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Morbidity and mortality due to severe diseases in Kasungu District, Malawi, Central Africa

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Analysis of the distribution of patients and diseases in the Kasungu District Hospital of Malawi, a land locked country in south-eastern Africa, was presented. The statistics of reported diseases in the hospital data with variables such as disease types, patient types and times of the year were examined. It is shown in this study that many of the diseases endemic to Africa do generally occur in this selected district as well. However, the analysis presents the possibility of reducing the incidences of many diseases by preventive measures and access to health facilities on time. This work is the extension of previous efforts to make accurate data available and is placed in the larger context of the diseases affecting the African continent in general.

Key words: Malaria, tuberculosis, Malawi, childhood education.

INTRODUCTION

Africa is the world's second-largest and second-most-populous continent. Every geographic locale has diseases endemic to the region, and Africa is not different. However, the vast majority of the diseases that plague Africa can be prevented with basic measures such as preventative early childhood education regarding disease and adequate hygienic practices.

An overview of the diseases that are pandemic in

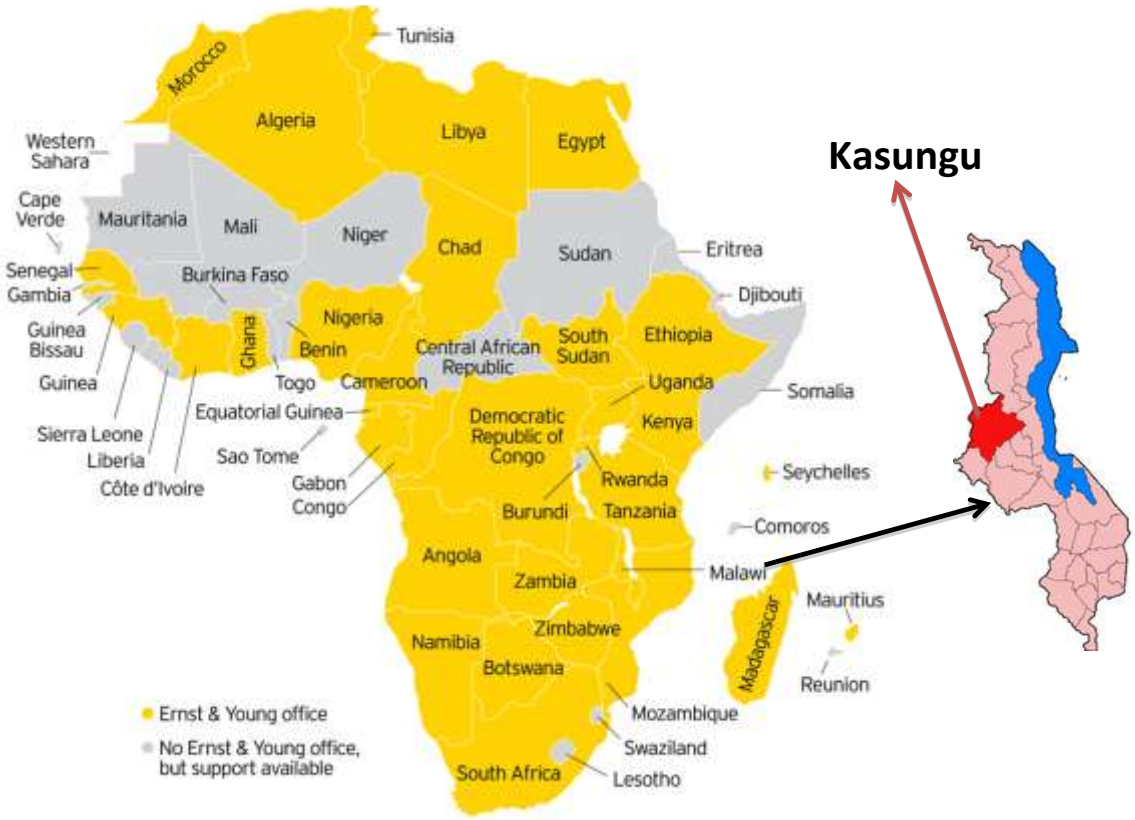

Figure 1. Map of Africa with Malawi and the Kasungu District highlighted.

