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The Assessment of Prevalence of Hypertension as Cardiovascular Risk Factors Among Adult Population

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1. Introduction

Significant increase in noncommunicable diseases, in particular cardiovascular disease, in the past few decades worldwide represents one of the major health challenges in the overall global and social development of society. Cardiovascular conditions have the highest impact on lost years of life, lost quality of life, but also on the differences in longevity in different population groups. Global statistics show that cardiovascular conditions are responsible for one third of global deaths, while coronary heart conditions are the leading cause of death worldwide. (1,2) Many population research studies corroborated that high blood pressure is an independent and significant risk factor of cardiovascular disease and coronary heart disease and most significant determinant of morbidity and mortality in developed countries. (2,3)

Constant increase in morbidity and mortality caused by cardiovascular disease, in particular high blood pressure as one of the most significant public health problem, evaluation of prevalence of high blood pressure and evaluation of control of high blood pressure in the population, including the distribution of cardiovascular risk factors altogether represent the basis for the modeling of an integrated risk and disease prevention program – an integrated management of hypertension in the community (4), which is effectively a step further in providing efficient, effective and high-quality health care.

Globally health care is becoming more complex and more expensive and countries are now faced with various problems that need to be addressed in order to ensure sustainability of their health care systems. With the advance in technology, clinical treatment is also becoming more complex and more expensive so that countries are now more and more focused on preventive programs and controls of conditions which entail less direct costs. Key argument for introduction of preventive public health programs is that such programs have much bigger potential for long-term improvement of the population's health status and also involve much lower costs than clinical medicine. (1,3)

2. Cardiovascular diseases and leading risk factors

A number of research studies clearly showed that cardiovascular disease can be attributed to unhealthy life styles and poor social and physical environment. Unhealthy diet, smoking,

physical inactivity and psychosocial stress are the leading risk factors for cardiovascular disease, as well as consequential manifestations of such life styles: hypertension, glucose intolerance and hyperlipidemia. These risk factors also reflect major preventable health problems. (5-12))

In the world the issue of cardiovascular disease became very pressing in early 1970s. At that time many health intervention program were planned at the level of the community and their purpose was to promote health and reduce detrimental life style changes. The basic starting premise was that the use of measures to reduce risk factors in population with clinically identified risk factors has only a limited effect on prevention of cardiovascular risk factor at the national level; on the other hand, global public health actions have more effects altogether.

The first implemented program that was based on these ideas was the North Karelia Project carried out in Finland in 1972. This project achieved significant results, in particularly through the hypertension control programs. It started off as a pilot but after significant net reductions in both risk factors and cardiovascular disease-caused mortality rate, the project was rolled out to the national level. Over the next 25 years, smoking prevalence in men was significantly reduced and so was serum cholesterol and blood pressure levels. Over this period, mortality rate caused by cardiovascular disease in men aged 35-64 years dropped by 68%, coronary heart disease mortality rate by 73%, cancer mortality rate by 44%, and mortality rate for all samples effectively dropped by 49%. (13-15)

Building on this success, many projects have been implemented since then in the form of demonstrational projects under different WHO programs: CINDI (WHO/EURO), CARMEN (WHO/AMRO), and INTERHEALTH (WHO/HQ). Apart from clinical trials, all these projects involved different design, intervention approach, method, intensity, goals in reducing the risk factors, evaluation measurements and timeline. Major role of projects implemented in community is to demonstrate and stimulate health policies of non-contagious disease prevention. (16)

In their recommendations for 2003, the WHO and the International Society of Hypertension (ISH) defined three sets of risk factors required for monitoring in management of hypertension. (Table 1.) (28)

Based on this, a stratification of overall cardiovascular risk factors was provided. Three major risk categories - low, medium and high risk - were calibrated to effectively indicate absolute likelihood of developing a cardiovascular disease in the next 10 years as follows: (1) low risk - less than 15%; (2) medium risk - 15-20%; and (3) high risk - over 20%. (Table 2.)

3. Hypertension as a cardiovascular risk factor

Nearly 1 billion of people worldwide are suffering from hypertension. Population research studies showed that 15-37% of adult global population is stricken by hypertension. The WHO statistics in 2002 showed that hypertension is the third leading cause of the global burden of disease. Untreated and non-controlled hypertension as highly prevalent risk factor for cardiovascular disease results in cerebrovascular accidents, myocardial infarction, heart failure and dementia, kidney failure and blindness. (2,3,4).

