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Epidemiological Analysis and Trend Forecast of Gynecological Diseases and Their Incidence by Age in China

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Abstract: ***Objective:*** *To analyze the changes in the burden of gynecological diseases in China from 1990 to 2021 and the main types of gynecological diseases among women of different ages, providing a scientific basis for formulating prevention and treatment strategies for gynecological diseases.* ***Methods:*** *Absolute numbers and crude rates of incidence, mortality, and disability-adjusted life years (DALYs) for gynecological diseases among Chinese and global women from 1990 to 2021 were extracted from the 2021 Global Burden of Disease (GBD) database. Trends in the burden of disease and the main types of gynecological diseases among different age groups were analyzed.* ***Results:*** *In 2021, the number of new cases of gynecological diseases among Chinese women was 100.6675 million, with a standardized incidence rate of 14016.22 per 100,000, a decrease of 19.54% compared to 1990; the number of deaths from gynecological diseases among Chinese women in 2021 was 0.07 million cases, with a standardized mortality rate of 0.07 per 100,000, an increase of 57.14% compared to 1990; DALYs caused by gynecological diseases in China increased from 3.8283 million in 1990 to 3.9542 million in 2021.* ***Conclusion:*** *From 1990 to 2021, the number of global deaths, standardized mortality rates, and DALYs for gynecological diseases showed an overall upward trend, while standardized incidence rates and standardized DALY rates showed an overall downward trend. The situation for the prevention and treatment of gynecological diseases among Chinese women remains severe. It is essential to strengthen gynecological disease screening and prevention, especially in grassroots areas, improve women's health education, and help them identify early symptoms and seek medical attention promptly. Additionally, increasing research investment, promoting the application of new technologies, and optimizing diagnostic and treatment methods are crucial to alleviating the burden of gynecological diseases and improving the quality of life for women.*

Keywords: Gynecological diseases, Women, Disease burden.

1. Introduction

Gynecological diseases typically refer to disorders of the female reproductive system, which are common among women. They include reproductive tract malformations, inflammations of the reproductive tract organs and surrounding tissues, and tumors in various parts of the reproductive tract. Common conditions include uterine fibroids, ovarian cysts, vaginitis, cervicitis, pelvic inflammatory disease, dysfunctional uterine bleeding, and menstrual disorders [1]. If gynecological diseases in women are not diagnosed and treated promptly, these conditions can significantly affect women's physical health, their families, and even the well-being of society [2]. In the 1990s, data released by the World Health Organization (WHO) indicated that 40% of Chinese women suffered from varying degrees of reproductive system infections and other gynecological diseases [3,4], and the health life loss caused by gynecological diseases was as high as 626.54 per 100,000 [5], significantly affecting the physical and mental health of women. With changes in the environment, residents' lifestyles, and risk factors, the prevalence of gynecological diseases among women is on the rise, especially reproductive tract infections pose a significant threat to women's daily quality of life and health [6,7], becoming a global social and public health issue. The prevalence rate of gynecological diseases among Chinese women aged 15 and above can reach 24.94%, while the prevalence rate among women aged 15 to 49 is as high as 36.71% [8]. At the same time, the accelerated pace of modern women's lives, changes in dietary patterns, frequent staying up late, and lack of exercise have all hurt their reproductive health. As people's understanding of gynecological diseases deepens, women's awareness of seeking medical attention is gradually increasing, which to some extent has driven the rise in statistics of gynecological disease prevalence rates. In response to this phenomenon, strengthening health education for women and increasing attention to the early prevention and treatment of gynecological diseases is particularly important. However, with changes in the environment, changes in residents' lifestyles, and the increase in risk factors, the burden of gynecological diseases in China may further increase. Therefore, understanding the burden and characteristics of gynecological diseases in China is of significant importance for formulating effective health policies and rationally allocating medical resources.

This study employs the results of the Global Burden of Diseases (GBD) 2021 for statistical analysis, aiming to understand the changes in the overall and sub-disease burdens of gynecological diseases in China from 1990 to 2021. It analyzes the main types of gynecological diseases among women of different ages to provide a scientific basis for formulating prevention and treatment strategies for gynecological diseases.

