American Journal of Clinical and Experimental Medicine
2026, Vol. 14, No. 3, pp. 40–48
https://doi.org/10.11648/j.ajcem.20261403.11

SciencePG
Science Publishing Group

Research Article

Analysis of Epidemiological Characteristics of Esophageal Cancer in Kailu County, Inner Mongolia, 2009–2022 and Prediction of Incidence Trends from 2023 to 2025

Geng Xin-Yao[1], Wang Hao[1], Ni Xiao-Na[2], Li Zhi-Hui[2], Gong Liang-Liang[2], Buren Ba-Tu[2], Li Na[2, *]

[1]School of Public Health, Baotou Medical College, Baotou, China

[2]Chronic Disease Prevention and Control Department, Tongliao Center for Disease Control and Prevention, Tongliao, China

Abstract

Objective: To investigate the epidemiological characteristics of esophageal cancer in Kailu County, Inner Mongolia Autonomous Region, from 2009 to 2022, and to predict trends in the incidence of esophageal cancer in the county from 2023 to 2025. *Methods:* Based on data on esophageal cancer incidence, mortality, and registered population in Kailu County from 2009 to 2022, crude incidence (mortality) rates, incidence (mortality) rates standardized to the Chinese population, and incidence (mortality) rates standardized to the world population were calculated by stratifying data by sex and age; The Joinpoint regression model was used to calculate the annual percentage change (APC) in China-standardized rates, and the autoregressive integrated moving average (ARIMA) model was employed to forecast trends in esophageal cancer incidence for 2023–2025. *Results:* From 2009 to 2022, the crude incidence and crude mortality rates of esophageal cancer in Kailu County were 25.31 per 100,000 and 20.58 per 100,000, respectively; the China-standardized incidence (mortality) rates were 23.59/100,000 (19.25/100,000), and the world-standardized incidence (mortality) rates were 22.09/100,000 (17.50/100,000); For men, all three incidence and mortality indicators were significantly higher than those for women ($P < 0.05$); the China-standardized incidence rate of esophageal cancer in the county showed an upward trend from 2009 to 2013 (APC = 12.86%, $P = 0.23$) and a year-on-year decline from 2013 to 2022 (APC = −12.66%, $P < 0.05$); The China-population-standardized mortality rate showed an upward trend from 2009 to 2013 (APC = 39.81%, $P < 0.05$) and a downward trend from 2013 to 2022 (APC = −9.12%, $P < 0.05$); The ARIMA(0,1,0) model predicts that the age-standardized incidence rate of esophageal cancer in the county will continue to decline from 2023 to 2025, with an estimated rate of 6.40 per 100,000 by 2025. *Conclusion:* From 2009 to 2022, the epidemiological characteristics of esophageal cancer in Kailu County were characterized by an initial rise followed by a decline in both incidence and mortality rates, with significant differences observed by age and gender; Although the incidence of esophageal cancer in the county is projected to drop to a relatively low level by 2025, the disease burden remains severe. Continuous monitoring of esophageal cancer is necessary, along with strengthened prevention and control efforts—including public awareness campaigns and interventions targeting high-risk populations—to reduce the disease burden.

Keywords

Esophageal Cancer, Epidemiological Characteristics, Trends, Prediction

*Correspondence: Li Na (fiona940508@126.com)

Received: 3 May 2026; **Accepted:** 4 June 2026; **Published:** 11 July 2026

1. Introduction

According to a cancer statistics report by the International Agency for Research on Cancer (IARC) of the World Health Organization, esophageal cancer ranked 11th in global cancer incidence and 7th in cancer mortality in 2022 [1]. The situation in China is equally grim. Studies show that in 2022, there were 224,012 new cases of esophageal cancer and 187,467 deaths in China, accounting for 43.8% and 42.1% of global cases and deaths, respectively. China ranked first globally in both incidence and mortality rates [2]. Given China's large population, even though the incidence and mortality rates of esophageal cancer are showing a gradual decline, the disease burden it imposes remains higher than in other countries [3]. In addition, the distribution of esophageal cancer in China varies by region [4], and the patterns of change differ across provinces. As the earliest rural cancer surveillance site in the Inner Mongolia Autonomous Region, Kailu County has comprehensive esophageal cancer data covering a long time span (from 2009, when records were first entered into the cancer registry, to the present). This study systematically analyzes the incidence and mortality data for esophageal cancer in Kailu County from 2009 to 2022 to describe its epidemiological characteristics and trends. It also uses an ARIMA model to forecast trends in standardized incidence rates for 2023–2025, providing early warnings to local authorities and a scientific basis for formulating prevention and control strategies.

