Malawi

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May 2014

MALAWI

"THE WARM HEART OF AFRICA"

COUNTRY REPORT

FOR USE IN RADIOLOGY OUTREACH INITIATIVES

May 2014

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Appendix 1. Abbreviation

Abbreviation	Meaning
ADC	Area Development Committee
ART	Anti-retroviral Therapy
CCS	Country Cooperation Strategy
CDC	Center for Disease Control and Prevention
CDCS	Country Development Cooperation Strategy
CHAM	Christian Health Association of Malawi
DALY	disability-adjusted life year
DEC	District Executive Committee
DPP	Democratic Progressive Party
EHP	Essential Health Package
GDP	Gross Domestic Product
GoM	Government of Malawi
GVH	Group Village Headman
HSSP	Health Sector Strategic Plan
IHS	Integrated Household Survey
MoH	Ministry of Health
MP	Members of Parliament
NTD	Neglected Tropical Disease
RTA	Road Traffic Accidents
SWAP	Sector Wide approach programs
SWOT	Strength, Weaknesses, Opportunities, Threats
RSOG	Radiology Standard Operational Guidelines
RTA	Road Traffic Accidents
SWAp	Sector Wide Approach
TA	Traditional Authorities
USAID	U.S. Agency for International Development
VDC	Village Development Committee
WHO	Word Health Organization

Malawi Country Report

General Country Profile

A. Geography and Population:

Malawi is a small country located in the southeastern part of Africa. The country shares its border with three countries: Mozambique, Zambia and Tanzania. More than half its border, 1,569 km, is shared with Mozambique on the northeast and northwest part of the country. Zambia shares 837 km of the country's border on the North West part. Tanzania shares 475 km of its border on the northeast side of the country. The size of the country is slightly smaller than the size of Pennsylvania. It covers an area of 118,484 sq km. Land covers 94,080 sq km of the country and 24,404 sq km of the country is covered with water. The capital city of the country is Lilongwe. The official language is English and Chichewa is the widely spoken local language.

Malawi has a subtropical climate with dry season extending from May to November and rainy season from November to May. Its landscape contains elongated plateaus, rolling plains, rounded hills and some mountains. The lowest elevation in the country is 37 m above sea level located at the junction of Shire River and international boundary with its neighboring country Mozambique. The highest elevation is located in Sapitwa or Mount Mlanje located in the south eastern part of the country. A beautiful lake called, Lake Nyasa (Lake Malawi) covers most part of the country's eastern border. The lake is about 580 km long and contains more species of fish than any other lake in the world.

The country has three administrative regions, the northern, central and southern regions. These three regions have 28 districts assemblies which are further divided into traditional Authorities (TA). These TAs are divided into villages. (Malawi- HSSP)

According to the 2008 Housing and Population Census, the population of Malawi was estimated to be a little over 13 million. WHO estimated that in 2011 it reached 15 million while the Ministry of Health estimates that Malawi's population will exceed 16 million by 2016. About 85% of the

CIA World Fact: Malawi

Malawi Demographic and Health Survey 2010

population lives in rural areas. Table 1 shows the distribution of population in the country according to the 2008 Population and Housing Census. Figure 1 shows the population pyramid of Malawi according to Integrated Household Survey 2010 – 2011. According to the second Country Cooperation Strategy (CCS) for Malawi by the World Health Organization (WHO), about 52% of the population lives below a national poverty line of 16,165 Malawi Kwacha (about US $147) per person per year. According to Country Health System Fact Sheet 2006 Malawi, by WHO Africa, the percentage of population living below poverty line in the years 1997 and 1998 was estimated to be 41.7%. The poverty line standard was percentage of population who made less than a dollar per day. The current GDP of the country is 4.26 billion according to World Bank. The Country Development Cooperation Strategy report by USAID reports that more than one-third of the population consumes less calories than required and 47% of children under 5 are stunted. The demographic features of the country according to census 2008 is presented in Table 2. Table 3 shows the Demographic and Socioeconomics statistics according to Country Health System Fact Sheet 2006 Malawi from WHO Africa.

Table 1. Distribution share percentage of population in each district and region

Region/District	Distribution share (%)	Region/District	Distribution share (%)	Region/District	Distribution share (%)
Malawi	**100**	**Central Region**	**42.1**	**Southern Region**	**44.8**
Urban	**15.3**	Kasungu	4.8	Mangochi	6.1
Rural	**84.7**	Nkhota kota	2.3	Machinga	3.8
Northern Region	**13.1**	Ntchisi	1.7	Zomba Rural	4.4
Chitipa	1.4	Dowa	4.3	Zomba City	0.7
Karonga	2.1	Salima	2.6	Chiradzulu	2.2
Nkhatabay	1.7	Lilongwe Rural	9.4	Blantyre Rural	2.6
Rumphi	1.3	Lilongwe City	5.2	Blantyre City	5.1
Mzimba	5.6	Mchinji	3.5	Mwanza	0.7
Mzuzu City	1	Dedza	4.8	Thyolo	4.5
Likoma	0.1	Ntcheu	3.6	Mulanje	4
				Phalombe	2.4
				Chikwawa	3.3
				Nsanje	1.8
				Balaka	2.4
Source: 2008 Population and Housing census				Neno	0.8

Table 2: Demographic indicators based on 2008 populations and Housing census.

Indicators	Census 2008
Population (millions)	13,077,160
Intercensal growth rate (1966-2008)	2.8
Density (pop/sq.km)	139
Percentage of urban population	15.3
Women of childbearing age as a percentage of female population	44.4
Sex ratio (number of males per 100 females)	94.7
Crude birth rate	39.5
Crude death rate	10.4
Male	48.3
Female	51.4

Figure 1. Population pyramid according to Integrated Household Survey 2010 - 2011

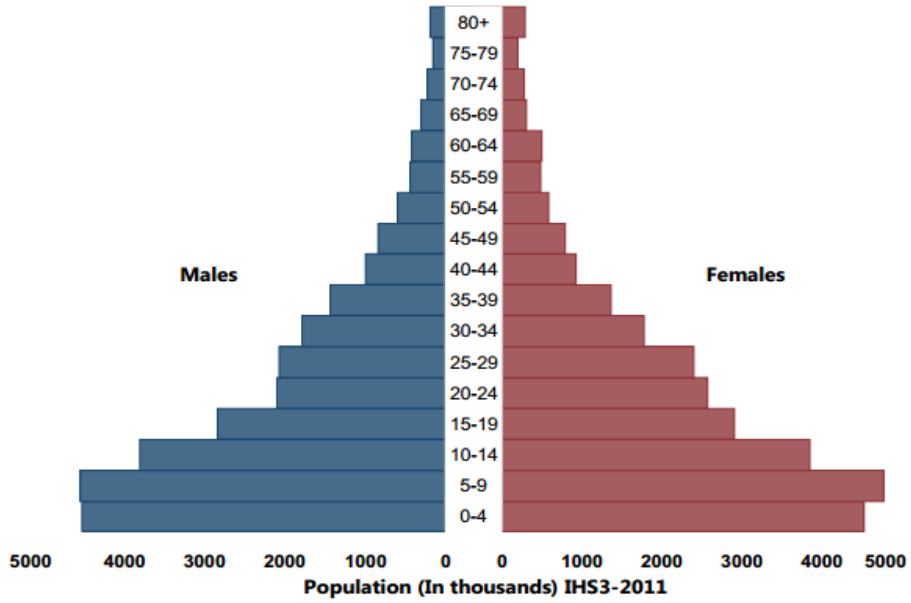

Table 3: Demographic and Socioeconomics statistics of Malawi according to Country Health System Fact Sheet 2006 Malawi by WHO Africa.