2. Materials and Methods

2.1 Materials and Methods

This study's data is sourced from GBD 2021, which carried out an extensive evaluation of the population, incidence, and mortality rates for 371 types of injuries and diseases, along with 88 risk factors, resulting in a disease burden database covering 204 countries and territories [9]. This provides an

effective reference for global countries to develop adaptive public health decisions and allocate health resources [10] [11]. The gynecological disease data used in this study is derived from the GBD 2021 database, which includes information on the incidence, mortality, and DALYs (Disability-Adjusted Life Years) of gynecological diseases among Chinese women aged 15 to 49 from 1990 to 2021. The incidence rate reflects the frequency of new cases, revealing the impact of diseases on population health; mortality measures the risk of death due to diseases; and DALYs indicate the healthy life years lost from the onset of disease to death, used to measure the shortening of life expectancy and the degree of disability caused by diseases. Based on the world standard population weights provided by the GBD 2021 database [12], the direct standardization method was used to age-standardize the extracted crude rates of incidence, mortality, and DALYs for early-onset gynecological diseases in women. Age group standards are: 15-19 years, 20-24 years, 25-29 years, 30-34 years, 35-39 years, 40-44 years, and 45-49 years.

2.2 Statistical Analysis

This study comprehensively analyzed various indicators of gynecological diseases, including 7 age groups (with a 5-year interval). Furthermore, The Bayesian Age-Period-Cohort (BAPC) model was employed to forecast the disease burden resulting from maternal diseases between 2022 and 2035. The data was first organized using Excel 2010, then analyzed with SPSS 23.0 to determine if it met the conditions for linear regression, and R 4.3.1 software was applied for plotting to generate visual effects for description.

3. Results

3.1 Analysis of the Current Status of Gynecological Diseases Burden Between China and Global Women

3.1.1 Current status of disease burden

Compared to the year 1990, both the number of new cases and the standardized incidence rate of gynecological diseases among Chinese women have decreased in 2021. The number of new cases in China dropped from 103.8478 million to 10.6675 million, and the standardized incidence rate decreased from 17419.58 per 100,000 to 14016.22 per 100,000, showing a relative reduction of 19.54%. Globally, the number of new cases increased from 506.0279 million to 7643.4398 million, while the standardized incidence rate fell from 19845.39 per 100,000 to 18836.42 per 100,000, indicating a relative decrease of 5.08%. (Table 1)

3.1.2 Current Status of Mortality Burden

Compared to the year 1990, both the number of deaths and the standardized mortality rate of gynecological diseases among women in China and globally have increased by 2021. In China, the number of deaths increased from 0.01 million cases to 0.07 million cases, and the standardized mortality rate increased from 0.03 per 100,000 to 0.07 per 100,000, which is a relative increase of 57.14%. Globally, the number of deaths increased from 0.46 million cases to 0.90 million cases, and the standardized mortality rate increased from 0.20 per 100,000 to 0.21 per 100,000, which is a relative increase of 4.76%. (Table 1)

3.1.3 DALY Burden Status

Compared to 1990, both China and the global female gynecological diseases DALY have increased in 2021, but the standardized DALY rates have decreased. China's DALY increased from 3.8283 million person-years to 3.9542 million person-years, and the standardized DALY rate decreased from 651.88/100,000 to 526.21/100,000, with a relative reduction of 19.28%. The global DALY increased from 18.2618 million person-years to 27.7376 million person-years, and the standardized DALY rate decreased from 727.74/100,000 to 678.64/100,000, with a relative reduction of 6.75%. (Table 1)

Table 1: Current Status of Female Gynecological Disease Burden in China and Globally in 1990 and 2021

Indicator	China		Global	
	1990 year	2021 year	1990 year	2021 year
Incidence				
Incidence No. ×104	10384.78	10066.75	50602.79	76343.98
ASIR	17419.58	14016.22	19845.39	18836.42
Death				
Death No. ×104	0.01	0.07	0.46	0.90
ASMR	0.03	0.07	0.20	0.21
DALY				
DALY No. ×104	382.83	395.42	1826.18	2773.76
ASDR	651.88	526.21	727.74	678.64