Africa that claim most lives are listed. Syphilis is widely prevalent. This disease affects approximately 12.2 million people each year around the world and Africa has a major share with a quarter of these cases occurring, primarily due to the lack of basic sexual health education. Infection rates range anywhere from 6-30% in various African states. Next, tetanus, whooping cough and measles, diseases that are largely under control in the US and the Western world because of early childhood vaccinations, are endemic in northern and central Africa, and accounts for above of 800,000 deaths each year. Further, tuberculosis, the lingering debilitating illness kills up to 2,000,000 people each year. Deaths due to diarrhea are more than 2,000,000 because of the lack of basic hygiene causing contamination of the water supply, even as it could be otherwise easily preventable. Malaria affects 500 million people worldwide, and in the mosquito prone areas of Africa, this disease causes 1-3 million death per year. HIV/AIDS currently infects 33 million people in Africa, with the vast majority of these cases concentrated in sub-Saharan Africa, spreading primarily due to the lack of proper sexual education and preventative measures.

Even though, the foregoing is a numbing list of tragic mortalities, by far, the most virulent killer of Africans is pneumonia and related respiratory illnesses. Each year, pneumonia kills at least 800,000 Africans. This list is, by no means, exhaustive, but is indicative of how any socio-political approaches of prevention and control can severely reduce these incidents. It should be recognized that the diseases affecting Africa in general, and by extension, both Malawi and the Kasungu District are pneumonia, anemia, malaria, and diarrheal diseases (non-bloody). Fatalities from these diseases in severe form can be prevented by early diagnosis and prompt institution of effective treatment. However, the condition is often recognized late and not all cases are located in a place where timely access to health facilities is available. It is imperative that coordinated and well-funded efforts begin to educate communities on early recognition of the diseases, strengthening referral systems, and making pre-referral treatment available.

Malawi, officially called the Republic of Malawi, is a landlocked country in southeast Africa (Figure 1). Malawi

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is over 118,000 km^2 (45,560 sq mi) with an estimated population of 16,777,547 (July 2013 estimate). Its capital is Lilongwe, which is also Malawi's largest city. Malawi has central hospitals, and also regional and private facilities. The public sector offers free health services and medicines, while non-government organizations offer services and medicines for fees. Private doctors offer fee-based services and medicines. Health insurance schemes have been established since 2000. Malawi's healthcare goal is for "promoting health, preventing, reducing and curing disease, and reducing the occurrence of premature death in the population".

Infant mortality rates are high, and life expectancy at birth is 50.03 years. There is a high adult prevalence rate of HIV/AIDS, with an estimated 930,000 adults (or 11.9% of the population) living with the disease in 2007. There are approximately 68,000 deaths a year from HIV/AIDS. Approximately 250 new people are infected each day, and at least 70% of Malawi's hospital beds are occupied by HIV/AIDS patients. The high rate of infection has resulted in an estimated 5.8% of the farm labor force dying of the disease.

There is a very high degree of risk for major infectious diseases, including bacterial and protozoal diarrhea, hepatitis A, typhoid fever, malaria, plague, schistosomiasis and rabies. Malawi has been making progress in decreasing child mortality and reducing the incidences of HIV/AIDS, malaria and other diseases. However, the country has been less successful in reducing maternal mortality.

The fact that access to health services in Malawi is limited affects a large number of Malawians. Only 46% of the population lives within a 5 km radius of any kind of health facility. Despite most public health services being free for the patients, the cost of availing them is not entirely free because of ancillary expenses. For example, there are often costs associated with transportation to and from a facility. These costs deter many individuals even as they may be in dire need of care but cannot afford to assume the costs of transportation. Additional transportation needs aggravate the matter when an individual is referred from either a rural hospital to a district hospital or from a district hospital to a central hospital (Chasimpha et al., 2015).