DEMOGRAPHIC AND SOCIOECONOMICS STATISTICS			YEARS	MALAWI	WHO AFRICAN REGION
Population	number	.(000)	2005	12,884	738,083
	annual growth rate	(%)	1995-2004	2.2	2.2
	in urban	(%)	2005	17	38
Total fertility rate (per woman)			2004	6	5.3
Adolescent fertility proportion		(%)	1998	13	11.7
Adult literacy rate		(%)	2000-2004	64.1	60.1
Net primary school enrolment ratio	Males	(%)	1998-2004	…	70
	Females	(%)		…	63
Gross national income per capita		(PPP int.$)	2004	620	2,074
Population living below the poverty line		(% with <$ 1a day)	1997-1998	41.7	44
… Data not available or not applicable.					
WORLD HEALTH STATISTICS 2006 http://www.who.int/whosis/en/					

B. History and Politics:

Malawi got its independence from Great Britain in 1964 under the leadership of a Malawian-American Dr. Hastings Kamuzu Banda. Post-independence, Banda ruled with totalitarian political control from 1963 to 1994. His ruling strategy was with paternalism, intimidation and violent suppression, spreading his motto, “Unity, Loyalty, Obedience, and Discipline.” He also declared himself, “Life President” in 1971. However, the increasing domestic movement of pro-democracy in early 1990s combined with western influence for legalization of other political parties resulted in his loss of power in 1994.

Bakili Muluzi became the second president of Malawi in 1994. In 1995 the country was able to apply the provisional constitution in full effect. Muluzi won a second term in 1999 and in 2002 he unsuccessfully tried to change the constitutional law for a third term. In 2004, Bingu wa Mutharika was elected as the third president of Malawi. In 2009 Mutharika was reelected by Malawians because of the outstanding economic progress and food security during his first

term. However, during Mutharika's second term the economic situation took a step back. Increase in corruption and decline in competitiveness was witnessed. Malawian also found Mutharika contradicting his stands from his first term.

On July 20-21, 2011, nationwide anti-government demonstrations caused civil unrest that led to 20 deaths in the capital Lilongwe, Blantyre, Mzuzu and Karonga.

Mutharika passed away unexpectedly on the first week of April, 2012 and Vice President Joyce Banda ascended to the presidency according to the constitution. Banda was the running mate of Mutharika for the 2009 election. However, they had a fall out in 2010 when she resisted Mutharika's plan to make his brother, Peter Mutharika, succeeding president of their party, Democratic Progressive Party (DPP). (USAID – Country Development Cooperation Strategy (CDCS) Public Version, 2013 – 2018, March 19, 2013).

C. Government and Legal System:

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There are a 193 seats in Malawi's National Assembly. They are directly elected to serve a five years term. In 2006, close to 15% of the total seats in the parliament were held by women. The president also serves for five years. The judiciary is independent from the parliament and is made up of magisterial lower courts, the High Courts and the Supreme Court of Appeal. Traditional Authorities (TA) are ruled by chiefs. TAs are divided into villages. A Group Village Headman (GVH) rules several villages. Village Development Committee (VDC) is responsible for development activities in the GVH level. Area Development Committee (ADC) are responsible for development activities in the TA level. The 28 districts are further divided into constituencies which are represented by Members of Parliament (MPs).

D. Economy and Employment:

Malawi's economy is agriculture-based with the farms dependent on mostly rain. The country exports mainly tobacco, tea and sugar. Maize, cassava, sweet potatoes, rice, sorghum, groundnuts and pulses are the main food crops in Malawi. Agriculture contributes to over 38% of the Gross Domestic Product (GDP) of the country. Over 85% of the labor force is also employed by agriculture. Malawi HSSP 2011-2016 reported that 58% of women and 49% of men work in agriculture. This makes the country's economy vulnerable to periodic fluctuations and droughts. Transportation cost in Malawi is among the most expensive in the world due to its landlocked geography and the fact that the country imports all of its fuel products. According to U.S. Agency for International Development (USAID), about 30% of the total import and/or export bill is transportation cost.

E. Physical and Technological Infrastructure:

Only 9% of the country's population has access to electricity. Electric power is fully generated by hydroelectric stations. Some of the challenges to Malawi's development are shortage of skilled labor, bureaucratic red tape and corruption. The country also has insufficient and declining road, water, and telecommunications infrastructure. USAID Malawi-CDCS-2013-2018 lists the underlying development problems of the country as: Rapid population growth, High level of Disease and poor Health, Low Productivity, Poor education and skills, Poor economic management, Weak institutions and Governance, and Gender inequality.

National Health Care Profile

A. National Health Care Profile:

According to USAID cdcs 2013 85% of Malawians live within 10 Kilometers of a health facility. Over half of the population lives within five kilometers. Malawi has high prevalence of communicable diseases including HIV/AIDS, malaria and tuberculosis, high incidence of maternal and child health problems, an increasing burden of non-communicable diseases, and neglected tropical diseases.

