ORIGINAL RESEARCH

Investigation on Common Chronic Non-Communicable Diseases and Epidemiological Characteristics of Forsaken Elders Over 60 Years Old in Rural Areas of Datong, China

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Objective: The common chronic non-communicable diseases and epidemiological characteristics of the forsaken elders over 60 in Guangling and Tianzhen were investigated and analyzed to provide reference for health resource allocation, hospital capacity establishing and health management of the forsaken elders in county-level regions.

Materials and Methods: The data of 10,331 resident elderly over 60 in Guangling and Tianzhen of Datong Civil Affairs Bureau in the management system for disabled and semi-disabled elderly was collected. The gender, age, main diagnosis and coding of diseases, common chronic non-communicable diseases, and system diseases of the respondents were retrospectively analyzed.

Results: The prevalence of the forsaken elders aged over 60 in Guangling and Tianzhen were different. Hypertension, arthritis, type 2 diabetes, hyperlipidemia and cerebral infarction are the top five common chronic non infectious diseases in Guangling, Tianzhen and the two counties. Among the top five common diseases in Guangling, Tianzhen and the two counties, arthritis or rheumatism, hypertension, diabetes or elevated blood sugar were found, which were different in the 60–65, 66–70, 71–75 and 76–80 groups, with the prevalence increasing with age. The top five diseases in Guangling, Tianzhen and the two counties were consistent, while the ranking changed slightly. The proportion of circulatory diseases, musculoskeletal diseases, connective tissue diseases and endocrine/nutritional and metabolic diseases in 60–65, 66–70 and 71–75 groups increased with age, and was much higher than that in other groups.

Conclusion: The prevalence and disease spectrum order of common chronic non-communicable diseases and systemic diseases in Guangling and Tianzhen are diverse, also in gender and age groups. As China's county-level local administrative divisions have relatively independent administrative autonomy, medical and health resources can be better configured according to the information mined, accurately maintaining and promoting residents' health. It is suggested to explore the disease management mechanism with county-level administrative divisions as database management units under the background of big data, so as to implement the interconnection and sharing of information among health-related departments in county-level regions.

Keywords: chronic non-communicable diseases, system diseases, administrative division, disease spectrum, the forsaken elders

Introduction

With the urbanization of China, many rural residents are gradually living urban life, leaving the places where their ancestors have lived for generations. However, many farmers still have not left there for various reasons, especially for the elderly over 60 years old. How to actively respond to the health issues of the elderly population remains an urgent problem to be solved. At present, the common diseases affecting human health have transformed from acute and chronic

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infectious diseases to chronic non-communicable diseases (NCD),[1,2] which has become a critical reason for poverty and return of rural residents in China.[3,4]

The World Bank estimates that primary health care (PHC) can meet up to 90% of medical needs.[5,6] Scholars around the world emphasize the significant role of strengthening primary health care in improving population health and manipulating medical costs.[7,8] If the public health service level is comprehensively strengthened, locating the NCD prevention threshold in the front, the poverty elicited by illness and the return to poverty by illness can be minimized.[9]

The composition of diseases is a crucial basis for reflecting the structures of diseases endangering the people in a certain area, which can comprehensively report the health and severity of diseases of local residents,[10,11] providing guidance for relevant departments to carry out accurate disease prevention and control. Tianzhen and Guangling counties have relatively backward economic and cultural conditions, and are far from the urban area, resulting in a higher number of elderly left behind residents in rural areas. Chronic non communicable diseases are a heavy burden on these elderly people, so it is necessary to conduct research on this situation. In this paper, the big data referring to health and medicine of the relevant departments of aging health are analyzed, so as to obtain the results of the common diseases and epidemiological characteristics of the forsaken elders over 60 years old in Guangling and Tianzhen counties, contributing to the regional health and health administrative departments for accurate application to elderly health services. This study is proposing the requirements of rural medical and health services as well as the focus of disease prevention and control, providing reference for the rational allocation of health human resources and the elevation of rural primary health care capacity, and data basis for the health management, maintenance and promotion of the forsaken elders.

Materials and Methods
Research Objects

The research objects is composed of the data of 10,331 individuals of the forsaken elders over 60 years old in the information management system for disabled and semi disabled elderly people in Guangling County and Tianzhen County of the Civil Affairs Bureau of Datong City, covering gender, age, main diagnosis, disease code and residence. The disease is diagnosed in hospitals of grade II or above, with the code formed according to ICD-10 (International Classification of Diseases, 10th Edition, ICD-10)[12.] The information management system was established by a third-party medical institution commissioned by the Civil Affairs Bureau of Datong City to conduct door-to-door household investigations on all forsaken elders over 60 years old in rural areas of Tianzhen and Guangling County. A total of 10,331 elders over 60 years old were investigated and registered.

