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Global Burden of Otitis Media in Africa and 5 Subregions: 1992–2021 Trends

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Received: 3 March 2026; **Revised:** 13 April 2026; **Accepted:** 19 June 2026; **Published:** 25 June 2026

Abstract: Africa has the highest global otitis media (OM) burden; however, regional trends and projections remain underexplored. We assessed the OM burden (incidence, prevalence, mortality, and disability-adjusted life years [DALYs]) across Africa (1992–2021) and forecasted 2037 trends. Data for this study were extracted from the Global Burden of Disease (GBD) database 1992 to 2021 and were analyzed using joinpoint regression, age-period-cohort (APC) analysis, decomposition analysis and Auto Regressive Integrated Moving Average (ARIMA) projections. Africa's age-standardized incidence rate (ASIR) slightly increased (+0.02% average annual percentage change, AAPC), while the prevalence (−0.18%), mortality (−2.73%), and DALY rates (−0.39%) declined. In 2021, Eastern Africa had the highest ASIR/ age-standardized mortality rate (ASMR); Central Africa had the highest age-standardized prevalence rate (ASPR)/age-standardized DALY rate (ASDR). Children aged <9 years bore the greatest burden. The APC analysis shows that age and period were correlated with incidence rate. Decomposition analysis showed that population growth positively drove increases in disease burden, while aging negatively affected the growth. Projections estimate that ASIR will rise to 6,019.27 per 100,000 by 2037, while ASPR and ASDR will decline to 1,730.65 and 34.11 per 100,000. Reducing OM's disease burden necessitates strategies better aligned with African population needs and global collaboration.

Keywords: Otitis Media; Trend; Incidence; Mortality; Prevalence; Disability-Adjusted Life Years

1. Introduction

Otitis media (OM), inflammation or infection in the middle ear, has been a public health problem, particularly in Africa. It is associated with a range of clinical manifestations including pyrexia, otalgia, otorrhea, vestibular dysfunction and auditory impairment. Furthermore, persistent otitis media can cause irreversible sensorineural hearing loss. This condition is particularly concerning in the pediatric population, as it can adversely impact speech and language acquisition, with long-term implications for cognitive development and social integration. The burden caused by otitis media underscores the urgency of addressing this health issue.

Global Burden of Disease (GBD) studies have been instrumental in quantifying the health challenges faced by various regions, including Africa. The GBD data provide a comprehensive picture of the disease burden, offering insights into the incidence, prevalence, mortality, and disability-adjusted life years (DALYs) about otitis media [1].

For example, from interactive data visuals from the GBD consortium, countries with high DALYs rates are predominantly located in Africa, particularly when the DALYs rate exceeds 50/100,000 (**Figure 1**). Somalia had the highest DALYs worldwide in 2021. These metrics are critical for understanding the scope and impact of these conditions on the African population. Africa is traditionally divided into five geographical regions: Eastern Africa, Western Africa, Southern Africa, Northern Africa, and Central Africa. Owing to unbalanced economic development, the economic burden caused by OM varies across these regions. To date, there have been no reports on this subject.