2. Materials and Methods

2.1. Data Sources

The data on esophageal cancer in this study were sourced from the cancer registry records of the Kailu County Cancer Registry for the period 2009–2022. These records include new cases and deaths from esophageal cancer in Kailu County, along with corresponding household registration information. Data from the Kailu County surveillance site has been included multiple times in the annual cancer reports of both the national government and the Inner Mongolia Autonomous Region. Esophageal cancer (C15) was identified using the International Classification of Diseases, 10th Revision (ICD-10) coding system and reported by medical institutions in Kailu County via an online system.

2.2. Quality Control

Data from Kailu County were coded strictly in accordance with the ICD-10 and the International Classification of Diseases, Oncology (3rd edition) (ICD-O-3) standards. Data completeness was assessed based on the *Chinese Cancer Registry Work Manual* (2016 edition) and the inclusion and exclusion criteria of the International Agency for Research on Cancer [5, 6], and the reported data were ultimately checked for completeness, validity, and consistency. Data evaluation utilized indicators such as the percentage of morphological verification (MV%), the percentage of death certification only (DCO%), and the mortality-to-incidence ratio (M/I). From 2009 to 2022, the MV%, DCO%, and M/I were 84.92%, 0.44%, and 0.81, respectively, indicating that the data are complete and reliable.

2.3. Statistical Analysis

Data were organized and analyzed using SPSS and Excel to calculate the crude incidence and mortality rates of esophageal cancer in Kailu County, as well as rates standardized to the Chinese population (using the 2000 Chinese standard age structure) and the world population (using the Segi world age structure). Statistical graphs were generated using Graphpadprism; JoinPoint 5.4 software was used to analyze the average annual percentage change (AAPC) in standardized rates to evaluate trends, with $P < 0.05$ indicating statistical significance; the ARIMA model was used to forecast the incidence of esophageal cancer in Kailu County. Non-stationary data were differenced until the data became stationary; the closer the r^2 value is to 1 and the smaller the MAPE% value, the better the prediction performance [7].

3. Results

3.1. Incidence and Mortality Patterns of Esophageal Cancer in Kailu County, 2009–2022

From 2009 to 2022, a total of 1,379 new cases of esophageal cancer were recorded in Kailu County, Inner Mongolia Autonomous Region, including 1,283 cases among men and 96 cases among women, resulting in a male-to-female ratio of 13.36. The crude incidence rate for the entire population was 25.31 per 100,000, and the age-standardized incidence rate was 23.59 per 100,000. The crude incidence rate (standardized incidence rate) for men was 46.36 per 100,000 (44.17 per 100,000), which was significantly higher than that for women (3.58 per 100,000 [3.32 per 100,000]), with $P < 0.01$.

There were 1,121 deaths from esophageal cancer, including 1,044 men and 77 women, with a male-to-female ratio of 13.56 (men to women); the crude mortality rate for the entire population was 20.58 per 100,000, and the age-standardized mortality rate was 19.25 per 100,000. The crude mortality rate (standardized mortality rate) for men was 37.72 per 100,000 (36.14 per 100,000), which was significantly higher than that for women (2.87 per 100,000 [2.64 per 100,000]), $P < 0.01$, as show in Table 1.

Table 1. Trends in the Age-standardized Incidence and Mortality Rates of Malignant Tumors, 2009–2022.

Years	ASIR (1/10⁵)			ASMR (1/10⁵)		
	Total	Male	Female	Total	Male	Female
2009	19.27	35.22	2.68	5.73	10.57	0.7
2010	39.04	74.41	2.17	23.72	44.41	2.14
2011	33.67	60.33	6.17	18.81	36.48	0.64
2012	32.01	55.62	7.85	24.53	41.43	7.29
2013	39.72	73.87	5.40	32.43	61.92	3.15
2014	30.13	55.59	4.02	30.69	56.28	4.61
2015	27.60	55.86	0.83	27.44	51.45	4.06
2016	27.62	47.37	7.63	20.00	36.85	2.98
2017	33.16	65.17	3.13	23.51	43.67	4.68
2018	22.52	43.12	2.79	14.92	28.47	1.97
2019	18.04	33.59	2.87	23.14	44.49	2.43
2020	12.95	25.33	1.00	16.78	32.06	1.85
2021	11.91	21.91	2.29	12.95	24.59	1.73
2022	12.93	24.23	2.18	11.53	21.67	1.72

