THE HEART OF SOWETO STUDY

Lessons from the Heart of Soweto Study and future directions

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ABSTRACT

South Africa is concurrently experiencing epidemiological transition with diseases of lifestyle on the increase, while still burdened by poverty related diseases. Chronic diseases of lifestyle such as CVD are rapidly becoming major causes of death in developing countries and by all predictions, will continue rising.[4,7,8,9] Of concern is the fact that in developing countries, CVD is occurring in younger individuals than in the developed countries and as the epidemic evolves, the poor are affected the most in both developed and developing countries.[1] The Heart of Soweto (HOS) study aimed to investigate and describe this emerging problem of CVD, and especially heart disease, amongst the urban African population in Soweto, who presented for the first time to a tertiary-care centre. Overall we found multiple challenges to the community of Soweto and surrounding regions from a combination of high levels of modifiable CV risk factors (with the exception of lipid disorders) and surprisingly high levels of advanced and deadly forms of heart disease affecting predominantly younger cases and women. Lessons learned from the HOS include, (1) building partnerships, (2) establish clear objectives with achievable goals, (3) think big and assume nothing, (4) provide an enabling environment, (5) be innovative and (6) never compromise on quality.

The prevention of CVD other chronic diseases of lifestyle, as well as the management thereof, needs to be a multi-disciplinary effort with all the necessary healthcare workers involved, implemented at the primary, as well secondary level. Our goal is the development of specific community-based intervention programmes directed towards prevention and management of chronic diseases of lifestyle in Soweto and to document the aetiology, presentation and management thereof. Our data collection will be not only meaningful for the population in Soweto, but also in other areas of South Africa and the broader Africa. It will be indicative of any urban African population in transition.

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INTRODUCTION

The socio-economic status and development of a country have a direct impact on the mortality and morbidity of its people.[1] With industrialisation, disease patterns have changed from being dominated by nutritional deficiencies and infectious disease, to chronic diseases of lifestyle, such as cardiovascular disease (CVD), hypertension, cancer and diabetes. This change has become known as "the epidemiological transition".[1] Countries around the world are however, affected differently, with developing countries, such as South Africa, being at a different stage of epidemiological transition compared to the more developed and affluent countries.[1,2]

South Africa is concurrently experiencing epidemiological transition with diseases of lifestyle on the increase, while still being burdened by poverty related diseases as well.[3] In fact, South Africa faces a quadruple burden of disease, characterised by a combination of poverty-related diseases, emerging chronic diseases of lifestyle, high injury rates, as well as the human immunodeficiency virus or acquired immunodeficiency syndrome (HIV/AIDS) pandemic.[3-6] As the overburdened healthcare service providers in South Africa struggle to cope, strategies to prevent chronic diseases of lifestyle (CDL) risk factors remain a low priority and adequate care and prevention of CDL are becoming an increasing public health issue.[4,6]

Chronic diseases of lifestyle, such as CVD, are rapidly becoming major causes of death in developing countries. According to the South African National Burden of Disease, CDL were the leading cause of death, followed by HIV/AIDS, injuries and other infectious diseases in the year 2000, and the prediction is that CVD might be increasing by approximately 150% by the year 2020.[4,7,8,9] It can be expected that in the early stages of the transition, people in higher socio-economic positions will carry the highest risk of CVD and other NCDs. However, indications are that as this transition progresses in developing countries, it is the most vulnerable members of society, the poor, who are affected the most.[8,10]

Of concern is the fact that in developing countries, CVD is occurring in younger individuals than in the developed countries and as the epidemic advances, the poor are affected the most in both developed and developing countries.[1] Poverty cannot be described in simplistic terms, because it is a multidimensional phenomenon with ideological and political, governance, social, economic, environmental and biological (health) components. It is often characterised by a lack of freedom, education, capabilities, opportunities, employment and equity and results in insufficient sanitation and food supply that leads to malnutrition (both under- and over-nutrition), and increases the risk for developing CVD. The effect of this is felt most by communities with low socio-economic status and living in urban areas.[3,8,11]

Soweto

The South Western Township, later named Soweto, was developed in the proximity of Johannesburg, South Africa, approximately 100 years ago. It is home to one of the largest number of urban black Africans on the African continent.[4,12] According to an official census done in 2001, the number of people living in Soweto was approximately 1 million people. This number is rising, as there is a steady influx of migrants.[13] It is a population in transition, with old squatter misery and new prosperity existing side by side.[4,12]