The information management system has a very effective quality assurance mechanism: ①screening personnel are senior physicians in neurology, geriatrics, internal medicine, or general practice, who received strict screening-related training; ②Professional personnel conduct on-site screening and random sampling in the system backend; ③Check the content consistency, integrity, and logic of the completed system backend data. The data must be verified to be correct before submission; ④Utilizing the familiarity of community and community health service center staff with the characteristics of community residents, each person was responsible for conducting specific screening and statistical work on a certain population, in order to minimize the dropout rate of home-based elderly people in the community.

Research Methods

The retrospective analysis method was applied to analyze the gender, age, main diagnosis and coding of diseases, common chronic diseases, systemic diseases and residence of the subjects. Considering the large proportion of NCD, it was the only one to be studied here. The research data are analyzed between groups according to gender, age and living county, where the age groups are distributed among 60–65 years old, 66–70 years old, 71–75 years old, 76–78 years old, 81–85 years old, 86–90 years old and over 90 years old, respectively. In the analysis of the disease composition of the research object, difference is found between the total population of the two counties and each population of the two counties in terms of gender and age, so the overall situation of the two counties and their respective situations are analyzed and reported.

To facilitate the study, some of the same type of disease diagnosis names and their coding were combined, such as "lacunar infarction", "cerebral embolism" and "cerebral infarction" collectively referred to as "cerebral infarction".

Statistical Analysis

The survey data was exported to the Excel table and double checked. SPSS17.0 was applied to processing and analyzing the data, with the enumeration data described by the number of cases and percentage. Due to the fact that standardization rates only provide a basis for mutual comparison, they cannot reflect the actual level of certain things at a certain time or place, and cannot be used as a basis for the allocation of health resources. In order to better reflect the actual level of Guangling and Tianzhen counties, we have used a crude rate for statistical description. This study is descriptive without statistical analysis.

Medical Ethics

This study was approved by the Ethics Committee of Shanxi Datong university (approval number: 2018H003), Patients were consented by an informed consent process that was reviewed by the Ethics Committee of Shanxi Datong university and certify that the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki.

Results

Basic Situation of the Forsaken Elders Aged 60 Over Years Old in Guangling and Tianzhen Counties

A total of 10,331 subjects were involved, 4505 males (43.61%) and 5826 females (56.39%), ageing from 60 to 102 years old, with an average age of 70.86 years old (70.86 ± 7.02); Guangling County occupied 6311 cases, male 2675 cases (42.39%), female 3636 cases (57.61%), age ranging 60–102 years old, average age of 70.79 years old (70.79 ± 7.02); Tianzhen county occupied 4020 cases, 1830 male cases (45.52%), 2190 female cases (54.48%), age ranging 60–102 years old, the average age of 70.96 years old (70.96 ± 7.02). Most of the forsaken elders in the two counties distributed in 66–80 years old, with more women; and more the forsaken elders in Guangling County than in Tianzhen County (Figure 1).
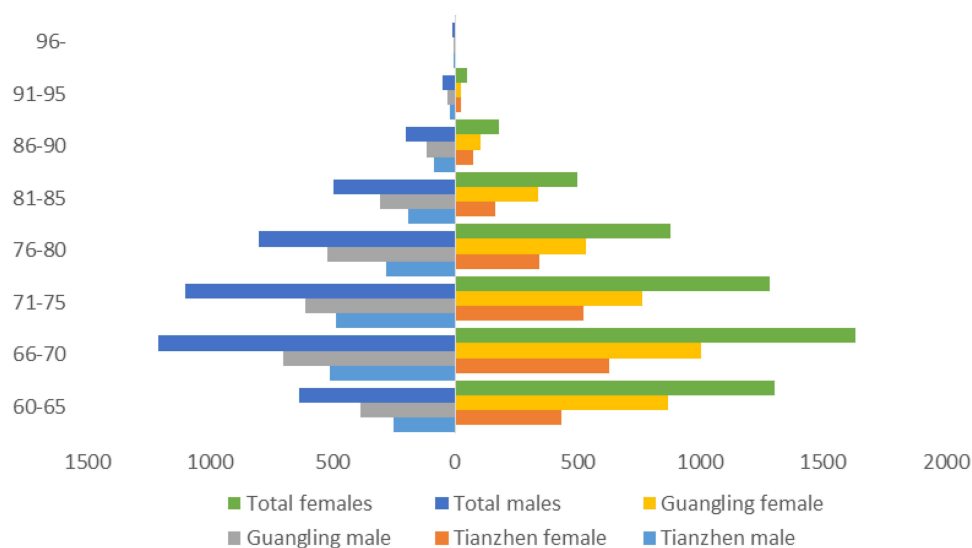

Figure 1 Population pyramid of the forsaken elders aged over 60 in Tianzhen and Guangling counties.