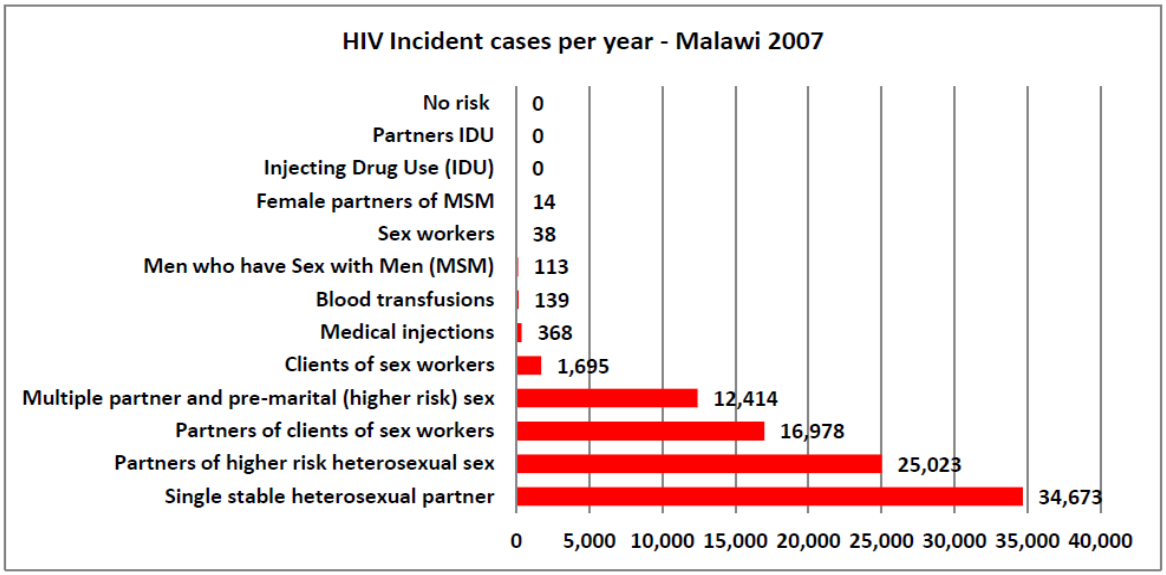
According to WHO country cooperation strategy of Malawi, the national prevalence of HIV is about 12% for adult aging from 15 to 49. Mother to child transmission accounts for about 25% of the new infections while the majority of the rest is by heterosexual contact. 250,000 adults and 23,000 children require Anti-retroviral Therapy (ART). However, only 150,000 adults and 10,000 children were on ART as of December 2007. Figure 2 shows HIV incident cases in year 2007 according to Malawi Ministry of Health WHO Country cooperation Strategy also noted that there are close to 28,000 cases of TB notified countrywide. Majority of the reported TB case (70%) are HIV positive. WHO estimates the detection rate to be about 42% and multi-drug resistant TB is an emerging threat.

Malawi Ministry of Health reported that there are an estimated 6 million cases of malaria annually. It is a leading cause of morbidity and mortality for children under five and pregnant women. According to World Bank 2000, malaria is the reason for hospitalization of 40% of children under-five. Malaria is also the reason for 40% of all hospital deaths. Some of the factors affecting interventions of malaria, according to The Ministry of Health, are lack of insecticide residual spraying, poor diagnostic capacity, abuse of insecticide treated nets, low coverage of second dose of preventative medicine, lack of quality medicine and poor attendance to treatment.

Another major health problem in Malawi is dehydration from diarrheal diseases. The Ministry of Health reported that the prevalence of diarrhea is about 17.5% with 38% being in children 6 – 12 months. About 60% of the cases were treated with a formal health provider while 24.2% of children under six months did not receive any treatment at all. Burden of Disease reported that

there were 13 million cases of acute diarrhea in children under five in 2010. However, only 324,000 of the cases were treated by the health service.

Figure 2. Malawi HSSP 2011-2016 Government of Malawi Ministry of Health



WHO noted that prevalence of Neglected Tropical Diseases (NTDs) in Malawi is rising. NTDs are parasitic and bacterial diseases that can cause substantial illness and sometimes death to most or all low-income countries. They are considered neglected because they only persists in the poorest and low income communities and have been wiped out form most of the developed countries. Some of the NTDs that affect Malawi are Lymphatic filariasis, Rabies and Schistosomiasis. Non-communicable Diseases are also noted to be increasing in Malawi. According to WHO country cooperation strategy, non-communicable diseases such as cancer contribute significant amount to the disability-adjusted life years (DALYs). It accounted for about 12% of total DALY in 2012. DALY is the number of years lost due to disability, illness or death. Table 4 shows the top 10 risk factors and top 10 diseases and/or injuries in Malawi according to Malawi Ministry of Health.

The Ministry of Health has been trying to improve maternal and neonatal health situation. Maternal mortality has decreased from 984 per 100,000 in 2004 to 675 per 100,000 in 2010. Women delivering at a health centers has also increased from 57.2% in 2004 to 73% in 2010. According to WHO, in 2005 only 18.5% of women with obstetric complications were treated in emergency obstetric care facilities. Malnutrition is also a challenge in Malawi. About 13% of children under five are underweight and 3% are severely underweight. Acute respiratory infections, specifically pneumonia, caused 5.7% of fatality in 2008.

Neonatal mortality rate is currently 33 death per 1,000 live birth with rural areas having higher rates, 34/1,000, and urban having lower, 30/1,000. Common causes of infant and child

mortality are malaria, pneumonia, diarrhea, HIV/AIDS, malnutrition and other neonatal causes. Several efforts are implemented by Malawi Ministry of Health to improve children health.

Table 4. Malawi HSSP 2011-2016 Government of Malawi Ministry of Health

Top 10 risk factors			Top 10 diseases/injuries		
Rank	*Risk factor*	*% of total*	*Rank*	*Disease*	*% of deaths*
1	Unsafe sex	34.1	1	HIV/AIDS	33.6
2	Childhood and maternal underweight	16.5	2	Lower Respiratory Infections	11.3
3	Unsafe water, sanitation and hygiene	6.7	3	Malaria	7.8
4	Zinc deficiency	4.9	4	Diarrhoeal diseases	7.6
5	Vitamin A deficiency	4.8	5	Conditions arising from perinatal conditions	3.2
6	Indoor smoke from solid fuels	4.8	6	Cerebrovascular disease	2.8
7	High blood pressure	3.5	7	Ischaemic heart disease	2.6
8	Alcohol	2.0	8	Tuberculosis	2.4
9	Tobacco	1.5	9	RTA	1.3
10	Iron deficiency	1.3	10	Protein energy malnutrition	1.0

Sector wide approach programs (SWAP) were developed by the Ministry of Health in conjunction with other government ministries, private sectors, Civil Society Organizations and Health Development Partners to guide the implementation of interventions in the health sector in 2004. These programs were implemented for the time period of 2004 – 2010. The program was completed in 2010 but was extended to June 2011 for final evaluation of the program.

Cost-effective intervention for diseases and conditions affecting the majority of the population was provided free of charge to Malawians through the Essential Health Package. Some of the conditions affecting the majority of Malawians are: vaccine-preventable diseases, acute respiratory infections, malaria, tuberculosis, sexually transmitted infections, diarrheal disease, Schistosomiasis, malnutrition, ear, nose and skin infections, prenatal conditions, and common injuries.

According to Demography and Health survey in 2010, 81% of children aged 12-23 months were “fully immunized”. From 2004 Demography and Health Survey, this is an increase of 26%. In 2010 the country experienced an outbreak of measles which required about 43,000 children to be treated. Malawi Ministry of Health indicated that there is a need for more vaccine coverage specifically of measles. To increase the coverage to 90% and sustain it, additional resources are required.

The Malawi Ministry of Health presented some challenges in providing health care for the people of Malawi. Shortage of Drugs and Medical supplies, lack of Human resources for health, Laboratory, radiology services, Quality Assurance, and Essential Medical Devices are some of the challenges presented by the Ministry.

Table 5. The baseline data (2010-11) and the target data in 2015/16 for Health care profile according to Malawi Ministry of Health.