DALY: disability adjusted life years

3.2 Analysis of the Changing Patterns of Gynecological Disease Burden Among Chinese Women from 1990 to 2021

3.2.1 Analysis of the Variations in Gynecological Diseases Among Chinese Women

Figure 1 illustrates the differences in the types of gynecological diseases between Chinese and global female populations and their temporal trends. From the figure, it is evident that there are certain disparities in mortality rates for diseases such as endometriosis, genital prolapse, other gynecological diseases, and uterine fibroids between China and the global context. Overall, from 1990 to 2021, the growth rates of these diseases have shown a declining trend in both China and globally. This indicates that with the improvement in medical standards and the strengthening of preventive measures, the increase in gynecological diseases has been effectively controlled.

Specifically, the downward trend in China's growth rate may be similar to the global trend, however, the decline rate could be faster, indicating notable advancements in the prevention and treatment of gynecological diseases in China. Globally, the mortality rate for gynecological diseases generally shows a downward trend, while the mortality rates for endometriosis and uterine fibroids may show an upward trend. In contrast, the mortality rates for genital prolapse and other gynecological diseases show a downward trend. China's mortality rate for uterine fibroids may be slightly lower than the global average, but it has shown an upward trend in recent years, which may be related to increased life pressures among Chinese women, changes in dietary habits, and increased

diagnostic rates. Compared to the global trend, China's growth rate may be lower, but as lifestyles continue to change, the mortality rate in the future may gradually approach the global level.

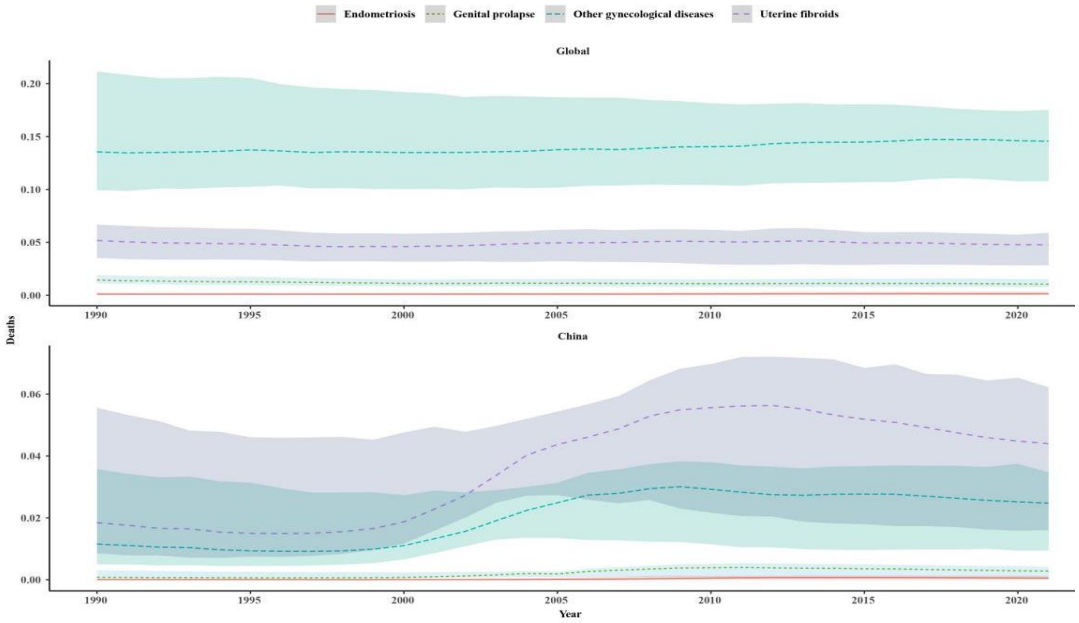

Figure 1: Comparative Analysis of the Temporal Trends in Gynecological Diseases Among Women Globally and in China

3.2.2 Analysis of Age Differences in Gynecological Diseases Among Chinese Women

Figure 2 illustrates the age differences and temporal trends of gynecological diseases among women in China and globally. The figure clearly shows that there are considerable variations in the incidence rates of gynecological diseases (such as endometriosis, genital prolapse, other gynecological diseases, and uterine fibroids) across different age groups of women. Overall, from 1990 to 2021, the trends in the incidence of these diseases among various age groups have varied within China and globally.

