The Impact of Dietary Risk Factors on the Burden of Diseases among Adults Aged 25 and above in China: A Systematic Analysis of the Global Burden of Disease Study 2021

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Abstract

Background: With rapid economic growth and lifestyle changes, diet-related diseases have emerged as a major global public health concern. As one of the most populous countries in the world, China is experiencing significant shifts in dietary patterns and is actively implementing a range of dietary interventions.

Objective: This study seeks to provide a comprehensive assessment of diet-related burden of diseases in China and explore their trends from 1990 to 2021.

Methods: Data on sex- and age- specific burdens from dietary risks in China were obtained from the Global Burden of Disease (GBD) Study 2021. The GBD study included number of deaths, mortality rate, years of life lost (YLLs), years lived with disability (YLDs) and disability-adjusted life years (DALYs) to assess the disease burden. Temporal trends of age-standardized rates (ASRs) from 1990 to 2021 were evaluated by estimating annual percentage changes (EAPCs).

Results: In China, the number of deaths and DALYs attributed to dietary factors in 2021 was estimated at 1.70 million (95% uncertainty interval [UI]: 0.69–2.68) and 38.39 million person-years (95% UI: 16.21–58.61) respectively. The ASR-DALY had an EAPC of -1.76 (95% UI: -2.39 to -1.55). Cardiovascular diseases were the leading cause of diet-related deaths, with high sodium, low whole grain and low fruit intake as the leading dietary risk factors.

Conclusions: The diet-related disease burden in China remains a significant concern. We recommend regular monitoring of population nutrient intake, raising public awareness on the importance of a nutritious diet and adopting appropriate evidence-based strategies to intervene dietary risk factors.

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The Impact of Dietary Risk Factors on the Burden of Diseases among Adults Aged 25 and above in China: A Systematic Analysis of the Global Burden of Disease Study 2021

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Abstract

Background: With rapid economic growth and lifestyle changes, diet-related diseases have emerged as a major global public health concern. As one of the most populous countries in the world, China is experiencing significant shifts in dietary patterns and is actively implementing a range of dietary interventions.

Objective: This study seeks to provide a comprehensive assessment of diet-related burden of diseases in China and explore their trends from 1990 to 2021.

Methods: Data on sex- and age- specific burdens from dietary risks in China were obtained from the Global Burden of Disease (GBD) Study 2021. The GBD study included number of deaths, mortality rate, years of life lost (YLLs), years lived with disability (YLDs) and disability-adjusted life years (DALYs) to assess the disease burden. Temporal trends of age-standardized rates (ASRs) from 1990 to 2021 were evaluated by estimating annual percentage changes (EAPCs).

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Conclusions: The diet-related disease burden in China remains a significant concern. We recommend regular monitoring of population nutrient intake, raising public awareness on the importance of a nutritious diet and adopting appropriate evidence-based strategies to intervene dietary risk factors.

Keywords: Global burden of disease, dietary risk factors, diet-related diseases.

Introduction

Globally, non-communicable diseases (NCDs) are responsible for 74% of all deaths [1], with cardiovascular diseases, neoplasms, diabetes and kidney diseases as the leading causes of mortality and disability [2, 3]. Extensive research has explored the association between dietary intakes and these NCDs through a multitude of long-term observational studies and short-term trials [4]. The evidence demonstrates that an unhealthy diet is one of the most critical and modifiable risk factors for such diseases [5]. Dietary risk factors have imposed an increasing health and economic burden worldwide [6]. In recent years, there has been a growing focus on addressing the burden of diet-related disease in China. In response, China has implemented a series of measures with the aim to improve the nutritional quality of diets at a population level [7]. The Chinese dietary guidelines were first published in 1989 and subsequently revised in 1997, 2007, 2016 [8], and the most recent version (the 5th edition) was released in 2022 [9]. These guidelines provide recommendations for nutrient intake for the general population and specific population groups, such as pregnant women or breastfeeding mothers, infants, children and adolescents [10, 11]. Additionally, the Healthy China Action Plan (2019-2030) has identified promoting a healthy diet as a crucial initiative, emphasizing the need for governmental and societal efforts to improve dietary standards [12].

