Appendix 1. Countries in the Epidemiological Subregions

African Region (AfrE)	Botswana, Burundi, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe
South East Asia Region (SearD)	Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar, Nepal

Appendix 2. Summary of intervention effectiveness for tobacco control strategies

MPOWER component	Interventions assessed	Code	Efficacy [a] (reduced smoking)	References	Coverage [b]	Adherence	Population-level effect [c] (smoking prevalence) *Afr-E*	*SearD*
Monitor tobacco use / policies	None							
Protect people from tobacco smoke	Clean indoor air laws	TOB-4	-29% (where enforced)	1	35% (indoor public places)	50%	-0.3%	-0.8%
Offer to help quit tobacco use	Nicotine replacement therapy; Brief advice; Counselling	TOB-6 TOB-7 TOB-8	-6.1% -6.8% -9.4%	2-4	20%	80%	-1.0% -1.1% -1.5%	-1.0% -1.1% -1.5%
Warn about the dangers of tobacco	Counter-advertising and warning labels	TOB-5	-5%	5	100%	80%	-4%	-4%
Enforce bans on tobacco advertising	Comprehensive ban on advertising of tobacco products	TOB-3	-5%	5	100%	50%	-2.5%	-2.5%
Raise taxes on tobacco	Current excise taxation (~40%) Increased excise taxation (60%)	TOB-1 TOB-2	-0.7 (price elasticity)	6	100%	85% (15% untaxed)	-29.3% -54.6%	-31.4% -58.9%

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Appendix 3. Summary of intervention effectiveness for CVD intervention strategies

Code	Intervention	Target population	Outcome	Risk reduction	Reference(s)
Primary prevention					
Non-personal					
CVD-1	Voluntary salt reduction by manufacturers of processed foods, plus appropriate labelling	Population wide	Total dietary salt intake	15%	1-3
CVD-2	Legislation to decrease salt content of processed foods, plus appropriate labelling and enforcement	Population wide	Total dietary salt intake	30%	1-3
CVD-3	Health education through mass media	Population wide	Total cholesterol (TCh)	2%	4
Personal					
CVD-4	Blood pressure lowering medication (beta-blocker and diuretic) and education	SBP ≥ 160mmHg OR ≥ 140mmHg	Difference between actual SBP and 115 mmHg	-33%	5-9
CVD-5					
CVD-6	Cholesterol lowering medication (statin) and education	Tch ≥ 6.2 mmol/l OR ≥ 5.7 mmol/l	Total blood cholesterol	-20%	10
CVD-7					
CVD-8 to CVD-11	Combined drug therapy (aspirin, beta blocker, statin and diuretic) for individuals at a given cardiovascular risk threshold	Absolute risk ≥ 35%, 25%, 15%, 5%	Absolute risk of CVD	-33% (SBP) - 20% (TCh)	5-11
Acute-care					
Acute myocardial infarction (AMI)					
CVD-14	Aspirin			-24%	11
CVD-16	ACE inhibitors			-7%	12
CVD-18	ß-Blockers			-4%	16
CVD-21	Thrombolysis with streptokinase			-26%	13-14
CVD-22	Primary PTCA	Hospitalized patients with AMI	28-day AMI case-fatality rate (In-hospital & post-in-hospital)	-61%	13-15
Stroke					
CVD-28	Organised stroke unit care	Hospitalized patients with stroke	28-day Stroke case-fatality rate (In-hospital & post-in-hospital)	-14%	17
Ischemic stroke					
CVD-24	Aspirin	Hospitalized patients with ischemic stroke	28-day Ischemic Stroke case-fatality rate (In-hospital & post-in-hospital)	-5%	11

Secondary and tertiary prevention

Post-myocardial infarction					
CVD-15	Aspirin			-15%	11
CVD-17	ACE inhibitors			-21%	18
CVD-19	ß-Blockers				16
CVD-20	Statin	Patients with history of MI	Post-28-day MI case-fatality rate	-27%	10
CVD-23	Cardiac rehabilitation			-31%	19
Post-stroke					
CVD-27	ACE-Inhibitor + diuretic	Patients with history of stroke	Post-28-day stroke case-fatality rate	-42%	8
Post-ischemic stroke					
CVD-25	Aspirin			-30%	11
CVD-26	Statin	Patients with history of ischemic stroke	Post-28-day ischemic stroke case-fatality rate	-28%	10
Congestive heart failure					
CVD-29	Diuretics			-75%	20
CVD-30	ACE inhibitors			-11%	21
CVD-31	Beta blockers	Patients with congestive heart failure	Case-fatality rate	-22%	22
CVD-32	Exercise training			-35%	23