Data on the population of Soweto has shown a low prevalence for CVD and the underlying risk factors.[4] This might however be changing, as several studies have shown that urbanisation and the nutrition transition in South Africa is accompanied by an increase in the CVD risk factors in those of African descent. More data is however needed to determine whether this increase in CVD risk is related to urbanisation per se, or whether socio-economic position influences the nutrition transition and related increase in CVD risk.[8] The World Health Organisation (WHO) has estimated that people living in developing countries, such as South Africa will be affected twice as much, and even more, by non-communicable disease than in developed countries, with poor people living in urban settings being the most vulnerable, thereby increasing demand for chronic disease care and prevention.[11]

Thus, studies to investigate the emergence of heart disease in developing countries and among risk populations like the predominantly African, urban population of South Africa are of extreme importance.

The Heart of Soweto Study

The Heart of Soweto (HOS) study was established at Chris Hani Baragwanath Hospital, Soweto, South Africa. The aim of the HOS study was to investigate and to describe this emerging problem of CVD, and especially heart disease, amongst the urban African population in Soweto, who presented for the first time to a tertiary-care centre.[6]

This ongoing project has confirmed our worst fears in terms of the CV risk profile of this community in epidemiological transition and the likely consequences in terms of deadly forms of advanced disease. Through a monthly series of "Heart Awareness Days" we undertook community screening of voluntary adult participants in Soweto (>1 500 subjects in total) and found that only 22% of participants had no risk factor for CVD. Moreover, awareness rates of heart disease and its risk factors were extremely low. The most prevalent CV risk factor by far was obesity (43%), while up to 70% were overweight; an observation that is consistent with other community-based surveys in the region, with far more obese women than men (23% versus 55%: OR 0.24 95% CI 0.19 to 0.30: p <0.001). The fundamental importance of this finding should be emphasised. In a culture where low weight is either associated with the stigma of malnutrition or, worse, HIV/AIDS, it is difficult to educate individuals and the wider community about the dangers of excess weight. Indeed, the general lack of weigh scales both in the homes and healthcare facilities of Soweto are a major challenge in managing obesity even when an individual is committed to losing weight. A further 33% of subjects in the "Heart Awareness Days" recorded elevated blood pressures whilst 13% of

participants recorded an elevated (non-fasting) total blood cholesterol level with minimal difference between men and women observed in this regard. Consistent with the importance of our findings in relation to the weight profile of participants, being either overweight or obese was significantly associated with elevated blood pressure, and raised cholesterol levels.[13]

In addition to monitoring risk factors at the community level, within the constraints of limited resources and a chaotic township environment that prevented a more orthodox approach to risk surveillance, we established an advanced clinical registry for all patients attending the Cardiology Unit of the Baragwanath Hospital servicing Soweto and surrounding communities.[6] In 2006, this registry captured a combination of demographic, clinical, investigative and treatment data from 4 162 new and returning patients. The majority of new presentations (n = 1 593 / 38% of all cases) were subject to a systematic screening programme with an echocardiograph. Overall, we found a broad range of CVD (predominantly advanced heart disease) in the 1 593 new cases that comprised mainly black Africans (85%) and women (60%); the latter being slightly younger than men (mean age 53 ± 16 vs. 55 ± 15 years: p = 0.031) with almost a quarter of cases aged <40 years old overall. Data from the HOS showed that CVD risk factors was high, with 56% of cases diagnosed with hypertension (47% of which were also obese) and almost two thirds having multiple risk factors. Compared to the rest of the cohort, those of African descent were far more likely to be diagnosed with HF (OR 2.36, 95% CI 1.74 to 3.21: p <0.0001) but far less likely to be diagnosed with coronary artery disease (OR 0.10, 95% CI 0.07 to 0.14: p <0.0001). Apart from the 310 cases (19%) with a primary diagnosis of hypertension, most were "late" clinical presentations with established heart disease and multiple etiologies. The four most common diagnoses overall were hypertension (total of 897 cases – 56%), HF (844 cases – 53%), valvular heart disease/dysfunction (360 cases – 23%) and coronary artery disease (165 cases – 10%) (Figure 1). Those patients diagnosed with valvular heart disease being on average more than a decade younger than the remainder of cases. A further 10% of cases were diagnosed with concurrent diabetes and/or renal disease. Perhaps due to the fact that this was an urban population and the focus on cardiologic cases, the number of stroke presentations was low: overall 145 patients (9.1%) reported a family history of stroke but there were only 64 cases (4.0%) of acute stroke or stroke as a secondary diagnosis.[14]