Globally, the incidence of gynecological diseases is higher among middle-aged and elderly women, particularly uterine fibroids and genital prolapse. In contrast, the incidence of endometriosis is higher among younger women, which may be related to delayed childbearing age, increased life stress, and environmental factors. In China, the age distribution trend of gynecological diseases is similar to that of the global pattern, but the incidence of certain diseases may be higher. As shown in Figure 3, the incidence of endometriosis among young Chinese women has been on the rise in recent years. Uterine fibroids, as the most common gynecological disease, have a high proportion in women of all age groups, especially among middle-aged and elderly women. This may be related to changes in hormone levels, genetic factors, or lifestyle, among other factors. Secondly, the incidence of other gynecological diseases fluctuates with age, but overall, it remains at a certain level. It is noteworthy that although cases of genital prolapse are relatively rare, they still account for a certain proportion among young women.

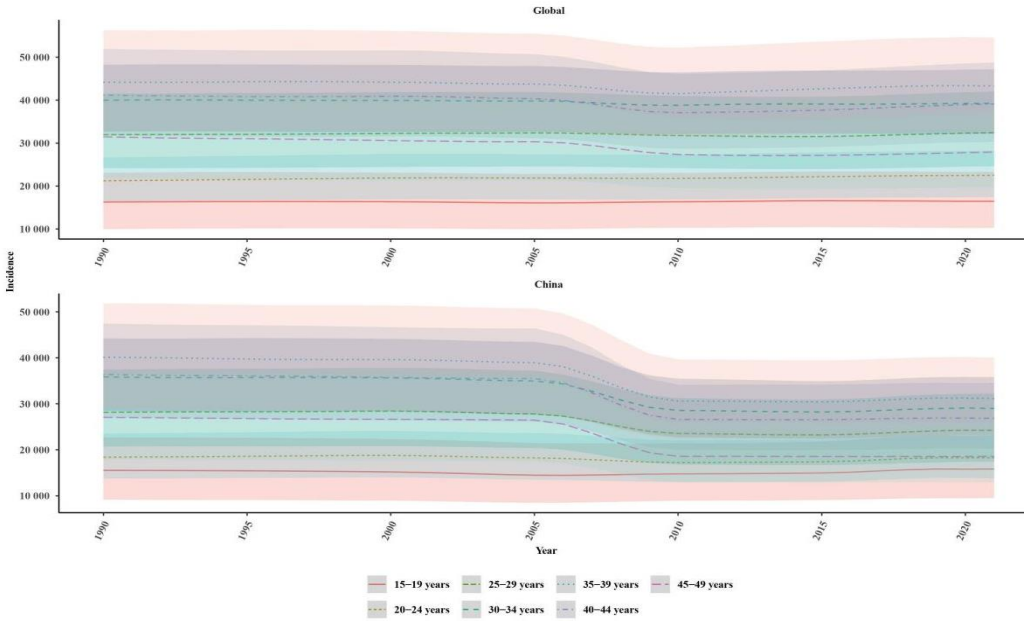

Figure 2: Comparative Analysis of Age-related Trends in Gynecological Diseases Between Global and Chinese Women