Despite these efforts, significant challenges related to both undernutrition and overnutrition persist. Concurrently, the rapid social and economic development in China has markedly influenced traditional Chinese dietary patterns [13, 14]. This transition, influenced by external cultures, has resulted in changes to the nutritional content and quality of diets, leading to greater diversity in the Chinese diet. In addition, the process of urbanization has notably increased the consumption of processed foods [15]. Analyzing the disease burden caused by dietary factors in China has primarily focused on individual risk factors or specific diseases, leaving a gap in understanding the broader impact of all dietary risks on the overall health in China. Over recent decades, dietary patterns in China have changed significantly, thus, it is important to examine regional and temporal trends and identify how the contribution of individual dietary risk factors to health outcomes has shifted. These insights are vital for reviewing and refining current nutrition-related policies and implementing more targeted, effective public health interventions [16, 17].

Therefore, we conducted this study by utilizing the 2021 Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) data, performed a systematic evaluation of the disease burden associated with dietary factors in China, while also examining temporal trends spanning over last three decades. Furthermore, this study separately analyzed the three major disease categories contributing the highest diet-related disease burden in China, which include cardiovascular diseases, neoplasms, and diabetes and kidney diseases [17-19].

Methods

Using data from the GBD 2021, the study provided estimates of disease burden related to dietary risks in China, by sex and age, between 1990 and 2021. A detailed description of the methods for estimating the disease burden attribute to risk factors has been published elsewhere [4]. We summarize the methods for estimating disease burden related to dietary risks below.

Briefly, this study analyzed data on dietary risk factors associated with all diseases among adults aged 25 and above across 33 provinces/regions in China from 1990 to 2021. This includes all 31 mainland provinces, autonomous regions, and municipalities, and two special

administrative regions, Hong Kong and Macao. Data was segmented by age, year, sex, geographical region, and different dietary risk factors.

Data Source and Definitions

GBD 2021 consists of the most recent epidemiological data available on a global level and has improved standardized methodologies compared to previous GBD data [20]. In this study, data classification conformed to the GBD database classification standards, encompassing age, region, and disease categories. This study not only analyzed the all-cause disease burden caused by dietary risk factors, also separately analyzed the three major disease categories, cardiovascular diseases, neoplasms, and diabetes and kidney diseases. All three disease categories are classified as Level 2 cause within the GBD classification system [20].

Dietary risk factors are behavior factors that have a correlation relationship with the increased or decreased of developing diseases [21]. The selection of dietary risk factors includes 15 specific dietary risks that meet GBD criteria for risk factor selection. These criteria consider the significance of the risk factors in contributing to disease burden, as well as the availability of adequate data to estimate exposure to these risks. The selection process was further guided by the strength and consistency of epidemiological evidence supporting a causal relationship between dietary factors and disease. The method used to evaluate the strength of this evidence for causality is detailed elsewhere [4] and summarized in **Multimedia Appendix 1, Table S3**.

Measurement of Disease Burden

GBD 2021 quantified the proportion of disease burden attributable to each dietary factor that could be prevented if exposure levels were maintained at the minimum risk level, defined as the theoretical minimum risk exposure level (TMREL) [22]. Assuming exposure levels for other risk factors remain constant, the population attributable fraction (PAF) for a given risk factor was estimated by comparing the TMREL with the exposure level in a specific population [23]. GBD 2021 applied a comparative risk assessment framework to calculate the disease burden attributable to major dietary risk factors.

Statistical Analysis

This study used various epidemiological indicators, including number of deaths, mortality rate, years of life lost (YLLs), years lived with disability (YLDs) and disability-adjusted life years (DALYs) to describe the disease burden attributable to dietary factors. When comparing populations across different regions or age groups over time, we used age-standardized rates (ASRs), calculated as a weighted average of age-specific rates. All measures were reported as unstandardized and ASRs (rate/100,000 persons), including their 95% uncertainty intervals (UIs). To explore the trends of ASRs from 1990 to 2021, we calculated the estimated annual percentage change (EAPC) of ASRs based on the formula $EAPC=100 \times (\exp(\beta) - 1)$, where $Y = (\alpha + \beta X + \varepsilon) = \ln(ASR)$, X = calendar year and ε = the error term. This model is based on the assumption that a natural logarithmic scale will show a linear trend of ASR over a specified time. The ASR is considered to exhibit an increasing trend when EAPC and the lower bound of the UI are positive, whereas the ASR is considered to exhibit a decreasing trend when EAPC and the upper bound of the UI are negative. All data were analyzed using RStudio (Version 2024.04.0).