In contrast to a lack of stroke cases, it was clear that advanced cases of HF was a major feature of this study cohort. Consistent with the overall pattern of presentations, black Africans predominated (88% of cases); being far more likely to be diagnosed with HF (OR 2.36, 95% CI 1.74 to 3.21: p <0.0001) but far less likely to be diagnosed with CAD (OR 0.10, 95% CI 0.07 to 0.14: p <0.0001).[12] In contrast to reports from high-income countries,[4-6] of the patients attending the cardiology clinic at Chris Hani Baragwanath Hospital, there were more women than men (57% of cases) and the average age on presentation was 55 ± 16 years. The most common forms of HF were hypertensive HF (281 [33%]), idiopathic dilated CMO (237 [28%]) and, surprisingly, right HF (225 [27%]). Black Africans had less ischaemic CMO (adjusted OR 0.12, 95% CI 0.07 to 0.20) but more idiopathic and other causes of CMO (adjusted OR 4.80, 95% CI 2.57 to 8.93). Overall, 180 (23%) patients had isolated diastolic dysfunction, 234 (28%) tricuspid regurgitation, 121 (14%) isolated right HF and 100 (12%) mitral regurgitation.[12] Consistent with a different pattern of HF when compared to high income countries,[15] concurrent renal dysfunction, anaemia and atrial fibrillation were found in relatively fewer cases overall representing 172 (25%), 72 (10%) and 53 (6.3%) cases, respectively.[16]

In addition to establishing and evaluating dedicated management programmes to specifically focus on the many patients who present with advanced heart disease in Soweto, as part of the HOS, we have initiated a specific programme of research that addresses the potential interaction between HIV/AIDS, its treatment (highly active antiretroviral therapy – HAART) and CVD. As such, South Africa is not only facing an epidemic of CVD but also suffering from the current HIV pandemic with an estimated 5 million South Africans infected, 1 million having AIDS and 500 000 HIV-related deaths annually.[17] Infection itself may predispose to premature atherosclerosis through endothelial dysfunction, a heightened pro-inflammatory state and dyslipidaemia.[18] After a slow start, South Africa has since 2004, started HAART on more than 500 000 patients. Currently, Johannesburg and Soweto have one of the most effective implementation programmes. Paradoxically, from a treatment perspective, protease inhibitors have the potential to induce an adverse metabolic phenotype including dyslipidaemia and insulin resistance, endothelial dysfunction and a prothrombotic state leading to atherosclerosis.[18] However, this has not been examined systematically in a larger population in Africa.

Data are urgently needed to be able to plan cost-effective screening and management strategies to combat the interaction between the two different but contemporary epidemics in low- to middle-income countries.

Overall, therefore, we found multiple challenges for the community of Soweto and surrounding regions, from a combination of high levels of modifiable CV risk factors (with the exception of lipid disorders) and surprisingly high levels of advanced and deadly forms of heart disease affecting predominantly younger cases and women. Apart from a clear need to develop tailored detection and treatment strategies for those individuals unfortunate enough to develop clinically detectable forms of CVD, these data from the HOS have highlighted the importance of redoubling our efforts to prevent CVD in order to truncate what is shaping up to be a devastating epidemic in vulnerable communities subject to the profound effects of epidemiological transition.