Table 1 Distribution of Top 10 Diseases in Guangling, Tianzhen and Two Counties, n (%)

Guangling and Tianzhen (n=10,331)		Guangling (n=4020)		Tianzhen (n=6311)	
Sequence	Cases	Sequence	Cases	Sequence	Cases
Hypertension	952 (9.21)	Hypertension	489 (12.16)	Arthritis	551 (8.73)
Arthritis	868 (8.40)	Hyperlipidemia	393 (9.78)	Hypertension	463 (7.34)
Hyperlipidemia	808 (7.82)	Type 2 diabetes	325 (8.08)	Hyperlipidemia	415 (6.58)
Type 2 diabetes	773 (7.48)	Arthritis	317 (7.89)	Type 2 diabetes	448 (7.10)
Cerebral infarction	402 (3.89)	Cerebral infarction	121 (3.01)	Cerebral infarction	293 (4.64)
Coronary heart disease	370 (3.58)	Lumbar disc protrusion	106 (2.64)	Cerebral arterial insufficiency n	281 (4.45)
Cerebral arterial insufficiency	319 (3.09)	Coronary heart disease	89 (2.21)	Coronary heart disease	281 (4.45)
Lumbar disc protrusion	288 (2.79)	Lumbago	35 (0.87)	Chronic bronchitis	221 (3.50)
Chronic bronchitis	234 (2.27)	Cerebral arterial insufficiency	26 (0.65)	Lumbago	198 (3.14)
Lumbago	233 (2.26)	Chronic bronchitis	12 (0.30)	Lumbar disc protrusion	182 (2.88)

Common Diseases Among the Forsaken Elders Aged 60 Over Years Old in Guangling, Tianzhen Counties

The top ten diseases in Guangling, Tianzhen and the two counties were the same, while exhibiting different rankings (Table 1). Among the top ten diseases in Guangling County, the number and proportion of male patients with cerebral insufficiency and chronic bronchitis were higher than those of female patients, which is consistent in eight diseases; in addition to cerebral infarction, the distribution of 9 diseases in Guangling County and Tianzhen Guangling exhibited the same results as the above (Figure 2).

In the age groups of 60–65, 66–70, 71–75 and 76–80 years old, the prevalence and proportion of hypertension, arthritis, hyperlipidemia, type 2 diabetes and cerebral infarction in the forsaken elders in Guangling, Tianzhen and two counties are relatively high. Despite the difference in the order of disease spectrum above five diseases in the three observation groups, they all seem to increase with age (Table 2).

Prevalence of Systemic Diseases Among the Forsaken Elders Aged 60 Over Years Old in Guangling, Tianzhen and Two Counties of Different Ages and Genders

The prevalence of systemic diseases among the forsaken elders in Guangling, Tianzhen and two counties is shown in Table 3, where the top 10 systemic diseases changed slightly, and the proportion of various systemic diseases in Tianzhen was higher than that in Guangling. The first five types of systemic diseases among the ares were consistent, ranking
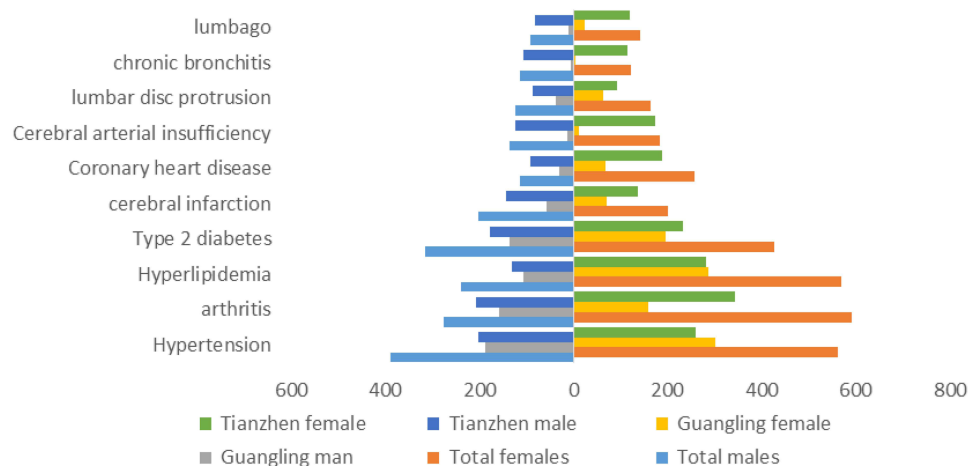

Figure 2 Sex pyramid of chronic disease among the forsaken elders aged over 60 in Guangling and Tianzhen counties.