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Appendix 4 Modelling the impact and costs of diabetes interventions

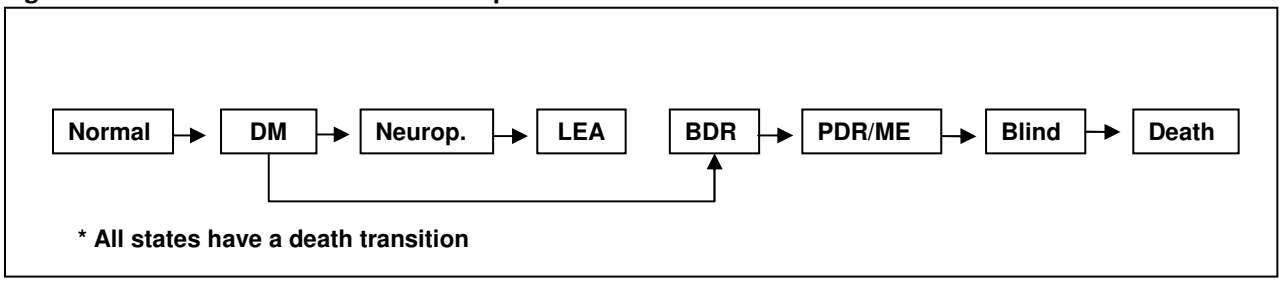
Interventions

Interventions	***Description***	**Evidence**
A. Intensive glycemic control	*The administration of oral sulphonylureas or insulin to diabetic patients for a goal of HbA1c levels of ≤ 7%.*	Lowering HbA1c levels has been associated with a reduction of microvascular, macrovascular and neuropathic complications of diabetes. (A)*. A management plan for diabetic patients should be developed or adjusted to achieve normal or near-normal glycemia with an HbA1c goal of <7% (B)*. (Standards of Medical Care for Patients with Diabetes Mellitus, American Diabetes Association, 2003). ** ADA evidence grading system. A=clear evidence from well conducted, generalizable, randomized controlled trial. B=Supportive evidence from well conducted cohort studies.*
B. Screening for retinopathy followed by photocoagulation	*Case detection of diabetic proliferative retinopathy and macular edema and treatment with laser photocoagulation of suitable cases.*	Early detection of sight threatening retinopathy and treatment by laser therapy has been shown to be effective in preventing the onset of visual impairment. (UK National Screening Committee [NSC]*, 2000). **The NSC assesses proposed new screening programmes for the UK against a set of internationally recognised criteria covering the condition, the test, the treatment options and effectiveness and acceptability of the screening programme. In forming its proposals, the NSC draws on the latest research evidence and the skills of specially convened multi-disciplinary expert groups, which always include patient and service user representatives.*
C. Screening for diabetic foot risk factors followed by preventive foot care	*Identification of feet at risk for potential foot problems and classification of patients according to risk factors by checking for loss of sensitivity to touch, vascular status, foot deformities and previous history of ulcer/amputation. Referral of high risk patients for periodical examination by a multidisciplinary team. Provision of appropriate footware, insoles, skin and nail care and foot care education at each review.*	Implementing a screening and protection programme for patients with gross risk factors for ulceration reduces morbidity and is cost effective. (1b)* (Clinical guidelines and evidence review on prevention and management of foot problems, Royal College of General Practitioners UK, 2003). **Agency for Health Care Policy Research grading framework. 1b=Evidence from at least one randomized trial.*

