Cardiovascular disease in Sudan: Past, Present and Future Prospects

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Review of Cardiovascular disease in Sudan: Historical Perspective and Future Prospects.

History tells us that the Kushites had well developed medical care; they defined disease, prescribed medicine and practiced a form of surgical practice. They ruled Egypt from 741-656 BC forming the 25th Egyptian Dynasty. King Tanwetamani (C) ruled from 664-656 BC returning to Sudan after being defeated by the Assyrians. He was buried in the royal tomb at El Kurru in North Sudan. The image in (Fig 1) depicts the heart of King Tanwitamani, successor of Tirhaga, being weighed by his doctor under the watchful eyes of the vulture goddess Mut. The huge heart reflects the possibility of cardiomyopathy as a likely cause of his death[1].



Figure 1: the heart of Tanwitanami being weighed by the Priest doctor while the vulture goddess Mut looks on.

Throughout the centuries health care was provided by native healers, bone setters, barber surgeons and midwives. The invasion of Sudan by Moslem army in 1276 introduced Islamic Medicine in Sudan. Basir (Al Hakeem) was considered the wise physician and was entrusted with diagnosis of disease and compounding of medicine. The medicaments then available were of particular interest, even today, as they represent the long tradition of Islamic medicine that had been handed down from practitioner to practitioner of the same family.

The Turkish rule introduced western medicine to Sudan. The early doctors were European who were recruited into the Turkish army. They had small hospitals in the garrison towns like Khartoum, Berber, Medani and El Obied. Their medical service was provided only to the soldiers and their families. Later after 1870 Khartoum hospital provided better service and improvement in sanitation was noticeable.

During the rule of the Mahdia some of the doctors of the Turkish era continued to provide service and there was at least one hospital at Bait Al Mal in Omdurman. Dr Naom Al Atrash was in charge of that hospital. Dr Hussien Zaki an Egyptian doctor was also recognized during this era as he provided medical care for Al Imam Al Mahdi during his last illness.

The condominium started on 19/1/1899 and the early policy of the British regarding the health of the people can be perceived from Governor Reginald Wingate following statement:

"I believe that the pacification and contentment of these primitive people can he obtained more effectively by medical aid than by any other means[2,3].

That policy was a priority that was put into action during the British Military Rule. The medical corps of Kitchener army provided medical care in field hospitals and some of the houses in Omdurman and later in the rest of Sudan with the prime objective of pacification of people by medical care.

The first British hospital in Sudan was that at Wadi Halfa (1896) which catered for the health of Kitchener invading army. The medical service at its infancy was composed of only Military doctors of the British Army. By 1900 small civil hospitals were erected in Omdurman, Khartoum, Atbara, Berber, Dongola and Port Sudan. The medical services were carried out by carefully selected army officers. They proved their worth both in vocation and administration

In 1901 the first three civilian doctors arrived in Sudan were Dr. EA Gates, Dr. Web Jones and Dr. ES Crispen Nurse Pye Moore arrived in 1907 and should be remembered as the first nurse in Sudan and the first matron of Khartoum Civil Hospital. She retired unwillingly in 1930s.

Three major events had impacted education and health during the early decades of the Condominium: The opening of Gordon Memorial College in 1902, Wellcome Research Laboratory in 1903 and the Kitchener School of Medicine in 1924. Those institutions have contributed immensely to the foundations of medicine with its different specialties, to training and to research.

Cardiovascular disease (CVD) was rare in Sudan during the early twentieth century. Dr. Bousfield who was one of the early doctors who worked in Sudan wrote in 1906:
"The main diseases in Sudan were malaria and dysentery, there was, however a striking absence of some diseases encountered at home (England). I have never seen a case of scarlet fever. Rheumatic fever was rare and as a corollary there were very few cases of heart disease except those of syphilitic origin.[4]"

In 1937 Halim reported that Syphilis accounted for 80% of CVD admissions in Khartoum Hospital. Following the advent of Penicillin it dropped to 5% by 1961[5]. Syphilis is a disease with wide spectrum of clinical presentation, we were taught in the sixties that: know syphilis and you know medicine. Cardiovascular syphilis presents as aortitis involving the ascending aorta and resulting in aortic regurgitation, angina pectoris and aortic aneurysm that may rupture with severe emotional distress. As medical students we have seen few cases of pure aortic regurgitation (AR) and the rule those days was to check the Wassermann for patient with AR. It is pertinent to report the comment of John Hunter (1728-1793) the great British surgeon and

anatomist who had contaminated himself with syphilis and later developed huge aortic aneurysm "I am under the mercy of a fool who makes me angry"

