Spatial Analysis of West Nile Virus Infection Status on Mosquitos & Land Coverage in the US, 2008-2015

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Trend of Measles Incidence in Africa from 2008 to 2018: A Pooled Analysis of Evidence From 50 WHO-Member States

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Background/Purpose: The purpose of this research is to identify areas at high risk of a measles outbreak in Africa. Measles is a highly infectious viral disease of the respiratory system, caused by the *Morbillivirus*. Despite the availability of a safe and effective vaccine, it remains a significant cause of morbidity and mortality in Africa.

Methods: Surveillance data on measles from the World Health Organization (WHO) over ten years were reviewed, highlighting trends and making recommendations for improvement. The method involved analysis of secondary data of measles in the African and Eastern Mediterranean regions of the World Health Organization (WHO) over a ten-year period.

Results: Findings revealed a total of 1,181,355 cases reported between July 2008 and July 2018 with most cases, 201,273 (17%) reported in 2011. The least cases of 37,811 (3.2%) were in 2008. The same trend was observed for all sub-regions throughout the period under review. The central Africa sub-region had the highest incidence rate (>400% increase) and the southern Africa sub-region recorded the least number of cases (about 120% rise).

Conclusion: The trend of measles in Africa is rising, with rates higher in the central African sub-region. Case-based surveillance and laboratory confirmation of cases have been dismally low in most regions. This is more noticeable in the southern African region.

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TREND OF MEASLES INCIDENCE IN AFRICA FROM 2008 TO 2018: A Pooled Analysis of Evidence from 50 WHO-Member States

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Abstract

Measles is a highly infectious viral disease of the respiratory system, caused by the *Morbillivirus*. Despite the availability of a safe and effective vaccine, it remains a significant cause of morbidity and mortality in Africa. A ten-year surveillance data on measles from the World Health Organization (WHO) was reviewed, highlighting trend and making recommendations for improvement.

Methods:
Secondary data analysis of measles in the African region of the World Health Organization (WHO) over a period of ten years.

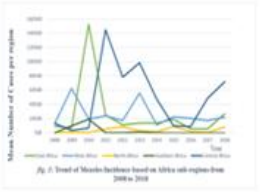
Results:
A total of 1,181,355 cases were reported between July 2008 and July 2018 with most cases, 201,273 (17%) reported in 2011. The least cases of 37,811 (3.2%) were in 2008. The same pattern of trend was observed for all sub-regions throughout the years, with the central Africa sub-region having the highest incidence rate (>400% increase), as against the southern Africa sub-region, which recorded the least number of cases (about 120% rise).

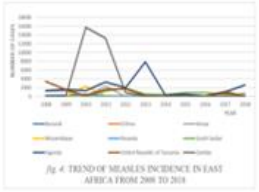
Introduction

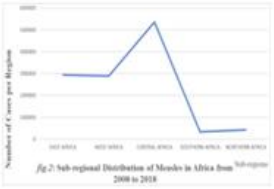
Measles is a highly contagious viral disease which is transmitted through droplets, mouth, throat or nose of infected individuals.[1] It is caused by *Morbillivirus* and usually attacks children, with a secondary attack rate of 80% or more.[2] Complications from measles include severe respiratory disorders, encephalitis, severe diarrhea, and related dehydration and blindness.[1] It is one of the most contagious viral diseases known, and it has been preventable through vaccination since 1963. The first major measles control program in Africa was in 1965.[3] Between 2013 and 2016, overall confirmed measles cases that were reported in Africa was 176,785.[4] In 2018, more than 140,000 people worldwide died of measles. If the disease needs to be contained in Africa, individual countries need to achieve 95% 2-dose measles vaccination coverage in 2020.[1,4] However, according to the national immunization schedules, only 69% of children received two doses of measles vaccine.[5] The worst impacts of measles are in sub-Saharan Africa.[6] More recently, the Africa region has experienced measles stagnation and measles outbreaks continue to occur in Africa with case fatality rates among children reaching as high as 5%–10% and an estimated 28,000 measles-related deaths annually. Measles is still a major public health problem in the continent of Africa.[1,3,6] As at 2013, 51% of all measles-associated deaths occurred in Africa, despite the establishment of several goals towards measles eradication. Compared with the same period in 2018, preliminary surveillance data from WHO in April 2019 suggested that there was a 300% rise in cases of measles.[6]
The key public health strategies to reduce African measles death are effective surveillance, routine measles vaccination, and mass immunization campaign.[1,6] To describe the current measles trend in Africa and to explore the distribution of cases, an analysis of the sub-regional measles case-based surveillance data was conducted.