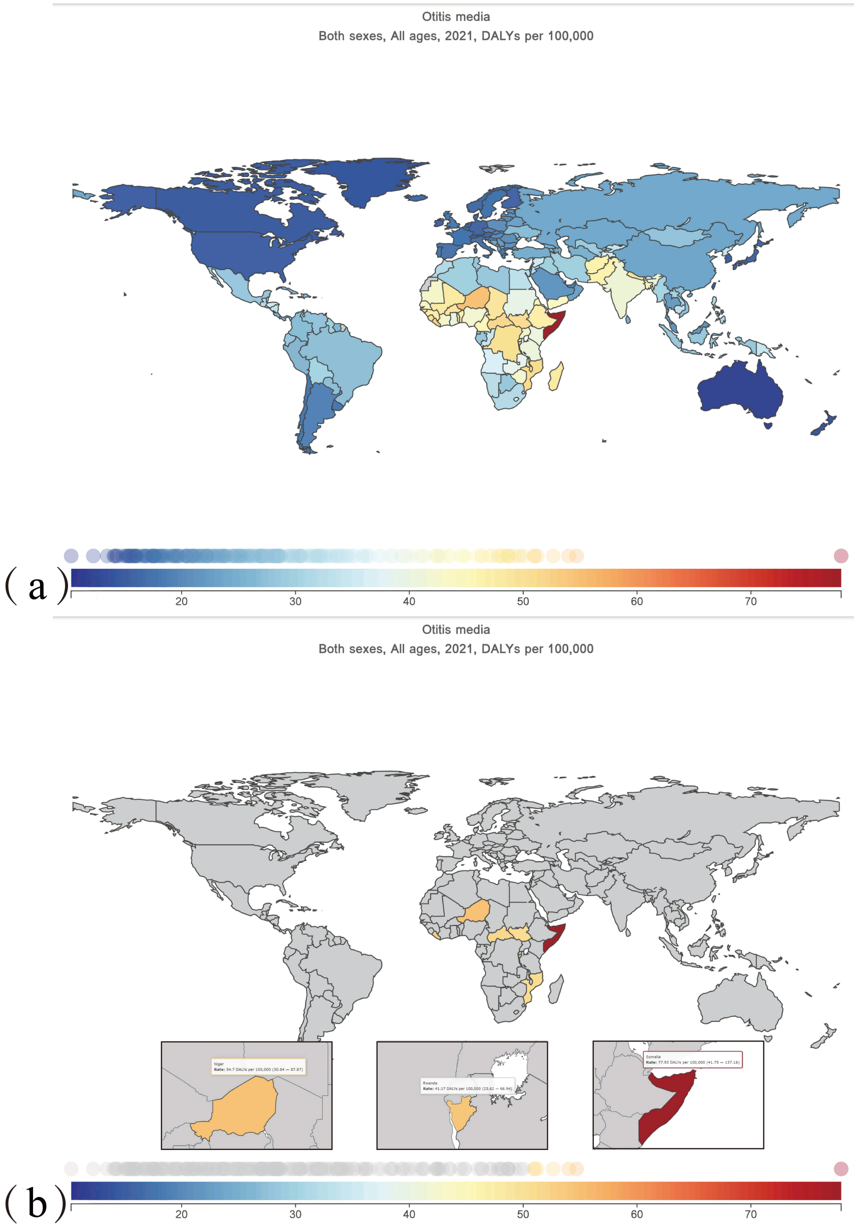

Figure 1. The DALY (Disability-Adjusted Life Year) of otitis media for both sexes in 204 countries and territories. (**a**) The DALY of otitis media in 2021; (**b**) Countries with a DALY greater than 50.

In consideration of the aforementioned factors, the present study is designed to utilize GBD data to conduct a comprehensive analysis of the epidemiological profile of otitis media in Africa. The objectives include the evaluation of factors contributing to disease prevalence and the identification of potential strategies for enhancement within the scope of Sino-African healthcare collaboration. This analysis fills critical knowledge gaps in regional epidemiological surveillance and provides information on targeted intervention strategies.

2. Materials and Methods

2.1. Data Sources

We accessed the latest GBD 2021 dataset, which meticulously documents health metrics for a spectrum of diseases worldwide. The dataset encompasses a wide array of indicators, such as incidence, prevalence, mortality rates, and disability-adjusted life years (DALYs), stratified by age, sex, and geographical location for 204 countries and territories. Otitis media is listed in the GBD database with code "B.2.1". The associated International Classification of Diseases, 10th Revision (ICD-10) is H65-H75.83 [2].

DisMod-MR, a Bayesian meta-regression tool, was used to assess the data related to the incidence, prevalence and mortality rates of otitis media. This tool facilitates the analysis of disease epidemiology by ensuring consistency across various parameters. Additionally, the Cause of Death Ensemble model (CODEm) was used to analyze mortality data.

Specific data extracts for otitis media were sourced from the Global Health Data Exchange (GHDx), an open-access platform that houses metadata and datasets used in the GBD consortium. The GHDx provides a comprehensive resource for researchers and health professionals to explore and download relevant data, including those used in this analysis.

The methodology applied in this study is consistent with previous GBD research and adheres to the principles of transparency and accuracy in health data reporting. Ethical considerations were considered, and since the data used were publicly available and aggregated, no ethical approval was sought. This study aligns with the established protocols for health assessment reporting as set forth by the Institute for Health Metrics and Evaluation (IHME), the coordinating center for the GBD.

2.2. Statistical Analysis

In the present study, a meticulous analysis of epidemiological data was conducted to ascertain the trends and patterns of disease occurrence. The metrics included incidence, prevalence, mortality and disability-adjusted life-years (DALYs). Crude rates, namely crude incidence rate (CIR), crude prevalence rate (CPR), crude mortality rate (CMR), and crude DALYs rate (CDR), were also screened. To facilitate comparability across the various demographic segments, the age-standardized incidence rate (ASIR), age-standardized prevalence rate (ASPR), age-standardized mortality rate (ASMR), and age-standardized DALYs rate (ASDR) were computed.

The average annual percentage change (AAPC) was estimated to quantitatively track the evolution of these metrics over time, encompassing the construction of a 95% confidence interval (CI). This estimation was facilitated by applying joinpoint regression analysis, which permitted the identification of significant trend changes within the dataset.

We applied the age-period-cohort (APC) model to disentangle the intricate associations of age, time period, and birth cohort with health status. To identify the drivers of the change in DALYs, we used decomposition analysis to separate the respective influences of population growth, population aging, and epidemiological changes. To anticipate future disease patterns, an autoregressive integrated moving average (ARIMA) model was employed.

Statistical software R (version 4.3.2), in conjunction with specialized packages, and Joinpoint software (version 5.1.0) were used to perform these analyses and generate graphical representations of the data.

2.3. Patient and Public Involvement

Patients and the public were not involved in the design, conduct or reporting of our simulation model-based research. All analyses adhered to the GBD data access and utilization protocols.

3. Results

3.1. Overview of the Africa Burden

3.1.1. Incidence of OM in Africa and 5 Regions

The number of new incident cases in Africa has increased from 58,110,595 (95% confidence interval (CIs): 42,028,334–80,563,698) in 1992 to 109,339,100 (95% CI: 79,193,585–151,822,588) in 2021, representing a cumulative increase of 88.16%. Among the five regions, Western Africa had the highest number of OM cases in 2021, with 37,810,489 cases reported. It also shows the most dramatic increase from 1992 to 2021, with a significant increase of 123.57%.

In Africa, the ASIR has increased from 5954.75/100,000 in 1992 to 5988.45/100,000 in 2021, with the AAPC increasing by 0.02% (95% CI: 0.021–0.023). Eastern Africa had the highest ASIR in the five regions, with 6230.96 per 100,000 individuals in 2021. Western Africa had the highest AAPC, an increase of 0.01%. Other patients had negative or zero AAPC (**Table 1**).