IDENTIFYING SOME OF THE CHALLENGES FACED IN THE PREVENTION OF CVD IN A LOW-RESOURCE ENVIRONMENT

Given the relative burden of CVD in low- to middle- income countries, it is unfortunate that most of our knowledge surrounding its prevention and treatment is derived from high-income countries with predominantly Caucasian populations. An ever-expanding body of research has facilitated the development of expert guidelines (e.g. those produced by the American Heart Association/ American College of Cardiology) to provide a comprehensive guide for the primary and secondary prevention of CVD.[19,20] Regardless of the environment, one of the key issues that continue to drive debate over the best way to optimise the primary prevention of CVD focuses on cost-effective screening for modifiable risk factors (e.g. hypertension) as well as sub-clinical CVD (e.g. early signs of atherosclerosis as indicated by carotid intimal thickness or

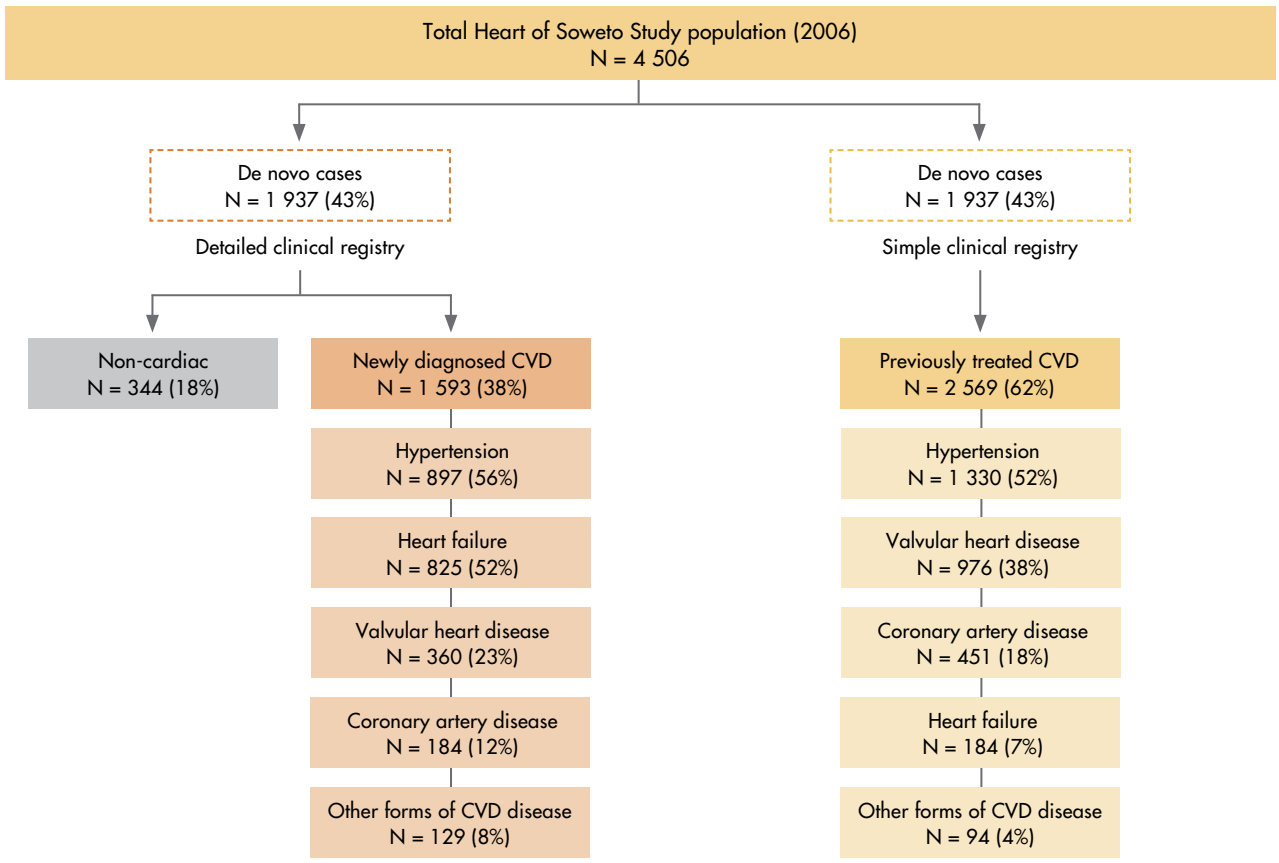

FIGURE 1: Profile of the 2006 Heart of Soweto Cohort[14]

asymptomatic left ventricular dysfunction detected by echocardiography). Similarly, the thresholds for active intervention both at the individual and population level (e.g. particularly when considering borderline risk) on an age and sex-specific basis are not only open to debate but complicated by the choice between selective treatment versus application of the broader "polypill" approach.[21] Although the targets for secondary prevention are easier to identify, there are clearly many similar issues to be addressed before our approach in high-income countries, is optimised.[22]