No	Indicator	Baseline (2010-11)	Target (2015-16)
	Health impact		
1	Maternal Mortality Ratio (MMR)	675/ 100000	155/ 100000
2	Neonatal Mortality Rate (NMR)	31/1000	12/1000
3	Infant Mortality Rate (IMR)	66/1000	45/1000
4	Under five Mortality Rate (U5MR)	112/1000	78/1000
	Coverage of health Services		
5	EHP coverage(% Facilities able to deliver EHP services)	74%	90%
6	% of pregnant women starting antenatal care during the first trimester	9%	20%
7	% of pregnant women completing 4 ANC visits	46%	65%
8	% of eligible pregnant women receiving at least two doses of intermittent preventive therapy	60%	90%
9	Proportion of births attended by skilled health personnel	58% (HMIS) 75% (WMS)	80% 80%
10	Penta III coverage	89%	94%
11	Proportion of 1 year-old children immunized against measles	88%	90%
12	Proportion of 1 year-old children fully immunized	80.9%	86%
13	% of pregnant women who slept under an insecticide treated net (ITN) the previous night	49.4%	80%
14	% of under 5 children who slept under an insecticide treated net (ITN) the previous night	55.4%	80%
15	Neonatal postnatal care (PNC) within 48 hours for deliveries outside the health facility	Baseline to be established	
16	% of women who received postpartum care after delivery by skilled health worker within seven days	10%	30%
17	Prevalence of HIV among 15-24 year old pregnant women attending ANC	12%	6%
18	% of HIV+ pregnant women who were on ART at the end of their pregnancy (to reduce mother to child transmission and for their own health)	35%	82%
19	% of health facilities satisfying health centre waste management standards	35%	55%
20	% surveyed population satisfied with health services (by gender and rural/urban)	83.6% (urban) 76.4% (rural)	90% (urban) 90% (rural)
Coverage of Health Determinants			
21	% of households with an improved toilet	46%	60%
22	% of households with access to safe water supply	79.7% (DHS 2010)	TBA
23	% of children that are stunted	47.1% (DHS 2010)	TBA
24	% of children that are wasted	4.0% (DHS 2010)	TBA3

No	Indicator	Baseline (2010-11)	Target (2015-16)
Coverage of Risk factors			
25	Contraceptive Prevalence Rate (modern methods)	42% (DHS 2010)	60%
Health systems Outputs (availability, access, quality, safety)			
26	OPD service utilization (OPD visits per 1000 population)	1316/1000 pop	>1000/1000 pop
27	% of fully functional health centres offering basic EmOC services	98 90%	134 100%
28	% of non public providers in hard to staff/serve areas signed SLAs with DHOs		
29	% of monthly drug deliveries monitored by health facility committees	85%	95%
30	% of health facilities with stock outs of tracer medicines in last 7 days (TT vaccine, LA, Oxytocin(oxy), ORS, Cotrimoxazole,(cotrim) Diazepam Inj., All Rapid HIV Test kits, TB drugs Magnesium Sulphate, (Mag sulph)Gentamicin, Metronidazole, Ampicillin, Benzyl penicillin, Safe Blood, RDTs)	TT vaccine= 98% LA=98% Oxy= 95% ORS= 97% Cotrim = 99% Diaz Inj.= 94% All Rapid HIV Test kits=89% TB drugs= 99% Mag Sulph = Gent= Metro= Ampicillin= Benzyl penicillin= Safe Blood= RDTs=	All tracer drugs 100%
31	% of health facilities supervised and written feedback provided	63%	100%
32	% facilities reporting data (according to national guidelines)	96%	99%
33	% districts reporting timely data	52%	90%
34	Bed occupancy rate	50%	80%
Health Investment			
35	% health facilities with functioning equipment in line with standard equipment list at time of visit	Baseline to be established	
36	% health facilities with functioning water, electricity & communication at time of visit	79% w 81% e 90% c	100% w 100% e 100% c
37	% health centers with minimum staff norms to offer EHP services	Clinician=30% Nurses/Mws=50% EHO/HA=48% Composite=19%	Clinician= 80% Nurses/Mws=75% EHO/HA= 70% Composite=45%
38	% GoM budget allocated to health sector	12.4%	15%

Malawi Ministry of Health uses the SWOT model to continuously improve quality health care in the country. Table 5 shows the Strengths, Weaknesses, Opportunities and Threats Treats of the Health care services in Malawi according to The Ministry of Health.

Table 5. SWOT quality management method for Malawi Ministry of Health

STRENGTHS	**WEAKNESSES**
• The development of the EHP in the context of limited resources. • The development of draft Health Bill. • The availability of the National Health Policy, other health policies, and standards and guidelines for delivery of the EHP. • Existence of mechanisms for conducting formal health sector reviews and monitoring the performance of the health sector. • Increasing alignment of partners within the sector. • Functioning governance structures within the health sector. • Strong partnerships with HDPs and other stakeholders including the community. • Alignment of HSSP targets with the MGDS and MDGs. • Decentralization of the health system to District Assemblies (partially). • Establishment of CMS Trust. • Availability of standards for the different levels of health facilities. • Commitment to increasing human resources. • Strong commitment to mobilization of financial resources.	• Limited implementation and enforcement of policies, guidelines, standards and protocols; delay in revision of PIM. • Shortage of human resources and inequitable distribution. • Increasing number of donor funded projects. • Non-alignment with some donors which results into inequitable distribution of resources and inappropriate management and utilization of resources (human, financial and logistics). • Procurement systems require further strengthening. • Inadequate health service coverage and utilization. • Financial management and accountability system requires continual strengthening. • Weak referral system and over-reliance on central hospitals for EHP delivery. • Poor coordination of public-private activities in the health sector. • Non-adherence to capital investment plan at district level. • Poor performance of contractors in infrastructure. • Lack of utilities in some facilities. • Poor transport management system. • Lack of adequate attention to social determinants of health. • Weak monitoring and evaluation system and lack of utilization of data for decision making. • Slow implementation of decentralization.
OPPORTUNITIES	**THREATS**
• Government's commitment to improve the health service delivery and quality of care through priority and cost effective interventions. • Government commitment to public-private partnerships in health service delivery. • Decentralization of services for effective community participation in health services delivery.	• Compromised national ownership through parallel processes and uncoordinated oversight. • Shortage of human resources. • Lack of control over determinants of health. • Climate change. • Illiteracy, poverty and high levels of population growth.

OPPORTUNITIES	THREATS
• Commitment by donors to support the health sector.	• Lack of capacity to implement the decentralized health system. • Rising cost of medical equipment, drugs, supplies and construction materials. • Irrational drug use. • Donor dependency. • Lack of capacity of training institutions to fulfil human resource needs of MoH. • Costs of Service Level Agreement to ensure universal coverage, and difficulties in implementation of SLAs. • Migration of experienced professionals from the public sector. • Limited capacity of the existing means of communication to reach all segments of the population, impacting on IEC/BCC activities. • Resistance from some HDPs to adhere to the agreed requirements and harmonization of budget cycle, funds disbursement and reporting. • Approval of the draft Health Bill may take time. • Inadequate resource mobilization to meet financial resource needs of the HSSP.