3.2. Joinpoint Regression Analysis of the Epidemiological Trends of Esophageal Cancer in Kailu County, 2009-2022

The results of the regression model show that both the incidence and mortality rates of esophageal cancer in Kailu County from 2009 to 2022 followed a pattern of first increasing and then decreasing. From 2009 to 2013, the incidence rate in the general population increased by an average of 12.86% per year, though this result was not statistically significant; the mortality rate increased by an average of 59.81% per year, and this result was statistically significant ($P < 0.05$); From 2013 to 2022, the annual average incidence and mortality rates decreased by 12.66% and 9.12%, respectively, and both results were statistically significant ($P < 0.05$). Incidence and mortality trends among men were consistent with those of the general population. Among women, incidence showed a downward trend from 2009 to 2022 (APC = -5.83%), but this result was not statistically significant ($P = 0.19$). Female mortality, however, exhibited an initial increase followed by a decrease, and both trends were statistically significant ($P < 0.05$), as shown in Table 2.

Table 2. Joinpoint Analysis of ASIRC and ASMRC for Esophageal Cancer, 2009–2022.

Graph	Category	Time Period (Year)	APC(%)	95%CI	t	*P*
Incidence	Total	2009-2013	12.86	-9.16~40.22	1.26	*P*=0.23
		2013-2022	-12.66	-17.97~-7.02	-4.89	*P*<0.05
	Male	2009-2013	13.14	-10.54~43.09	1.19	*P*=0.26
		2013-2022	-12.38	-18.13~-6.24	-4.14	*P*<0.05
	Female	2009-2022	-5.83	-14.28~3.45	-1.39	*P*=0.19
Mortality	Total	2009-2013	59.81	3.45~146.87	2.44	*P*<0.05
		2013-2022	-9.12	-15.07~-2.75	-3.19	*P*<0.05

Graph	Category	Time Period (Year)	APC(%)	95%CI	t	*P*
	Male	2009-2013	38.80	1.89~89.09	2.4	*P*<0.05
		2013-2022	-10.66	-18.29~-2.32	-2.86	*P*<0.05
	Female	2009-2013	89.88	1.20~256.28	2.30	*P*<0.05
		2013-2022	-8.99	-17.49~-0.37	-2.18	*P*<0.05

3.3. Trends in Incidence and Mortality of Esophageal Cancer by Sex and Age in Kailu County, 2009–2022

From 2009 to 2022, the incidence of esophageal cancer in the general population (both men and women) in Kailu County increased with age before declining; the trend in male incidence was consistent with that of the general population. The highest incidence rates for both sexes were observed in the 60-year-old age group; The incidence rates for the overall population and for men each reached two peaks in the 65-year-old and 75-year-old age groups, respectively; the incidence rate for women, however, rose gradually until the 75-year-old age group, after which it began to decline; the trends in incidence rates differed significantly between the two genders (Figure 1A). The mortality trends for esophageal cancer in the overall population, men, and women in Kailu County all followed a pattern of initially rising and then declining with increasing age; the highest number of deaths from malignant tumors for both men and women occurred in the 60-year-old age group; The trends in mortality rates for the general population and for men were consistent, with inflection points occurring in the 65-year-old and 75-year-old age groups, respectively; the female mortality rate peaked in the 75-year-old age group and then declined (Figure 1B); over the 14-year period, the overall incidence and mortality rates of esophageal cancer in Kailu County increased most significantly among individuals aged 45–79.