Ethical Considerations

This study used data from the GBD study, which was approved by the institutional review board of the University of Washington School of Medicine. The original data collection obtained

informed consent from study participants or was granted exemptions by the institutional review board. As this is a secondary analysis of existing data, no additional human participant research ethics review or informed consent was required. Study data were anonymized and deidentified to protect the privacy and confidentiality of study participants. Our study adhered to the GBD protocol and followed the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) [24]. The GATHER checklist is provided in the **Multimedia Appendix 1, Table S1.**

Results

Overall Disease Burden Attributable to Dietary Risk Factors in 2021

In 2021, 1.70 million deaths (95% UI: 0.69, 2.68) from all diseases were attributed to dietary risk factors among people aged 25 years and above in China. The YLLs due to dietary factors amounted to 34.18 million person-years (95% UI: 14.57, 52.84). The YLDs were 4.21 million person-years (95% UI: 1.57, 6.73), and the DALYs totaled 38.39 million person-years (95% UI: 16.21, 58.61). YLLs accounted for 89% of DALYs. The ASR-YLDs was 204.17 per 100,000 persons (95% UI: 75.67, 326.07), and the ASR-DALYs was 1892.69 per 100,000 persons (95% UI: 775.77, 2904.23) (**Table 1**).

Regional Distribution of Disease Burden Attributable to Dietary Risk Factors

There are significant regional differences in the disease burden attributed to dietary factors in China. Fujian, Shanghai, Macao, and Hong Kong experience a lower diet-related disease burden, while Hebei, Heilongjiang, Jilin, Inner Mongolia, and Qinghai have a higher diet-related disease burden. **Figure 1** displays the distribution of age-standardized death rate (ASDR) and ASR-DALY attributed to dietary factors for all diseases. The contribution of individual dietary factors to the overall diet-related disease burden varies across regions. **Figure 2** ranks the different dietary factors contributing to the disease burden in various regions of China, high-sodium diet emerges as the top risk factor for disease burden in all regions. A diet high in sodium and low in whole grains and fruit are the leading dietary risk factors in almost every region. In Shanghai and Beijing, high red meat consumption ranks third in contributing to the burden of diet-related diseases, while low fruit intake ranks fourth. In Macao and Hong Kong, low dietary fiber intake ranks third, with low whole-grain intake and low fruit intake ranking fourth, respectively.

Table 1. The total disease burden caused by dietary risk factors.

	Absolute number, thousands		Age-standardized rate, per 100,000 people		EAPC of ASR*
	1990	2021	1990	2021	1990 - 2021
Deaths (95% UI)					
All causes	1011.13 (518.27, 1474.48)	1704.02 (687.92, 2684.78)	152.13 (76.40, 222.36)	90.37 (35.35, 143.15)	-1.68 (-2.49, -1.42)
Cardiovascular diseases	829.87 (471.40, 1149.29)	1449.88 (594.79, 2244.04)	128.62 (69.70, 181.22)	77.76 (30.45, 121.22)	-1.62 (-2.67, -1.30)
Diabetes and kidney diseases	31.94 (16.00, 48.16)	76.77 (32.01, 121.77)	4.77 (2.41, 7.06)	3.91 (1.65, 6.18)	-0.64 (-1.22, -0.43)
Neoplasms	147.02 (29.72, 306.47)	176.53 (60.80, 367.46)	18.44 (3.89, 38.01)	8.66 (2.98, 17.89)	-2.43 (-2.41, -0.86)
YLLs (95% UI)					
All causes	25261.26 (12317.56, 36672.75)	34186.08 (14575.66, 52839.91)	3103.51 (1545.93, 4508.14)	1688.52 (689.96, 2601.5)	-1.96 (-2.60, -1.77)
Cardiovascular diseases	20213.91 (11357.25, 27664.76)	28353.16 (12271.3, 42425.37)	2536.16 (1418.19, 3489.77)	1409.55 (584.61, 2114.00)	-1.89 (-2.86, -1.62)
Diabetes and kidney diseases	793.65 (397.55, 1209.75)	1581.38 (654.40, 2528.97)	97.41 (49.20, 146.73)	75.81 (31.53, 120.59)	-0.81 (-1.44, -0.63)