Table 2 Age Distribution of the Top 10 Diseases in Guangling, Tianzhen and Two Counties, n (%)

County	Age	1	2	3	4	5	6	7	8	9	10
Guangling and Tianzhen	60–65 n=1940	Hypertension 191 (9.85)	Arthritis 178 (9.18)	Hyperlipidemia 178 (9.18)	Type 2 diabetes 165 (8.51)	Cerebral infarction 117 (6.03)	Coronary heart disease 67 (3.45)	Cerebral arterial insufficiency 63 (3.25)	Lumbar disc protrusion 61 (3.14)	Chronic bronchitis 52 (2.68)	Lumbago 44 (2.27)
	66–70 n=2842	Arthritis 272 (9.63)	Hyperlipidemia 272 (9.63)	Hypertension 254 (8.99)	Type 2 diabetes 222 (7.86)	Cerebral infarction 156 (5.52)	Cerebral arterial insufficiency 107 (3.79)	Chronic bronchitis 102 (3.61)	Lumbar disc protrusion 100 (3.54)	Lumbago 84 (2.97)	Coronary heart disease 76 (2.69)
	71–75 n=2381	Hypertension 238 (10.00)	Type 2 diabetes 214 (8.99)	Arthritis 209 (8.78)	Hyperlipidemia 209 (8.78)	Cerebral infarction 122 (5.12)	Cerebral arterial insufficiency 120 (5.04)	Chronic bronchitis 98 (4.12)	Lumbar disc protrusion 84 (3.53)	Coronary heart disease 72 (3.02)	Lumbago 53 (2.23)
	76–80 n=1679	Hypertension 153 (9.11)	Arthritis 113 (6.73)	Hyperlipidemia 113 (6.73)	Cerebral infarction 111 (6.61)	Type 2 diabetes 105 (6.25)	Chronic bronchitis 75 (4.47)	Cerebral arterial insufficiency 66 (3.93)	Coronary heart disease 41 (2.44)	Lumbar disc protrusion 33 (1.97)	Lumbago 31 (1.85)
	81–85 n=995	Hypertension 84 (8.44)	Arthritis 66 (6.63)	Hyperlipidemia 66 (6.63)	Type 2 diabetes 51 (5.13)	Cerebral infarction 37 (3.72)	Chronic bronchitis 33 (3.32)	Lumbar disc protrusion 32 (3.22)	Cerebral arterial insufficiency 31 (3.12)	Coronary heart disease 19 (1.91)	Lumbago 13 (1.31)
	86–90 n=379	Hypertension 29 (7.65)	Arthritis 22 (5.80)	Hyperlipidemia 22 (5.80)	Cerebral infarction 16 (4.22)	Cerebral arterial insufficiency 13 (3.43)	Type 2 diabetes 12 (3.17)	Coronary heart disease 10 (2.64)	Lumbar disc protrusion 9 (2.37)	Chronic bronchitis 7 (1.85)	Lumbago 6 (1.58)
	91- n=115	Arthritis 8 (6.96)	Hyperlipidemia 8 (6.96)	Type 2 diabetes 5 (4.35)	Hypertension 3 (2.61)	Cerebral infarction 3 (2.61)	Coronary heart disease 3 (2.61)	Chronic bronchitis 3 (2.61)	Cerebral arterial insufficiency 2 (1.74)	Lumbago 2 (1.74)	Lumbar disc protrusion 0 (0.00)

(*Continued*)

Table 2 (Continued).