Modelling the impact of interventions for diabetes

MiniMod**:** The health outcomes measures or average disability weights for the scenarios simulated in PopMod were calculated by means of a 7 state diabetes model (Figure 1) developed using MiniMod. As opposed to PopMod, MiniMod simulated the evolution of the population as a closed cohort for each of the scenarios studied. A population per region of 100,000 subjects 15 years and older, was followed for 100 years along seven states: 6 diseased states and 1 outcome state or death state. The six disease states reflected the progression of diabetes along the long-term consequences of eye and foot disease. The states included were: diabetes mellitus without complications, neuropathy, lower extremity amputation (LEA), background retinopathy (BR), proliferative diabetic retinopathy + macular edema (PDR+ME), and blindness due to retinopathy. All but two states, BR and PDR+ME, correspond with the states studied in the global burden of diabetes (GBD) 2000 [11]. These two states were included to have an adequate estimate of the health outcomes of the interventions affecting diabetic eye disease, since the effect size of the interventions studied for retinopathy varies among the different disease progression stages (background retinopathy, proliferative diabetic retinopathy and macular edema). The hazard rates, prevalence figures and disability weights per state used in the model were obtained from published studies, the Global Burden of Diabetes 2000 and the Global Burden of Disease [11, 12]. The hazard rates for the BR and PDR+ME states were obtained from the retinopathy model developed for this analysis (see below). The disability weights and mortality rates for these two states were assumed the same as for diabetes without complications. The prevalence of these two conditions in diabetic patients were derived from previous models [13,14] and calculated for general population using the regional population figures from WHO statistics. The output of the model was the average of the disability weights per year experienced by the population over 100 years. The corresponding output for each simulation was then transposed to PopMod to calculate the end health effects.

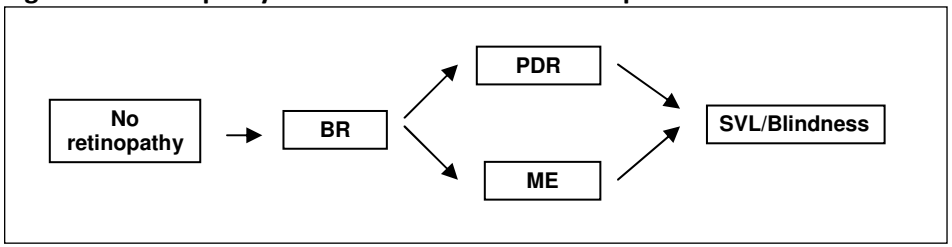
Figure 1. MiniMod states and transition paths



Validation. The input data used for MiniMod was validated by simulating the evolution of a diabetic population under current care (HbA1c=7.9%) using the parameters and information for Euro A region. This simulation was worked in the null sheet of a separate generic MiniMod excel file. The cumulative incidence of neuropathy, lower extremity amputations and blindness due to retinopathy experienced by this cohort of 100,000 diabetic patients was compared to published cumulative incidences [15, 16]. The validation was performed on a diabetic cohort since published figures on incidence of diabetes complications in general population are unavailable. For this same reason, a cohort of type 2 patients was chosen. The resulting cumulative incidences obtained and corresponding published values (in brackets) were: neuropathy: 23.6% (30%-46%), lower extremity amputation: 17.7% (16%-22%) and blindness: 14.1% (12%-19%).

Retinopathy model**:** The effect of the interventions in the transition from diabetes mellitus to severe visual loss/blindness in MiniMod, were simulated in an excel based model which described the onset and progression of diabetic retinopathy along 5 health states. (Figure 2). This model builds on a previous retinopathy model constructed by Eastman et al. [13]. Input information for the model was obtained from the Wisconsin Epidemiologic Diabetic Retinopathy study [17-19]. Incidence rates on 4 clinical endpoints (background diabetic retinopathy, proliferative diabetic retinopathy, macular edema and blindness) were obtained for the 3 cohorts studied in the WEDRS: diabetes mellitus type 1 patients and type 2 patients insulin and non-insulin requiring. Incidence rates are summarized in table 3. Based on the HbA1c levels described in this study, the hazard rates obtained were used to simulate the null scenario for retinopathy (HbA1c=10%). These rates were assumed the same for all the regions studied. The time interval for the transitions among states was defined at 1 year.