Table 1. All-age cases and age-standardized incidence, prevalence, mortality, and DALYs rates and corresponding AAPC of OM in Africa and African regions in 1992 and 2021.

Location	Measure	1992		2021		1992–2021 AAPC
		All-Ages Cases	Age-Standardized Rates per 100,000 People	All-Ages Cases	Age-Standardized Rates per 100,000 People	
		n (95% CI)	n (95% CI)	n (95% CI)	n (95% CI)	n (95% CI)
Africa	Incidence	58,110,595 (42,028,334–80,563,698)	5,954.746 (4,382.88–8,108.343)	109,339,100 (79,193,585–151,822,588)	5,988.45 (4,403.619–8,137.222)	0.022 (0.021–0.023)
	Prevalence	14,537,768 (12,586,823–17,004,426)	1,956.534 (1,656.297–2,266.81)	27,900,163 (24,093,028–32,642,461)	1,825.021 (1,554.939–2,113.264)	−0.176 (−0.199–−0.154)
	Deaths	531 (185–1,313)	0.069 (0.02–0.174)	303 (55–928)	0.025 (0.005–0.071)	−2.731 (−2.763–−2.698)
	DALYs	336,176 (200,143–522,881)	44.032 (26.526–67.547)	588,002 (350,090–937,374)	38.432 (22.907–61.217)	−0.393 (−0.418–−0.368)
Eastern Africa	Incidence	17,989,955 (12,908,541–25,080,395)	6,234.693 (4,543.993–8,457.475)	32,182,889 (23,105,883–44,636,756)	6,230.956 (4,542.1–8,450.72)	−0.002 (−0.003–−0.001)
	Prevalence	4,262,138 (3,706,331–4,975,565)	2,034.938 (1,720.816–2,346.066)	8,009,888 (6,917,415–9,362,382)	1,859.602 (1,594.699–2,159.416)	−0.266 (−0.28–−0.252)
	Deaths	401 (129–1,006)	0.192 (0.047–0.503)	219 (36–694)	0.07 (0.011–0.198)	−2.779 (−2.849–−2.71)
	DALYs	116,097 (66,691–180,736)	51.715 (29.708–77.332)	175,749 (102,681–274,441)	40.768 (24.166–64.01)	−0.759 (−0.782–−0.736)
Western Africa	Incidence	16,912,846 (12,243,293–23,309,135)	6,077.342 (4,484.848–8,259.945)	37,810,489 (27,368,958–52,677,848)	6,095.083 (4,498.028–8,290.89)	0.011 (0.01–0.011)
	Prevalence	4,325,529 (3,732,372–5,064,554)	2,118.063 (1,791.783–2,473.271)	9,296,005 (8,038,189–10,846,321)	1,906.242 (1,618.378–2,208.065)	−0.219 (−0.254–−0.184)
	Deaths	1 (0–2)	0.001 (0–0.001)	1 (0–3)	0.001 (0–0.001)	−0.195 (−0.378–−0.011)
	DALYs	90,360 (52,105–144,090)	44.269 (25.757–71.585)	192,779 (112,561–308,733)	39.507 (23.196–63.512)	−0.224 (−0.266–−0.181)
Southern Africa	Incidence	8,376,085 (6,081,275–11,542,693)	6,131.629 (4,506.915–8,298.346)	14,016,205 (10,123,598–19,231,130)	6,111.928 (4,498.55–8,264.7)	−0.002 (−0.004 – 0)
	Prevalence	2,032,899 (1,762,572–2,368,801)	1,836.041 (1,566.659–2,128.432)	3,426,383 (2,956,999–4,009,768)	1,696.954 (1,454.453–1,971.776)	−0.242 (−0.258–−0.225)
	Deaths	108 (38–261)	0.096 (0.031–0.231)	64 (15–171)	0.04 (0.01–0.107)	−2.61 (−2.807–−2.413)
	DALYs	48,402 (28,694–75,000)	42.502 (25.584–65.514)	71,885 (42,532–114,061)	35.704 (21.213–56.523)	−0.572 (−0.616–−0.528)
Northern Africa	Incidence	8,390,564 (6,075,610–11,745,837)	5,191.65 (3,857.14–7,132.959)	11,696,432 (8,599,982–16,196,493)	5,193.792 (3,859.582–7,135.088)	0.002 (0.001–0.002)
	Prevalence	2,328,867 (2,005,919–2,708,077)	1,694.264 (1,450.046–1,968.013)	3,314,190 (2,858,896–3,859,583)	1,528.052 (1,318.655–1,768.935)	−0.345 (−0.357–−0.333)
	Deaths	0 (0–1)	0 (0–0.001)	0 (0–1)	0 (0–0)	−2.411 (−2.818–−2.002)
	DALYs	47,462 (27,538–76,421)	34.593 (20.07–55.552)	67,125 (38,913–106,149)	30.94 (18.029–48.779)	−0.367 (−0.389–−0.344)

