龄调整残疾患病率总体已经下降，然而因残疾类别不同得出的结果也不一致。研究结果呼吁仍需进一步努力以预防中国的残疾。

Résumé

Des tendances de vingt ans dans la prévalence de l'invalidité en Chine

Objectif Evaluer les changements dans la prévalence de l'invalidité en fonction de l'âge dans la Chine en transition de 1987 à 2006.

Méthode Des données provenant d'études représentatives sur le plan national menées en 1987 et en 2006 ont été utilisées pour calculer le taux de prévalence de l'invalidité en fonction de l'âge, en appliquant des échantillons appropriés et en ajustant directement la répartition de l'âge de la population chinoise en 1990. Les tendances ont été évaluées en termes de modification du pourcentage annuel moyen.

Résultats On a estimé à respectivement 52,7 millions et 84,6 millions le nombre de personnes invalides en Chine en 1987 et en 2006, ce qui correspond à une prévalence pondérée de 4,9% et de 6,5%. La prévalence de l'invalidité en fonction de l'âge a diminué d'en moyenne 0,5% par an (modification du pourcentage annuel moyen, MPAM: 0,5%; intervalle de confiance à 95%, IC: -0,7 à -0,4) entre 1987 et 2006. Il a toutefois augmenté d'en moyenne 0,3% (MPAM: 0,3%; IC 95%: 0,1 à 0,5)

par an chez les hommes et d'en moyenne 1% (IC 95%: 0,8 à 1,2) par an parmi les résidents ruraux, alors qu'il présentait, parmi les femmes une diminution annuelle moyenne de 1,5% (MPAM: 1,5%; IC 95%: -1,7 à -1,3) et parmi les résidents urbains, une diminution annuelle moyenne de 3,9% (MPAM: -4,3 à -3,5). En dépit de tendances déclinantes significatives pour l'audition et la parole et pour les incapacités intellectuelles et visuelles, la prévalence annuelle en fonction de l'âge des invalidités physiques et mentales a augmenté d'en moyenne 11,2% (MPAM: 11,2%; IC 95%: 10,5 à 11,9) et 13,3% (MPAM: 13,3%; IC 95%: 10,7 à 16,2), respectivement.

Conclusion En Chine, la prévalence de l'invalidité en fonction de l'âge a décliné depuis 1987, avec des incohérences en fonction du type d'invalidité. Ces conclusions invitent à poursuivre des efforts ciblés en vue de prévenir les invalidités en Chine.

Резюме

Тенденции в области распространенности инвалидности в Китае за 20-летний период

Цель Оценить динамику показателя распространенности инвалидности, скорректированного с учетом возраста, в Китае в переходный период, с 1987 по 2006 год.

Методы Для расчета коэффициентов распространенности инвалидности, скорректированных с учетом возраста с применением соответствующих весовых коэффициентов и непосредственной корректировкой по возрастному распределению населения Китая 1990 года, использовались данные национально репрезентативных обследований, проведенных в 1987 и 2006 годах. Оценивались тенденции среднегодовых процентных изменений.

Результаты По оценкам, численность инвалидов в Китае в 1987 и 2006 годах составляла, соответственно, 52,7 и 84,6 млн чел., что корреспондировало со взвешенными коэффициентами распространенности 4,9 и 6,5%. В течение 1987–2006 годов распространенность инвалидности, скорректированная с учетом возраста, снижалась в среднем на 0,5% в год (среднегодовое процентное изменение, СППИ: -0,5%; 95% доверительный интервал, ДИ: от -0,7 до -0,4). Вместе с тем она возрастала в среднем на 0,3% (СППИ: 0,3%; 95% ДИ: от 0,1 до 0,5) в году у мужчин и в среднем на 1,0% (СППИ: 1,0%; 95% ДИ: от 0,8 до 1,2) в году у сельских жителей, тогда как среди женщин наблюдалось среднегодовое

снижение на 1,5% (СГПИ: -1,5%; 95% ДИ: от -1,7 до -1,3), а среди городских жителей – среднегодовое снижение на 3,9% (СГПИ: -3,9%; 95% ДИ: от -4,3 до -3,5). Несмотря на значительные понижательные тенденции в численности инвалидов с дефектами слуха, зрения и нарушением умственных способностей, ежегодная распространенность инвалидности вследствие соматических и психических заболеваний, скорректированная с учетом возраста, выросла в среднем на 11,2 (СГПИ: 11,2; 95%

ДИ: от 10,5 до 11,9) и 13,3% (СГПИ: 13,3%; 95% ДИ: от 10,7 до 16,2). **Вывод** В Китае с 1987 года распространенность инвалидности, скорректированная с учетом возраста, в целом снизилась, хотя в зависимости от типа инвалидности наблюдались противоречивые тенденции. В свете этих результатов необходимы последовательные и целенаправленные усилия по предупреждению инвалидности в Китае.

Resumen

Tendencias de la prevalencia de discapacidad en China a lo largo de veinte años

Objetivo Evaluar los cambios en la prevalencia de discapacidad ajustada por edad en la China de la transición desde 1987 hasta 2006.