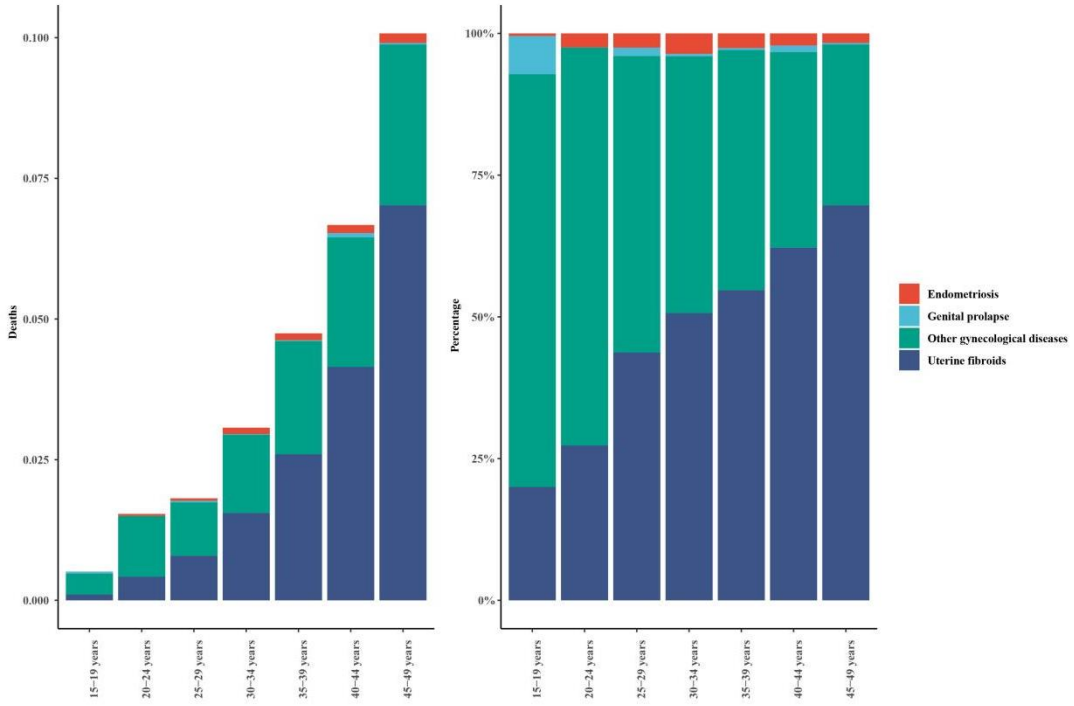

Figure 3: Comparison of Etiologies of Gynecological Diseases in Chinese Women by Age Group

3.3 Bayesian Age-Period-Cohort Model Prediction

Using the BAPC model to predict the age-standardized incidence rate (ASIR) in China up to 2035, in Figure 4, the black line represents the trend of age-standardized rates in China from 1990 to 2021, while the purple-blue area represents the 95% confidence interval. The forecast before 2035 indicates a relatively rapid upward trend for China. This suggests that in the next 15 years, the age-standardized incidence rate of the population may continue to rise from 2020 to 2035.