Table 1. *Cont.*

Location	Measure	1992		2021		1992–2021 AAPC
		All-Ages Cases	Age-Standardized Rates per 100,000 People	All-Ages Cases	Age-Standardized Rates per 100,000 People	
		n (95% CI)	n (95% CI)	n (95% CI)	n (95% CI)	n (95% CI)
Central Africa	Incidence	6,441,145 (4,650,464–8,971,655)	5,840.678 (4,303.88–7,958.749)	13,633,084 (9,840,072–18,969,517)	5,838.313 (4,301.252–7,955.744)	−0.002 (−0.003–−0.001)
	Prevalence	1,588,335 (1,364,455–1,856,792)	2,014.989 (1,702.722–2,345.337)	3,853,697 (3,287,247–4,503,092)	2,116.744 (1,785.052–2,468.401)	0.223 (0.185 – 0.262)
	Deaths	22 (6–59)	0.031 (0.007–0.084)	18 (2–73)	0.016 (0.002–0.056)	−2.219 (−2.347–−2.09)
	DALYs	33,855 (20,039–53,626)	42.697 (25.149–68.02)	80,464 (46,706–128,558)	44.205 (25.795–70.123)	0.179 (0.141–0.217)

3.1.2. Prevalence of OM in Africa and 5 Regions

The number of prevalent cases in Africa increased from 14,537,768 (95% CI: 12,586,823–17,004,426) in 1992 to 27,900,163 (95% CI: 24,093,028–32,642,461) in 2021, representing a cumulative increase of 91.92%. Central Africa experienced the highest cumulative increase in OM cases, with a 142.62% increase from 1992 to 2021. Northern Africa showed the lowest cumulative increase in OM cases, with a 42.31% increase over the same period.

In Africa, the ASPR has decreased from 1956.534/100,000 in 1992 to 1825.021/100,000 in 2021, with the AAPC decreasing by 0.18% (95% CI: −0.20––0.15). Central Africa had the highest ASPR of 2116.744/100,000 in 2021, and also had the highest AAPC, with an increase of 0.22%. Northern Africa had the lowest ASPR and AAPC values.

3.1.3. Deaths of OM in Africa and 5 Regions

The number of OM cases in Africa has decreased from 531 (95% CI: 185–1,313) in 1992 to 303 (95% CI: 55–928) in 2021, representing a cumulative decrease of 42.94%. Eastern Africa has experienced the highest cumulative decrease in OM cases, with a 45.37% decrease from 1992 to 2021.

In Africa, the ASMR fell from 0.069 to 0.025 per 100,000 population between 1992 and 2021, and the AAPC of incidence rate decreased by 2.731% (95% CI: −2.76––2.70). Eastern Africa had the highest AAPC, with a decrease of 2.78%.

3.1.4. DALYs of OM in Africa and 5 Regions

In Africa, DALYs increased from 336,176 (95% CI: 200,143–522,881) in 1992 to 588,002 (95% CI: 350,090–937,374) in 2021, representing a cumulative increase of 74.91%. Central Africa experienced the highest cumulative increase in DALYs, with an increase of 137.67%. Northern Africa had the lowest cumulative increase of 41.13% in DALYs.

In Africa, the ASDR decreased from 44.032/100,000 (95% CI: 26.526–67.547) in 1992 to 38.432/100,000 (95% CI: 22.907–61.217) in 2021, with the AAPC of incidence rate decreased by 0.39% (95% CI: −0.42––0.37). Central Africa had the highest ASDR of 44.205/100,000 in 2021 and the highest AAPC, with an increase of 0.179%.

3.2. Joinpoint Regression Analysis of the Burden of OM in Africa

The ASIR showed a minimal overall increase, with an AAPC of 0.02% from 1992 to 2021. Joinpoint regression analysis identified multiple inflection points, segmenting the long-term trend into distinct phases. Specifically, the trend followed a fluctuating multiphase pattern: a significant increase was observed from 1992 to 2009, before transitioning to a modest decline from 2009 to 2016. Subsequently, a renewed upward trajectory emerged from 2017 to 2021. (ASIR: 1990–1993 AAPC = 0.06; 1993–1999 AAPC = 0.05; 1999–2005 AAPC = 0.04; 2005–2009 AAPC = 0.01; 2009–2017 AAPC = −0.01; 2017–2021 AAPC = 0.01, $p < 0.05$). For ASPR, the AAPC increased from 1992 to 2000 but demonstrated a downward trajectory during the period 2000 to 2021 ($p < 0.0.5$). The AAPC of

DALYs showed an upward trend from 1992 to 1994 but exhibited a significant decrease after 1994 (p < 0.0.5). Over the period 1992 to 2021, the African AAPC of ASMR significantly declined ($p < 0.05$) (**Figure 2**).