County	Age	1	2	3	4	5	6	7	8	9	10
Guangling	60–65 N=685	Hyperlipidemia 109 (15.91)	Hypertension 103 (15.04)	Type 2 diabetes 71 (10.36)	Lumbar disc protrusion 24 (3.50)	Cerebral infarction 19 (2.77)	Arthritis 81 (11.82)	Lumbago 10 (1.46)	Coronary heart disease 5 (0.73)	Chronic bronchitis 1 (0.15)	Cerebral arterial insufficiency 1 (0.15)
	66–70 n=1139	Hyperlipidemia 114 (10.01)	Hypertension 108 (9.48)	Type 2 diabetes 85 (7.46)	Arthritis 75 (6.58)	Lumbar disc protrusion 31 (2.72)	Cerebral infarction 23 (2.02)	Coronary heart disease 16 (1.40)	Lumbago 10 (0.88)	Chronic bronchitis 5 (0.44)	Cerebral arterial insufficiency 1 (0.09)
	71–75 n=1009	Hypertension 125 (12.39)	Type 2 diabetes 84 (8.33)	Hyperlipidemia 83 (8.23)	Arthritis 70 (6.94)	I63.901 37 (3.67)	Lumbar disc protrusion 24 (2.38)	Coronary heart disease 22 (2.18)	Cerebral arterial insufficiency 7 (0.69)	Lumbago 4 (0.40)	Chronic bronchitis 2 (0.20)
	76–80 n=622	Hypertension 94 (15.11)	Hyperlipidemia 55 (8.84)	Type 2 diabetes 51 (8.20)	Arthritis 47 (7.56)	Coronary heart disease 29 (4.66)	Cerebral infarction 24 (3.86)	Lumbar disc protrusion 19 (3.05)	Cerebral arterial insufficiency 5 (0.80)	Lumbago 4 (0.64)	Chronic bronchitis 2 (0.32)
	81–85 n=355	Hypertension 44 (12.39)	Type 2 diabetes 23 (6.48)	Hyperlipidemia 15 (4.23)	Coronary heart disease 15 (4.23)	Arthritis 14 (3.94)	Cerebral infarction 13 (3.66)	Lumbar disc protrusion 8 (2.25)	Cerebral arterial insufficiency 6 (1.69)	Lumbago 3 (0.85)	Chronic bronchitis 1 (0.28)
	86–90 n=159	Coronary heart disease 15 (9.43)	Hyperlipidemia 14 (8.81)	Hypertension 13 (8.18)	Cerebral infarction 13 (8.18)	Arthritis 13 (8.18)	Lumbar disc protrusion 8 (5.03)	Type 2 diabetes 6 (3.77)	Cerebral arterial insufficiency 6 (3.77)	Lumbago 3 (1.89)	Chronic bronchitis 1 (0.63)
	91- n=51	Arthritis 17 (33.33)	Cerebral infarction 4 (7.84)	Type 2 diabetes 3 (5.88)	Hyperlipidemia 3 (5.88)	Hypertension 2 (3.92)	Lumbar disc protrusion 2 (3.92)	Coronary heart disease 1 (1.96)	Cerebral arterial insufficiency 0 (0.00)	Lumbago 0 (0.00)	Chronic bronchitis 0 (0.00)

Tianzhen	60–65 n=1255	Hyperlipidemia 122 (9.72)	Arthritis 110 (8.76)	Type 2 diabetes 92 (7.33)	Hypertension 83 (6.61)	Cerebral arterial insufficiency 60 (4.78)	Coronary heart disease 47 (3.75)	Cerebral infarction 44 (3.51)	Lumbar disc protrusion 43 (3.43)	Chronic bronchitis 37 (2.95)	Lumbago 34 (2.71)
	66–70 n=1703	Arthritis 176 (10.33)	Hyperlipidemia 152 (8.93)	Type 2 diabetes 137 (8.04)	Hypertension 146 (8.57)	Cerebral arterial insufficiency 99 (5.81)	Coronary heart disease 86 (5.05)	Cerebral infarction 84 (4.93)	Chronic bronchitis 80 (4.70)	Lumbago 71 (4.17)	Lumbar disc protrusion 45 (2.64)
	71–75 n=1372	Arthritis 133 (9.69)	Type 2 diabetes 130 (9.48)	Hypertension 113 (8.24)	Cerebral infarction 83 (6.05)	Hyperlipidemia 79 (5.76)	Cerebral arterial insufficiency 77 (5.61)	Coronary heart disease 76 (5.54)	Lumbar disc protrusion 50 (3.64)	Chronic bronchitis 50 (3.64)	Lumbago 49 (3.57)
	76–80 n=1057	Arthritis 73 (6.91)	Hypertension 59 (5.58)	Type 2 diabetes 54 (5.11)	Coronary heart disease 46 (4.35)	Cerebral infarction 42 (3.97)	Hyperlipidemia 32 (3.03)	Chronic bronchitis 29 (2.74)	Cerebral arterial insufficiency 28 (2.65)	Lumbago 27 (2.55)	Lumbar disc protrusion 22 (2.08)
	81–85 n=640	Arthritis 43 (6.72)	Hypertension 40 (6.25)	Type 2 diabetes 28 (4.38)	Cerebral arterial insufficiency 26 (4.06)	Coronary heart disease 18 (2.81)	Cerebral infarction 18 (2.81)	Chronic bronchitis 17 (2.66)	Hyperlipidemia 17 (2.66)	Lumbar disc protrusion 11 (1.72)	Lumbago 10 (1.56)
	86–90 n=220	Hypertension 16 (7.27)	Arthritis 12 (5.45)	Cerebral infarction 9 (4.09)	Cerebral arterial insufficiency 8 (3.64)	Lumbar disc protrusion 8 (3.64)	Chronic bronchitis 7 (3.18)	Type 2 diabetes 6 (2.73)	Coronary heart disease 6 (2.73)	Hyperlipidemia 6 (2.73)	Lumbago 5 (2.27)
	91- n=64	Arthritis 4 (6.25)	Lumbar disc protrusion 3 (4.69)	Hyperlipidemia 2 (3.13)	Lumbago 2 (3.13)	Coronary heart disease 2 (3.13)	Chronic bronchitis 2 (3.13)	Cerebral infarction 1 (1.56)	Hypertension 1 (1.56)	Type 2 diabetes 1 (1.56)	Cerebral arterial insufficiency 0 (0.00)