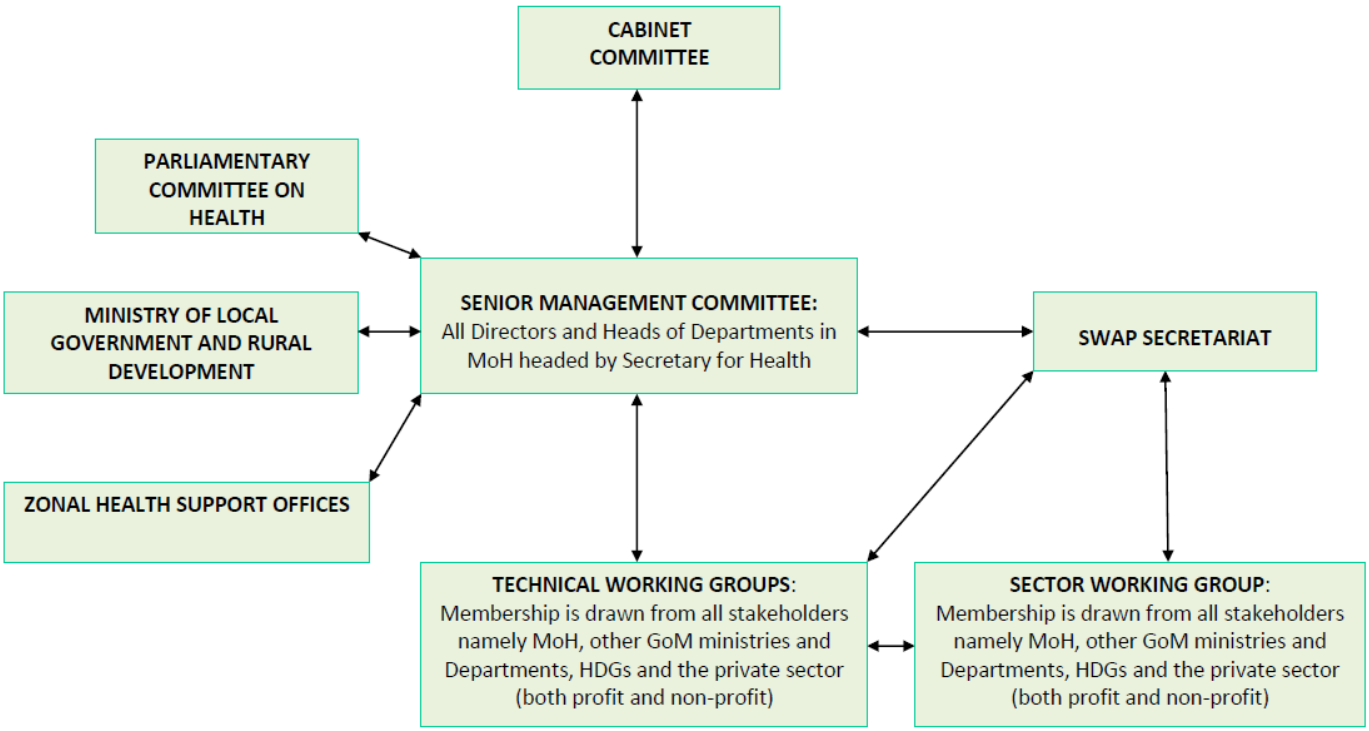
B. National Health Care Structure:

Malawi Ministry of Health (MoH), in collaboration with stakeholders, sets the agenda for health in Malawi. MoH is a sector of the government that has various departments that develop, review and enforce health and related policies. The Ministry also regulates all health sectors including private sectors. The Ministry has five Zonal Offices responsible for providing technical support to District Health Management Teams. Malawi Ministry of Health divided the structure of health sector into National Level and District Level. The chart below shows the National level health care structure.

1. Governance structure of health sector: National level

The Cabinet Committee works in close proximity with The Ministry of Health to provide overall political and policy direction for the health sector in Malawi. The Parliamentary Committee works closely with the Senior Management Committee to lobby for health sector in parliament. The Health Sector Working Group is the overall coordinating body. It works with the Ministry of Health, different ministries in The Government of Malawi, training institutions, local government, regulatory bodies, research institutions, Civil Society Organizations and private sectors. These Groups are responsible for endorsing the budget and the Annual Implementation Plan as well as controlling the implementation of the Annual Implementation Plan and the Health Sector Strategic Plan.

Figure 3. Governance structure of health sector at the National Level according to Malawi HSSP 2011-2016 Government of Malawi, Ministry of Health



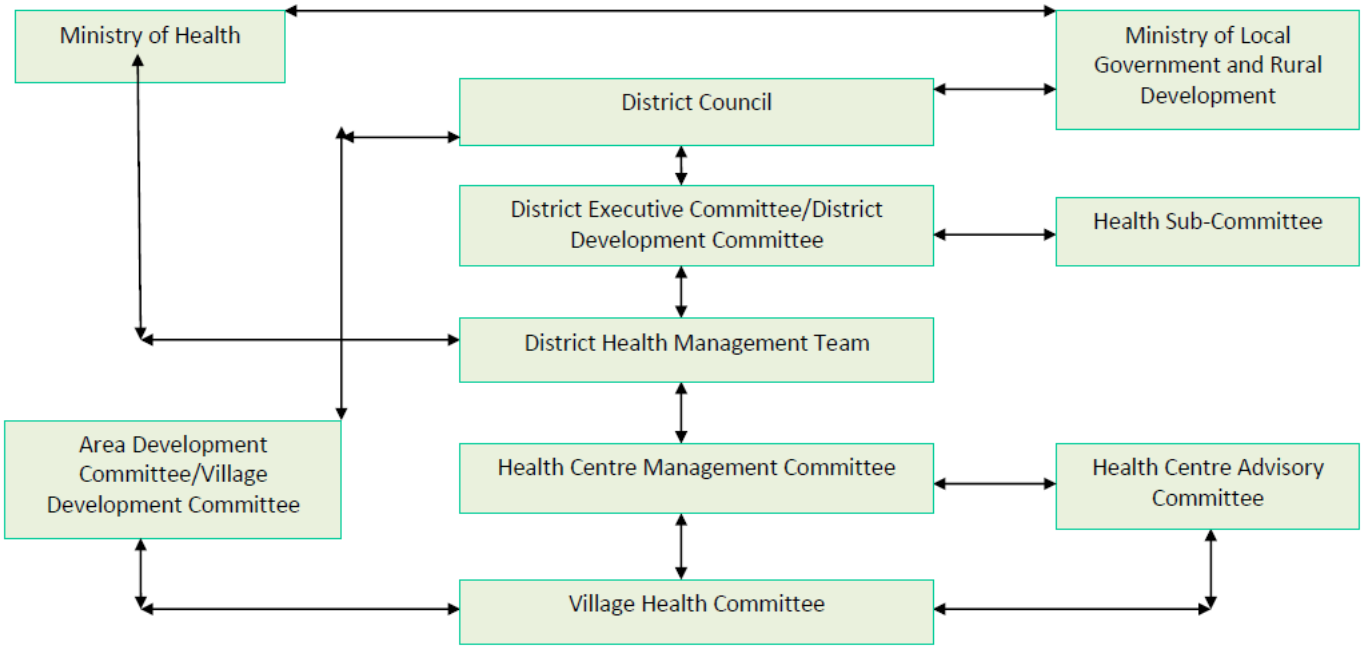
The Senior Management Committee includes all the Directors and Heads of Departments in the Ministry of Health and it is chaired by the Secretary for Health. It is responsible for the final approval of policies and to give advice to the Health Sector Working Groups. The Technical Working Groups provide guidance to The Senior Management Committee and it is guided by the Office of the President and Cabinet. These Working Groups are composed of 11 different groups.