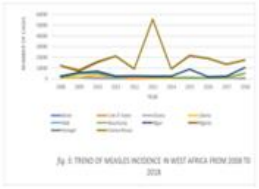
Methods

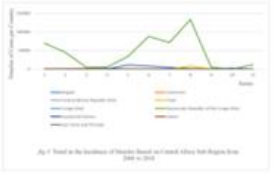
Study Design and Data Sources: Secondary data analysis on reported measles cases in the African region of the WHO was used. The primary data was sourced based on monthly reports submitted to the WHO by individual member states in this region, using their respective national disease surveillance system. Descriptive analysis was conducted using the data on the incidence of measles cases from the WHO and UNICEF joint reporting channels.[5] The joint WHO and UNICEF data allow various health-related indicators to be monitored as well as early detection of vaccine-preventable diseases for all the WHO-member nations. From the data collection, a measles case was defined based on epidemiological, clinical or laboratory-confirmed cases.[7] Ethical approval from Liberty University's institutional review board was done. However, the analyzed data had open access. **Statistical Analysis:** Data of the 50 member states were classified based on the five sub-regions of Africa- North, East, West, South, and Central- to provide continental and region-wise estimates on the trend of measles cases. All analysis was carried out using Microsoft excel. The outcome variable (incidence of measles cases) was a count outcome, while the exposure variable was time in years.[8]

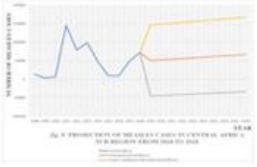












Results and Conclusion

Results
Data on measles incidence from 2008 to 2018 from 50 countries was included. The data was classified based on African sub-regions, to provide the continental and region-wise estimates of the trend. Across Africa, the reported number of cases of measles has been fluctuating over the ten years. However, there was a significant increase from 13,737 in 2008 to 72,274 in 2018 (as shown in *figure 1*), accounting for more than 400% increase in measles cases. After adjusting for clustering, an increase in case incidence over the years was further analyzed. From the results, there was a true increasing trend over the years with around 320% increase. In every of the African sub-region, the trend in the reported number of measles cases increased.
As depicted in *figure 2*, the burden of measles in Africa was in the Central Africa subregion. While the Southern African sub-region accounted for the least distribution and least increase (about 120% from 2008), the highest increase in cases was seen in the Central African region (>400% increase from 2008). East African sub-region had the next highest increase (about 200% rise from 2008).

Conclusion
The study showed there was disproportionate rise in the trend of measles over the ten-year period with rates higher in the central African sub-region. Case-based surveillance and laboratory confirmation of cases have been dismally low in most regions, but more noticeable in the southern African region. Hence, effective surveillance strategies need to be implemented in all the WHO-member states in Africa to eliminate measles in the region.

Future Work

1. Determination of measles trend based on per capital income of individual countries in Africa.
2. Determination and reporting of cases according to rural and urban settings.
3. Assessment of the association between measles immunization coverage and various age groups.
4. Re-evaluation of the most suitable age for a first dose vaccine administration among children, to assess efficacy with regards to the best time of vaccination.

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Comparability of Data on Infant and Young Child Feeding Indicators between Centers for Disease Control and Prevention and World Health Organization Approaches.

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Purpose*:* For my practicum, the infant and child breastfeeding and complementary feeding indicators between the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO).