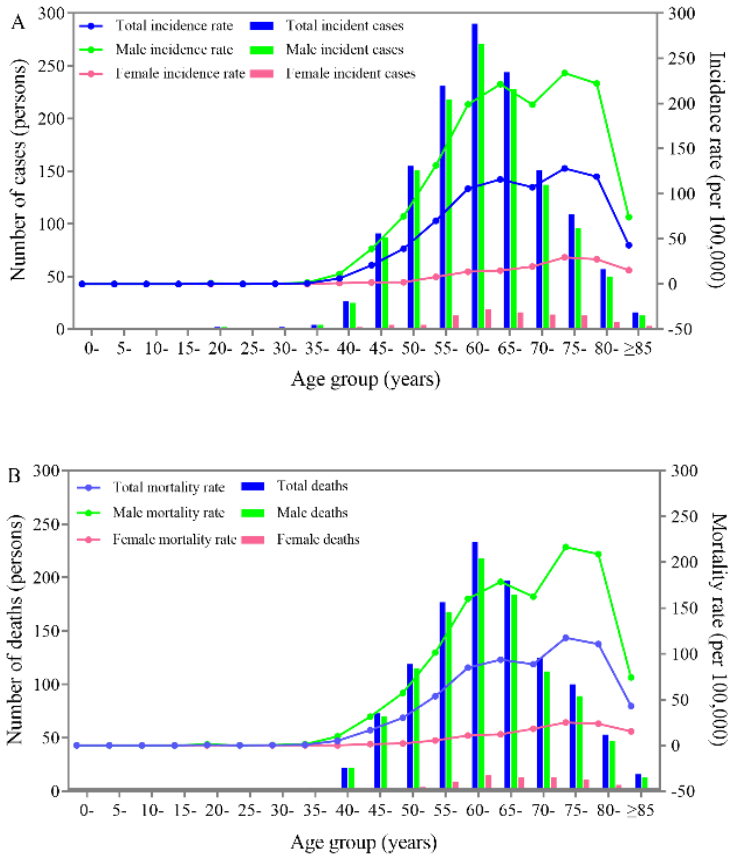

Figure 1. *Age and Gender Differences in Incidence and Mortality of Esophageal Cancer, Kailu County, 2009–2022.*

3.4. ARIMA Model Fitting and Forecast of Esophageal Cancer Incidence in Kailu County, 2023–2030

Upon entering data from 2009 to 2022 into this study, we found that the r^2 value was low (0.3) and and a high MAPE% (20.57%). Since Kailu County was newly designated as a rural monitoring site in the Inner Mongolia Autonomous Region in 2009 and was in its initial phase, the number of recorded samples was small. To ensure the stability and stationarity of the ARIMA model, the final analysis focused on esophageal cancer incidence data from 2010 to 2022. The results are shown in Figure 2, the ACF does not significantly converge to 0, indicating that the data is non-stationary and requires differencing.

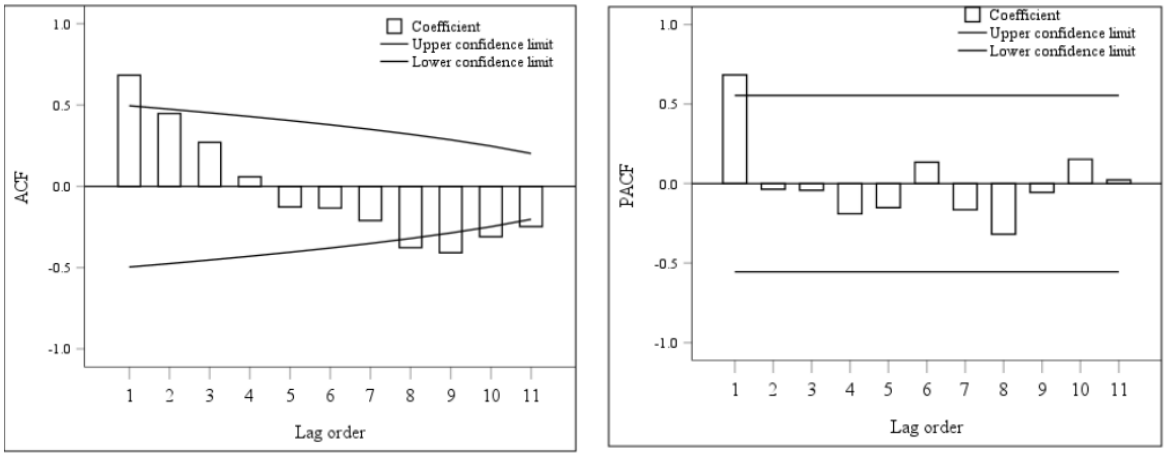

Figure 2. *ACF and PACF plots of the original time series.*

The results after first-order differencing are shown in Figure 3. The ACF approaches 0, indicating that the data are stationary. Both the ACF and PACF fall within their respective confidence intervals and are truncated before lag 1. Therefore, an ARIMA model of (0, 1, 0) was fitted. The r^2 value for the esophageal cancer incidence data was 0.66, and the MAPE was 16.68%. The normalized BIC is 3.59; the Yang-Box test ($P > 0.05$) indicates that the model fits the data well, and the prediction results are satisfactory.