In 2011, the University of Malawi released an article by Cameron Bowie that listed the following as the top ten causes of death in Malawi (Bowie, 2011):

1. HIV/AIDS (25%)
2. Lower respiratory infections (12%)
3. Diarrheal diseases (8%)
4. Malaria (8%)
5. Cerebrovascular disease (4%)
6. Ischemic heart disease (4%)
7. Perinatal conditions (3%)
8. Tuberculosis (3%)
9. Road traffic accidents (2%)
10. Chronic obstructive pulmonary disease (1%)

MATERIALS AND METHODS

The hospital patients' records for all wards were made available by the Kasungu District Hospital offices. The data collection and analysis was focused on the most recent data available in complete form, that is, that of the year 2012 and 2013. The cure rate and the fatalities count per disease were extracted by the simple statistical analysis of percentages from the total reported cases. Admittedly, a larger sampling size than that of only two years would make the reported data more representative of the general trends, however, the data is construed to be large enough to make statistical sense and establish broader trends.

RESULTS

In the Kasungu district of Malawi, certain diseases affect a large number of children. According to the 2012 Kasungu District Hospital Annual HMIS Report 2012/2013 in the Pediatric Ward (Figure 2), there were almost 1200 cases of pneumonia. Trailing closely, were slightly over 1000 cases of malaria. At a distant third were 300 cases of anemia and the rest diseases or conditions were negligible as compared to these three.

There is a distinct division between the cases of diseases that affect children under five and the others that are older. For children five and below, the greatest infection is malaria. While infection rates for these children are high, there seems to be a danger threshold that children five and above have passed as evidenced by the infection rates for these children falling off precipitously. This may be due to the fact that older children have a relatively more developed and mature immune system that allows them to resist infection. However, pneumonia infection rates remain high across the board for all children in all categories. This may be due to the nature of this disease. Pneumonia is often times an opportunistic infection that attacks when the body’s immune system is low after a long and extensive battle with another illness, disease or ailment. It is interesting to know if the children who have become infected with pneumonia had been battling another illness before they came down with pneumonia. If so, this would lend great credence to this proposed hypothesis.

Falling in line with the previous analysis above, pneumonia has the highest prevalence of afflicting people in the Kasungu area, making up 38.7% of the diseases. Malaria comes in as second and makes up 33.6% of the illnesses plaguing this area.

In 2013, Malawi had a HIV/AIDS adult prevalence rate of 11% (CIA, 2014). In 2013, there were 920,000 people living with HIV/AIDS and 51,000 AIDS related deaths occurred. The incidence of Malaria deserves a special attention as it has a high rate of incidence in Malawi. Malaria affects numerous aspects of social and economic life in Malawi. High malaria prevalence affects fertility,