Any consideration of CVD prevention has to begin with the collation of risk factor and CVD profiling via community surveillance programmes and collation of mortality and morbidity data wherever possible. In terms of a broad prevention strategy, both a "population-based" approach (reducing the burden of disease in the whole community while providing only small benefits to each individual)[23] and a "high-risk" approach (providing greater benefit to the most vulnerable individuals while offering limited benefits to the majority of the population - some of whom may derive immediate marginal or longer-term benefits from being actively treated)[24] have been advocated and both have some relevance to resource-deficient countries depending on the most prevalent modifiable risk factors and the type of intervention required to modify them.

In practical terms, to effectively prevent and manage CVD in any environment there needs to be a balance between "population-based" and "high-risk" approaches and a threshold for defining those at "high-risk" with adjustment of that balance (i.e. not an all or nothing approach) to reflect the circumstances. In low- to middle-income countries, an environment of limited healthcare resources makes the "high-risk" group approach a natural target. However, in such countries, there is often no organised programme or scheme for screening and detecting these "high-risk" individuals.[24] The primary care sector (in whatever form), therefore, plays a critical role in providing effective delivery of cost-effective interventions for CVD. The barrier for most low and middle-income countries is that human resources and infrastructure capacity at primary level is unable (and in some cases instructed by governments and health departments) to upgrade their healthcare facilities to screen, diagnose and effectively treat the emergence of chronic conditions when confronted with the burden of infectious disease and other historical conditions.

A multidrug regimen to address the most common risk factors has been proposed to be both cost-effective and reduce the occurrence of CVD by half in high risk individuals.[25-27] The concept of a "polypill" was introduced by Wald and Law and consisted of a statin (lipid-lowering), aspirin (anti-platelet), ß-blocker (anti-hypertensive) an angiotensin-converting enzyme inhibitor (ACEI), a thiazide and folic acid.[25] Whilst the notion of "polypill" would undoubtedly improve adherence rates, the most effective combination of its constituents still remains heavily debated and unsubstantiated by clinical trials. The definition of what is cost-effective differs between countries, as well as from region to region within countries. In developing countries, the WHO recommendations indicate that for an intervention to be cost-effective in a particular region or country, it should be less than three times the gross national income per capita (GNI).[17]

Poor access to quality healthcare services

Adding to the burden of chronic diseases, is the still persistent social and economical inequalities in South Africa due to past legacies of racial and gender discrimination, people having to work away from their homes and the resultant destruction of family life, income inequalities, and increased rates of crime and violence. Inadequate access to good-quality health services is still a reality for the poor due to financial constraints, having to travel far to healthcare centres and poor care from the healthcare system.[5,7]

ADDRESSING SOME OF THE CHALLENGES FACED WHEN CONDUCTING RESEARCH IN A LOW-RESOURCE ENVIRONMENT

As described above, like many other parts of the world in sub-Saharan Africa, the process of urbanisation has led to an increase in conventional CV risk factors such as obesity, hypertension and type 2 diabetes, resulting in alarming rates of CVD; a pattern that mimics the western world. For example, a systematic review of studies of hypertension in the region demonstrated a clear differential between urban and rural regions; the latter demonstrating far lower prevalence of hypertension (i.e. consistent with historical lows) as a presumed result of continued adherence to traditional lifestyles. Despite the potential benefits of applying effective and

inexpensive treatment regimens for both primary and secondary prevention such treatments are frequently under-utilised in low- to middle-income countries.[28,29,30] Issues relating to lack of awareness of CVD, basing decisions on accurate risk factor profiling and the cost and complexity of developing systems of care to apply these seemingly cheap and simple options remain under-utilised even in high-income countries clearly need to be addressed if their potential is to be realised in truncating a rising epidemic of CVD in vulnerable communities.