Methods: All available online information related to infant and young child feeding practices was reviewed using the CDC and WHO approach. Three tables were developed comparing the CDC and the WHO core indicator definitions, survey questions, and measured equations. An excel spreadsheet was developed comparing the CDC, WHO, and UNICEF core indicators for the United States. To account for some gaps in data for the WHO, some data was derived from two articles on breastfeeding.

Results: The WHO included early breastfeeding initiation, where the CDC did not. The WHO defined and developed formulas that included infants and children age ranging between 0-24 months. The CDC definitions and formulas included infants and children age ranging between 19-35 months. The WHO had 15 survey questions, specific for breastfeeding and non-breastfeeding infants and children, including the duration of each breastfeeding session, the number of breastfeeding sessions per day, and additional foods, or liquids they had consumed. The WHO also included an extensive list of the types of foods and liquids in the survey to select from. The CDC only had four survey questions imbedded in their National Immunization Survey. The CDC did not have the same in-depth questions as the WHO but did have a separate list of what types of food and liquids consumed for breastfed and non-breastfed infants and children.

Discussion: The results showed that the CDC's core indicators were significantly different from the WHO's. The CDC did not include early breastfeeding initiation, which the WHO includes. When interviewing two RN's from Sentara Norfolk General Hospital, they confirmed they include early breastfeeding initiation right after birth, referred to as the *golden rule*. This immediate skin-to-skin process with breastfeeding has two benefits: 1) to help reduce the bleeding when the uterus contracts after birth and, 2) the mother produces colostrum, which contains antibodies and nutrients for the infant until they are able to receive their vaccinations. The CDC does not include complementary feeding in their calculated indicators, unlike the WHO and UNICEF. It was concluded, at this time, that the CDC is primarily focused on improving breastfeeding rates in the United States and viewed introduction to complementary feeding as a secondary focus. Due to the SARS-COVID-2 pandemic, in-person interviews were not able to be conducted at Sentara Norfolk General Hospital because of the extreme restrictions to visitations. Any projects, including this study that were not deemed an emergency or important, were postponed or delayed. Because of this, only two registered nurses from the hospitals were interviewed, but given the nursery policy at Sentara, it was determined that all lactation nurses follow the Sentara guidelines of immediate breastfeeding after birth. But it is also important that the CDC indicators, questions, definitions, and formulas align more with the WHO to reduce any conflicting data and secure any gaps in data. If the CDC were to do that, then they could compare their previous data with their new data to see if any significant differences need to be addressed. This comparison could be the first step in addressing the differences between the CDC and the WHO.

Characteristics of High-Risk Areas for Colorectal Cancer Mortality in Southeastern Virginia

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Purpose: Recent data identified Southeastern Virginia as a hotspot for colorectal cancer (CRC) mortality but the reasons for this are unknown. This study aims to identify and characterize zip codes areas at high risk for CRC mortality in Virginia.

Methods: Several data sources were linked to create the study data. The main source of data included the Sentara Cancer Registry. Data linkage was achieved by geocoding patients' zip codes at diagnosis and spatially assigning contextual and behavioral risk factors from publicly available databases. Bivariate analyses were used to summarize and compare individual and neighborhood characteristics between hotspot and non-hotspot areas. A hierarchical logistic regression model was used to estimate the association between the contextual- and demographic-level variables with the high-risk areas.

Results: The sample consisted of 4,408 CRC cases. Among them, 21.6% (n = 952) resided in a CRC high-risk area. Patients living in hotspots areas were significantly more likely to be African American, to have private insurance, and to be Medicaid recipients. They were also found to have a Charlson comorbidity index greater than three when compared to patients living in non-hotspot areas. Furthermore, zip code areas with low education attainment rates, higher obesity and screening rates, and composed mostly of African American were significantly associated with high-risk zip code areas for CRC mortality.

Conclusion: The inequalities in individual and contextual characteristics between hotspot and non-hotspots areas were striking in Virginia. These findings suggest the need for policy to try to delineate those factors associated with these disparities.