Neoplasms	4189.84 (855.34, 8742.78)	4229.48 (1429.36, 8797.48)	462.79 (95.46, 964.05)	202.08 (68.33, 417.31)	-2.67 (-2.70, -1.08)
YLDs (95% UI)					
All causes	1440.14 (648.54, 2200.15)	4207.73 (1567.38, 6728.75)	161.77 (72.93, 250.42)	204.17 (75.67, 326.07)	0.75 (0.12, 0.85)
Cardiovascular diseases	824.48 (425.83, 1258.08)	1913 (786.69, 3080.93)	94.68 (47.86, 145.38)	90.03 (36.97, 145.22)	-0.16 (-0.83, 0.01)
Diabetes and kidney diseases	550.76 (125.63, 981.24)	2109.35 (403.13, 3857.85)	59.72 (14.66, 105.88)	105.35 (20.53, 193.47)	1.83 (1.09, 1.94)
Neoplasms	58.94 (15.08, 114.05)	177.77 (47.72, 340.07)	6.70 (1.77, 12.80)	8.41 (2.25, 16.11)	0.74 (0.73, 0.77)
DALYs (95% UI)					
All causes	26701.40 (13025.80, 38381.93)	38393.81 (16213.07, 58607.05)	3265.28 (1625.52, 4693.91)	1892.69 (775.77, 2904.23)	-1.76 (-2.39, -1.55)
Cardiovascular diseases	21038.39 (11853.04, 28797.03)	30266.17 (13228.42, 45225.09)	2630.84 (1471.93, 3614.80)	1499.58 (632.89, 2247.22)	-1.81 (-2.72, -1.53)
Diabetes and kidney diseases	1344.40 (546.84, 2147.75)	3690.73 (1021.61, 6162.48)	157.13 (66.38, 247.18)	181.17 (50.05, 301.66)	0.46 (-0.91, 0.64)
Neoplasms	4248.78	4407.25	469.49	210.49	-2.59

	(868.87, 8847.49)	(1479.11, 9106.09)	(97.07, 975.92)	(70.5, 431.87)	(-2.63, -1.03)

*EAPC of ASR: The estimated annual percentage change (EAPC) of ASR to explore the trends of ASRs from 1990 to 2021

Figure 1: The distribution of ASDR and ASR-DALYs attributed to dietary factors for all diseases in 2021

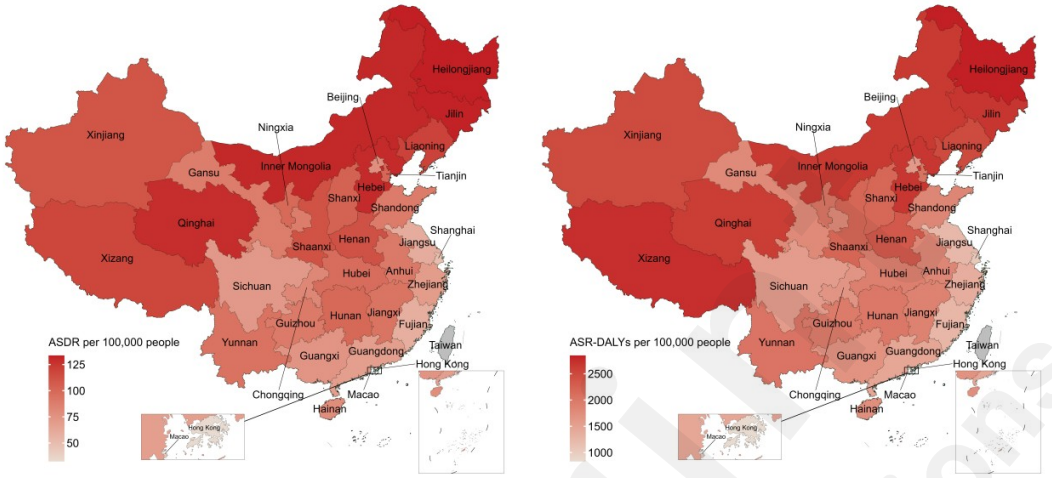
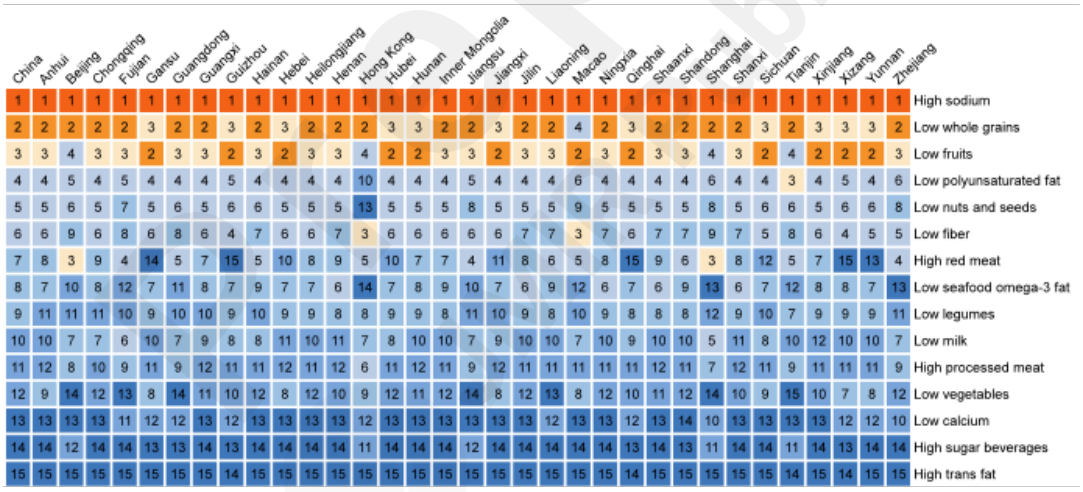