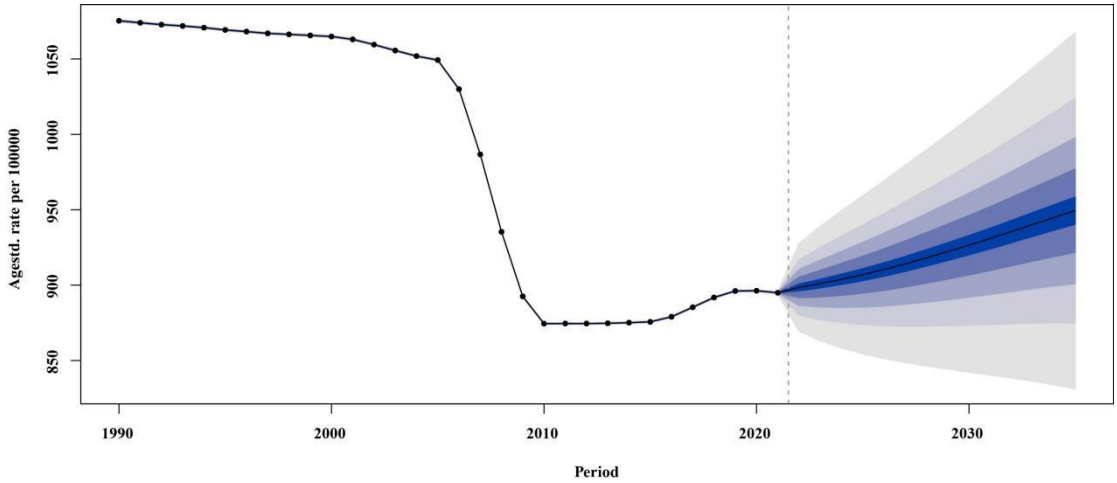

Figure 4: Bayesian Age-Period-Cohort Model Prediction

4. Discussion

This study is based on the gynecological disease statistical data from the GBD 2021 database, analyzing the disease burden and changing trends of gynecological diseases among Chinese and global women over the past 30 years. The results show that from 1990 to 2021, both the number of deaths and the standardized mortality rate and DALY (Disability-Adjusted Life Years) in China and globally have shown an overall upward trend, while the standardized incidence rate and standardized DALY rate have shown an overall downward trend. The age effect results of this study show that in China, the age distribution trend of gynecological diseases is similar to that of the world, but the incidence of certain diseases may be higher. For example, the incidence of genital prolapse in middle-aged women in rural China may be significantly higher than the global average, which is related to the traditional concept of multiple births and higher physical labor intensity. In addition, the incidence of endometriosis in young women in China has shown an increasing trend in recent years, which may be related to changes in lifestyle and increased diagnostic rates.

In China, women of different age groups encounter various health challenges related to gynecological diseases, with endometriosis, a chronic condition, having a lasting effect on the reproductive health of women of childbearing age. The prevalence rate is about 10%-15% [13], and this proportion is also significant globally, affecting up to 10% of women of

childbearing age [14]. Endometriosis is characterized by the abnormal growth of endometrial tissue in locations outside the uterus, including the pelvic cavity, ovaries, bladder, and intestines. These ectopic tissues undergo bleeding, shedding, and inflammatory reactions with the menstrual cycle, but because they cannot be discharged like normal menstruation, patients often experience chronic pelvic pain, infertility, dyspareunia, and menstrual abnormalities. These symptoms not only bring physical pain to patients but also severely reduce their quality of life [15]. Although the direct mortality rate of endometriosis in gynecological diseases is relatively low, in recent years, globally, from 1990 to 2021, the mortality rate has significantly risen across various age groups and regions. Even more concerning, studies indicate that individuals with endometriosis have an elevated risk of developing cancer [16-18], especially related to an increased risk of ovarian, breast, and thyroid cancers [19]. Pelvic organ prolapse typically occurs due to the loss of pelvic support and primarily leads to non-specific symptoms. It may impact over half of women aged 50 to 59, although spontaneous remission can also take place [20], From 1990 to 2021, due to the progress in overall healthcare standards, such diseases have significantly decreased globally and in China, with a lower proportion. The etiology of other gynecological diseases is more complex, but globally, they have remained at a certain level from 1990 to 2021, with uterine fibroids being one of the main benign tumors threatening women's health [21]. The prevalence and incidence of uterine fibroids are on the rise globally, with a prevalence rate of 4.5% to 68.6% [22-24], and the true prevalence rate may be higher than reported, increasing the healthcare burden [25]. According to the 2021 GBD database, in China, uterine fibroids account for the highest proportion of deaths in middle-aged and elderly women, but there is also a certain proportion in young women. Although uterine fibroids occupy a high proportion of deaths in middle-aged and elderly women in China, they are also gradually showing a certain incidence rate in young women. In recent years, with changes in lifestyle, environmental factors, and genetic factors, an increasing number of young women have begun to exhibit symptoms of uterine fibroids. Although uterine fibroids are usually benign tumors, if not treated promptly, they may cause serious complications, such as anemia, menorrhagia, severe pelvic pain, and even affect fertility. Therefore, young women should be vigilant about uterine fibroids, undergo regular gynecological examinations, and treat related issues promptly to reduce their impact on physical health.

5. Summary

In summary, the situation of prevention and treatment of gynecological diseases among Chinese women remains severe. It is essential to further strengthen early screening and preventive measures for gynecological diseases based on current health policies and actual conditions, especially in urban and rural grassroots areas. Improving women's health education levels, enabling them to understand common gynecological diseases and their early symptoms, and seeking medical attention promptly can effectively reduce the occurrence and development of diseases. At the same time, the government and relevant institutions should increase investment in research and development for the prevention and treatment of gynecological diseases, promote the application of new technologies and methods, and optimize diagnostic and treatment approaches to better address the increasingly complex issues of women's health. Through the joint efforts of the entire society, it is possible to significantly alleviate the health burden on the female population and improve the quality of life for women.

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