The first report of rheumatic heart disease (RHD) in Sudan came in the paper of Halim in 1937 when he reported mitral stenosis as forming 5% of CVD admissions[5]. There had been gradual increase in the prevalence of RHD reaching 12% in 1945, 25% in 1960[5], and 34% in 1984[6].

In 1986-1989 WHO launched a global rheumatic fever/ rheumatic heart disease (RF/RHD) prevention program with objectives of detecting the prevalence and initiating prophylaxis with Benzathine Penicillin for primary school children at the target age of 7-15 years. The study was carried out in Sahafa Town during which 13,332 children were screened and prophylaxis initiated for susceptible cases. RF prevalence rate was found as 10.4/1000 and Penicillin coverage was measured as reaching 30-72%. The study had also provided a prevalence rate for congenital heart disease reaching 2% of school children[7].

A similar study was carried out as WHO RF/RHD Phase II during 1998-1996. The target population was primary school children. The study has shown a ten-fold reduction in the prevalence of RF/RHD[8].

The burden of RF/RHD was immense especially during the seventies and eighties and with morbidity and mortality that had affected a lot of children and young adults in the prime of their lives. Hospital resources had also been over-stretched with chronic valvular disease admissions. Multivalvular disease was specially a difficult surgical problem and has contributed to nearly 25 % of the total admission of RHD (Table I).

Table I: load of multivalvular disease

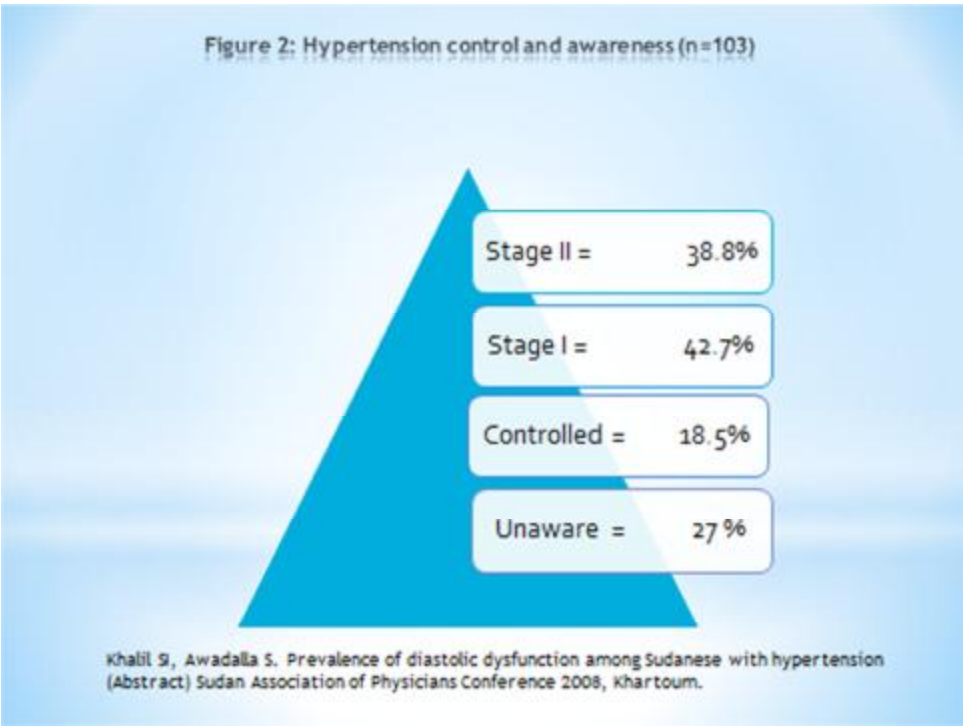
Valvular disease	Number of cases	Percentage
MR	35	24.5
MS	32	22.4
MR+MS	32	22.4
MR+MS+AR	10	7.0
MR+MS+AR+AS+	22	15.3
AS	8	5.4
AS+AR	4	3.0
	143 cases	100%

Khalil SI, et al. An epidemiological survey of rheumatic fever and rheumatic heart disease in Sahafa Town, Khartoum. J Epidemiol Community Health 1992;46:477-479.