Figure 2: Ranking of ASR-DALYs caused by dietary factors in each province in 2021.



Dietary Risk Factors Associated with Individual Disease Burden in 2021

Cardiovascular diseases attributable to dietary risk factors were the leading cause of death and DALYs amongst disease groups, with 1.45 million deaths (95% UI: 0.59, 2.24) and 30.26 million person-years of DALYs (95% UI: 13.23, 45.23). The ASR-DALYs rate was 1499.58 per 100,000 persons (95% UI: 632.89, 2247.22). Meanwhile, diabetes and kidney diseases attributed to

dietary risk factors lead to 76.77 deaths per 1,000 persons (95% UI: 32.01, 121.77) and 3.69 million person-years of DALYs (95% UI: 1.02, 6.16). The ASR-DALYs rate was 181.17 per 100,000 persons (95% UI: 50.05, 301.66). Neoplasms attributed to dietary risk factors lead to 176.53 million deaths per 1,000 persons (95% UI: 60.80, 367.46) and 4.41 million person-years of DALYs (95% UI: 1.47, 9.11). The ASR-DALYs rate was 210.49 per 100,000 persons (95% UI: 70.50, 431.87).

Sex Distribution of Disease Burden Attributable to Dietary Risk Factors

The death rate for males due to dietary risk factors was 124.40 per 100,000 persons (95% UI: 49.56,199.28), 1.89 times higher than females (65.73 per million persons, 95% UI: 23.36,110.28). The YLDs rate for males was 225.21 per 100,000 persons (95% UI: 86.13, 355.83), and the DALYs rate was 2524.01 per 100,000 persons (95% UI: 1034.57, 3878.49). Whereas for females, the YLDs rate and DALYs rate were 183.97 per 100,000 persons (95% UI: 64.49, 299.26) and 1350.20 per 100,000 persons (95% UI: 509.30, 2179.77) respectively. The proportion of DALYs due to YLLs from dietary risk factors was 91.1% for males and 86.4% for females, with males having a slightly higher proportion compared to females.

Age Distribution of Disease Burden Attributable to Dietary Risk Factors

The disease burden attributable to dietary risk factors increases with age, particularly among individuals aged 60 years and above. Death rate, YLL rate, and DALY rate are the highest in the 80 years and above age group, while YLD rate was highest in the 75-79 age group (1038.88 per 100,000 persons for the 75-79 years age group compared to 964.02 per 100,000 persons for the 80 years and above age group). The proportion of YLLs to DALYs gradually increased with age, reaching 95.4% in the 80 years and above age group. Detailed data are presented in **Multimedia Appendix 1, Table S5**.

Trends of Disease Burden Attributed to Dietary Risk Factors from 1990 to 2021

Figure 3 illustrates the temporal changes in the disease burden caused by dietary risk factors amongst Chinese adults aged 25 years and above from 1990 to 2021. The ASDR, ASR-YLLs, and ASR-DALYs for all diseases show a significant downward trend over time, with an EAPC of -1.76 (95% UI: -2.39 to -1.55) for ASR-DALY. In contrast, ASR-YLDs exhibit an upward trend, with an EAPC of 0.75 (95% UI: 0.12 to 0.85). **Figure 4** illustrates the changes in the proportion of disease burden caused by different dietary risk factors. Over the past 30 years, there have been notable changes in dietary risk factors contributing to the diet-related disease burden. In 1990, low vegetable intake ranked third in its contribution but dropped to 12th place by 2021. In contrast, high red meat consumption rose from the lowest rank (15^{th}) to seventh place.

Figure 3: The temporal changes in disease burden attributed to dietary factors from 1990 to 2021.

