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ASSESSMENT OF EPIDEMIOLOGICAL TRENDS AND THE EFFECTIVENESS OF PREVENTIVE MEASURES AGAINST MEASLES AMONG CHILDREN

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Abstract
Measles is one of the most highly contagious viral infectious diseases among children. In recent years, factors such as declining vaccination coverage, migratory movements, inadequate performance of epidemiological surveillance systems, and disruptions in healthcare services following the pandemic have contributed to the resurgence of this disease. This scientific article analyzes the epidemiological dynamics of measles incidence among children, including risk factors, age-specific distribution, and regional characteristics. Furthermore, the effectiveness of vaccination strategies, the impact of supplementary immunization activities, and the role of herd immunity in disease prevention are evaluated. The analysis is based on national and global statistical data, revealing the interrelation between the coverage level of preventive measures and the spread of the disease. The study concludes with practical recommendations aimed at strengthening epidemiological control, optimizing immunization approaches, and implementing comprehensive preventive interventions.

Keywords: Measles, child health, epidemiological analysis, vaccination, prevention, herd immunity, public health, immunization coverage, epidemiological surveillance, supplementary immunization.

Introduction

Measles is a highly contagious viral infectious disease predominantly affecting children, often resulting in severe health complications such as pneumonia, encephalitis, and even death. In recent years, a global resurgence of measles has been observed, largely attributed to declining vaccination coverage, vaccine hesitancy, increased migratory flows, and temporary disruptions in healthcare systems during the COVID-19 pandemic. Particularly in regions where children's immunity is compromised or vaccination coverage is insufficient, measles outbreaks occur rapidly, placing significant burdens on healthcare systems and causing substantial socio-economic impacts.

Within Uzbekistan and its regions, especially among pediatric populations, continuous epidemiological surveillance of measles and effective implementation of preventive measures are of paramount importance. Such efforts not only limit the spread of the disease but also reduce childhood morbidity and mortality, contributing to long-term public health strengthening. Therefore, a comprehensive analysis of epidemiological trends and an evaluation of the

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effectiveness of prevention strategies constitute essential components of contemporary healthcare objectives.

The urgency of this topic is further underscored by regional disparities in vaccination coverage and acceptance, the necessity to identify causes of vaccine refusal, and the imperative to develop more effective interventions to prevent measles epidemics. Consequently, investigating the epidemiological trends of measles among children and assessing the practical effectiveness of preventive measures remain priority areas in scientific research and public health policy.

Objective

The objective of this article is to analyze the epidemiological trends of measles among children and to assess the effectiveness of vaccination coverage and preventive measures in order to develop evidence-based recommendations for reducing the spread of the disease. The study examines the distribution of cases by age and region, the level of vaccine coverage, as well as the impact of preventive immunization campaigns on disease incidence. Additionally, ways to improve epidemiological surveillance systems and implement more effective prevention strategies are identified. As a result, this article aims to contribute to the advancement of national and regional public health policies and practices related to measles control.

Materials and Methods

This study employed retrospective and observational methods to analyze the epidemiological trends of measles among children and to assess the effectiveness of preventive measures. The study materials consisted of epidemiological and immunization data collected between 2015 and 2024 by the Ministry of Health of the Republic of Uzbekistan, the Sanitary-Epidemiological Welfare and Public Health Center, and the Republican Virology Center.

Data were categorized by age groups (0–1 year, 1–5 years, and 6–14 years) and regional distribution. Annual changes in disease incidence and vaccination coverage were analyzed using statistical methods. To evaluate the effectiveness of vaccination campaigns, data from healthcare systems were compared with clinical indicators of measles cases.

Statistical analysis was performed using SPSS version 25 (Statistical Package for the Social Sciences). Descriptive statistics, trend analysis, and correlation methods were applied to determine the relationship between disease incidence and vaccination coverage. Standardized protocols and verified data sources ensured the reliability and validity of the data.

The study adhered to international ethical standards, ensuring the confidentiality of personal information.

Results

During the period under study, measles cases among children in Fergana region demonstrated a variable epidemiological dynamic over the years. In certain years, an increase in incidence was observed, primarily attributed to temporary declines in vaccination coverage, interruptions in immunization services, and systemic challenges during the COVID-19 pandemic period.

The distribution of cases varied significantly across age groups. The highest incidence was observed among children aged 1–5 years, which is likely due to their developing immune systems and the

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interval between the primary and booster doses of the measles vaccine. Infants under one year of age were also affected, which corresponds to the period before full vaccination is completed. In contrast, lower incidence was recorded among older children.

Geographically, lower measles incidence was observed in central districts and urban areas with well-established immunization services, while higher incidence was noted in remote and mountainous areas where access to routine vaccination was limited. This highlights disparities in healthcare access and uneven implementation of preventive measures across regions.

Epidemiological analysis revealed a clear relationship between measles incidence and vaccination coverage. Areas with higher immunization rates reported lower case numbers, suggesting a strong protective effect of vaccination. Furthermore, during years when supplementary immunization activities were implemented, a noticeable decline in disease incidence was recorded, indicating the effectiveness of these campaigns in curbing the spread of measles.

These findings underscore the critical importance of maintaining high routine immunization coverage, ensuring equitable access to vaccination services in all regions, and strengthening public health communication. Addressing regional disparities and implementing targeted preventive interventions are essential for controlling measles transmission among children.

Conclusion

The findings of this study reaffirm the critical role of immunization in controlling measles among children in the Fergana region. To maintain a favorable epidemiological situation for highly contagious diseases such as measles, it is essential to ensure sufficient vaccination coverage, strengthen public trust in vaccines, and support the consistent functioning of the healthcare system.

Age-specific analysis revealed that the highest incidence occurred among children aged 1–5 years, emphasizing the need to enhance protection during this vulnerable stage of the immunization calendar. Furthermore, lower vaccination coverage and limited access to healthcare services in remote and mountainous areas contributed to wider disease transmission in these regions.

The study demonstrated that consistent and well-planned immunization activities, effective implementation of supplementary immunization campaigns, and continuous improvement of epidemiological surveillance systems are key to the successful control of measles. Therefore, increasing vaccination coverage, reducing regional disparities in access to immunization, and strengthening evidence-based preventive measures must be prioritized to protect child health and prevent future outbreaks.

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