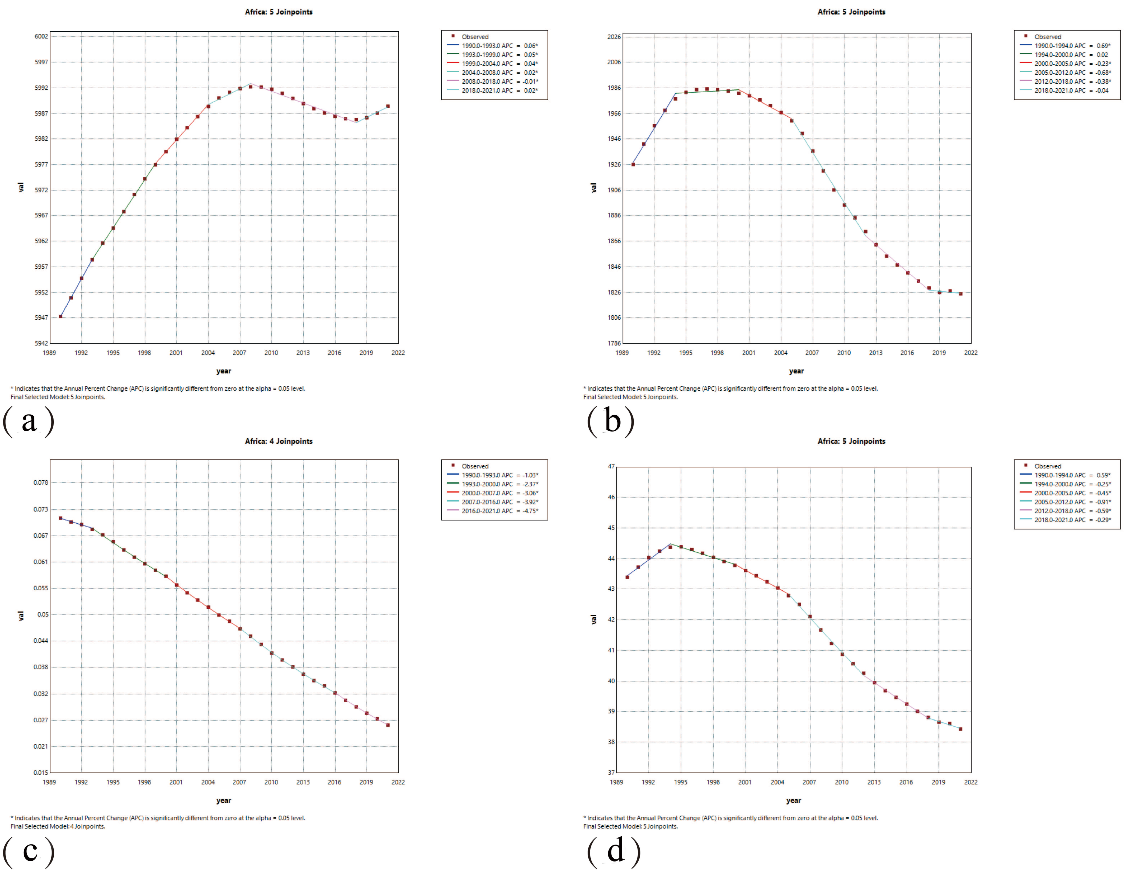

Figure 2. Joinpoint regression analysis of the age-standardized rate for otitis media in Africa from 1992 to 2021. (**a**) Age-standardized incidence rate. (**b**) Age-standardized prevalence rate. (**c**) Age-standardized death rate. (**d**) Age-standardized DALY rate.

3.3. Burden of OM in Different Age Groups in Africa in 1992 and 2021

Comparisons of the incidence, prevalence, mortality, and DALYs numbers of OM in different age groups in Africa in 1992 and 2021 are shown in **Figure 3**, along with the corresponding crude rates. From the incidence rate results, OM was prevalent among children less than 9 years of age, with the highest number of cases in the <5 years age group. The CIR of OM in Africa showed an increasing trend for all age groups. The <5 years age group had the highest number of deaths. The mortality number and CMR decreased in all age groups. The DALYs increased from 1992 to 2021, especially in the <5, 5–9, 10–14, 15–19 and 20–24 age groups. However, CDR showed a downward trend.

3.4. Gender Disparities in the Burden of OM in Different Age Groups in Africa

Figure 4 depicts the trends in sex-specific all-age numbers and age-standardized rates of OM incidence, prevalence, mortality and DALYs in Africa from 1992 to 2021. **Figure 4a** shows the incidence number and ASIR of OM in males and females, which gradually increased from 1992 to 2021. The prevalence number and DALYs of OM also showed an upward trend with increasing years; however, ASPR and ASDR gradually decreased in males and females (**Figure 4b,d**). With respect to mortality, the number and ASMR decreased in males and females (**Figure 4c**). Males had a higher burden than females in Africa.

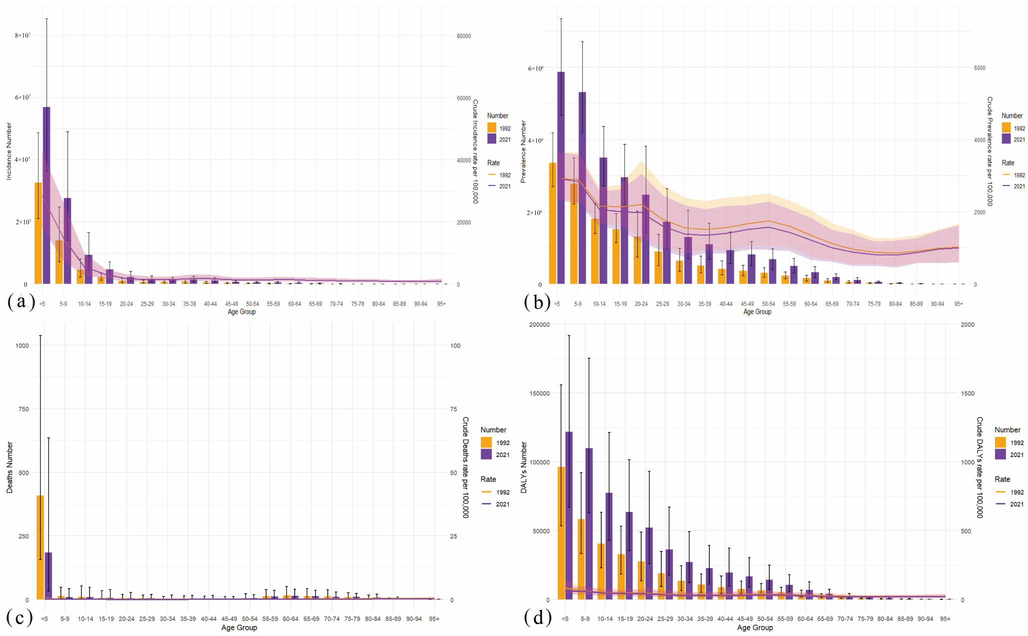

Figure 3. Comparison of the incidence, prevalence, deaths, and DALYs counts, along with their crude rates, by age group in Africa from 1992 to 2021. (**a**) Incident cases and CIR; (**b**) Prevalent cases and CPR; (**c**) Death cases and CMR; (**d**) DALYs counts and CDR.