The prevalence of hypertension in Sub-Saharan Africa was reported as 8-25%. In Sudan hypertension is the most common cause of CVD and acts as major risk factor for stroke and coronary heart disease (CHD). At the level of population studies hypertension constituted 7.5%[9], and 6.6% among university students[10]. At autopsy level hypertension was found to be the commonest cardiac pathology[11].

Hospital based studies have shown that hypertension is commonest cardiovascular disease and accounted for 34% of CVD admissions during 1984[6]. During 2011 it contributed to 28%.[12].

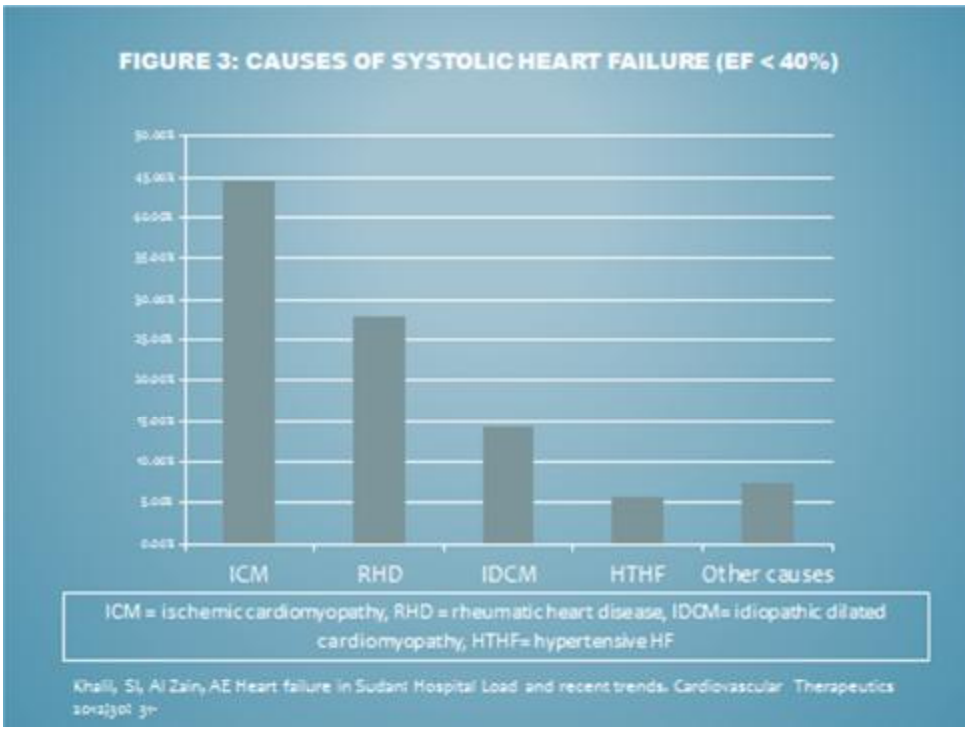
While in most cases awareness of hypertension is adequate however there is still a population group with awareness of 27% and control level is 18.5% (Figure 2).



Until the fifties coronary heart disease was rare among Sudanese. Professor Siddiq A Ismaeel had reported that when they were final year medical students they were called to see a patient admitted to South Block (the private wing in Khartoum Hospital). It was a case of acute myocardial infarction, a clinical rarity, the only case of myocardial infarction they saw during six years of studentship. However the study of Halim in 1961 reported ischemic heart disease as accounting up to 12.6% of Khartoum Hospital admissions in cardiovascular disease[5]. The disease has since shown increasing rates and by 1984 it formed 17.2%[6].