The five Zonal Office of the Ministry of Health has extension offices which are called the North, Central West, Central East, South East and South. These extension offices provide supportive supervision to District Health Management Teams to implement the Annual implementation Plan. Figure 3 shows the diagram of structure at the National level.

2. **Governance structure of health sector: District level**

The overall policy for the district is taken care by the District Executive Committee (DEC). The Committee prioritizes interventions to be implemented, and approves all expenditures. This committee has a Health Sub-Committee which is responsible to assess and respond to the health need of the district. Health Center Advisory Committee/Hospital Advisory Committee, Area Development Committee and Village Development Committee are some of the committees responsible for identifying development issues at the district level.

Figure 4. Governance structure of health sector at the District Level according to Malawi HSSP 2011-2016 Government of Malawi, Ministry of Health



Health Center Management Committee makes sure health services are implemented in line with the Health Sector Strategic Plan. Members of the community and health care workers are also available at each health center as Health Center Advisory Committee. The public participate in health care planning through Village Health Committee and Area/Village Development Committee.

Sectors/Ministries that affect the Health Care in Malawi

The Ministry of Finance allocates financial resources to different ministries according to its priority while the Department of Development Planning coordinates and monitors the country's growth. The National Local Government Finance Committee audits and supervises local authorities on their expenditure of financial resources. The Ministry of Health works with The Ministry of Finance for financial resource and works with The Department of Development Planning to monitor the development and progress of Malawi's health.

The Ministry of Education, Science and Technology along with Ministry of Health provides training to health workers in Malawi. After their training, The Health Service Commission recruits and reviews the condition of health care providers' service.

The Ministry of Local Government and Rural Development which is supported by the Ministry of Health provides health services at the district and community level. Other sectors of the government also play roles in the delivery of health care to the people of Malawi. Some of these sectors are: Ministry of Agriculture, Irrigation and Water Development, Ministry of Labor,

Ministry of Gender, Department of Nutrition, National AIDS Commission, Health Development Partners, Private Sector, Department of Public Service Management, Department of Disaster management Affairs, Ministry of Industry and Trade, and Health regulatory mechanisms and professional associations.

Delivering Health Care to the People of Malawi

Health Care in Malawi is nationalized system where all Malawian get service for free through the public health care sector. Citizens can buy health insurance, pay certain amount or coast-share with the government to get a better, quicker service. Health Care is delivered to the people of Malawi in three different levels; Primary, Secondary and Tertiary levels.

The primary level care is delivered to the people through door-to-door visits, village clinics and mobile clinics. This care is mostly run by NGOs, volunteers and Health Surveillance Assistants. These groups educate the public, vaccinate children, and provides HIV testing and counselling centers. The Health Center Advisory Committee and Village Health Committee monitors the performance of these centers and checks if the communities demand has been met. At this level community hospitals or Health centers that could have the capacity up to 250 beds could be present.

The secondary level care is delivered to the people through District Hospitals. Each district should have a district hospital but according to the Ministry of Health only 24 of the 28 districts have District Hospitals. These hospitals have the capacity up to 300 beds and are managed by the District Health Management Team. Zonal Health Support Offices give technical support for supervision as well.

The tertiary level care is provided by referral central hospitals. There are four total Central Hospitals in the country. Central Hospitals provide specialized service and complicated cases are referred to them. The central hospital located in the southern region, Queen Elizabeth in Blantyre district, has 1250 beds. The other central hospital in the southern region, Zomba in Zomba district, has 450 beds. The central hospital located in the Central region, Kamuzu in Lilongwe, has 1200 beds. The central hospital in the Northern region, Mzuzu in Mzimba district, has 300 beds. Kamuzu and Queen Elizabeth are also teaching hospitals surrounded by colleges and universities.

Private sector in Malawi

The private sector plays a huge role in delivering Health care to the people of Malawi. Christian Health Association of Malawi (CHAM), the biggest partner of The Ministry of Health, alone claims to be providing 37-40% of health care service in Malawi. It has 20 major hospitals, 30 community hospitals and 121 health centers totaling 171 health facilities. Ten of the hospitals are teaching hospitals where CHAM trains health care workers. The facility employees about 7000 Malawian. Most of CHAM health facilities are located in rural areas.

Table 6. Number of Health sectors in all districts and regions of Malawi according to Malawi Ministry of Health

Regions	Central Hospitals	District Hospitals	Health Centers	Dispen-sary	Mater-nity	Health Post	Rural Hospitals	Other Hospitals	Mental Hospitals
Chitipa		1	7	2			1		
Karonga		1	9	2	1		2		
Likoma									
Mizimba	1	1	24	5			4	3	1
Nkhata Bay		1	12				2		
Rumphi		1	16				2	1	
Total North	**1**	**5**	**68**	**9**	**1**		**11**	**4**	**1**
Dedza		1	17	1	1		3		
Dowa		1	13	2			2	1	
Kasungu		1	10	3			2	1	
Lilongwe	1		30	2			4	4	
Michinji		1	8	1			3		
Nkhotakota		1	9	2			1	1	
Ntcheu		1	15	6	3		2		
Ntchisi		1	9						
Salima		1	14	2				1	
Total Central	**1**	**8**	**125**	**19**	**4**	**0**	**16**	**8**	**0**
Balaka		1	7	2					
Blantyre	1		11	10	1			1	
Chikwawa		1	11	2				1	
Chiradzulu		1	7	2			1	1	
Machinga		1	11	2			1		
Mangochi		1	23	4				2	
Mulanje		1	17	7	4		1	2	
Mwanza		1	10				1		
Nsanje		1	13	2			2	1	
Phalombe		1							
Thyolo		1	12	4	5		2	1	
Zomba	1	1	13	5	1			1	1
Total southern	**2**	**11**	**135**	**40**	**11**	**0**	**8**	**10**	**1**
National Total	**4**	**24**	**328**	**68**	**16**	**0**	**35**	**22**	**2**

http://www.malawi.gov.mw/ Health Institutions

The Ministry of Health indicated that CHAM owns 11 of the 16 Health training institutions in Malawi on Health Sector Strategic Plan. All the facilities provided by CHAM charge user fees to cover operational costs which make it difficult for the poor rural population of Malawi to afford. Other Non-Governmental Organizations, Community Based Organizations and Faith Based Organizations also play role in providing health care to people of Malawi. Table 6 shows the number of different types of health care facilities in all 28 districts of Malawi.