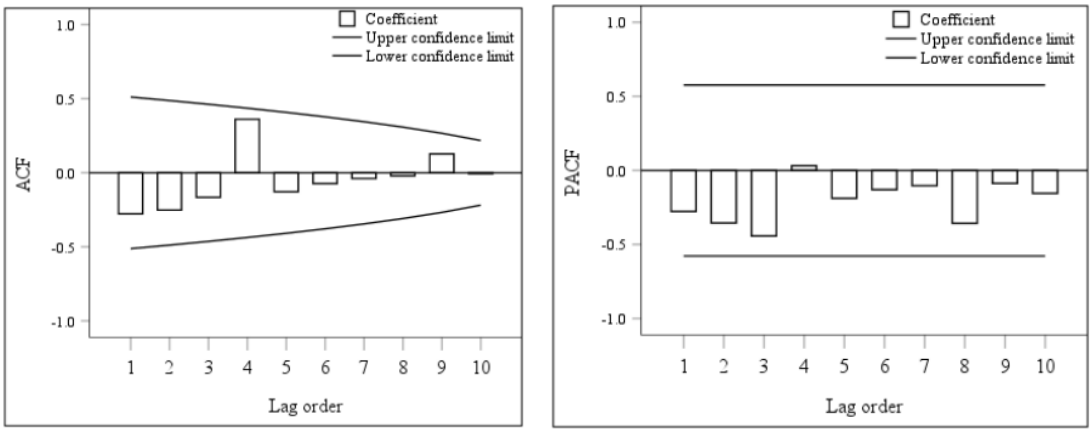

Figure 3. *ACF and PACF plots of the differenced time series.*

The ARIMA(0,1,0) model successfully fitted the time series of standardized incidence rates of esophageal cancer in Kailu County from 2010 to 2022. It predicts that the incidence of esophageal cancer will show a year-on-year downward trend from 2023 to 2025. The prediction results are shown in Table 3 and Figure 4. 10.75 per 100,000 in 2023 (95% CI: 5.75–15.76), 8.58 per 100,000 in 2024 (95% CI: 1.50–15.66), and 6.40 per 100,000 in 2025 (95% CI: −2.27–15.07).

Table 3. Prediction of esophageal cancer incidence from 2023 to 2025 by the ARIMA model.

Year	Actual value	Predicted value	95%CI	Percentage error (%)
2010	39.04	-	-	-
2011	33.67	36.86	31.86~41.87	9.49
2012	32.01	31.49	26.49~36.50	1.61
2013	39.72	38.48	33.48~43.49	3.11
2014	30.13	28.89	23.89~33.90	4.10
2015	27.60	27.95	22.95~32.96	1.28
2016	27.62	25.42	20.42~30.43	7.95
2017	33.16	33.53	28.53~38.54	1.13
2018	22.52	22.89	17.89~27.90	1.66
2019	18.04	20.34	15.34~25.35	12.77
2020	12.95	15.86	10.86~20.87	22.50
2021	11.91	10.77	5.77~15.78	9.54
2022	12.93	9.73	4.73~14.74	24.72
2023	-	10.75	5.75~15.76	-
2024	-	8.58	1.50~15.66	-
2025	-	6.40	-2.27~15.07	-