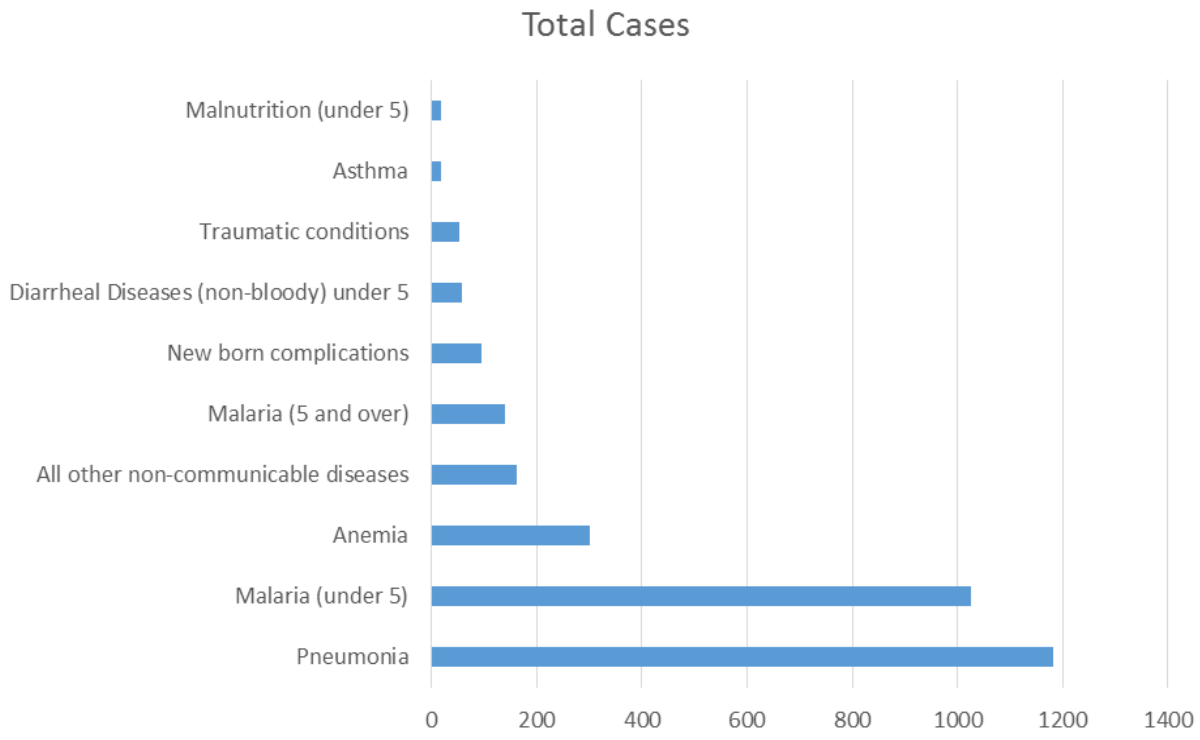

Figure 2. Diseases affecting children admitted in Kasungu District hospital pediatrics ward.

savings and investment rates, crop choices and schooling and migration decisions (Sachs and Malaney, 2002). There are a wide variety of cost-effective approaches to reduce the burden of malaria. Some current intervention tactics include case management, the use of insecticide-treated bed nets, indoor residual spraying, and environmental vector control measures such as larvaciding (controlling mosquitoes at the larval stage through the use of chemicals) and filling and draining of breeding sites. (Goodman and Mills, 1999). Each of these interventions has proven to have a high value of health gains achieved per dollar (Goodman and Mills, 1999). More specifically, mosquito nets are one of the most effective and widely used approaches. They are most effective in that they require a minimal amount of resource input and result in a large decrease in the prevalence of Malaria (Berthelemy et al., 2013).

While there is significant extant information on the diseases affecting Africans in general, and a certain compendium of data regarding diseases in Malawi proper, there was a dearth of statistics regarding the diseases affecting the people in the Kasungu district Malawi. The purpose of this study was to elaborate the literature and shed some light on this oversight and space. It is believed that a more detailed study and analysis on a specific region will not only enrich the research literature, but also enable preventive measures by ensuring more cognizance on any particular patterns. While there might be some logistical and financial obstacles that need to be overcome to provide better treatment for Malawians who have been already affected by diseases, it is believed that preventative measures can mostly alleviate this situation. It is hoped that the demographic research that is undertaken and the data gleaned from this research will be helpful in carrying out any future preventative initiatives.

DISCUSSION

Kasungu District is located in the Central Region of the Republic of Malawi. The district is bordered by Zambia in the West, Mchinji, Dowa and Lilongwe in the South, Mzimba in the North and Nkhotakota and Ntchisi in the East. It is the only district in Malawi sharing more district boundaries with other areas. The district headquarter is approximately 127 km from Lilongwe, the Capital City of Malawi. The total area of the district is 7878 sq km making up 8.4% of the total land area of Malawi, which is 94,276 sq km. The population in Kasungu is estimated at 764,859 from 480,659 in 1998. It has almost doubled over a 20-year period. Kasungu's population growth rate is estimated at 3.6%, predominantly due to the high total fertility rate (TFR), which is now estimated at 5.7, and the low contraceptive prevalence rate (CPR) of 35% among all women using any method. The ratio of female to male is 51.6 to 48.4. Almost half of the population is under 15 years of age and the dependency ratio rose from 0.92 in

1966 to 1.04 in 2010. About 5% of the population are infants aged less than 1 year, 23% are children under five years of age and about 46% are aged 18 years and above.

There are 28 registered health facilities in the district, of which one is a district hospital. The district hospital is often overcrowded, and suffers from a lack of nurses and anti-retroviral drugs. The hospital's 64-bed pediatric department can at times receive over 100 patients, leaving some patients on the floor, especially during the Malaria season from November-April.