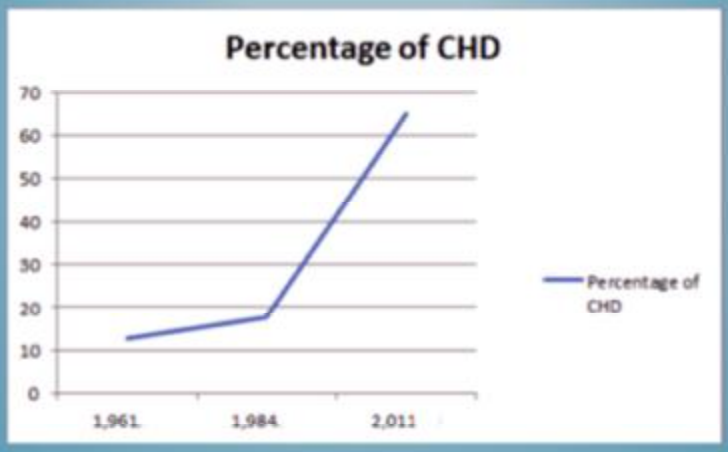
The toll from coronary heart disease continued to increase during the seventies and eighties.

A recent (2011) hospital based study of cardiovascular admission in Shaab Hospital, Khartoum. The pattern of heart disease in the same study reported CHD reaching 65% among all admissions[12]. These patterns have reflected into high prevalence of heart failure rates of 73% in acute admissions at Al Shaab Hospital. A recent study of heart failure in Sudan reported ischemic cardiomyopathy as the leading cause of heart failure (Figure 3)[13].



It seems that while the rates from rheumatic heart disease are showing gradual decrease during the last two decades, coronary heart disease rates are rapidly rising (Figure 4)

FIGURE 4: CORONARY HEART DISEASE AMONG CVD ADMISSIONS THROUGH SIX DECADES



A summary of the changing patterns of CVD is shown in Figure 5 and reflects the complete disappearance of syphilis and decline in rheumatic heart disease. Hypertension and coronary heart disease are now the major causes of CVD and consequently the main cause of heart failure.

Figure 5: Changing Patterns of CVD disuse during six decades.

Type of HD	Halim 1937	Daoud 1945	Halim 1961	Khalil 1984	Suliman 2011
HHD			44.4	33.7	28
Syphilis	80		6		
RHD	3	14	25.4	26.5	7
CHD			12.6	17.8	65
IDCM			3.6	4.8	
CONGEN			3.7	3.9	

HD = heart disease. HHD = hypertensive HD, CHD = coronary HD, IDCM = idiopathic dilated cardiomyopathy, CON HD = congenital HD.

The changing high rates in hypertension and coronary heart disease may be explained by the rapid changes that affected the Sudanese way of life. Improvement in transport, telecommunications, living conditions (improvement in GDP) and access to media and satellite broadcasts have promoted affluent (western) lifestyle. Traditional Sudanese food has been replaced by fast foods containing high amounts of refined carbohydrates and saturated fats. Add to this the rapid urbanization and adoption of urban lifestyle that affected rural communities. All these factors operated to bring about higher rates of smoking and diabetes mellitus and consequently higher rates of affluent forms of heart disease. The burden of communicable disease is now compounded by the wave of non-communicable disease e.g.: coronary heart disease and cancer, the epidemiological transition that swept the countries of sub-Saharan Africa has now landed in Sudan.

During the last thirty years coronary heart disease increasing prevalence has been recognized by cardiologist and health authorities. WHO focus on CVD disease at that time was to improve the awareness the public as well as the medical profession towards the new impending danger. WHO provided support for coronary care unit at Al Shaab Hospital during 1984 was in the form of training and provision of information material, and by August 1984 the first coronary care unit in Sudan was inaugurated (Figure 6)[14].



Figure 6: the first coronary care unit in Sudan, Shaab Hospital 1984

The first cardiac catheterization laboratory was installed during 1979 and the first cardiac catheterization was carried out late in 1979 by Dr. Sirrag Abbashar. During the early eighties a cardiac surgery set up was established. The support of Harefied hospital was remarkable in setting the initial foundation and training of scrub nurses, cardiac technician and heart surgeons. During the 1981-83 Shaab Hospital operating room had witnessed intense activity in cardiac surgery led by Professor Magdi Yacoug and Professor Donald Ross.

