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Prevalence of Communicable Diseases among Secondary Students in Kisumu County, Kenya

David Otieno Odongo, MCHD[1], Professor Wakhungu W.J., PhD[2],
DR. Omuterema Stanley, PhD[3].
[1, 2, 3] *Center for Disaster Management and Humanitarian Assistance, Masinde Muliro University of Science and Technology, Kenya.*

Abstract: *Malaria, diarrhea, tuberculosis and pneumonia are some of the serious infectious diseases which are largely preventable. Among the ten leading diseases for global disease burden include lower respiratory infections, diarrhoeal diseases, malaria, chronic obstructive pulmonary disease and tuberculosis among others. Therefore, it is not a surprise that malaria, diarrhea, tuberculosis and pneumonia are some of the critical illnesses in secondary schools in Kisumu County, Kenya. The objective of this study was to determine prevalence rates of common communicable diseases among secondary school students in Kisumu County to provide baseline data for directed intervention by health professionals, the government, partners and other stakeholders. This paper presents a descriptive analysis of data retrieved from a research carried out among secondary schools in Kisumu County, Kenya. Samples of blood, sputum, urine and stool from respondents were tested for presence of malaria parasite; a positive culture for Mycrobacterium tuberculosis; rapid urine test to identify presence of bacteria that cause pneumonia; and a positive stool test for Clastridium difficile confirming diarrhea respectively were performed. Through the findings malaria, diarrhea, tuberculosis and pneumonia are widely spread among students between age 14 and 17 years old. There was a significant variation ($p<0.05$) in prevalence of communicable diseases among secondary schools ($X^2_{5, 0.05} = 252.672$).*

Keywords: *Student; School; Infections; Prevalence; burden; intervention; significant; variation.*

I. Introduction

Global burden of communicable diseases is high causing 90% of all deaths with malaria as the leading cause of morbidity (30%) (WHO, 2005) followed by respiratory illnesses at 24.5%. The others are HIV/AIDS, diarrheal diseases, tuberculosis and measles.

Morbidity of communicable diseases is still high in Kenya (WHO, 2007). According to Kenya Demographic and Health Survey (GoK, 2010), Kisumu County has one of the highest HIV/AIDS prevalence rates at 17% which is greater than the entire Nyanza region. Household ownership and use of toilets stands at 42% while 21% of households in Kisumu West sub-County of Kisumu do not have toilets (KWHDSS, 2011).

Kisumu County is disaster prone to floods and drought. Floods cause damage to health infrastructure and people's health, causing interruptions in access to safe water (Mournie, 2011). These factors indicate that population in Kisumu County is at high risk of contracting communicable diseases including malaria, diarrhea, typhoid and cholera among others. This is likely to affect school attendance by students (CDC, 2007).

Introduction of free schooling in Kenya has recorded an upsurge in school enrollment (GoK, 2012). Enrollment in public secondary schools shot up from 1.1 million in 2008 to 1.85 million in 2012. This has overstretched physical infrastructure in schools.

A lot of research has been done on health challenges facing infants and under five year olds. However, little information on extent of prevalence rates of communicable diseases among secondary school students is available. It is for the above reasons and knowledge gaps that this research was carried out.

II. Materials and Methods

Sampling Strategy

Table 1.0 Distribution of zones, schools, student enrollment and coefficient of variation by sub - Counties of Kisumu County in Kenya

sub - County	No. of Zones	No. of Secondary Schools	Student enrollment	Coefficient of variation by gender and type of school
Kisumu East	8	48; Girls & Boys = 39, Boys only = 5, Girls only = 4	Boys = 8558, Girls = 6792	Gender School Type M F Girls Boys&G 14.21 2.139 2.679 20.85 Boys only 11.27
Kisumu West	5	34; Girls & Boys = 28, Boys only = 3, Girls only = 3	Boys = 6334, Girls = 5523	10.51 1.606 1.606 14.97 9.169