Funding support

In an endeavour to address the urgently required response to emergent CVD in the developing world, the Committee on Research, Development and Institutional strengthening for control of cardiovascular diseases in developing countries[31] outlined six broad areas for research and development that need to be addressed:

- Determine the magnitude of the CVD burden in developing countries.
- Develop, targeted, effective primordial and primary prevention strategies using case-control studies.
- Reduce tobacco use.
- Detect and treat high blood pressure/hypertension.
- Initiate pilot studies to evaluate essential vascular treatment for effective use of low-cost drugs.
- Develop and assess algorithms of affordable clinical care for CVD.

The same committee called for capacity building in the following areas:

- Population-based epidemiologic research.
- Clinical research.
- Health policy research.
- Economic evaluation of healthcare interventions.

As with any research, a key factor in building research and clinical capacity is through multidisciplinary and international collaborations. Currently, the WHO and various other philanthropic international agencies provide funding and sponsorship for researchers in low- to middle-income countries to forge collaborations with researchers and clinicians in high-income countries to tackle the emerging issue of non-communicable disease. Such opportunities obvious facilitate the establishment of research networks within and among developing countries to leverage scientific expertise and financial resources in order to establish world-class research facilities and training programmes.

A systematic approach

In order to facilitate any attempt to quantify and then respond to the rapid emergence of non-communicable disease states such as CVD in low- to middle-income countries, the WHO has developed prioritised guidelines for disease surveillance. The WHO STEPwise approach to Surveillance (STEPS) is a simple, standardised method for collecting, analysing and disseminating data on non-communicable disease states. For example, the WHO STEPS stroke system[32] focuses on gathering equivalent data on the following within well-defined populations:

- Stroke-related deaths in healthcare facilities (i.e. major tertiary centres).
- Stroke-related deaths in the wider community.
- Non-fatal hospital events related to stroke.

In the absence of a specific database, this approach (across the range of CVD states) is particularly helpful and has been successfully employed in Mozambique deriving invaluable data on the burden of strokes in that country.[33]

PRACTICAL LESSONS FROM THE HEART OF SOWETO STUDY

Given all of the above information, is it really possible to establish a combined public health and clinical research programme that is not only able to increase awareness of new forms of CVD (both within the public and health policy domain) but develop a cost-effective screening programme that is built on capacity building and the development of new programmes of care? Whilst not perfect in any shape or form, or particularly unique (especially when considering high quality research programmes such as the THUSA – Transition and Health during Urbanisation of South Africans),[34] the SASPI (South African Stroke Prevention Initiative)[35] and the Agincourt project,[36] there is much to learn from the broad activities undertaken as part of the HOS.[6]

Six useful lessons learnt from initiating and developing the HOS correlates with the timing of each key development in this study and should be interpreted with the previous section of the paper firmly in mind.

Building partnerships

Partnerships with a stronger research/clinical group

In a resource-poor environment with untapped potential (in terms of research development and outputs), there is often the need for the "home" research/clinical team to develop a collaboration with a much stronger research/clinical group that can provide instant access to new sources of funding and, of course, bring to the table a combination of skills currently lacking. Not surprisingly, such collaboration will often involve an international research group with a substantial reputation and track record in the field. Two key ingredients are, however essential for a successful collaboration. The first of these is mutual respect, recognising the skill-sets and contributions of both sides. Another key ingredient to "harmonising" such collaboration is establishing (in an open and honest manner) what the collaboration is about. A common purpose in addressing CVD within a target community or population yields capacity building, funding success and publications as joint rewards.

Partnerships with the community and other important role players in the community

When planning and implementing community-level activities, such as the "Heart Awareness Days", it is important to get to know and be accepted by the local communities, key role players and organisations working in the area.

Establish clear objectives with achievable goals

One of the major dangers when operating within a challenged environment with clearly identifiable needs (e.g. a poorly understood, but clearly large and evolving burden of CVD in a vulnerable community), is to immediately jump to the "end solution". For example, when we first began thinking about the HOS in late 2005, we had grandiose visions of the "African Framingham". While not completely shelved, a much more orderly and achievable programme of public health activities (i.e. the simplistic, but highly successful "Heart Awareness Days" undertaken in key locations throughout Soweto) and clinical research focusing on a "controlled" environment (i.e. the Cardiology Unit at Baragwanath Hospital in Soweto) was initially developed. Figure 2 shows how this initial programme of focusing on community screening (on a monthly basis) and tertiary cases of heart disease (on a continuous basis) has built the requisite systems and personnel to enable us to develop other key streams; including plans for a primary care registry and specific disease management programmes in 2009 and population screening in the not-too-distant future. A three to five year plan with clearly achievable goals is obviously worthwhile; success in small steps is much better than failure on a large scale.