Figure 2. Retinopathy Model states and transition paths



Modelling the cost of interventions for diabetes

1. Glycaemic control. Patient costs for diabetes control included medication, labor, self care, laboratory/procedures and complications costs (see Table below). Calculation of drug use was based on the UKPDS and DCCT experience (3, 4). In the case of type 2 patients, the drug pattern accounted for the fact that patients starting in one treatment arm later switched to alternative therapies. Drug doses for glibenclamide and metformin equaled the maximum dose allowed in the UKPDS. Concerning insulin doses, patients were modeled to receive NPH insulin for the first 14U and regular insulin accounted for the additional units. Cost of insulin for type 1 patients was based in a daily dose of 28 U of regular and NPH insulin, for a median daily insulin dose of 58 U (as per the DCCT). The prices assigned to each medication were taken from the International Drug Price Indicator for 2005 (www.erc.msh.org). Labor costs were calculated according to likely standard clinical practice frequency and type of visit as per the UKPDS (4), including contacts with a general practice nurse A price per visit was assigned according to the level of care (primary, secondary, tertiary) following the WHO price list for outpatient visits. Concerning self-care costs, the source of frequency and resource use of home glucose tests for type 2 patients was the UKPDS cost-effectiveness analysis [7]. This study assumes 1 monthly self-testing of glucose levels for patients in the oral arm and an average of 10 self tests a month for insulin users. Final estimates for type 2 patients were computed according to the proportion of patients receiving each treatment group - insulin or orals - at year 5 (37% insulin and 63% orals). The frequency of home glucose tests for type 1 patients was obtained from the DCCT resource utilization study [5]. This frequency of 4 times a day, correlates well with that recommended by the American Diabetes Association (ADA): 3 or more times day for type 1 patients. The number of lancets and glucose test strips for type 1 and 2 patients were based on the number of self-tests considered and was calculated accordingly. Glycated Hb measures, blood and urinary tests were considered the essential laboratory tests required to determine the metabolic control of diabetic patients in this

study. The frequency of glycated Hb measures was derived from the UKPDS [7] for type 2 patients and from the ADA recommendations for type 1 patients [2]. The frequency of the blood tests was matched to that of HbA1c level measurements. The major side effect described with intensive therapy is hypoglycemia. Complication costs were calculated for major hypoglycemic events. The assumption for this model is that all patients with a major event required 1 emergency room visit, 3 days of hospitalization and 1 extra outpatient visit.

Health service use and self care for conventional and intensive diabetes management

		Conventional glycaemic control	*Intensive glycaemic control*
Visits	General Practice nurse	3	1.1
	Diabetic nurse	0.2	2.9
	GP consultation	1	2.0
	Diabetologist consultation	0.1	0.7
Self care (test & supplies)	Lancet	57	193.1
	Glucose meter	0.33	0.3
	Battery for glucose meter	2	2.4
	Syringes	204	474.1
	Glucose test strips	57	193.1
Procedure/Laboratory	Glycated Hb measure	1.3	1.3
	Blood test	1.3	1.3
	Urine test	1.0	1.0

2. Eye screening followed by photocoagulation. Patient costs for eye screening and photocoagulation were divided into labor and procedure costs. The labor costs included 1 opthalmologist consultation for referral and 3 opthalmologist consultations for treatment. The procedure costs included the costs for the laser session. The frequency of outpatient and laser sessions were derived from the average outpatient visits and laser sessions described for the treatment of proliferative retinopathy and macular edema in the UK Diabetic Retinopathy Screening Programme (20). The price of the opthalmologist consultation corresponded to the outpatient visit price in a secondary level hospital (WHO-CHOICE regional price values were used). The price of a laser session was derived from Medicare reimbursement prices in 1999 and updated to 2005 prices using inflation indices from the Hospital and Community Health Services inflation indices USA [21]. Administrative costs of the screening and photocoagulation program were also calculated using standard WHO-CHOICE methods. Other program costs were calculated separately since they are variable costs depending on the number of patients screened. These costs included 1) the costs of the screening office in charge of the register, call and recall system of the program, 2) the costs of performing the screening test, including the costs of maintenance of the digital cameras and camera transport expenses, (in the case of digital retinal screening) among others, 3) the costs of the internal quality assurance of the program and 4) the initial setting-up costs of the program which includes the capital costs of the program and the variable training costs. The capital costs included the cost of the digital retinal camera or slit lamp camera. The number of retinal cameras and slit lamp cameras purchased in each region was calculated on the basis of 1 retinal camera per 5,000 patients screened.