Note: Bar charts represent counts; lines represent crude rates.

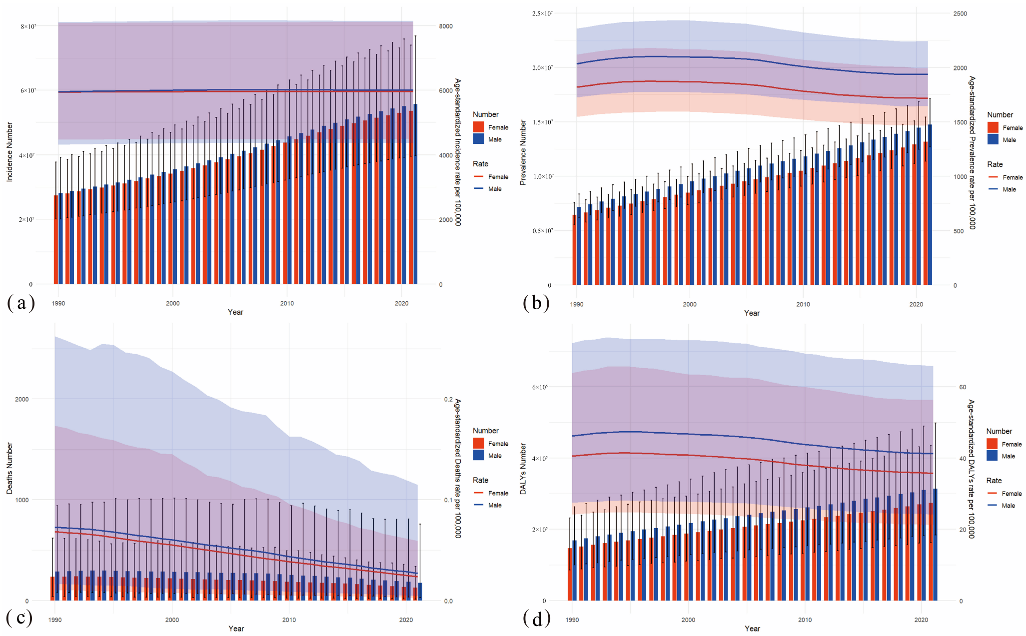

Figure 4. Comparison of full-age cases and age-standardized rates of incidence, prevalence, mortality and DALYs among men and women in Africa from 1992 to 2021. (**a**) Incident cases and ASIR; (**b**) Prevalent cases and ASPR; (**c**) Death cases and ASMR; (**d**) DALYs counts and ASDR.

Note: Bar charts represent counts; lines represent age-standardized rates.

3.5. The Effects of Age, Period, and Cohort on Incidence Rates

The incidence rate exhibited an age-dependent deceleration in decline: a rapid decrease before age 9, followed by a more gradual decline from age 10 onward, which slowed to a minimal change after age 20 (**Figure 5a**) ($p <$

0.05). The incidence rate was highest during 2017–2021 (**Figure 5b**). The group of people born between 1962 and 1966 was set as a reference (RRcohort (1962–1966) = 1, 95% CI: 1–1) ($p > 0.05$). The group born between 1912 and 1916 had the highest incidence rate (RRcohort(1912–1916) = 1.02, 95% CI: 0.80–1.30). The second occurred in the group born from 2002 to 2006 (RRcohort (2002–2006) = 1.01, 95% CI: 1.00–1.01) (**Figure 5c**) ($p < 0.01$).

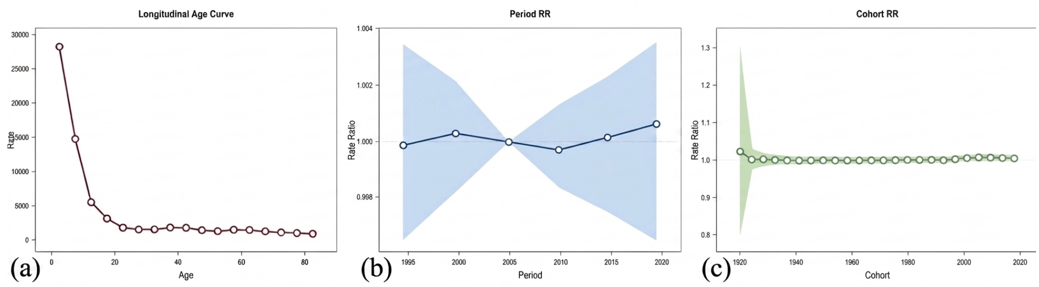

Figure 5. Age, period and cohort effects on otitis media incidence rate in Africa during 1992–2021. (**a**) The red dot line represents the longitudinal age curve for otitis media incidence; (**b**) The blue dot line represents period relative rate for otitis media incidence; (**c**) The green dot line represents cohort relative rate for otitis media incidence.

