Role of Data in Enhancing Public health Research and Healthcare Strategies: A Life Saving Resource

INTRODUCTION

Data is measurements or observations that are collected as a source of information [1]. According to WHO public health refers to all organized measures (whether public or private) to prevent disease, promote health and prolong life among the population as a whole [2]. Its activities aim to provide conditions in which people can be healthy and focus on the entire population, not on individual patients or diseases. Data can provide evidence-based insights into population health trends, disparities, risk factors and effectiveness of policies and intervention strategies [3]. The concept of using mortality and morbidity data as a basis for public health action arose in Europe 600 years ago with the emergence of scientific thoughts during the renaissance [4].

DATA COLLECTION AND SOURCES

Epidemiological data or modelling uses mathematical models like machine learning to create simplified representations of the spread of infectious diseases. This helps with public health surveillance and warns systems about disease outbreaks [3]. Clinical Data includes patient demographics, medical history, diagnostic test results, treatment plans and outcomes. This data id documented in electronic health records (EHRs). HIEs health information exchanges facilitate the exchange of EHRs between different organisations [3]. Behavioural Data includes dietary habits, physical activity levels, smoking status, socioeconomic indicators etc. This data is collected using national health surveys, health assessments [3]. Environmental data includes information about pollution levels and climatic conditions. Various data sources include health surveys by NHANES, WHO, Surveillance systems like NNDSS, CARSS, GISRS (operated by WHO), wearable health devices and mhealth apps.

Statistical Methods that most often researchers in the field of public health use include regressive analysis, survival analysis, correlation, analysis of variance, biostatistics, cluster analysis, measure of dispersion, hypothesis testing, meta analysis and others.

IMPACT OF PUBLIC HEALTH INTERVENTIONS

Disease surveillance and monitoring: Guerrisi et al discusses participatory surveillance, using the European influenza reporting system Influenzanet as an illustration, in an effort to strengthen already well-established Sentinel physician-based systems in Europe. The authors emphasise how such a system can be utilised for real-time monitoring of any emerging health issues. A key advantage of participatory systems is to report from populations who would not otherwise seek medical care for illnesses they perceive as minor, particularly adults with influenza-like illnesses [4].

Policy Development: For eg the research project entitled ‘evidence-based management of hearing impairments: public health policymaking based on fusing big data analytics and simulation’ (EVOTION) aims to build an evidence base for the formulation of public health policies related to the prevention, early diagnosis, long-term treatment, and rehabilitation of hearing loss (HL), as well as the detection and prevention of cognitive decline and the socio-economic inclusion of individuals with HL [5].

Resource Allocation: healthcare systems are increasingly turning to data-driven approaches, leveraging demographic and psychographic analysis to inform resource allocation decisions. Moreover, data-driven approaches enable continuous monitoring and evaluation of resource

allocation strategies, allowing for real-time adjustments and optimizations based on evolving patient needs and preferences [6].

ETHICAL AND PRIVACY CONSIDERATIONS

Healthcare data is frequently fragmented, segregated, and unpredictable in quality, making it difficult to combine and analyse efficiently (Oyeniyi, 2024). Furthermore, differences in data availability among populations and geographical regions can inject bias and errors into resource allocation models. Healthcare data is highly sensitive and subject to strict privacy regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) (Olubusola et al., 2024).

CONCLUSION

Improving interoperability and data sharing among healthcare systems and stakeholders is essential for optimizing healthcare resource allocation (Ogundipe,2024) and can provide a more comprehensive view. Artificial intelligence (AI) and machine learning (ML) can analyze vast amounts of healthcare data to identify patterns, predict healthcare needs, and optimize resource allocation strategies. AI-powered predictive analytics can forecast disease outbreaks, predict patient readmissions, and optimize hospital bed utilization, leading to more efficient and proactive resource allocation [7]. Data by public health professionals can be further utilized to shape policies and provide better understanding of epidemiology behind diseases that shall contribute to preparedness of healthcare systems.

References

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