3. Foot screening followed by preventive foot care. Patient costs for foot screening and preventive foot care were divided into labor costs, costs for protective foot-ware and patient education costs. The labor costs included the consultation visits required for the preventive follow up of high-risk patients. The frequency of annual visits followed the recommendations of the International Working Group on the Diabetic Foot (IWGDF). The price per outpatient visit corresponded to the price per visit in a secondary hospital level. Costs for protective foot-ware included the costs for shoe inlays and protective shoes (depth shoes). Three insoles and 1 pair of protective shoes per year per patient were calculated according to the International Consensus on the Diabetic Foot and Medicare's coverage for diabetic shoes. The price of the shoes inlays and protective shoes were the lowest prices available at Internet sites for diabetic devices (www.feetnet.com/diab/shoe/medicare.html, www.bigfeetstuff.com). Patient education costs were calculated in terms of the extra time per visit spent in patient advisory. Five minutes per visit were calculated for a total annual education time of 20 minutes per patient. Education leaflets for patients and physicians/podiatrists were also included.
The basic administrative costs of the foot screening and preventive foot care program were calculated using standard WHO-CHOICE methods. Other program costs included were 1) the costs associated with the administration of the screening office 2) the costs of performing the screening test and 3) the initial setting up costs. These costs were performed separately since their calculation depended on the number of patients screened (variable costs).

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Unit costs of Health and Social Care. ONS Statistics.

Appendix 5 Patient-level resource use for CVD interventions

Primary Prevention				
Intervention code	**Drug treatment**	**Hospitalisation/Provider visits**	**Laboratory tests**	**Adverse events/others**
CVD-4 CVD-5	50 mg/d atenolol 25 mg/d hidrochlorotiazide	4 health centre visits/year 1.5 outpatient hospital visits/year for health education	Frequency: once per year Renal function Lipid profile Blood glucose	None
CVD-6 CVD-7	30 mg/d lovastatin	4 health centre visits/year 1.5 outpatient hospital visits/year for health education	Frequency: once per year Total cholesterol Hepatic function	None
CVD-8 to CVD-11	50 mg/d atenolol 25 mg/d hidrochlorotiazide 30 mg/d lovastatin 100 mg/d aspirin	4 health centre visits/year 1.5 outpatient hospital visits/year for health education	Frequency: once per year Renal function Lipid profile Blood glucose Total cholesterol Hepatic function	Major GI bleeding 7 hospital bed days 2 units of blood 1 endoscopy 1 blood count
Acute Care				
CVD-12	175 mg/d aspirin during first month of acute event	9 hospital bed days (2 days in CCU and 7 in a general ward)	Frequency: 3 times during hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Serum electrolytes Renal function Blood glucose Serum lipids	Major GI bleeding 7 hospital bed days 2 units of blood 1 endoscopy 1 blood count
CVD-14	Captopril, starting dose 6.25mg/d, 12.5 mg 2 hrs later and 25 mg 10-12 hrs later for the first 24 hrs. From then on 50mg bid for 4 weeks.	9 hospital bed days (2 days in CCU and 7 in a general ward)	Frequency: 3 times during hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Serum electrolytes Renal function Blood glucose Serum lipids	None

CVD-16	Propranolol 60 mg/tid starting 2 days after infarction and for the the first month of acute event.	9 hospital bed days (2 days in CCU and 7 in a general ward)	Frequency: 3 times during hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Serum electrolytes Renal function Blood glucose Serum lipids	None
CVD-19	Sreptokinase 1.5 MU single dose	9 hospital bed days (2 days in CCU and 7 in a general ward)	Frequency: 3 times during hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Serum electrolytes Renal function Blood glucose Serum lipids	Major bleeding event: 7 days in hospital bed stay 2 units of blood 1 endoscopy 1 blood count
CVD-20	IV Heparin 70-100 IU/kg (85 IU/kg average) during first 2 days Aspirin 175 mg/d during the 6 days of hospital stay	6 hospital bed days (2 days in CCU and 4 in a general ward)	Frequency: 3 times during hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Serum electrolytes Renal function Blood glucose Serum lipids	- Supplies: 2 Balloon catheter 1 Guiding catheter 1 Guidewire Radiographic contrast and other intra surgery supplies - Professional fees per procedure (angiography + angioplasty): 1 Interventional cardiologist 1 technical radiologist 2 Nurses 1 Radiographer - Operating room costs (equipment, admission, anesthesics, administrative) equivalent to 41% of total costs: - Major bleeding event: 7 days in hospital bed stay