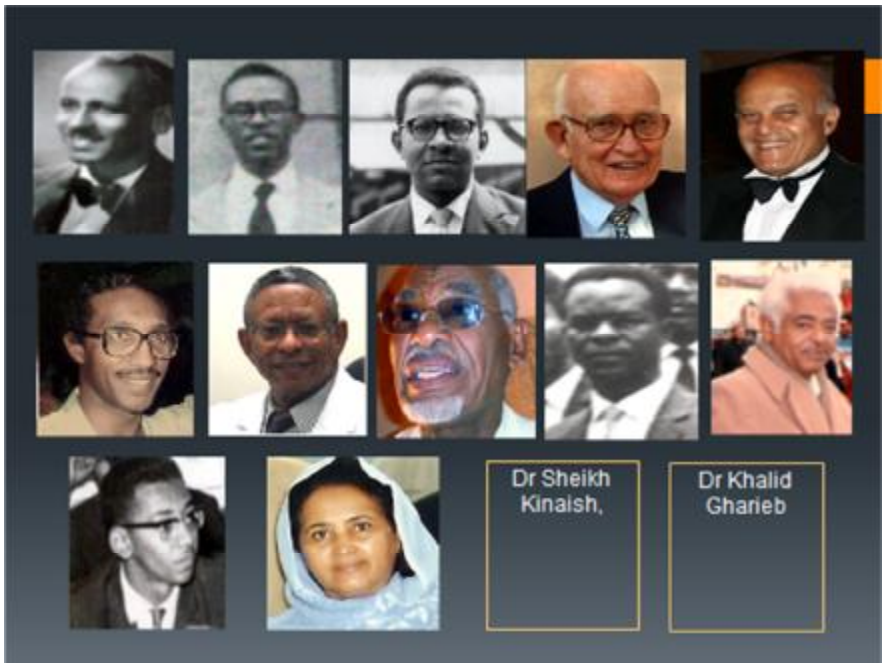


Figure 7: Pioneers of cardiology and cardiac surgery Shaab Hospital, Khartoum
Top panel: Halim Mohamed, Ahmed A Aziz, Siddiq Ismaeel, Donald Ross, Magdi Yacoub.
Middle row: Sirraj Abasher, Siddiq I Khalil, Kamal Altayeb, Ibrahim Mustafa, Mohamed S Alfeel.
Lower row; Abdul Monem A Seed, Nawal Kordofani, Shiekh Kinaish, Khalid Gharieb

The effort of Dr Halim Mohamed, Mr. Ahmed A. Aziz and Professor Siddiq A Ismaeel to establish the early cardiac catheterization and cardiac surgery in Sudan should be recorded and recognized. The early pioneering cardiologists and cardiac surgeons should also be mentioned: Sirraj Abbashar, Siddiq Ibrahim Khalil, Kamal Al Tayeb, Al Shiekh Kinaish, Abdul Monem Al Seed, Khalid Gharieb and Nawal Kordofani. The work of the pioneers cardiac surgeons; Ibrahim Mustafa and Mohamed Saeed Al Feel should also be recorded (Figure 7).

In 1984 President Numairi visited the catheter laboratory and cardiac operating rooms during a week of Sudanese- Saudi Arabian joint activity. The photograph below shows the president inside the catheter laboratory during a morning session. Numairi is on the far right on the far left is the investigator (Siddiq I Khalil) the patient was a case of aortic stenosis.



The burden of CVD in Sudan is immense. Hypertension is still a leading cause with high prevalence at community and hospital level. Rheumatic heart disease has receded in cities and towns due to improvement in socio-economics but there is still a big backlog of chronic valvular disease the “unfinished agenda”. The emerging epidemic of coronary heart disease is still unharnessed and efforts to improve awareness, prevention and treatment are needed. There is also clinical evidence supporting emerging higher rates of cardiomyopathies especially; post-partum cardiomyopathy, idiopathic dilative cardiomyopathy and endomyocardial fibrosis. Figure 8, show a plan of standard care for cardiovascular disease. A national commitment to implement this plan is urgently needed.



Table 9: shows distribution of the available cardiac setup including cardiac catheterization laboratory. An uneven distribution has characterized this map. While states with population reaching 10.4 million do not enjoy full cardiac setup service others smaller states have more than one service. The congestion of cardiac services in Khartoum state should be realized and resolved by offering new services and resources to the other states.