3.6. Decomposition Analysis of Incidence, Prevalence, Mortality and DALYs in Africa

The number of incidence, prevalence and DALYs increased significantly over the past 30 years, and population growth had the largest positive effect on the three indicators (102.23%, 108.38%, 120.48%), affecting both males and females. Population growth also had a positive effect on mortality growth (21,156.72%). The effect of epidemiological change on prevalence, mortality, and DALYs growth was negative (−6.39%, −17352.23%, −20.8%), but the effect on incidence growth was positive (0.7%). Aging had a negative effect on the growth of incidence, prevalence, and mortality (−2.93%, −2%, and −3704.38%, respectively) (**Figure 6**).

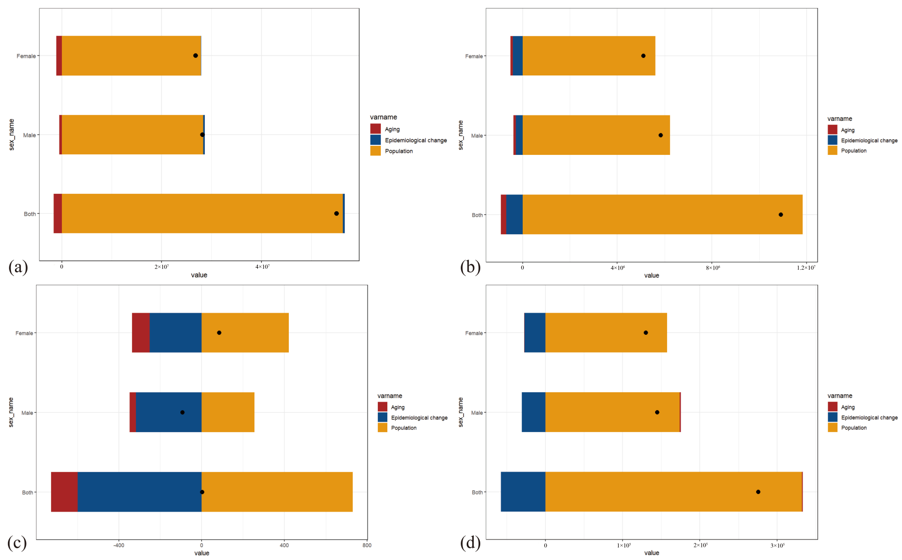

Figure 6. Changes in otitis media incidence (**a**), prevalence (**b**), death (**c**), and DALYs (**d**) according to population-level determinants of population growth, aging, and epidemiological change from 1992 to 2021 at the gender level in Africa.

Note: The black dot represents the overall value of change contributed by all 3 components.

3.7. Prediction of OM ASIR, ASPR and ASDR in the Following 15 Years

The ARIMA model was used to forecast the trends in OM ASIR, ASPR, and ASDR for the next 15 years (**Figure 7**). The ASIR was expected to increase from 5,592.14/100,000 in 2022 to 6,019.27/100,000 in 2037 by the ARIMA model (1,2,2) (AIC = −31.04). However, the ASPR would decrease from 1820.86/100,000 in 2022 to 1730.65/100,000 in 2037, as in the ARIMA model (1,2,0) (AIC = 124.99). The ASDR also continued to decline over the coming 15 years, decreasing from 38.19/100,000 to 34.11/100,000 (ARIMA model (1,2,0), AIC = −85.52).

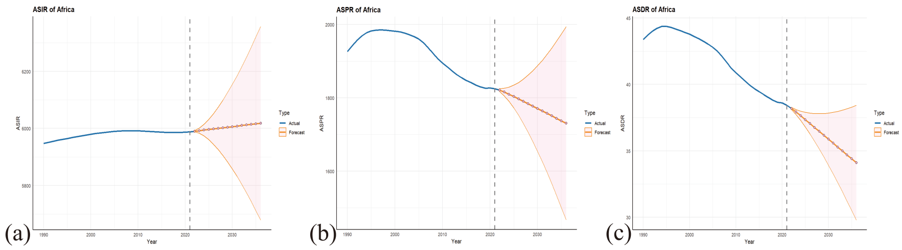

Figure 7. Predicted trends of ASIR, ASPR and ASDR rate in Africa over the next 15 years (2022–2037).
Note: Blue lines represent the true trend of OM incidence, prevalence and DALYs rate during 1992–2021; orange lines and shaded regions represent the predicted trend and its 95% CI.

4. Discussion

To our knowledge, this study constitutes the first longitudinal analysis quantifying the epidemiological transition of the otitis media (OM) burden across Africa and its five subregions over three decades (1992–2021). Our analysis of GBD 2021 data revealed divergent trends: while crude counts of incident cases (88.16% increase; 95% CI: 82.34–94.01), prevalent cases (91.92% increase; 95% CI: 85.70–98.15), and disability-adjusted life years (DALYs; 74.91% increase; 95% CI: 68.20–81.62) all rose substantially, age-standardized rates demonstrated progressive declines in prevalence (−0.18% AAPC), mortality (−2.73% AAPC), and DALYs (−0.39% AAPC). Notably, the <5-year cohort exhibited a disproportionately high disease burden, with age-specific incidence rates 3.2-fold greater than population averages, a pattern congruent with global epidemiological profiles [3]. There are mainly two reasons. On one hand, physiological structures of children are not yet fully developed, such as easily hyperplastic lymphoid tissue and immature eustachian tube function; on the other, daily habits also contribute, such as feeding in a prone position or frequent pacifier use.