Think big and assume nothing!

Having warned of the dangers of jumping too far ahead and trying to achieve the impossible, it is worthwhile warning of the converse danger of thinking too small and too conservatively. The dangers of giving away invaluable research data (see point 1) and/or failure to truly develop something worthwhile (i.e. an internationally competitive CV screening and prevention programme) is often underpinned by false assumptions that it is either all too hard or has all been done before. Despite initial reservations about the usefulness and potentially unique aspects of the HOS Clinical Registry, we have come to realise that it had value. For example, when we looked to replicate the larger data sets (e.g. the Euro Heart Survey)[37] that captured similar data in other parts of the world,

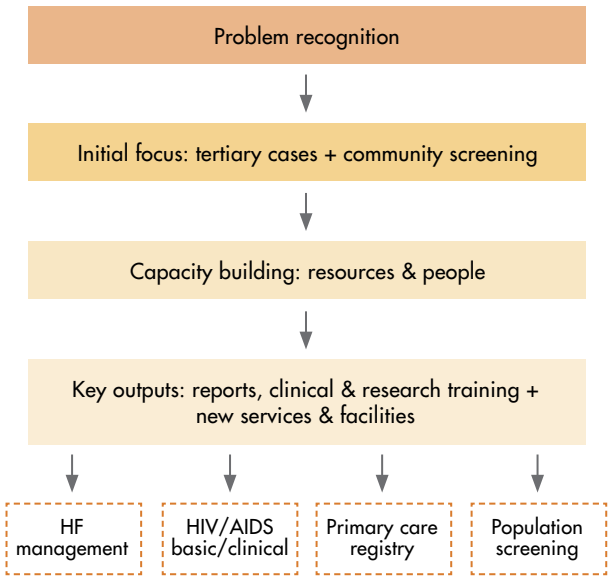

FIGURE 1: Key phases of development in the Heart of Soweto Study

we realised that we were in a position to develop a meaningful system for classifying a complexity of CVD not seen or described outside Europe and North America. The mutual goal of our African-Australian collaboration is to achieve something unique to sub-Saharan Africa and the needs of the community of Soweto.

Provide an enabling environment

Sufficient and reliable funding

As described previously, the level of philanthropic and global funding to support public health and clinical research into non-communicable disease states such atherosclerotic disease and CVD arising from metabolic disorders (i.e. diabetes and obesity), smoking and hypertension in low- to middle-income countries is far behind that directed towards infectious diseases. Rather than tread the well-worn path to rejection and little output, it is worthwhile considering alternative sources of funding that may be initially small but then lead to greater funding; having established a stronger application for funding via compelling preliminary data. As such, a more entrepreneurial mindset is often required. Our novel approach to involve generic drug manufacturers who were interested in establishing a "presence" in the CVD market led to both direct funding and funding derived from their philanthropic arms. This proved useful when focusing on the community aspects of the "Heart Awareness Days" and producing "marketing friendly" products such as the study logo and educational pamphlets on heart disease.

Investing in the right people

While funding is crucial to any effort, it is worthless without the right people to support a research or healthcare programme. The Heart of Soweto Study currently supports, rather than simply employ, a number of key individuals from a range of health disciplines. In each case, there is a focus on "investment" and personal growth to enable us to tackle the next phase of the overall research programme and related healthcare services. For example, we quickly identified the need to attract nurses with the clinical expertise to capture complex CV data, who were prepared to learn new skills and knowledge of clinical and public health research. Similarly, we have provided opportunities for nurses, dieticians, basic researchers and physicians alike to undertake higher degrees and create their own opportunities within the framework of the programme.

In the initial phases of a new research or healthcare programme (particularly when contemplating an ambitious screening programme in challenging circumstances) there will always need to be clear "leaders" who develop the collaborations, set clear objectives, attract funding and invest in key personnel via supervision and mentorship. In the longer-term, it is essential that a true team approach emerge, where all members of the team are encouraged and given the opportunity to address all aspects of the programme in an open and constructive manner.