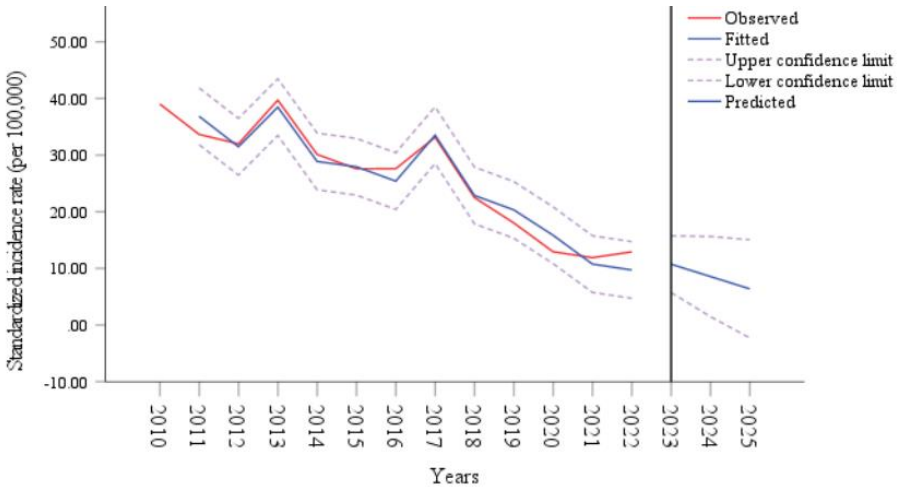

Figure 4. Comparison of actual and fitted values of esophageal cancer incidence with predictions in Kailu County, 2010–2022.

4. Discussion

Esophageal cancer is a common malignant tumor worldwide. Characterized by high malignancy and poor prognosis, it is one of the major cancers that seriously threaten public health [8]. China is a region with a high incidence of esophageal cancer, and the overall disease burden remains significant [9]. From a pathological classification perspective, esophageal cancer is primarily divided into two types: squamous cell carcinoma and adenocarcinoma, with squamous cell carcinoma being the predominant type in China [10]. This study systematically analyzed data on esophageal cancer incidence and mortality in Kailu County, Inner Mongolia Autonomous Region, from 2009 to 2022. The results showed that over the 14-year period, the average crude incidence and age-standardized incidence rates of esophageal cancer in the region were 25.31 per 100,000 and 23.59 per 100,000, respectively, with crude and age-standardized mortality rates of 20.58/100,000 and

19.25/100,000, respectively. In 2022, the local age-standardized incidence and mortality rates for esophageal cancer were 11.03/100,000 and 9.98/100,000, respectively. During the same period, the global standard incidence and mortality rates for esophageal cancer were 5.0 per 100,000 and 4.3 per 100,000, respectively, while those for China were 8.3 per 100,000 and 6.7 per 100,000, respectively. In comparison, the overall disease burden of esophageal cancer in Kailu County remains at a relatively high level.

In terms of gender distribution, both the incidence and mortality of esophageal cancer in Kailu County showed a significant male predominance, with male-to-female ratios of 13.36 and 13.56, respectively. The crude incidence, age-standardized incidence, crude mortality, and age-standardized mortality rates were all significantly higher in men than in women ($P < 0.01$). This is consistent with the findings of most domestic and international studies. This disparity may be attributed to men being exposed to a greater number of risk factors in daily life compared to women, such as more frequent tobacco use, higher levels of alcohol dependence [11, 12], and a diet high in salt and heat [13, 14]; other studies have also indicated that estrogen may act as a protective factor against esophageal cancer in women [15].

Analysis by age group shows that both the incidence and mortality rates of esophageal cancer in Kailu County first rise and then decline with age. They remain at a relatively low level before the age of 40, beginning to rise gradually in the 40–44 age group, with a rapid increase observed between 45 and 79 years of age. The peak incidence and mortality rates are concentrated in the 60–75 age group, indicating that middle-aged and elderly individuals are the primary focus for esophageal cancer prevention and control. People in this age group are chronically exposed to risk factors, experience a decline in immune and repair functions, and have a low willingness to modify esophageal cancer risk factors [16], and the risk of malignant transformation of precancerous lesions is elevated; therefore, they should be prioritized for screening and health interventions.

Joinpoint trend analysis shows that the age-standardized incidence rate of esophageal cancer in Kailu County exhibited an initial upward trend followed by a decline between 2009 and 2022. Among men, the rate began to decrease by 12.38% annually after 2013, while the rate among women decreased by 5.83%. This trend may be attributed to improvements in the local population's dietary patterns, the widespread dissemination of health education, and the gradual advancement of early screening programs in recent years [17, 18]; The epidemiological trend of the age-standardized mortality rate aligns with that of the incidence rate, with both men and women showing a marked downward trend after 2013. The rate of decline among men (-10.66%) was slightly higher than that among women (-8.99%), suggesting that the local comprehensive prevention and control strategies for esophageal cancer have achieved phased results in reducing the risks of both incidence and mortality. Men may have benefited more significantly from the interventions due to higher baseline exposure levels; The overall decline in esophageal cancer mortality (-9.12%) was lower than that in incidence (-12.66%), suggesting that current prevention and control efforts still face challenges such as low early diagnosis rates and limited diagnostic and treatment capabilities at the primary care level [19, 20]. Future efforts should continue to focus on early screening and diagnosis, implementing targeted prevention and control strategies tailored to different populations to reduce the disease burden caused by esophageal cancer.