Kisumu North	3	19; Girls & Boys = 16, Boys only = 2, Girls only = 1	Boys = 2737, Girls = 2151	4.544 1.069 0.537 8.557 3.571
Nyando	2	14; Girls & Boys = 10, Boys only = 2, Girls only = 2	Boys = 3423, Girls = 2796	5.683 1.069 1.069 5.349 4.642
Muhoroni	5	25; Girls & boys = 20, Boys only = 5, Girls only = 0	Boys = 3605, Girls = 3660	5.985 2.676 0.000 10.69 6.076
Nyakach	8	47; Girls & Boys = 38, Boys only = 6, Girls only = 3	Boys = 7245, Girls = 7406	12.03 3.209 1.605 20.32 12.31
Total	**31**	**Girls & boys = 151, Boys only = 14, Girls only = 22 Total = 187.**	**Boys = 31902, Girls = 28328 Total = 60230**	**52.962 47.038 100**

G= Girls' only schools, B= Boys only schools, G&B= mixed schools); last column entries derived by the researcher. Source: GoK (2013)

The first three sub-Counties, out of six, were purposively selected based on the decreasing value of coefficient of variation by gender of student and type of school. A representative cluster sample size (n = 400) out of 60 230 students was estimated using Fisher's *et al*. formula while sample size per sub-County based on coefficient of variation by gender of student. Thirty percent of schools, 38 out of 187 (Table 1.0), were selected based on coefficient of variation by school type. Students in sampled schools were clustered and selected by cluster sampling.

Data Collection and Analysis

A pretested questionnaire was administered to the respondents to capture their morbidity and socio-demographic data. Respondents who self-reported their morbidity in the last two weeks and had clinic/hospital cards clinically confirming their illnesses formed Index Cases for secondary data. Those respondents who did not have clinic/hospital cards that clinically confirm their illnesses were booked for medical examination at the nearest health facility. Medical examination was by blood slides testing positive for Malaria parasite, a positive culture for *Mycrobacterium tuberculosis* carrying tuberculosis infection, rapid urine test to identify presence of bacteria that cause pneumonia and a positive stool test for *Clostridium difficile* confirming diarrhea. Results from medical examination formed primary data. In-depth interview guide was used to collect data from Index Cases to create a direct interaction between the researcher and the respondents. Data was analyzed using SPSS 16.0 for windows. Results were statistically tested using Chi-Square ($p<0.05$) to find if there is any significant variation in prevalence rates among secondary schools.

III. Results

Respondents Age

Age of interviewees was clustered into three groups: 18-21 years, 14-17 years and 10-13 years. Those who were 18-21 years were 127 (31.8%) out of 400, the age bracket 14-17 years formed 67.8% (271 out of 400), and age group 10-13 years formed 0.2% (1 out of 400) (Figure 1.1). There was a significant ($p<0.05$) variation in age of respondents ($X^2_{3,\ 0.05} = 380.784$).

Figure 1.1 Age distribution of respondents.

Gender of Respondents

Male respondents formed 53% (212 out of 400) while female respondents formed 47% (188 out of 400) of student population sampled (Figure 1.2).

In form 1, male and female respondents were 19.3% each (41 out of 212) 19.7% (37 out of 188) respectively. In form 2, male respondents were 40.1% (85 out of 212) while female respondents were39.4% (74 out of 188). In form 3 and form 4, male proportion was 16.3% (35 out of 212) and 24.3% (51 out of 212) respectively while female proportion was 26.6% (50 out of 188) and 14.3% (27 out of 188) respectively. There was significant ($p<0.05$) variation in gender of respondents ($X^2_{1, 0.05}=10.652$).