National Radiology Profile

Radiology is one of the areas of health care Malawi is struggling with. The Ministry of Health indicated that there is shortage of human resource in the medical imaging field. There is also a shortage of equipment and maintenance for donated equipment. In addition, there is a lack of infrastructure for medical imaging facilities to comply with International Radiology Standard Operating Guidelines such as the one provided by WHO. The Ministry also indicated that there is a lack of provision and laws for the disposal of radiological waste. Protective materials are inadequate and monitoring equipment are not available.

There is no radiology residency program in Malawi and only Malawi College of Health Sciences train medical imaging professionals in certificate and diploma level. Professionals have to go abroad to do residency in radiology or get a B.S. in Radiography.

A. Radiology Workforce and Training and Professional Representation:

There is only one Government Consultant Radiologist in Malawi who gives service to the public. He is also the head of Radiology department at Kamuzu Central Hospital, located in Lilongwe, Malawi. The Ministry of Health reported that there are 289 Radiography Technicians in the country. According to the data collected from the Head of The Radiography program, Lovemore Afune, at Malawi College of Health Sciences there were 170 graduates from the Radiography department since 1991. From the 170 graduates, 39 pursued a bachelors program by traveling to a neighboring country that provides the program. From those 39 technologists, 18 of them were sponsored by the government while 21 of them sponsored themselves.

Mr. Afune also expressed the interest of the department to recruit 20 students each year. However the department faces some challenge to recruit and maintain interested candidates in the field. One of the challenges presented by the department is the fact that there is not higher level education beyond certificate and diploma for medical imaging in Malawi. When students graduate from The College of Health and Sciences, Ministry of Health assigns the students to different hospitals throughout the country based on needs. Radiographers then have to stay at their assigned location for two or three years, based on their contract with the government (Ministry of Health). Once radiographers are done with the two or three years of service for the government, they are free to do what they like. During this time a lot of radiographers change

profession or enter another allied health profession because the opportunity to grow in Radiography is very slim in Malawi.

The Ministry of Health supports the affiliation of the College of Health Science with a university that has a radiography baccalaureate program to provide a BS degree in radiography in Malawi. The University of North Carolina, Division of Radiologic Science, and UNC RAD-AID chapter visited Malawi College of Health Science twice, in 2013 and 2014, to establish a professional partnership. Mr. Afune expressed how important the success of this relationship is to solve some of the challenges the medical imaging profession in the country is facing.

B. Equipment Inventory, Distribution, and rules and regulations:

Lack of medical imaging equipment is one of the biggest challenges for Malawi's Health care. There is also lack of available data for inventory and distribution of medical imaging equipment. Lack of rules and regulations for medical imaging is another challenge presented by The Ministry of Health concerning Medical Imaging. The Medical council of Malawi has some regulations for medical imaging departments of private practices.

On-site Assessment

UNC division of Radiologic Science and UNC RAD-AID chapter sent two teams of Medical imaging professionals to Malawi at two different times. The first team consisted of a faculty member and a diagnostic technologists from UNC Hospitals. The second team consisted of a team of student technologists, a technologist, faculty members and a radiology resident. The main objectives of the two teams were to assess the Medical imaging situation in Kamazu Central Hospital and to establish educational partnership with Malawi College of Health Sciences. RAD-AID Radiology Readiness Survey was done at Kamuzu Central Hospital during these trips.

Kamuzu Central Hospital is a public/government hospital located in the central region, in the city of Lilongwe. The hospital gets referral patients from district hospitals that it supervises. Patients are able to see a physician within 24 hours but if emergency it could take up to 2 hours. It might take 2-3 days to get plain Radiography or Ultrasound. If a patient needs a Computed Tomography scan, a 64 slice machine which was installed at the hospital in the beginning of 2013, it might take up to a month. The facility does not have Magnetic Resonance Imaging equipment. However, if a patient needs to be scanned in MRI and if he/she can afford to pay, he/she has to travel to Queen Elizabeth Central Hospital in the Southern Region. All MRI images are read by a private Radiologist who is a consultant for the Queen Elizabeth Central Hospital Radiology Department. The patient also may have to wait over a month.

Health care service is provided free at Kamuzu Central. The Government (Ministry of Health) run health care in the country. Some patients may choose to make a payment for a quicker

services. A single view radiography costs K 1366 (Malawian Kwachas). A complete abdominal ultrasound coasts K 3000 and a chest CT without contrast coasts K 9000.

As of now, the facility provides Radiography, Sonography and CT 7 days a week and patients are frequently referred to the facility for these studies. Per day an estimate of 150 Radiography studies, 50 Ultrasound studies, and 30 CT studies are done at this facility. There is a plan to have digital Mammography, PET and Planar Gamma Camera soon. There is a huge shortage of Iodinated contrast, barium oral contrast, and water-soluble oral contrast. There is also a big shortage of basic needs for procedures such as syringe, gloves and gauze. Films, cassettes, catheters and sheaths for urethrograpm and cystogram studies, and Jelly for ultrasound are usually available.

The specialties available at Kamuzu are Breast Surgery, Cardiology, Dermatology, General Internal Medicine, General Surgery, Gynecology, Hematology, Maxillofacial Surgery, Neonatology, Neurological Surgery, Obstetrics, Medical Oncology, Ophthalmology, Orthopedic Surgery, Otorhinolaryngology, Pathology, Pediatrics, Physical Medicine and Rehabilitation, Radiology and Urology. Some of the conditions that appears frequently at this hospital are; Cardiac disease, Stroke, Diabetes, Cancer, Trauma and Musculoskeletal Injury, Pregnancy, Peripartum hemorrhage, Diarrheal Illness, HIV/SIDS, Tuberculosis, Viral Hepatitis, Malaria, and Schistomiasis. The order of these conditions are not related to their occurrence.

The inpatient beds are occupied >100% and an estimate of 1000 patients are seen every day at this hospital. The hospital sometimes refers patients to other Central Hospitals in the cases where the specialties are located at other Central Hospitals. The Hospital is able to do different kinds of clinical Microbial, chemistry and hematology tests.

