# SECTION A: MEASLES OUTBREAK

## Q1: Measles Burden and Public Health Impacts in Nigeria

Nigeria bears a substantial burden of measles, ranking among the countries with the highest cases globally (Ori *et al.*, 2021). The reported incidence in 2018 was 24.98 per 1,000,000, indicating a persistent challenge despite vaccination efforts (Ibrahim *et al.*, 2019a). Geographical disparities are evident, with the Northern region facing higher incidence rates due to lower immunization coverage, as highlighted by the 2017/2018 campaign achieving 87.5% coverage but followed by a resurgence of cases(Ibrahim *et al.*, 2019b) . Measles remains a significant contributor to under-five child mortality, emphasizing its public health impact (Faruk *et al.*, 2020).

Socioeconomic factors exacerbate the measles burden in Nigeria. The Southern regions, with higher MCV1 coverage, showcase the impact of income levels and education on immunization rates (Adeyanju, Tubeuf and Ensor, 2017). Only 42% of children at 9 months receive routine immunization, leaving a significant proportion susceptible (Garba *et al.*, 2022). Studies by (Jean Baptiste *et al.*, 2021) corroborate that lower socioeconomic status is associated with higher measles incidence, emphasizing the need for targeted interventions to address these disparities. Nigeria's high measles burden is deeply intertwined with poverty, limited healthcare access, and cultural beliefs, creating a tale of inequality that requires urgent attention (Meuser and Robnett, 2019).

Age-related disparities further compound the measles challenge, with children under five being the most affected group (Aworabhi-Oki *et al.*, 2020). The age-specific data from Bayelsa State indicates that the 1-4 years age group is most affected, highlighting the vulnerability of young children (Aworabhi-Oki *et al.*, 2020). These disparities lead to severe outcomes, with a high burden of measles admissions and complications in this age group, particularly among the unvaccinated and those of low socio-economic status (Sato *et al.*, 2022). Targeted immunization efforts, especially in urban areas where susceptibility is higher, are crucial to address these age-related disparities (Uzochukwu *et al.*, 2017).

## Q2: Immediate Public Health actions in response to Measles Outbreak in Smithtown, England

In response to the potential measles outbreak in Smithtown, immediate and comprehensive public health actions are essential. Begin with a swift preliminary assessment as suggested by (Sato *et al.*, 2022) , activating an incident management team comprising epidemiologists, healthcare professionals, and communication experts (*Public Health England*, 2021). This rapid response, guided by PHE guidelines and lessons from past UK outbreaks, emphasizes extensive contact tracing and immediate provision of post-exposure prophylaxis to proactively contain potential transmission (*Public Health England*, 2021).

Simultaneously, focus on case identification, isolation, and reporting, aligning with PHE guidelines (Amanda, 2018). Swiftly identify suspected cases, isolate affected individuals, and promptly report cases to local health authorities (Thomas *et al.*, 2011). Emphasize the vulnerability of non-immune groups, stressing the importance of these measures in preventing sustained outbreaks (McHale, Keenan and Ghebrehiwet, 2016). Highlight successful mass vaccination programs as examples of proactive measures effectively controlling measles (Thomas *et al.*, 2011).

In parallel, prioritize effective communication and public awareness. Craft a comprehensive communication plan to inform parents, school staff, and the community about the suspected outbreak (Tannous, Barlow and Metcalfe, 2014). Address concerns, correct misconceptions, and stress the significance of vaccination. Acknowledge the decline in MMR vaccine confidence, emphasizing the importance of rebuilding trust to enhance vaccination rates (Tannous, Barlow and Metcalfe, 2014). This step ensures that the community is well-informed, fostering cooperation in outbreak response.

## Q3: Transmission of Measles and Prevention

Measles transmission follows a defined chain of infection (CDC, 2020). The infectious agent, the highly contagious measles virus, is primarily transmitted through respiratory droplets expelled when infected individuals talk, cough, or sneeze (Brigitta *et al.*, 2017).Infected individuals serve as the reservoir, harboring the virus in respiratory secretions, and the primary portal of exit is the respiratory tract, releasing infectious droplets into the air (John *et al.*, 2016). Transmission occurs through direct contact with respiratory droplets or by touching surfaces contaminated with these droplets (Brigitta *et al.*, 2017). The virus enters the body through the respiratory system, typically the nose and throat, with susceptible hosts being individuals without prior immunity due to lack of vaccination or previous infection, including infants too young for vaccination, immunocompromised individuals, and those who haven't received all recommended doses (Jefferson, 2024).

Preventing measles transmission involves breaking the chain at multiple points. Vaccination is a key strategy, with the highly effective MMR vaccine offering long-term protection against measles, mumps, and rubella (John *et al.*, 2016).As described by (Peter, Athol and Gisli, 2020) Achieving and maintaining high vaccination coverage (over 95%) in communities is crucial to establish herd immunity, protecting even those unable to get vaccinated. Additionally, respiratory hygiene measures such as coughing and sneezing etiquette, frequent handwashing, and environmental cleaning and disinfection can reduce the spread of infectious droplets (Abdullah *et al.*, 2022). Early isolation of infected individuals, especially in high-risk settings like schools and healthcare facilities, is essential to prevent further transmission (Wang *et al.*, 2023).

The chain of infection further emphasizes specific points to address in preventing measles transmission. Isolation and quarantine play crucial roles in reducing transmission during outbreaks, along with contact tracing (CDC, 2020). Respiratory hygiene, including hand hygiene and the use of facemasks, is pivotal in preventing the transmission of measles and other respiratory viruses, particularly in community settings (Vincent, 2020). These measures have consistently proven effective in reducing the spread of respiratory viruses, with hand hygiene being protective against respiratory infections (John *et al.*, 2016). Public health education campaigns are crucial to dispel misconceptions about vaccination, address vaccine hesitancy, and educate the community on the importance of preventive measures (*Public Health England*, 2021).

## Q4: Outbreak management and roles/responsibilities

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