In Kasungu, health care services are delivered by both the public and the private sectors. The public sector includes all facilities under the MoH and the Army (Mziza Health Center). The private sector consists of private for profit and private not for profit providers (mainly CHAM). The public sector provides services free of charge while the private sector charges user fees for their services. It is the policy of the Government of Malawi that the Essential Healthcare Package should be provided free of charge to all Malawians (Sachs and Malaney, 2002). The EHP includes diseases and conditions affecting the majority of the population especially the poor and includes the following conditions: HIV/AIDS; acute respiratory infections; malaria; diarrheal diseases; perinatal conditions; non communicable diseases (NCDs) including trauma; tuberculosis; malnutrition; cancers; vaccine preventable diseases; mental illness and epilepsy; neglected tropical diseases (NTDs); and eye, ear and skin infections.

Health services are delivered at different levels, namely: primary, secondary and tertiary. These different levels are linked to each other through an elaborate referral system that has been established within the health system. At the primary level, services are delivered through community initiatives, health posts, dispensaries, maternities, health centers and community rural hospitals. At community level, health services are provided by community-based cadres such as Health Surveillance Assistants (HSAs). The district hospital constitutes the secondary level of healthcare. It is a referral facility for both health centers and rural hospitals. The district hospital also service the local town population offering both in-patient and out-patient services. Kasungu district hospital refers its patients to Kamuzu Central hospital, a tertiary level of healthcare. The provision and management of health services has since been devolved to Local government (District Council) following the Decentralization Act (1997).

Low literacy levels, especially among women, and negative cultural practices that potentially impact health, do indeed affect the health of the people in the district. The 2006 Multiple Indicator Cluster Survey (MICS) and 2010 DHS reports show that the higher the educational level attained, the lesser the rate of prevalence of diseases such as malaria, diarrhea and acute respiratory infections; and more knowledgeable are the public about diseases such as HIV/AIDS. Educated people are more likely to access modern health care services as compared to those who have little or no education. Education is, therefore, an important determinant of health in the district. The prevalence of diseases such as malaria, ARIs and diarrhea is higher among poor people as compared to those who are rich.

Malawi is predominantly an Agricultural country: the sector accounts for 35% of the GDP and more than 80% of export earnings (primarily from tobacco sales). The Agriculture sector supports more than 85% of the population. Kasungu is arguably one of the districts in Malawi with high level of agro-business, contributing significantly to the economy of Malawi.

Over 100 people died in a famine in 2002, according to official estimates; Kasungu was the worst affected area in Malawi. In 2005 too, a famine occurred in Malawi, affecting 4.2 million Malawians. The efforts to distribute food to the needy were concentrated in Kasungu. During 2004 and 2005, there was an outbreak of cholera, with eight people recorded to have suffered the disease (Zachariah et al., 2002).

While there have been great strides made in controlling the spread, treatment and prevention of malaria in the past decade, malaria still remains endemic in Africa. It is not surprising that Malawi, and more specifically the Kasungu district, wrestles with this disease. The health care budget for the Malawian government for acute conditions and illnesses is inadequate most of the time, so expectations for funding of preventative measures would be very thin. The unfortunate nature of malaria is that the most efficacious treatment of this disease is not ex post facto, but before the disease has a chance to infect people. Thus it is inevitable to nip this calamity in the bud by taking every possible preventive measure. However, the preventive measures such as mosquito fumigation campaigns, draining of stagnant pools of water, mosquito nettings, etc. all which would cost money, fail to get allotments in the healthcare budget.

The leading cause of death among children was pneumonia, with 50 deaths due to this disease. The second leading cause of death was anemia with 40 fatalities followed by the third leading cause of death malaria with 38 deaths (Table 1 and Figure 3). There is a slight discrepancy in the data in that while there were substantially more cases of children afflicted with malaria rather than anemia, more children died of anemia rather than malaria. This may be explained in part that there might be more established procedures to deal with malaria, and that the disease is more readily treatable with medication. Anemia is easily diagnosed but urgently and adequately treated. The latter is also attributed to malaria especially in the children; thus those who had anemia most likely also had malaria.