Power is available at Kamuzu 75-99% of the time and the power is always stable. Electronic devices are not connected to voltage stabilizers and there is available back-up diesel or gasoline power. The building is made out of stone or brick frame with lead shielding, barium plaster and brick/stone. The flooring is also concrete and able to hold heavy equipment such as CT. Indoor temperature ranges from 15 – 30 degrees centigrade and air conditioning is always or almost always available. During the dry season, the facility has problem with dust accumulating on equipment. Water is usually available and there exists an intact, functional plumbing system for automatically distributing water around the facility for most parts. Roads to the hospital are paved and patients use motor vehicles, non-motorized bicycle and walking to get to the hospital.

There is a big shortage of land line telephones in the facility and international calls on them is not allowed. However, mobile/cellular telephone service is widely available for voice transmission, text messaging and data transmission. The mobile phones also have 3G or 4G mobile internet access. Even though there are enough mobile lines among staff working at the facility, it is not financially and logistically possible to make international calls. There is a mobile broadband access to internet available with infrequent to occasional interruptions. However,

the internet bandwidth is inadequate for the facilities need and to have web conferences. The general-use computer workstations have the capability for basic e-mail, word processing and power point presentation.

An electronic medical record system is not used in the Radiology department unless reports need to be printed. Currently most dictations are written in patients' Health Passport book that the patients carry with them. This book is private and only hospital staff can access patient files. There is no Picture Archiving and Communication System and there is only one Computed Radiology image viewing workstation that is connected to the machine. Even though there was talk of starting teleradiology for ultrasound and x-ray, the facility never put the cable that allows for images to be sent. The facility desires to fully transfer to digital and install Picture Archiving and Communication System. However there is no firm plan or resources to do so.

There is 1 radiologist, 17 radiographers, 1 radiology nurse, 2 registration desk attendants and 1 registrar in the Radiology Department at Kamuzu Central Hospital. The Radiology Department, like most other departments, is under-staffed. Most of the Radiographers do not have official training to be Sonographers. Most Radiographers are not also trained to be a CT Technologists. There is no one specially trained to conduct radiation safety either. However, all radiographers perform X-ray, Sonogram, and CT Studies. They are also responsible to conduct radiation safety and quality control for the department. It was reported that there is someone in training to become a medical physicist in Ghana who will return to Malawi in 2015.

The final image interpretation for CT images is frequently done by the Radiologist. All plain films are given to the patients to take back to the ordering physician so interpretation of plain film is always done by non-radiologist physicians. Ultrasound images are always interpreted by radiographers. Not all radiographers have official training how to interpret ultrasound images. It is very important that non-radiologist physicians and Radiographers are trained to interpret images because most of the interpretation is already being done by them since there is only one Radiologist.

Medical imaging professionals acknowledge the importance of continuing education. However, access to trainings is very limited. In person training is usually accessible for radiographers but it's not available for the Radiologist. On the contrary, the radiologist has access to online journals while Radiographers have limited access to online journals. All imaging professionals have limited access to international conferences/meetings and rare or no access to online training and paper journals.

The challenges faced by the medical imaging department of the hospital is very similar to what the Ministry of Health indicated. There is shortage of human resources, equipment, service to existing equipment and supplies such as contrast, syringes and grids. The Ministry of Health and Kamuzu Central Hospital are interested in receiving donation of medical imaging equipment. The Ministry is able to accept the full responsibility of customs clearance and transportation as long as it is aware of the situation and confirmed that the equipment is needed. Some of the

equipment the facility interested in are: Film Radiography, Digital Radiography, Ultrasound/Sonography, CT, MRI, Conventional Fluoroscopy, PET, Planar/SPECT scintillation camera device. The facility puts priority on Conventional Radiography, portable x-ray and Ultrasound for donations.

Currently the facility has 2 working film Radiography machines, 3 Developers, 1 Computed Radiography, 1 Ultrasound and 1 CT. There is a digital mammography unit that is waiting to be assembled and put to use. There are 3 broken film radiography, 1 film developer and 2 ultrasound units in the facility. Radiology repair highly depends on service contracts which does not cost the facility anything unless it is user error and a machine breaks. The working radiography units are on service contracts and the equipment is able to be fixed within a week. The ultrasound unit is also on service contract but it was indicated that it was difficult to get service and it takes more than 4 weeks to repair the equipment. The CT machine was supposed to be on service contract but the agreement with the service provider was for two CT machines and they are refusing to provide service until the second CT unit is installed.

The facility provides personal dosimeters for radiology personnel to monitor their exposure to radiation. However it is currently suspended due to a shortage of dosimeters. The company that provided the dosimeters in previous years refused to send more until the government pays the bill for the previous years. There is also shortage of personal radiation protection equipment at the facility. There are no national guidelines for radiation safety in Malawi so Kamuzu is trying to follow international guidelines. The facility is also trying decrease dose reasonably in all CT protocols and avoid repeats, lower patient waiting time and provide more imaging studies and treatment including Nuclear Medicine and Radiation Therapy.

Conclusion

In the professional world and outside, the people of Malawi are very friendly, welcoming and take pride in being a peaceful nation. It is for these reasons the country has gotten the nick name of, “The Warm Heart of Africa.” Imaging professionals do a phenomenal job with the very limited source they have. Health care professionals and facilities are also willing to work with any organization to improve their medical imaging department. Some of the opportunities for different organizations to get involved and help Health care facilities in Malawi are:

- Donating medical imaging equipment (Digital Radiography, Fluoroscopy, ultrasound, MRI, portable x-ray) with service contracts or other sustainable plans for equipment maintenance and repair,
- Helping facilities build infrastructure for medical imaging equipment (MRI, Interventional radiography),
- Providing service contracts on existing working and non-working medical imaging equipment,
- Training of personnel on new equipment, software, and radiation protection (CT, MRI, Mammography),

- Training ultra-sonographers, medical physicists, radiation therapist, Radiologists, and Radiology assistants,
- Helping build the infrastructure for teleradiography and PACS system,
- Training IT personnel, and engineers to fix faulty machines and support PACS system,
- Providing accessible continuing education for imaging professionals, and
- Training of personal on leadership, management style and Continuous Quality Improvement models.

There are multiple opportunities to work with the education department to improve medical imaging in Malawi as well. Malawi College of Health Sciences is the only school that trains medical imaging professionals in Malawi. The college is willing to work with any organization to improve the quality of education it provides to students and professionals. Some of the opportunities for different organizations to work with the college and help improve the quality of medical imaging education in Malawi are:

- Helping with the establishment of higher education in medical imaging,
- Helping to increase the medical imaging books collection available to students,
- Establishing relationship with the college's faculty members,
- Supplying educational lectures, videos and images,
- Helping build imaging laboratory for imaging students,
- Sharing professional experience through guest lectures, and
- Collaborating with students and faculty members to publish research.

The Radiologic Science Division of University of North Carolina and its RAD-AID chapter has established educational partnership with Malawi College of Health Sciences since 2013. The two partners are working together to improve quality of education in medical imaging in Malawi. Partnership with the only school that provides education to imaging professionals around the country is very crucial to support the field in the country. Improving the quality of education and providing higher medical imaging education will solve some of the problems the Ministry of Health and health facilities reported concerning radiology.

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