Innovative solutions

One of the most important aspects of operating within a resource-poor and challenging environment is being prepared to experiment and fail in order to find a solution that is appropriate for that environment. In the early phases of the HOS, for example, we introduced a system of hand-held devices to capture clinical data electronically within an inherently chaotic environment. Our key expectations were that our dedicated research nurses would appreciate the flexibility of the system, data quality would be better than other paper-based methods and that data transfer and storage would be achieved without having to employ a specific data manager. As it turned out, we were wrong on all counts and spent a good three to four months exploring this option. However, the resulting system of paper capture via a semi-automated approach to data entry (following clinical verification) has proved to be extremely satisfactory. As such, we have continued to consider the lessons of the past in designing the next phase of our research activities – a continent wide study of heart disease called the "Heart of Africa Study".

Don't compromise on quality

In assessing our various systems and data arising from the HOS, we have never tolerated any excuse that would lead us to accept sub-standard outcomes. Naturally, in a resource-poor environment, potential excuses for poor quality research and healthcare relative to the rest of the world may be many and varied and often times seemingly perfectly legitimate. However, if you have set clear and achievable goals, attracted appropriate funding and invested in the right people and resources, there should be no excuse for accepting poor quality outcomes. Indeed, if adjusted to the particular needs of environment based on a logical and rationale plan of research or healthcare activities, even the simplest of programmes can be regarded as "world-class" and provide a valuable contribution to the literature.

FUTURE DIRECTIONS

The prevention of CVD and other chronic diseases of lifestyle, as well as the management thereof, need to be a multidisciplinary effort with all the necessary healthcare workers involved, implemented at primary and secondary level. This should include specific risk factor profiling and trajectory of CVD in these resource-poor communities in epidemiologic transition, building on the HOS data and experiences.

Long-term projects and key objectives

In-reach programme

Future long-term projects will include an "in-reach programme", to extend the successful "Heart of Soweto Hypertension and Heart Failure Management Programme" into a broader "Chronic Disease Management Programme" to the remaining ten Soweto Primary Health Clinics.

Out-reach programme

An "out-reach programme" for African teenagers, to focus our research and education to a particular vulnerable group: African teenagers with poor knowledge of an affordable and culturally acceptable healthy lifestyle. As outlined above the obesity epidemic in South Africa start already in children and in particular teenagers. Obesity results in hypertension and its long-term disabling or even deadly consequences heart failure, diabetes and stroke. We aim to establish a dedicated programme focussing on living a healthy life in children and teenagers supported by members of our multidisciplinary team. We aim to achieve this goal by using suitable, simple and youth appropriate education material.

Out-reach programme

A broader "out-reach programme", to the general Soweto community, continuing with our very successful "Chronic Disease Awareness Days", screening and documenting risk factors for chronic diseases of lifestyle and creating awareness on the prevention thereof.

The goal is the development of specific community-based intervention programmes directed towards prevention and management of chronic diseases of lifestyle in Soweto and to document the aetiology, presentation and management thereof. In addition, we plan to develop an "African Cardiovascular Disease Risk Score", intended to find application not only in Soweto, but also in other areas of Africa with an urban African population in transition.

SUMMARY

In summary, there is ample evidence to suggest that the burden of CVD is already having a profound effect on the health of vulnerable populations in low- to middle-income countries of the world. The phenomenon of epidemiological transition has certainly contributed to the rise of CVD and will no doubt feed a sustained epidemic of non-communicable forms of CVD for the foreseeable future. Unfortunately, in resource poor countries there is often limited scope to respond to this growing problem. This is particularly exacerbated by a lack of awareness and funding to tackle CVD both at the national and international level.

There is, however, still time to implement cost-effective primordial, primary and secondary prevention strategies in low- to middle-income countries in order to truncate the type of epidemic seen in high-income countries. Applying a practical and systematic approach in order to: (a) properly understand the problem (i.e. risk profile and spectrum of CVD within the local population), (b) health promotion strategies to deal with anticipated health risks, (c) adopt fundamental, low-cost treatment strategies, (d) build clinical and research capacity, (e) develop flexible surveillance programmes and (f) evaluate the impact of any implemented strategies from a local perspective, is the key to achieving sustainable and productive health outcomes within a resource-poor environment.

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DISCLOSURES

None.

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