As analyzed earlier, the total number of deaths due to malaria for children under five years of age falls in line with this study assertion of a younger child's less

Table 1. Diseases/death affecting children admitted in Kasungu District Hospital pediatrics ward (2013).

Pediatrics Ward	Pneumonia	Asthma	Diarrhea Diseases	Anemia	Malnutrition Under Age 5
Total Cases	1181	19	59	300	18
Total Deaths	50	0	6	40	10
	Malaria Under 5	**Malaria Over 5**	**New Born Complications**	**Traumatic Conditions**	**Others**
Total Cases	1025	140	95	53	161
Total Deaths	38	6	5	0	2

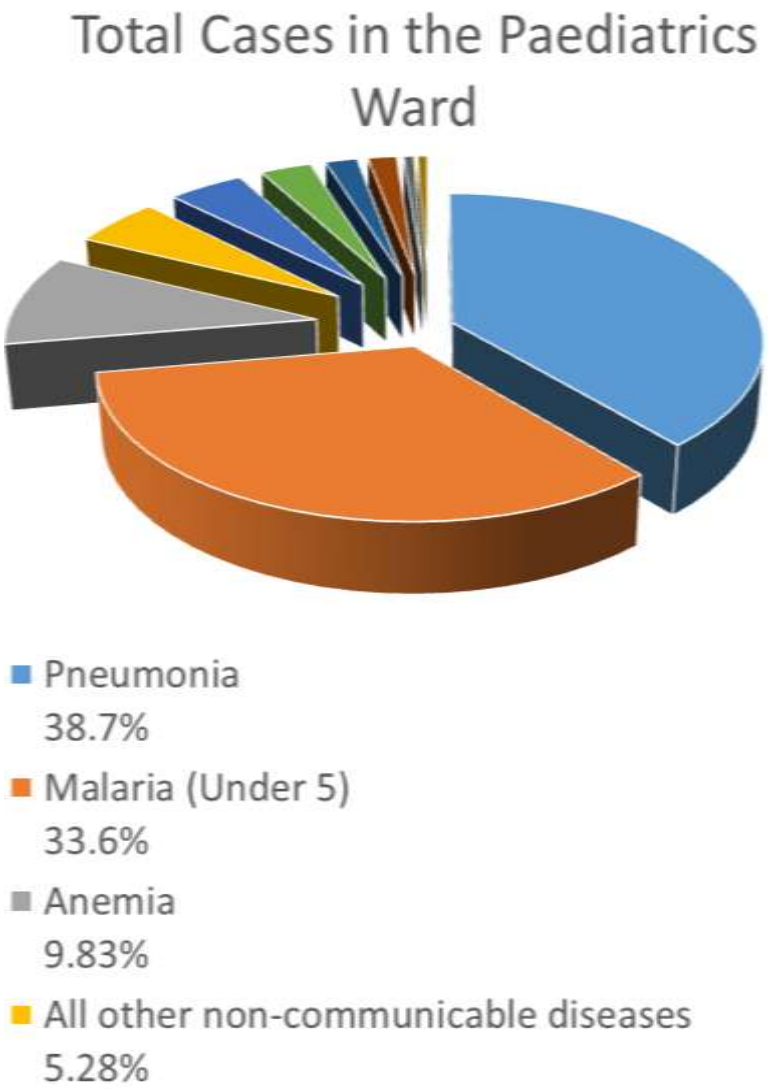

Figure 3. Statistics of illnesses distribution in the paediatric ward.

developed immune system not conferring sufficient immunity to the disease. For children under five, within the total number of 1025 malaria cases, there were 38 deaths. With children over five, within a total of 140 cases, there were 6 deaths. The case fatalities for malaria for children below five and above five are 3.7 and 4.2, respectively. Thus, it appears that both sides of the age 5 mark, suffer equal fatalities as though the developed immunity in older than 5 group should render higher survival rate as suggested earlier. However, the