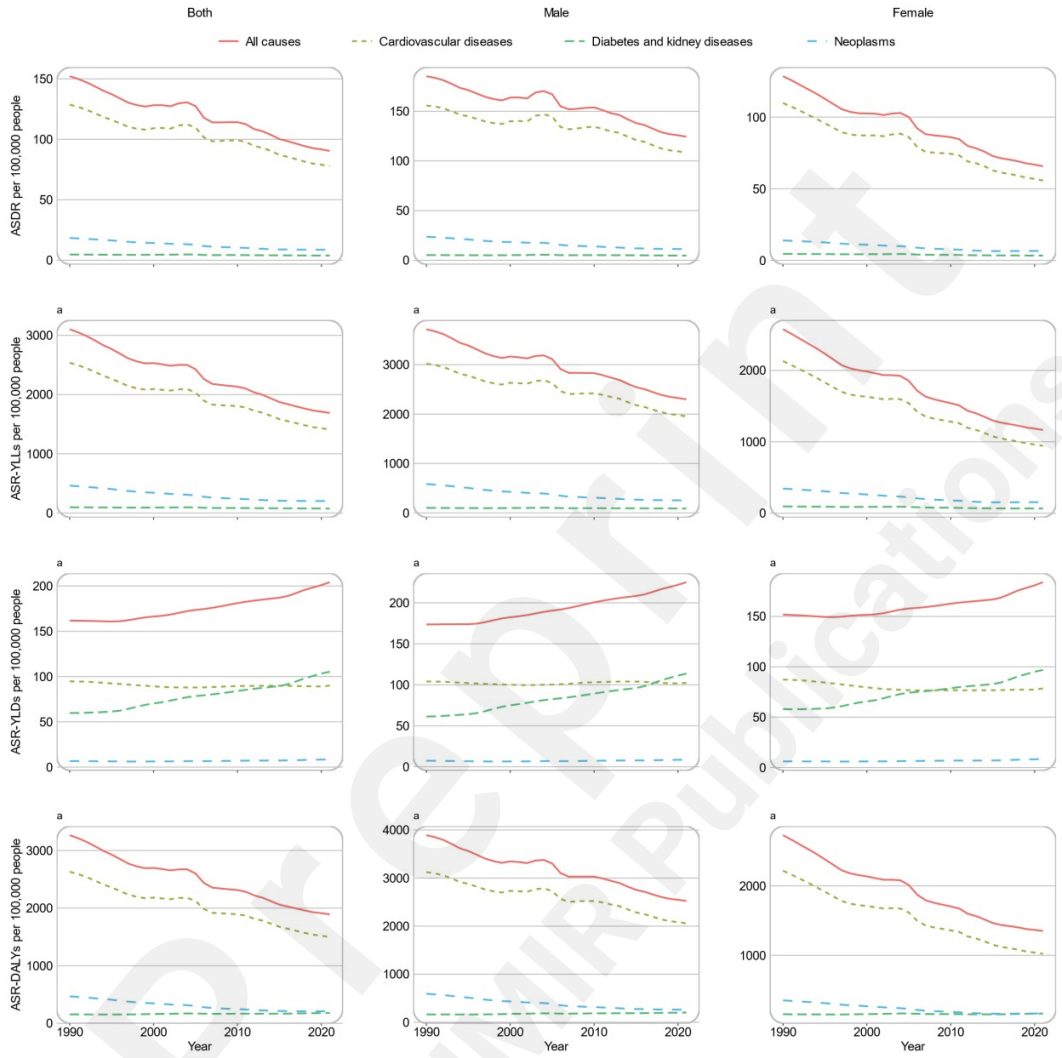
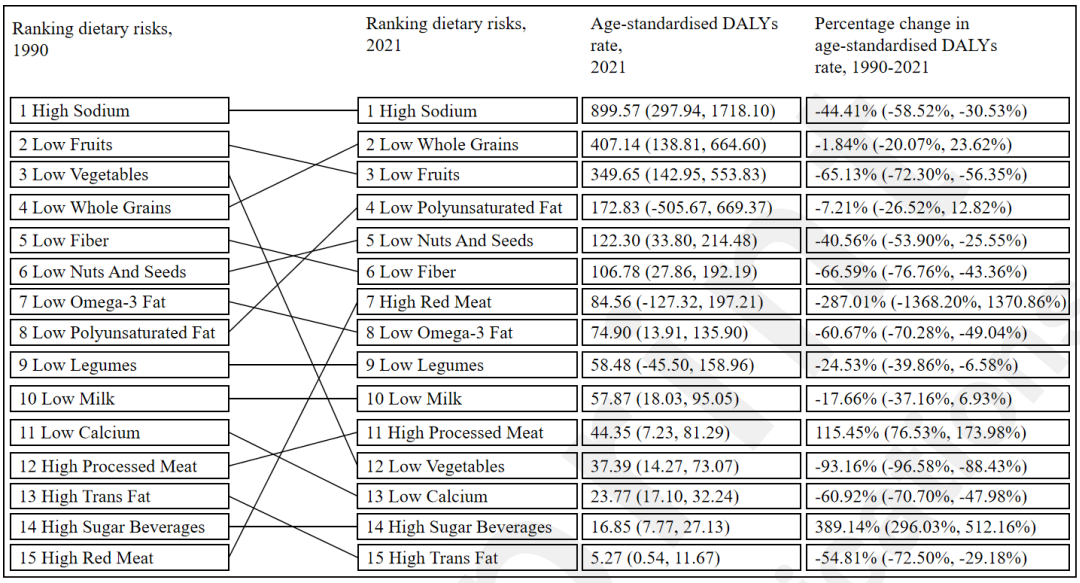