Table 3 Distribution of Top 10 Systemic Diseases in Guangling, Tianzhen and Two Counties, n (%)

Guangling and Tianzhen (n=10,331)		Guangling (n=4020)		Tianzhen (n=6311)	
Sequence	**Cases**	**Sequence**	**Cases**	**Sequence**	**Cases**
Circulatory diseases	2155 (20.86)	Circulatory diseases	751 (18.68)	Musculoskeletal system and connective tissue diseases	1585 (25.11)
Musculoskeletal system and connective tissue diseases	1964 (19.01)	Digestive system diseases	669 (16.64)	Circulatory diseases	1404 (22.25)
Digestive system diseases	1363 (13.19)	Musculoskeletal system and connective tissue diseases	379 (9.43)	Digestive system diseases	694 (11.00)
Endocrine, nutritional and metabolic diseases	978 (9.47)	Endocrine, nutritional and metabolic diseases	327 (8.13)	Endocrine, nutritional and metabolic diseases	651 (10.32)
Symptoms, signs and clinical and laboratory abnormalities that cannot be classified elsewhere	554 (5.36)	Symptoms, signs and clinical and laboratory abnormalities that cannot be classified elsewhere	147 (3.66)	Symptoms, signs and clinical and laboratory abnormalities that cannot be classified elsewhere	407 (6.45)
Respiratory diseases	462 (4.47)	Urogenital diseases	140 (3.48)	Respiratory diseases	398 (6.31)
Urogenital diseases	322 (3.12)	Respiratory diseases	64 (1.59)	Urogenital diseases	182 (2.88)
Eye and appendage diseases	128 (1.24)	Eye and appendage diseases	22 (0.55)	Eye and appendage diseases	128 (2.03)
Mental illness	103 (1.00)	Mental illness	14 (0.35)	Mental illness	89 (1.41)
Mental and behavioral disorders	74 (0.72)	Mental and behavioral disorders	14 (0.35)	Mental and behavioral disorders	60 (0.95)

differently and accounting for the majority of each study group (56.54% in Guangling, 75.12% in Tianzhen and 67.89% in the two counties).

There display gender differences in systemic diseases in Guangling, Tianzhen and the two counties. As female patients exhibit higher number and proportion than male patients, especially in the proportion of female circulatory diseases (Figure 3).
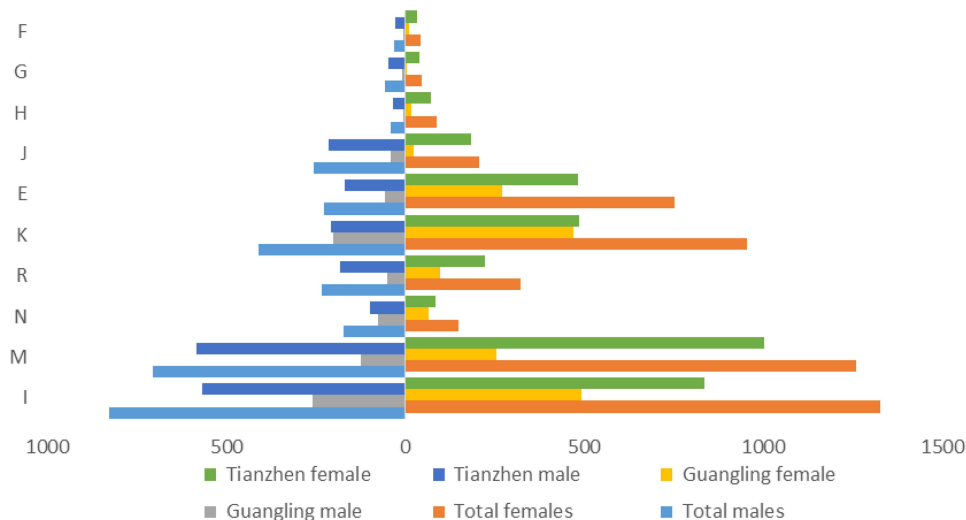