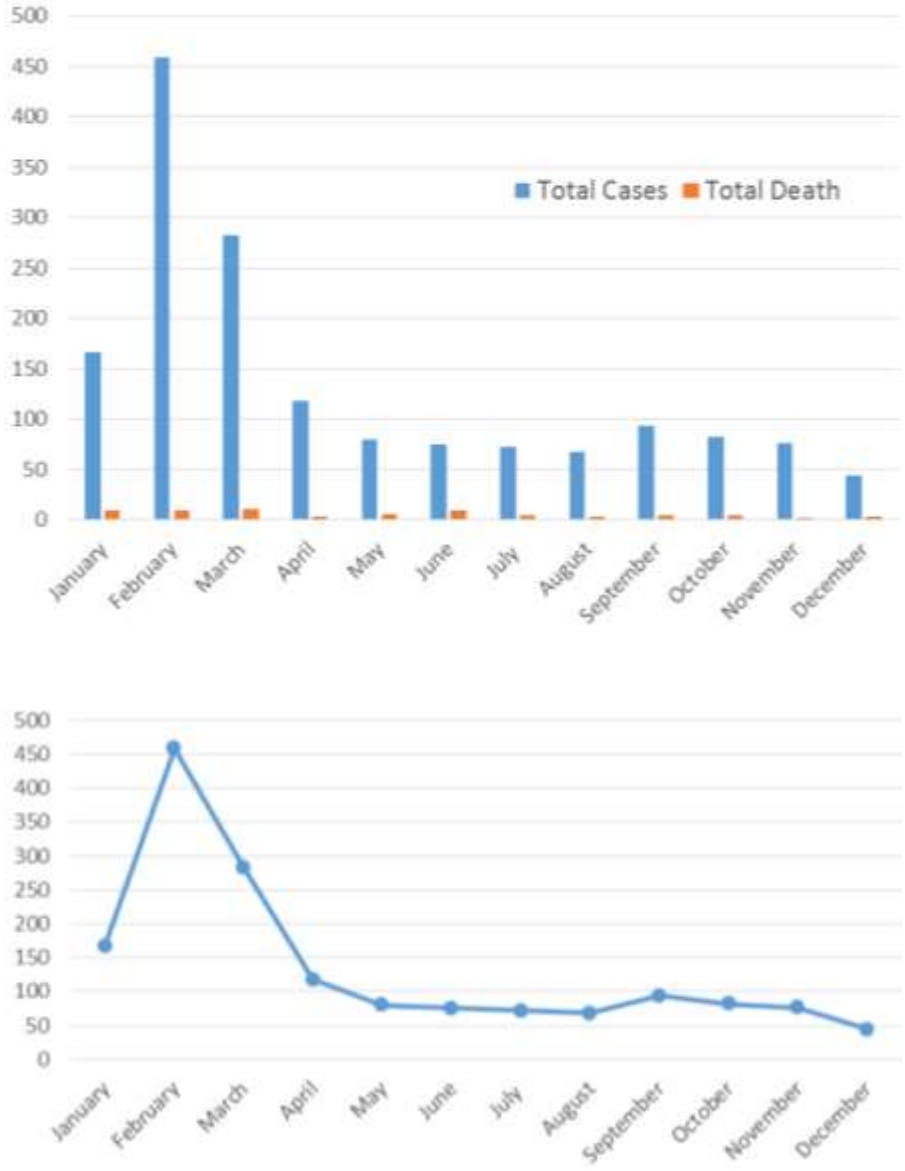

Figure 4. Number of pneumonia patients admitted by months in Kasungu District Hospital, Malawi in 2013.

registration of significantly lower cases of older than 5 children seems to indicate that the older children are less prone to the malaria.

Another point of significance is the number of cases and deaths due to anemia and malnutrition. There is a link between these two conditions, both are caused by the lack of adequate nutrition. While it is hard to intuit a causal relationship between the two, that is, anemia coming before general malnutrition or vice versa, it is of considerable interest that there are significantly more cases of malnutrition (18 cases, 10 deaths, 55.5% than anemia (300 cases, 40 deaths, 13.33%). This is a pointer to the extreme malnutrition that exists. It is apparent that while children may now be fed adequate number of calories in the Kasungu district, the quality and nutritional content of the ingested calories might not be functionally complete (especially protein from animal sources), thus leading to the higher rates of malnutrition. Finally, one cannot ignore the fact that the children who are afflicted with malnutrition are under five years of age, falling in line with the fact that younger children are at a more vulnerable stage in life and hence, might not have the nutritional reserves to rely upon as older children generally have.