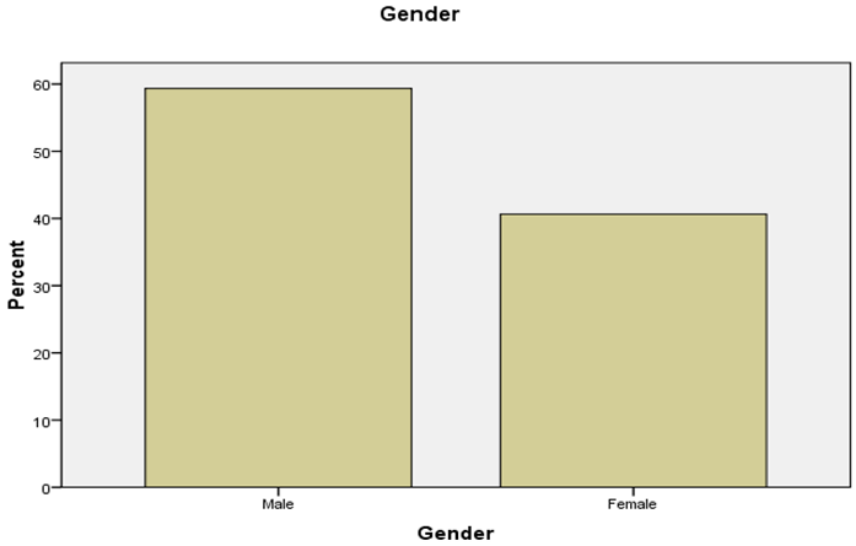


Figure 1.2 Gender distribution of secondary students in Kisumu County, Kenya

Respondents' Religion

Thirty-three point eight percent (33.8%), 135 out of 400 were Catholics, 17.0% (68 out of 400) Anglican; 17.2% (69 out of 400) Seventh Day Adventists; 8.0% (32 out of 400) Indigenous Churches; Muslims 5.5% (22 out of 400); those who did not belong to any church 2.0% (8 out of 400); and other Churches 16.5% (66 out of 400) (Figure 1.3). There was no significant variation in religion of students in Kisumu County ($X^2_{6, 0.05}=1.719$)

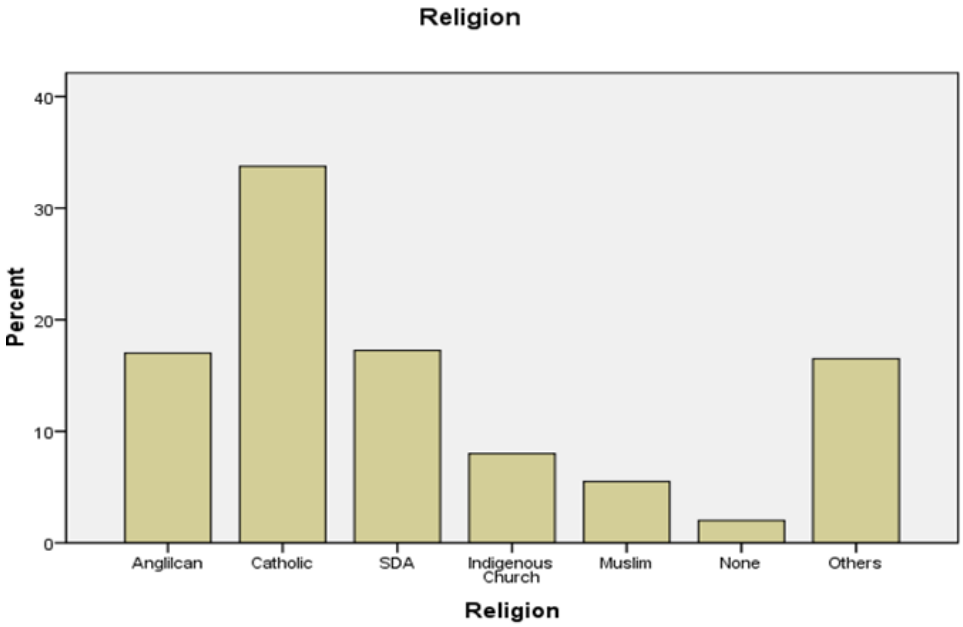
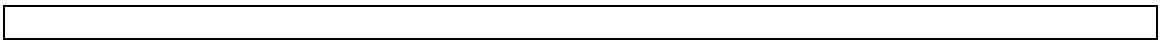


Figure 1.3 Religion membership of respondents

Prevalence of communicable diseases in secondary schools in Kisumu County

The most important communicable diseases among secondary students were Malaria, Diarrhea, Tuberculosis, and Pneumonia. Malaria prevalence was 20.7% (20700 per 100000 students), Diarrhea 15.1% (15100 per 100000 students), other respiratory-related infections 3.7% (3700 per 100 000 students), Pregnancy related 0.2% (200 per 100 000 students), other illnesses 0.2% (200 per 100 00 students). Tuberculosis 7.2 %(7 200 per 100 000 students), Pneumonia 5.2% (5200 per 100 000 students), There was a significant ($p<0.05$) variation in prevalence of communicable diseases among secondary schools in Kisumu County ($X^2_{5, 0.05}=252.672$).