Figure 3 Gender distribution of systemic diseases over 60 years old in Guangling and Tianzhen counties.
Notes: I, diseases of circulatory system; M, musculoskeletal system and connective tissue diseases; K, digestive system diseases; N, urogenital diseases; R, symptoms/signs and clinical and laboratory abnormalities that cannot be classified elsewhere; E, endocrine/nutritional and metabolic diseases; J, respiratory diseases; H, eye and appendage diseases; G, mental disorders f mental and behavioral disorders.
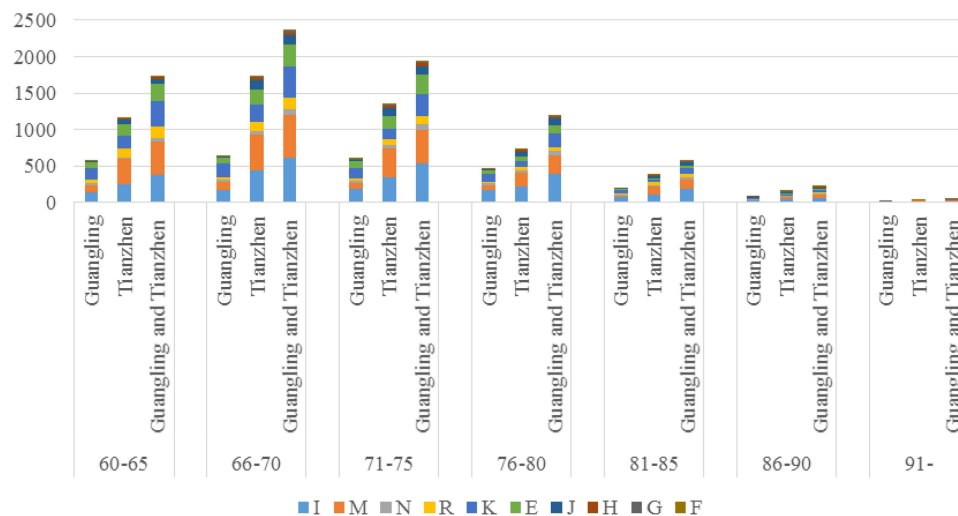
Figure 4 Stacked bar diagram of chronic diseases over 60 years old in Guangling and Tianzhen counties.
Notes: I, diseases of circulatory system; M, musculoskeletal system and connective tissue diseases; K, digestive system diseases; N, urogenital diseases; R, symptoms/signs and clinical and laboratory abnormalities that cannot be classified elsewhere; E, endocrine/nutritional and metabolic diseases; J, respiratory diseases; H, eye and appendage diseases; G, mental disorders f mental and behavioral disorders.

In the 60–65, 66–70, and 71–75 age groups, circulatory system diseases, musculoskeletal system, connective tissue diseases and endocrine/nutritional and metabolic diseases increased in line with age; the proportion of circulatory diseases, musculoskeletal systems, connective tissue diseases and endocrine/nutritional and metabolic diseases in the 60–65, 66–70, 71–75 and 76–80 age groups exhibit higher than those in other age groups (Figure 4).

Discussion

In the present study, Guangling and Tianzhen Counties were found to have inconsistence in chronic disease prevalence, disease spectrum, and various disease types among the two counties and their total observation subjects, which are distinguished from the prevalence rate of chronic diseases and the disease spectrum reported globally and nationally. We found that the total prevalence of Guangling and Tianzhen counties were 49.43%, 50.07% and 47.90%, respectively, which is lower than the prevalence of chronic diseases in the elderly in other parts of the country.[13–15] This phenomenon may be related to the fact that the object of this investigation was diagnosed previously in secondary and higher hospitals, without carrying out objective diagnosis, resulting in the consistence between the prevalence of the respondents with the actual situation, causing a certain bias in the results of the study. The prevalence shows higher in comparison to urban and rural residents in other provinces and cities, possibly due to the different data sources of observation population.[16]

The top 10 diseases in Guangling, Tianzhen and the two counties were not in the same order, while hypertension, arthritis, type 2 diabetes and hyperlipidemia were located in the top five of the three disease spectrums. The top five common diseases among them have the same type while different sequence, which are close to the results of a domestic research while quite different from the national survey results (hypertension, diabetes, cerebrovascular disease, ischemic heart disease and chronic lung disease),[11,17] as well as with the results of Jilin Province.[14,18] Consideration may point to regional and economic differences that result in quite difference in disease spectrum, and the lifestyle with high salt, high carbohydrate, high fat diet, and bad way make hypertension, diabetes and hyperlipidemia the common diseases.[19] The top five systematic diseases in the three research groups were consistent, with slight variation in the order, suggesting that the diagnosis, treatment and nursing of these systematic diseases the focus of medical and health work in Guangling and Tianzhen counties, especially in Tianzhen County, where the proportion of various system diseases in the elderly population is higher than that in Guangling County, requiring more attention to the above system diseases.