				2 units of blood 1 blood count
CVD-26	Medication use calculated as a percentage of acute bed day costs.	11 hospital bed days in an acute stroke unit ward, 17 hospital bed days in a non acute stroke ward	Frequency: once per week of hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Electrolytes Renal function (BUN, Creatinine) Hepatic function	Extra staff costs: full time stroke nurse and part time occupational therapist and fysiotherapist, costed as a percentage of acute bed day costs.
CVD-22	Aspirin 300 mg/d	30 hospital bed days	Frequency: once per week of hospital stay Complete blood count Prothrombin time (INR) Partial time of thromboplastin Electrolytes Renal function (BUN, Creatinine) Hepatic function	Major bleeding event: 7 days in hospital bed stay 2 units of blood 1 endoscopy 1 blood count
Secondary and Tertiary Prevention				
CVD-13	Aspirin 75 m/d	4 health centre visits/year	Frequency: once per year Renal function (BUN, Creatinine) Total cholesterol Liver function (ALT, ALP, AST, Brr, Alb, Tprot)	Major bleeding event: 7 days in hospital bed stay 2 units of blood 1 endoscopy 1 blood count
CVD-15	Captopril 50 mg/tid	4 health centre visits/year	Frequency: once per year Renal function (BUN, Creatinine) Total cholesterol Liver function (ALT, ALP, AST, Brr, Alb, Tprot)	None
CVD-17	Propranolol 60 mg/tid	4 health centre visits/year	Frequency: once per year Renal function (BUN, Creatinine) Total cholesterol Liver function (ALT, ALP, AST, Brr, Alb, Tprot)	None
CVD-18	Lovastatin 40 mg/d	4 health centre visits/year	Frequency: once per year	None

			Renal function (BUN, Creatinine) Total cholesterol Liver function (ALT, ALP, AST, Brr, Alb, Tprot)	
CVD-21	Non	1 outpatient hospital visit for initial medical evaluation	Frequency: once during first year. CBC Serum lipids Exercise stress test	During first year: - 1 consultation with an exercise professional for exercise prescription -3 sessions of individual supervised training Annually: -3 annual exercise group sesions
CVD-25	Perindopril 4 mg/d Indapamide 2.5mg/d	4 health centre visits/year	Frequency: once per year Total cholesterol Liver function (ALT, ALP, AST, Brr, ALb, TProt) Renal function (BUN, creatinine) Serum electrolytes	None
CVD-23	Aspirin 75 mg/d	4 health centre visits/year	Frequency: once per year Total cholesterol Liver function (ALT, ALP, AST, Brr, ALb, TProt) Renal function (BUN, creatinine) Serum electrolytes	Major bleeding event: 7 days in hospital bed stay 2 units of blood 1 endoscopy 1 blood count
CVD-24	Lovastatin 40 mg/d	4 health centre visits/year	Frequency: once per year Total cholesterol Liver function (ALT, ALP, AST, Brr, ALb, TProt) Renal function (BUN, creatinine) Serum electrolytes	None
CVD-27	Furosemide 40 mg/d	4 health centre visits/year	- First year: CBC Urinalysis Electrolytes (Na, K, Ca and Mg) Renal function (BUN, Creatinine) Blood glucose Liver function tests	None

			TSH - Annual: Serum electrolytes Renal function (BUN, creatinine)	
CVD-28	Captopril 50 mg/tid	4 health centre visits/year	- First year: CBC Urinalysis Electrolytes (Na, K, Ca and Mg) Renal function (BUN, Creatinine) Blood glucose Liver function tests TSH - Annual: Serum electrolytes Renal function (BUN, creatinine)	None
CVD-29	Metoprolol 200mg/d	4 health centre visits/year	- First year: CBC Urinalysis Electrolytes (Na, K, Ca and Mg) Renal function (BUN, Creatinine) Blood glucose Liver function tests TSH - Annual: Serum electrolytes Renal function (BUN, creatinine)	None
CVD-30	Non	1 outpatient hospital visit for initial medical evaluation	Frequency: once during first year CBC Serum lipids Exercise stress test	During first year: - 1 consultation with an exercise professional for exercise prescription - 4 exercise training sessions with medical supervision. Annually: -3 exercise group sessions