For the overall population, the cases of pneumonia patients have been broken down on a month by month basis for the year 2013 (Figure 4a and b). The highest instance of pneumonia occurred in February with 459

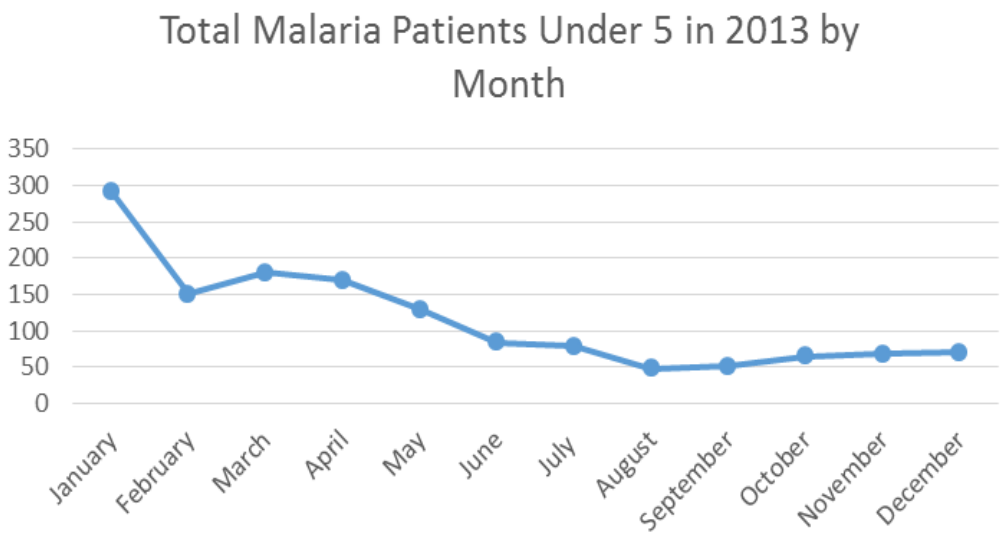

Figure 5. Number of malaria patients under 5 admitted by months in Kasungu District Hospital, Malawi in 2013.

cases followed by second in March with 282 cases and the third in January with 67 cases. The highest rates of deaths also occurred in these three months, with 10, 11, and 10 deaths occurring respectively. It is noteworthy that the highest incidence of pneumonia infection and fatality rates occurred within this short three month period, and it bears further interest and study. It is hypothesized that potential instigators for these higher rates of pneumonia during these aforementioned three months might be due to multiple causes, such as the end result of opportunistic infection from other yet unidentified illness or it may be due to the simple fact that food stores generally fall off at the beginning of the year before the new crops can be planted and harvested (Friends of Malawi), and as such, people's immune system may not be as robust since their diets are less than optimal.

For patients under 5 years of age who were admitted into the Kasunga District Hospital for malaria in 2013, the primary month of infection was in January with 292 cases (Figure 5). Though decreased, the number of malaria cases stayed significant but stable during the months of February, March, April and May. The death rates due to malaria during these months were 8, 3, 7, and 7 respectively. From June onwards to the end of the year, the rates of malaria infection and deaths dropped precipitously. Like pneumonia, the infection and death rates of malaria are clustered at the beginning of the year

The pediatric rates of infections and deaths correlate highly with the general infections and death rates. These higher levels of infections and deaths are understandable in that they correlate with the rainy season in Malawi, running from December through April, which are the prime breeding times for mosquitoes, the principle vector of malaria infections.

Conclusions

Deaths due to these rather easily preventable and once infected, easily treatable, diseases will continue to exact a staggering toll on the African people. Studies such as this will intensify the consciousness of administrations and associated public health organizations to this important public health management issue so that they act more proactively.

Conflict of Interests

The authors have not declared any conflict of interests.

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