Métodos Se utilizaron datos de sondeos representativos a nivel nacional realizados en 1987 y 2006 para calcular las tasas de prevalencia de discapacidad ajustada por edad mediante la aplicación de los tamaños de muestra adecuados y mediante el ajuste directo de la distribución por edades de la población china en 1990. Las tendencias se evaluaron en función del porcentaje promedio anual de cambio.

Hallazgos El número estimado de personas discapacitadas en China en 1987 y 2006 era de 52,7 y 84,6 millones, respectivamente, lo que a su vez se corresponde con una prevalencia ponderada del 4,9% y del 6,5%. En promedio, la prevalencia de discapacidad ajustada por edad se redujo en un 0,5% al año (porcentaje promedio anual de cambio, PPAC: -0,5%; intervalo de confianza del 95%, IC: de -0,7 a -0,4) de 1987 a 2006. No obstante, en promedio ha presentado un incremento del 0,3% (PPAC: 0,3%; IC del 95%: de 0,1 a 0,5) al año en varones y el promedio ha sido

del 1,0% (PPAC: 1,0%; IC del 95%: de 0,8 a 1,2) al año en residentes en áreas rurales, mientras que en mujeres se observó una reducción anual media del 1,5% (PPAC: -1,5%; CI del 95%: de -1,7 a -1,3) y en residentes en áreas urbanas la reducción anual media observada fue del 3,9% (PPAC: -3,9%; CI del 95%: de -4,3 a -3,5). A pesar de que las tendencias muestran un descenso significativo de las discapacidades auditivas, del habla, intelectuales y visuales, la prevalencia de discapacidad anual ajustada por edad de las discapacidades físicas y mentales aumentó, en promedio, el 11,2% (PPAC: 11,2%; IC del 95%: de 10,5 a 11,9) y 13,3% (PPAC: 13,3%; IC del 95%: de 10,7 a 16,2), respectivamente.

Conclusión En China, la prevalencia de discapacidad ajustada por edad ha disminuido desde 1987, si bien se encuentran ciertas contradicciones entre los tipos de discapacidad. Estos resultados destacan la necesidad de contar con iniciativas continuas y concretas para prevenir las discapacidades en China.

References

- Lubitz J, Beebe J, Baker C. Longevity and Medicare expenditures. *N Engl J Med* 1995;332:999–1003. doi:10.1056/NEJM199504133321506 PMID:7885430
- World report on disability [Internet]. Geneva: World Health Organization; 2011. Available from: http://www.who.int/disabilities/world_report/en/index.html [accessed 8 March 2011].
- Disability and health state chartbook, 2006: profiles of health for adults with disabilities. Atlanta: Centers for Disease Control and Prevention; 2006.
- Peng X, Song S, Sullivan S, Qiu J, Wang W. Ageing, the urban-rural gap and disability trends: 19 years of experience in China - 1987 to 2006. *PLoS ONE* 2010;5:e12129. doi:10.1371/journal.pone.0012129 PMID:20730089
- Lubitz J, Cai L, Kramarow E, Lentzner H. Health, life expectancy, and health care spending among the elderly. *N Engl J Med* 2003;349:1048–55. doi:10.1056/NEJMs020614 PMID:12968089
- Brault M. *Americans with disabilities: 2005, current population reports*. Washington: US Census Bureau; 2008.
- Freedman VA, Martin LG, Schoeni RF. Recent trends in disability and functioning among older adults in the United States: a systematic review. *JAMA* 2002;288:3137–46. doi:10.1001/jama.288.24.3137 PMID:12495394
- Sagardui-Villamor J, Guallar-Castillón P, García-Ferruelo M, Banegas JR, Rodríguez-Artalejo F. Trends in disability and disability-free life expectancy among elderly people in Spain: 1986–1999. *J Gerontol A Biol Sci Med Sci* 2005;60:1028–34. doi:10.1093/geron/60.8.1028 PMID:16127108
- Perenboom RJ, Van Herten LM, Boshuizen HC, Van Den Bos GA. Trends in disability-free life expectancy. *Disabil Rehabil* 2004;26:377–86. doi:10.1080/0963828032000174098 PMID:15204474
- Hashimoto S, Kawado M, Seko R, Murakami Y, Hayashi M, Kato M et al. Trends in disability-free life expectancy in Japan, 1995–2004. *J Epidemiol* 2010;20:308–12. doi:10.2188/jea.JE20090190 PMID:20530916
- Crimmins EM. Trends in the health of the elderly. *Annu Rev Public Health* 2004;25:79–98. doi:10.1146/annurev.publhealth.25.102802.124401 PMID:15015913
- Communiqué on major statistics of China national sample survey on disability. Beijing: Leading Group of the Second China National Sample Survey on Disability & National Bureau of Statistics of the People's Republic of China; 1987.
- Communiqué on major statistics of the second China national sample survey on disability. Beijing: Leading Group of the Second China National Sample Survey on Disability & National Bureau of Statistics of the People's Republic of China; 2006.
- Li A, Li L. Study on hearing and speech disability in China. *Chin J Rehabil Med*. 1994;10:96.Chinese.
- Li A, Li L, Qian Y. Analysis of factors causing visual disability and its preventive measures in China. *Zhonghua Yu Fang Yi Xue Za Zhi* 1995;29:225–7. PMID:7587664
- Li AL, Li LM, Qian YP. Preliminary analysis of factors causing mental retardation in China. *Zhonghua Yu Fang Yi Xue Za Zhi* 1994;28:284–6. PMID:7842893
- Li A, Qian Y. Study on causes of functional disability and prevention in China. *Chin J Publ Health* 1995;12:348–9. Chinese.
- Ming G, Jixiang M. Demography of people with disabilities in China. *Int J Rehabil Res* 1993;16:299–301. doi:10.1097/00004356-199312000-00005 PMID:8175232
- Zheng XY, Zhang L, Chen G, Pei LJ, Song XM. Prevalence of visual, hearing, speech, physical, intellectual and mental disabilities in China, 2006. *Zhonghua Liu Xing Bing Xue Za Zhi* 2008;29:634–8. Chinese. PMID:19031749
- Tian B, Zhang Y, Qiu Z. Comparison and analysis of data obtained in two national sampling surveys of disability. *Chin J Spec Edu* 2007;8:54–6. Chinese.
- Luan C, Liu M. Comparison of prevalence of physical disabilities in year 2006 and 1987, in China. *Zhonghua Liu Xing Bing Xue Za Zhi* 2008;29:639–42. PMID:19031750
- Liu J, Chen G, Song X, Chi I, Zheng X. Trends in disability-free life expectancy among Chinese older adults. *J Aging Health* 2009;21:266–85.