Figure 4: Changes in the ranking of dietary risk factors contributing to the proportion of disease burden (ASR-DALY).



Discussion

In 2021, the dietary factors contributing to disease burden in China is more severe for males and older age groups. Cardiovascular diseases remain the primary contributors to the burden attributed to dietary risk factors. Key dietary contributors to disease burden include high sodium intake, low fruit consumption, and low whole-grain intake. The burden of disease, as measured by ASR-DALYs, is remarkably higher in certain areas of northern and western China compared to other regions.

The Chinese government has been striving to enhance the dietary health of its population [25], and since 1989, the Chinese Residents' Dietary Guidelines have been issued and revised multiple times. In parallel with expanded media campaigns, the Healthy China Initiative was launched in 2019, incorporating healthy eating as a key strategic objective [26]. These initiatives have demonstrated effectiveness, as evidenced by improvements in disease burden over time. This progress is closely linked to China's rapid economic expansion in recent years, resulting in greater dietary variety among the population and a relatively heightened consumption of specific food items both healthful and unhealthful in nature [27, 28]. One significant transformation is observed in vegetable consumption, which has transitioned in disease burden rankings from third place in 1990 to twelfth place. The discrepancy in the increasing trajectory

of ASR-YLDs attributed to dietary factors in contrast to other metrics, may be explained by advancements in medical treatment that prolong patient survival [29]. Furthermore, the rise in the prevalence of chronic diseases stemming from overnutrition could also play a role in this situation [30].

While the overall standardized rates of disease burden from dietary factors is declining over time, the proportion attributed to specific dietary risks is increasing with diets high in processed meat, red meat, and high in sugar-sweetened beverages and low in whole grains contributing more to the disease burden. In most provinces in China, especially in inland cities, red meat is still the main meat consumption [31, 32], and economic development has also stimulated an increase in food variety, especially in meat consumption [33]. According to data from the China Statistical Yearbook, from the 1990s to 2021, China's red meat consumption (mainly pork, a small part of beef and mutton) showed a continuous upward trend except for a slight decline in 2019 due to the occurrence of African swine fever [34, 35]. This change in consumption is also related to the increase in the disease burden caused by high red meat intake in the past 30 years. In addition, the increased proportion of disease burden attributable to a diet low in whole grains may also be associated with economic development, which has led to a shift towards more refined grain in the diet. In economically underdeveloped periods, whole grains were more readily available compared to refined grains, leading to a subsequent association between increased poverty and increased whole-grain intake among the Chinese population [36]. This consciousness often results in reduced consumption of coarse grains and other whole-grain foods, exacerbating health risks [37]. This suggests that due to the improvement of socioeconomic status, the disease burden caused by dietary risk factors has shifted from a shortage of a certain dietary component to the overall dietary structure distribution [38, 39]. These findings underscore the need to shift dietary interventions toward transitioning from animal-based foods (such as red meat and processed meats) to healthy plant-based foods (such as fruits, vegetables, and whole grains). However, achieving this shift in dietary patterns is challenging for China where economic growth is just beginning [40].