This study used an ARIMA(0,1,0) model to forecast the incidence of esophageal cancer for 2023–2025. The model demonstrated good fit ($r^2 = 0.66$, MAPE = 16.68%). The results indicate that the standardized incidence rate of esophageal cancer will continue to decline over the three-year period from 2023 to 2025, with a projected rate of 6.40 per 100,000 by 2025, suggesting that local screening and awareness campaigns for esophageal cancer are yielding sustainable results; However, the overall disease burden of esophageal cancer in Kailu County remains significant. Combined with the forecast results, this study provides a scientific basis for optimizing local esophageal cancer prevention and control strategies and allocating resources, which holds important practical significance for consolidating the effectiveness of interventions and continuously reducing the disease burden.

This study has certain limitations: the data were derived from a cancer registry system, which may result in a small number of underreported cases; individual-level information, such as exposure to risk factors and clinical pathways, was not included; and the prediction intervals are wide, with limited extrapolation over time. Future research could involve population-based epidemiological studies that incorporate risk factors, screening coverage, and treatment outcomes into multivariate analyses to enhance the precision of prevention and control strategies.

5. Conclusion

From 2009 to 2022, the disease burden of esophageal cancer in Kailu County, Inner Mongolia, remained at a relatively high level. Both the age-standardized incidence and mortality rates followed a pattern of initially rising and then declining. Furthermore, the incidence and mortality rates of esophageal cancer among men were significantly higher than those among women, with both incidence and mortality concentrated among middle-aged and elderly individuals aged 45 and older, demonstrating clear differences by gender and age group. The ARIMA(0,1,0) model's projections for the standardized incidence rates in Kailu County from 2023 to 2025 indicate that the local esophageal cancer incidence rate will continue to decline; Although the epidemiological trend of esophageal cancer in Kailu County has been declining year by year since 2013, its high incidence and mortality rates remain one of the key factors affecting the health of local residents. It is recom-

mended that the Kailu County government and relevant departments continue to improve cancer surveillance, prioritize early screening and diagnosis of esophageal cancer among high-risk groups such as men and middle-aged and elderly individuals, strengthen health education and risk factor control, and enhance the standardization of diagnosis and treatment. These measures will effectively alleviate the health burden caused by esophageal cancer and reduce the risk of death.

Abbreviations

APC	Annual Percentage Change
ARIMA	Autoregressive Integrated Moving Average
IARC	International Agency for Research on Cancer
ICD-10	10th Revision
MV%	Percentage of Morphological Verification
DCO%	Percentage of Death Certification Only
M/I	Mortality-To-Incidence Ratio
AAPC	Average Annual Percentage Change

Author Contributions

Geng Xin-Yao: Conceptualization, Data curation, Formal analysis, Writing – original draft

Wang Hao: Data curation, Validation, Visualization

Ni Xiao-Na: Methodology, Formal analysis

Li Zhi-Hui: Resources, Data curation

Gong Liang-Liang: Writing – review & editing

Buren Ba-Tu: Project administration

Li Na: Conceptualization, Supervision, Funding acquisition

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Bray F, Laversanne M, Sung H, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024; 74(3): 229-263. https://doi.org/10.3322/caac.21834

[2] Cao W, Qin K, Li F, Chen W. Comparative study of cancer profiles between 2020 and 2022 using global cancer statistics (GLOBOCAN). J Natl Cancer Cent. 2024; 4(2): 128-134. Published 2024 May 7. https://doi.org/10.1016/j.jncc.2024.05.001

[3] He F, Wang J, Liu L, et al. Esophageal cancer: trends in incidence and mortality in China from 2005 to 2015. Cancer Med. 2021; 10(5): 1839-1847. https://doi.org/10.1002/cam4.3647

[4] Jingu K, Numasaki H, Toh Y, et al. Chemoradiotherapy and radiotherapy alone in patients with esophageal cancer aged 80 years or older based on the Comprehensive Registry of Esophageal Cancer in Japan. Esophagus. 2020; 17(3): 223-229. https://doi.org/10.1007/s10388-020-00725-w