Communicable Diseases

Figure 1.1 Prevalence of communicable diseases in secondary schools in Kisumu County, Kenya.

IV. Discussion

Despite uncertainties about mortality and morbidity of disease burden estimates, our findings suggest need to provide target specific interventions on Malaria, Diarrhea, Tuberculosis and Pneumonia in secondary schools. Our results on prevalence of communicable diseases in secondary schools can assist in accelerating progress towards better health by 2030 and reducing the persistent differentials in health between schools with better and poor infrastructure.

In a study by Baker *et al.* (2013), combined data from four case-control and observational studies showed that children less than five years old exposed to greater household crowding had 1.69 times the odds of pneumonia than children exposed to the least household crowding. Pneumonia and influenza are together ranked as eighth leading causes of death in the United States (US NCHS, 2009). Pneumonia consistently accounts for the overwhelming majority deaths between the two. Less than 2 percent of these deaths take place in the European Region and less than 3 percent in the American Region. These studies agree with the findings on pneumonia as one of the important communicable diseases among secondary schools, and overcrowding in schools could be a proxy risk factor to this finding.

It is estimated that every year two million people die from acute pulmonary tuberculosis (PTB) and that an additional 365 000 die with TB and HIV infection while eight million become newly infected with *Mycobacterium tuberculosis.* It is also estimated that two billion people (15-59 years) worldwide are infected with latent TB infection particularly in developing countries (Ayesha, 2010). The poor and the marginalized in the developing world are the most affected. In six case -control studies and another cross-sectional study (Baker *et al*., 2013), results showed 3.78 times increased odds of tuberculosis in the most crowded compared to the least crowded households. It is important to realize that most secondary students (67.8%; 271 out of 400) are in age bracket 14-17 years and are at high risk of being infected with latent TB as reported by Ayesha (2010).

Etiology of pneumonia infection has all indications towards personal hygiene and crowding. Evaluation of bed spacing in hostels and desk spacing in classrooms to establish association between the two variables and prevalence of pneumonia should be investigated.

Diarrheal diseases are estimated to have caused approximately two million deaths in 1998, most of which were children under five years living in developing countries. It was long thought that contaminated water supplies were the primary source of pathogens causing diarrhea, but it has now been shown that food can be responsible for up to 70% of diarrheal episodes (Muna, 2010; Eisenberg *et al*., 2007). A model of the interaction between water and diarrhea distinguishes five pathways of transmission; within households, household-to-household, household-to-water, water-to-household, and external-to-community (Eisenberg *et al*., 2007). The most common route of transmission of diarrheal agents is the faecal-oral route, within households or between households (Keusch *et al*., 2006). Students play a big role in communicable disease transmission from their households to school community. Those diagnosed with diarrhea should be followed retrospectively to control route of transmission.

It has been documented that malnutrition increases the risk of dying from diarrhea (Ochoa *et al*., 2004). Stress has been found to have a direct effect on the immune function through impairment of natural killer cell cytotoxicity (Cohen *et al*., 2007). Stress is constant in many underdeveloped countries, particularly, in low-to-middle-level income countries. Provision of safe water, proper sanitation, waste management and food control are vital community interventions to prevent diarrhea. Student's stress levels should be determined to find if it has significant effect on diarrhea prevalence.

The latest report on global malaria trend is based on information from 106 countries where malaria is endemic (WHO, 2011). The report estimates that globally there were: 655 000 deaths from malaria in 2010 from 216 million episodes; 91% of deaths and 81% of the events were in the African Region; Malaria incidence declined by 17%. These improvements are attributed to human interventions, such as greater use of insecticide-treated bed nets, indoor residual spraying, rapid diagnostic tests, and artemisinin-based combination therapies.

Determining malaria prevalence rates is a precursor to evaluating school health system while identifying barriers to the creation of safe and healthy school environments through health education for personal and community health.

In a school set up, delayed diagnosis of infectious diseases can be minimized by regular medical checkups for students, which is facilitated by having a well-run school health service.

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