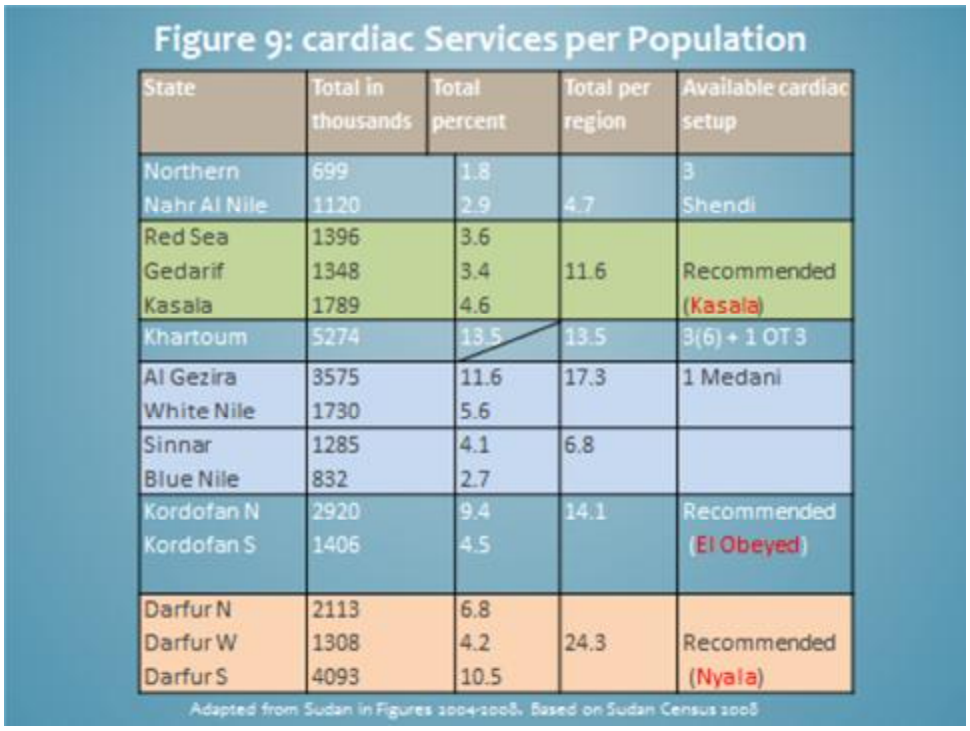


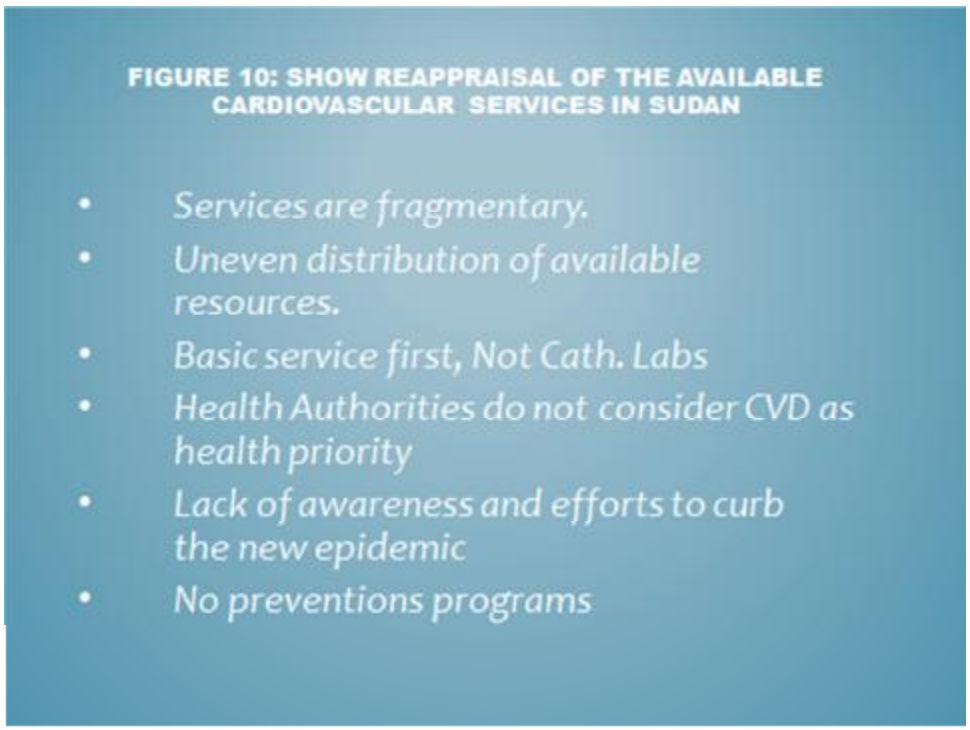
Figure 9: cardiac Services per Population