[5] Parkin DM, Bray F. Evaluation of data quality in the cancer registry: principles and methods Part II. Completeness. Eur J Cancer. 2009; 45(5): 756-764. https://doi.org/10.1016/j.ejca.2008.11.033

[6] Bray F, Parkin DM. Evaluation of data quality in the cancer registry: principles and methods. Part I: comparability, validity and timeliness. Eur J Cancer. 2009; 45(5): 747-755. https://doi.org/10.1016/j.ejca.2008.11.032

[7] Wang N, Zhuang W, Ran Z, Wan P, Fu J. Prediction of acute onset of chronic cor pulmonale: comparative analysis of Holt-Winters exponential smoothing and ARIMA model. BMC Med Res Methodol. 2024; 24(1): 204. Published 2024 Sep 13. https://doi.org/10.1186/s12874-024-02325-z

[8] Han B, Zheng R, Zeng H, et al. Cancer incidence and mortality in China, 2022. J Natl Cancer Cent. 2024; 4(1): 47-53. Published 2024 Feb 2. https://doi.org/10.1016/j.jncc.2024.01.006

[9] Chen W, Zheng R, Zhang S, et al. Cancer incidence and mortality in China, 2013. Cancer Lett. 2017; 401: 63-71. https://doi.org/10.1016/j.canlet.2017.04.024

[10] Zhang S, Sun K, Zheng R, et al. Cancer incidence and mortality in China, 2015. J Natl Cancer Cent. 2020; 1(1): 2-11. Published 2020 Dec 17. https://doi.org/10.1016/j.jncc.2020.12.001

[11] Fan J, Liu Z, Mao X, et al. Global trends in the incidence and mortality of esophageal cancer from 1990 to 2017. Cancer Med. 2020; 9(18): 6875-6887. https://doi.org/10.1002/cam4.3338

[12] Prabhu A, Obi KO, Rubenstein JH. The synergistic effects of alcohol and tobacco consumption on the risk of esophageal squamous cell carcinoma: a meta-analysis. Am J Gastroenterol. 2014; 109(6): 822-827. https://doi.org/10.1038/ajg.2014.71

[13] Islami F, Poustchi H, Pourshams A, et al. A prospective study of tea drinking temperature and risk of esophageal squamous cell carcinoma. Int J Cancer. 2020; 146(1): 18-25. https://doi.org/10.1002/ijc.32220

[14] Islami F, Pourshams A, Nasrollahzadeh D, et al. Tea drinking habits and oesophageal cancer in a high risk area in northern Iran: population based case-control study. BMJ. 2009; 338: b929. Published 2009 Mar 26. https://doi.org/10.1136/bmj.b929

[15] Petrick JL, Cook MB. Do Sex Hormones Underlie Sex Differences in Cancer Incidence? Testing the Intuitive in Esophageal Adenocarcinoma. Am J Gastroenterol. 2020; 115(2): 211-213. https://doi.org/10.14309/ajg.0000000000000511

[16] Liu M, Zhang C, Cai H, et al. The Willingness to Change Risky Health Behaviors among Chinese Rural Residents: What We Learned from a Population-Based Esophageal Cancer Cohort Study. PLoS One. 2016; 11(8): e0161999. Published 2016 Aug 30. https://doi.org/10.1371/journal.pone.0161999

[17] Hamashima C, Narisawa R, Ogoshi K, Kato T, Fujita K. Optimal interval of endoscopic screening based on stage distributions of detected gastric cancers. BMC Cancer. 2017; 17(1): 740. Published 2017 Nov 9. https://doi.org/10.1186/s12885-017-3710-x

[18] Chen R, Liu Y, Song G, et al. Effectiveness of one-time endoscopic screening programme in prevention of upper gastrointestinal cancer in China: a multicentre population-based cohort study. Gut. 2021; 70(2): 251-260. https://doi.org/10.1136/gutjnl-2019-320200

[19] Li H, Teng Y, Yan X, et al. Profiles and Findings of Population-Based Esophageal Cancer Screening With Endoscopy in China: Systematic Review and Meta-analysis. JMIR Public Health Surveill. 2023; 9: e45360. Published 2023 Jun 1. https://doi.org/10.2196/45360

[20] Xia C, Basu P, Kramer BS, et al. Cancer screening in China: a steep road from eviden-ce to implementation. Lancet Public Health. 2023; 8(12): e996-e1005. https://doi.org/10.1016/S2468-2667(23)00186-X