The number and proportion of female patients with the top ten common diseases and systemic diseases in the three observation groups exhibit higher than those of male patients, especially the proportion of female circulatory system diseases, which may be related to the special risk factors in female groups, such as special periods like menopause and

pregnancy that increase the risk of these diseases.[20] In addition, the level of estrogen in perimenopausal women decreases, on the one hand, it can reduce the level of high-density lipoprotein cholesterol while increase the level of cholesterol, thereby arising the risk of hyperlipidemia. On the other hand, it will also accelerate the occurrence and development of rheumatism or arthritis.

This study showed that the prevalence of hypertension, arthritis, hyperlipidemia, type 2 diabetes and cerebral infarction in the age groups of 60–65, 66 −70, 71–75 and 76–80 in the three observation groups increased in line with age, as well as the proportion of circulatory system diseases, musculoskeletal system and connective tissue diseases and endocrine/nutritional and metabolic diseases in the age groups of 60–65, 66–70 and 71–75. The proportion of circulatory system diseases, musculoskeletal system and connective tissue diseases and endocrine/nutritional and metabolic diseases in the 60–65, 66–70, 71–75 and 76–80 age groups was much higher than that in other age groups. The risk of chronic diseases may increase resulting from the degradation of body function and the accumulation of exposure to behavioral risk factors with age; the elevation of residents' health literacy increases active medical behaviors; in addition, the implementation of national basic public health services in recent years has arisen the detection rate of chronic diseases and adverse eating habits of the elderly with the improvement of living conditions.[21,22]

The analysis by age group reported that arthritis ranked first or second despite the different orders of common diseases in each age group of the total population of the two counties. The types and orders of the top five diseases in each age group in Guangling and Tianzhen counties changed slightly, while hyperlipidemia, hypertension, heart disease and type 2 diabetes all occupied the top five diseases. Arthritis has developed to a severe disease that seriously affects the rural elderly in Guangling and Tianzhen counties, suggesting the obvious regional specificity of the prevalence of chronic diseases in the elderly in Guangling and Tianzhen counties, which are agricultural counties with heavy rural field work. Located in the Loess Plateau, the climate of the two counties is relatively cold. The climate environment will increase the risk of arthritis in the elderly,[22,23] which may be the reasons why the prevalence rate of arthritis in the elderly is high in the ranking of chronic diseases with different genders and ages.[24,25]

Many countries implement hierarchical regional division based on historical traditions, population distribution, geographical conditions, etc., in order to achieve hierarchical management. Each region has different geographical landforms and social cultures. The prevalence, spectrum, and various types of chronic diseases in Guangling, Tianzhen, and their total observation objects are different. This suggests that in order for health departments in China and other countries to effectively intervene in chronic diseases, it is necessary to accurately grasp the local chronic disease situation based on big data in order to follow the "prevention first" health work policy for public health professionals, Exploring diseases and health-related issues related to left behind elderly people in rural areas from a real perspective, preventing disease occurrence, controlling disease development, and promoting health.

Limitations

First, all data involved came from only two counties, despite the more forsaken elders over 60 and the large sample size. Second, there are many missing data in this questionnaire, so it is not appropriate to do multiple imputation, in order to include high-quality data from both counties, we can only extract data from the results of this third-party medical institution's door-to-door survey, so the study lacks comparative analysis with other data. Third, the emergence of COVID-19 after our study may affect our conclusions to some extent, so it is required to further explore the epidemiological characteristics of the observers for future studies, especially in 2020, 2021 and 2022, and beyond. Finally, the data extracted from the door-to-door surveys of a third-party healthcare institution lack factors such as education, income, and some other regional variables, so only age and gender were considered to analyze the data.

Our research, with the support of mobile Internet technology, can contribute to easily and quickly following up with the respondents, promoting health-related data to better guide the elderly, elevating health management and improving their health.

Conclusion

The disease spectrum is of great significance for understanding the types of diseases in a certain region or medical institutions and their variation trends, which cannot only reflect the common laws of multiple diseases and universal

diseases but also illustrate the differences of regional characteristic diseases. There existed differences in the prevalence rate, common diseases and disease spectrum of systemic diseases among the three observation groups in Guangling, Tianzhen and two counties, which can also be observed in gender and age groups. It is recommended the information management mechanism of chronic diseases be explored under the background of big data, based on the gradual interconnection and sharing of inter-departmental information related to residents' health, such as medical care, public health services and civil affairs, and the county-level local administrative divisions as database management units. Due to the relatively independent administrative autonomy of county-level local administrative regions in China's unique administrative divisions, residents' health can be better accurately maintained and promoted based on data mining information; only through data interconnection and sharing can the health sector provide more targeted life-cycle precision health services than homogenization services.

At the same time, as the first station of primary health care and referral, the role of community health service centers weights particularly. It is urgently required to explore how to provide better health management services for the elderly in the community based on dynamic real data, and construct a localized community common disease management service model.

Data Sharing Statement

Data can be obtained from the authors on reasonable request.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

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