The analysis of subregional patterns brought several important findings. Eastern Africa showed the highest age-standardized incidence rate, at 6,230.96 per 100,000, along with the highest mortality rate (0.07 per 100,000). In contrast, Central Africa recorded the greatest prevalence, measured at 2,116.74 per 100,000, and shouldered the heaviest disease burden in terms of disability-adjusted life years (44.21 per 100,000). Meanwhile, Western Africa had the most striking rise among all regions, with a 123.57% increase in new cases. This surge likely stems from a combination of environmental factors prevalent in the region, such as persistent tropical humidity, particulate matter concentrations that regularly exceed WHO guidelines, and densely populated living conditions. Together, these factors create an environment that favors upper respiratory infections, a well-established precursor to otitis media [4].

Our decomposition analysis identified epidemiological transitions as the principal drivers of OM burden reduction. Multidimensional intervention frameworks should be designed to address the following region-specific determinants. First, Antibiotic stewardship programs must align with local epidemiological trends. Regional data offer a general baseline, such as the 23–25% prevalence of Pseudomonas aeruginosa and 18–27% of Staphylococcus aureus in sub-Saharan Africa [5]. However, local data demonstrate its uniqueness. A case in point is Ethiopia, where multidrug resistance is found in 72.45% of the bacterial isolates from ear infections. It is largely caused by Staphylococcus aureus, which alone accounted for 68.87% of the isolates [6]. It underscores the importance of grounding stewardship efforts in precise local data. Second, promising preventive strategies also include trialing synbiotic formulations to modulate the nasopharyngeal microbiome, as well as climate-adapted housing initiatives that reduce dampness-related risks. Third, strengthening otologic surgical training through bilateral programs within international health-cooperation frameworks can build sustainable local capacity. The "Health and Well-being Partnership Initiative" proposed at the 2024 Beijing Summit of the Forum on China–Africa Cooperation exemplifies a practical approach, outlining concrete steps such as establishing antibiotic-resistance surveillance sites and deploying mobile diagnostic units equipped with tele-otoscopy. Children with acute otitis media who receive tympanostomy tubes will have some objective benefits, such as reduced incidence, improved hearing and reduced middle-ear effusion prevalence [7–11]. So it is also important to produce low-cost tympanostomy tubes in Africa. Fourth, it is supposed that xylitol may reduce S pneumoniae infection and subsequent acute otitis media [12]. For example, xylitol chewing gum could reduce acute otitis media [13,14].

Our findings account for three constraints. First, given their divergent pathophysiological pathways and treatment paradigms, the composite case definitions in GBD 2021 risk obscure critical subtype-specific dynamics, particularly between chronic suppurative otitis media and otitis media with effusion. Second, there is a lack of data on the causes of death due to otitis media in the GBD. The morbidity of OM is significantly correlated with complications [15–18]. Among the intracranial complications, bacterial meningitis is the predominant complication and the leading cause of fatality [19]. Bacterial meningitis' mortality rate was from 2% to 29% in developing countries [20–23]. From data in a low-income country in Africa, the fatality rate was as high as 31% [24,25]. It was also reported that the most common pathogens in children with known cerebrospinal fluid etiology were Streptococcus pneumoniae [25,26]. Third, diagnostic capacity disparities between settings, for example, rural clinics, likely underestimate the true disease prevalence in pediatric populations. Last but not least, while the GBD 2021 revised its data sources to accommodate the variability among different studies and to standardize the information, these adjustments inevitably introduced greater uncertainty into the analysis.

5. Conclusions

Over the past 30 years, efforts to reduce the burden of otitis media have been successful. However, in Africa, where economic development is imbalanced, some underdeveloped areas must increase awareness and implement better strategies to alleviate the economic burden. Future studies of the GBD database are needed to better understand where strategies such as the proper use of antibiotics, enlargement of domestic spending and global assistance among nations are needed.

Author Contributions

D.C. and Q.M. participated in the design and prepared the first draft. H.Z., Q.M., M.Z. and Y.Y. contributed to data organization and management. R.L. was involved in the visualization of the results and participated in the research investigation. All authors have read and agreed to the published version of the manuscript.

Funding

This work was supported by the National Key Research and Development Program of China (2023YFB4705804); National High Level Hospital Clinical Research Funding (2025-PUMCH-D-005); Innovation and Cultivation Fund of Sixth Center of PLA General Hospital (CXPY202216).

Institutional Review Board Statement

This study used publicly available, de-identified data from an open-access platform. No human participants were directly involved, and no identifiable personal information was accessed. Therefore, ethical approval was not required and the study was exempt from Institutional Review Board (IRB) review in accordance with the regulations of our institution.

Informed Consent Statement

Informed consent was waived because this study used only publicly available, fully anonymized datasets, and no interaction with human participants was involved.

Data Availability Statement

The specific data extracts for otitis media were sourced from the Global Health Data Exchange (GHDx), an open-access platform that houses metadata and datasets used in the GBD studies.

Conflicts of Interest

No financial conflicts of interest relevant to this article were reported.

AI Use Statement

During the preparation of this manuscript, the authors used NetEase Youdao Dictionary solely for language refinement. No AI tools were used for data analysis, interpretation, or generation of scientific content. All outputs were critically reviewed and edited by the authors. The authors take full responsibility for the integrity and accuracy of the work.

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