State	Total in thousands	Total percent	Total per region	Available cardiac setup
Northern	699	1.8		3
Nahr Al Nile	1120	2.9	4.7	Shendi
Red Sea	1396	3.6		
Gedarif	1348	3.4	11.6	Recommended
Kasala	1789	4.6		(Kasala)
Khartoum	5274	13.5	13.5	3(6) + 1 OT 3
Al Gezira	3575	11.6	17.3	1 Medani
White Nile	1730	5.6		
Sinnar	1285	4.1	6.8	
Blue Nile	832	2.7		
Kordofan N	2920	9.4	14.1	Recommended
Kordofan S	1406	4.5		(El Obeyed)
Darfur N	2113	6.8		
Darfur W	1308	4.2	24.3	Recommended
Darfur S	4093	10.5		(Nyala)

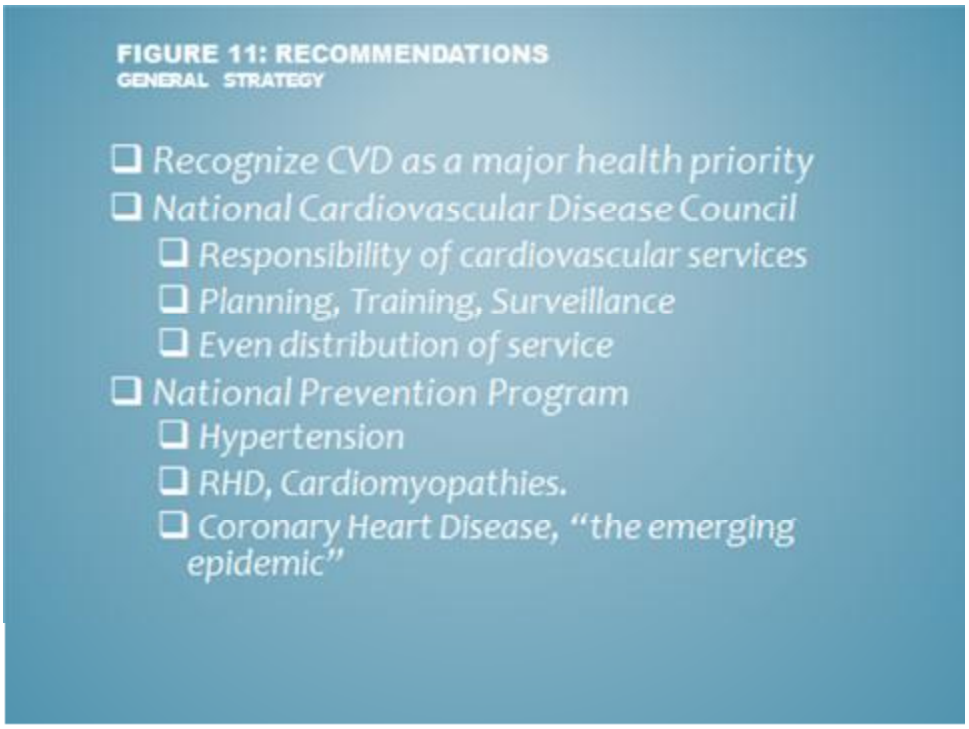
Adapted from Sudan in Figures 2004-2008. Based on Sudan Census 2008

Figure 9: uneven distribution of cardiac services throughout all states.

A reappraisal of the current situation of cardiovascular care can be seen in the Figure 10.



With the picture of CVD and services analyzed and clarified improvement is awaited and hopefully will address the issues pointed out above. The next two figures 11 and 12 show the recommendations and solutions that are relevant to the present cardiovascular health problems.





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