- doi:10.1177/0898264308328978 PMID:19104033
23. Phillips MR, Zhang J, Shi Q, Song Z, Ding Z, Pang S et al. Prevalence, treatment, and associated disability of mental disorders in four provinces in China during 2001–05: an epidemiological survey. *Lancet* 2009;373:2041–53. doi:10.1016/S0140-6736(09)60660-7 PMID:19524780
 24. Chou KL, Leung JC. Disability trends in Hong Kong community-dwelling Chinese older adults: 1996, 2000, and 2004. *J Aging Health* 2008;20:385–404. doi:10.1177/0898264308315852 PMID:18378722
 25. Access to rehabilitation for the 600 million people living with disabilities [Internet]. Geneva: World Health Organization; 2003. Available from: <http://www.who.int/mediacentre/notes/2003/np24/en> [accessed 5 July 2011].
 26. Korn E, Graubard B. *Analysis of health surveys*. New York: Wiley; 1999.
 27. SAS statistical software, version 9.2. Cary: SAS Institute; 2002.
 28. China, State Population Census Office. *National Bureau of Statistics population statistics yearbook: China 1990 census data*. Beijing: China Statistics Press; 1993.
 29. Fay MP, Tiwari RC, Feuer EJ, Zou Z. Estimating average annual percent change for disease rates without assuming constant change. *Biometrics* 2006;62:847–54. doi:10.1111/j.1541-0420.2006.00528.x PMID:16984328
 30. Agresti A. *An introduction to categorical data analysis*. New York: Wiley; 1996.
 31. Whitson HE, Landerman LR, Newman AB, Fried LP, Pieper CF, Cohen HJ. Chronic medical conditions and the sex-based disparity in disability: the Cardiovascular Health Study. *J Gerontol A Biol Sci Med Sci* 2010;65A:1325–31. doi:10.1093/geron/g1q139 PMID:20675619
 32. Cantor-Graae E, Selten JP. Schizophrenia and migration: a meta-analysis and review. *Am J Psychiatry* 2005;162:12–24. doi:10.1176/appi.ajp.162.1.12 PMID:15625195
 33. Centers for Disease Control and Prevention. Progress toward poliomyelitis eradication – People's Republic of China, 1990–1996. *MMWR Wkly Rep* 1996;45:1076–9.
 34. Wang SY, Li YH, Chi GB, Xiao SY, Ozanne-Smith J, Stevenson M et al. Injury-related fatalities in China: an under-recognised public-health problem. *Lancet* 2008;372:1765–73. doi:10.1016/S0140-6736(08)61367-7 PMID:18930527
 35. Takara J. *Introductory report: decent work, safe work*. Presented at the XVIIth World Congress on Safety and Health at Work, Orlando, United States of America, 18–22 September 2005.
 36. Chan KW, Zhang L. The “hukou” system and rural-urban migration in China: processes and changes. *China Q* 1999;160:818–55. doi:10.1017/S0305741000001351 PMID:20101805
 37. Hu X, Xing HY. *Research on health status of migration workers and health policy*. Zhejiang University; 2008. Chinese.
 38. *International classification of impairments, disabilities, and handicaps*. Geneva: World Health Organization; 1980.
 39. *International classification of functioning, disability and health*. Geneva: World Health Organization; 2001.
 40. Fries JF. Reducing disability in older age. *JAMA* 2002;288:3164–6. doi:10.1001/jama.288.24.3164 PMID:12495399