Another change is the rise in the disease burden caused by the diet high in sugar-sweetened beverages (SSBs). Over the past three decades, it also has seen an increase, which is a matter of serious concern. The consumption of SSBs is rapidly increasing worldwide, especially among adolescents [41], The rise in SSBs intake is associated with various health issues, such as obesity, insulin resistance, and dental caries [42]. This has become a significant public health concern. In China, the intake of SSBs is particularly concerning among young children, highlighting the need for early intervention [43]. Although this study did not analyze the disease burden caused by adolescents' consumption of sugar-sweetened beverages (SSBs), it remains an issue of significant concern.

Equally noteworthy dietary risk factors in this study are diets high in sodium intake and low in fruit consumption. Along with the low intake of whole grains mentioned above, high sodium intakes and low fruit intakes have consistently ranked among the leading dietary risk factors for disease burden in China both in 1990 and in 2021. Studies indicate that the average fruit intake among the Chinese population is around 100g/day [44], significantly below the World Health Organization (WHO)'s recommended levels. This can be attributed to factors such as low economic status, irregular eating habits, poor dietary literacy, and a lack of fruit consumption habits among residents [45]. Addressing these issues requires further efforts and plans at the national level, along with more frequent and in-depth health education initiatives. Educating individuals about healthy habits from a personal lifestyle perspective is relatively challenging and demands greater resourcing [46]. On the other hand, current sodium intakes of the Chinese population are high at around 4g/day [47], far exceeding the WHO maximum recommended level of <2g/day. Sodium intake in China typically comes from home cooking practices [48], which are deeply rooted in family cooking traditions and regional dietary cultures [49]. A more effective approach to reduce sodium is to promote the substitution of regular salt with potassium-enriched salt [50]. Addressing these factors also requires long-term health education efforts [49].

The distribution of disease burden caused by dietary risk factors in China varies significantly between regions. According to the National Bureau of Statistics of China, the country is divided into eastern, central, western, and northeastern regions [51]. The death rate and DALYs are more severe in the western and northeastern regions, while the eastern and central regions fare better, particularly the eastern coastal areas, which have the lowest overall disease burden. This can be attributed to both socioeconomic status [52] and dietary habits, such that diets are relatively healthful in eastern regions such as Shanghai, Guangdong, Jiangsu, and Zhejiang, where coastal cities consume more seafood [53]. In contrast, the northeastern region has heavier flavor profiles in its diet means a higher sodium intake [54]. The varying levels of economic development and dietary habits across regions can lead to an emphasis on differing dietary factors that require specific interventions. For instance, in Beijing and Shanghai where economic levels are high, the disease burden caused by high red meat consumption is higher than in other areas [55]. Provinces like Gansu, Hebei, Jiangxi, Yunnan, and Macau exhibit a relatively higher disease burden attributed to low vegetable intake, which is closely related to the lifestyle habits and economic conditions of those regions [56]. These factors can serve as focal points for dietary interventions in different regions.

This study also has certain limitations. Firstly, it lacks data on food intake levels across China, which hinders comprehensive analysis. Additionally, the study lacks an analysis of the disease burden caused by nutritional factors in urban and rural areas as well as in regions with varying levels of economic development in China.

These analyses necessitate further research in future studies. However, this study provides an analysis of the burden of diet-related diseases amongst Chinese adults aged 25 years and older, with a particular focus on regional variations and the burden attributed to specific dietary risk factors. This evidence can better inform the development of targeted dietary interventions.

In conclusion, in China, the burden of diseases related to diet remains significant. With rapid economic growth and shifting dietary patterns, the disease burden caused by dietary risk factors should receive greater attention. In response, tailored and impactful nutrition policies and strategies that address diet-related disease burdens in China need to be developed and implemented.

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Data Availability

The data sets generated for this study can be found in the Global Burden of Disease repository.

Authors' Contributions

MT and PPY contributed to the conception and study design, YZX, DS, NT, JYL, JYP participated in the manuscript writing, GCY and WT contributed to data acquisition and analysis, and HRS, AQG, XYL, KK, KT, JZ, XYZ revised the article critically for important intellectual content and interpreted the results. All authors read and approved the final manuscript.

Conflicts of Interest

None declared

Abbreviations

GBD: The Global Burden of Disease

YLLs: Years of life lost

YLDs: Years lived with disability

DALYs: Disability-adjusted life years

ASRs: Age-standardized rates

EAPCs: Estimating annual percentage changes

UI: Uncertainty interval

SSBs: Sugar-sweetened beverages

Multimedia Appendix 1

Supplementary Tables S1 - S6

Multimedia Appendix 2

Supplementary Figures S1 - S6

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Supplementary Files

Multimedia Appendixes

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