Cardiovascular disease risk factors	Target organ damage (TOD)	Associated clinical condition (ACC)
1. SBP/DBP values (level 1-3) 2. Man > aged 55 years 3. Women > aged 65 years 4. Smoking 5. Total cholesterol > 6.1 mmol/l or LDL - cholesterol > 4.0 mmol/l 6. HDL - cholesterol Males < 1.0 mmol/l Females < 1.2 mmol/l 7. History of cardiovascular disease in the first degree relatives before the age of 50 8. Obesity, physical inactivity	1. Left ventricular hypertrophy 2. Microalbuminuria (20-300 mg/daily) 3. Radiological or ultrasound evidenced extensive atherosclerotic plaque (aorta, carotids, coronary, iliac or femoral arteries) 4. Grade 3 or 4 hypertensive retinopathy	1. Diabetes mellitus 2. Cerebrovascular conditions: <ul style="list-style-type: none"> • Stroke • Cerebral hemorrhage • Transitory ischemic attack (TIA) • Heart disease • Myocardial infarction • Angina pectoris • Coronary revascularization • Congestive coronary insufficiency 3. Kidney diseases <ul style="list-style-type: none"> • Plasma creatinine concentrations • Females > 1.4 mg/dl • Males > 1.5mg/dl (120, 133 μmol/l) • Albuminuria >300mg/dneвно 4. Peripheral arterial disease

Source: 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension

Table 1. Risk factors required for monitoring in hypertension management

Other risks and history of disease	Blood pressure (mmHg)		
	Grade 1 mild hypertension SBP 140-159 or DBP 90-99	Grade 2 medium hypertension SBP 160-179 or DBP 100-109	Grade 3 severe hypertension SBP ≥180 or DBP ≥110
No other risk factors	LOW	MEDIUM	HIGH
1-2 risk factors	MEDIUM	MEDIUM	HIGH
3 or more risk factors or damaged target organs or diabetes mellitus	HIGH	HIGH	HIGH

Source: 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension

Table 2. Stratification of risk in quantification of prognosis

Hypertension is estimated to cause 7.1 million of deaths worldwide or roughly 13% of total global mortality. Significance of high blood pressure is becoming increasingly higher when it comes to disability caused by stroke and coronary ischemia, which expressed in DALY (Disability-Adjusted Life Year) that is 64.3 million DALYs of lost life or 4.5% of the total burden of disease. Each year globally there are 12 million fatal and approximately 20 million non-fatal myocardial infarctions, mostly in developing countries. Research showed that treated hypertension reduces risk of cerebrovascular accidents by 40% and risk of myocardial infarctions by 15%. (2,3,4)

Even with extensive knowledge about the pathophysiology and the epidemiology of hypertension, simple diagnostics, availability of efficient drugs, hypertension still has high prevalence and as a result introduction of an effective hypertension control represents considerable public health challenge. (18,19) Public health systems worldwide continue to cope with inadequate management of hypertension and there is a need to ensure constant improvement of management by health professionals in order to make sure that at least two thirds of treated patients suffering from hypertension reach adequate control of blood pressure.

In doing so it is necessary to perform control of major risk factors, such as smoking, obesity, increased total serum cholesterol and diabetes mellitus. (18,19) All this creates necessary prerequisites for setting up different methods of controlling hypertension that basically prevent continuation of costly cycle of clinical management of hypertension and the related complications.

Definitions of hypertension, in particular in public health sense, are essentially pragmatic. They can be used and they were also defined to characterize a group of individuals who potentially may benefit from specific treatment regimes - non-pharmacological and pharmacological. Definition of hypertension which is more than 30 years old and which says that "*Hypertension should be defined as the level of blood pressure which requires investigation and treatment to improve the condition*" indicates that any numerical definition and categorization should be flexible and based on evidenced risk and availability of effective and well-tolerated drugs. (20-24) Also clinically used definitions are rather arbitrary because of the nature of blood pressure distribution in the population. (25-27) Researchers have long discussed about threshold values of high blood pressure in different populations, in particular those threshold values that warrant therapeutic interventions. There is also variability in deciding the threshold values for evaluation of cardiovascular disease risk factor in individuals.

Problem-based approach to hypertension is twofold: (i) it is described as a separate clinical entity/condition and is classified as a prevalent cardiovascular disease. Also hypertension is a very important factor in development of morbidity and mortality that are caused by cardiovascular disease; or (ii) it is described as intermediary (biological) factor in development of cardiovascular disease and conditions of circulatory system. In both cases hypertension is recognized as "an entry point" for the management of cardiovascular disease.

The World Health Organization/International Society of Hypertension issued in 1999 and 2003 guides for the management (diagnostics and treatment) of hypertension. The European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) did not

develop their own guides but simply endorsed the WHO/ISH guides. As the number of population research studies and clinical trials in Europe increased and their results brought to light the new evidence, the European Society of Hypertension and the European Society of Cardiology developed for the first time in 2003 their own guides for the management of hypertension as a response to a suggestion by the WHO/ISH that regional experts should develop recommendations for the management of the disease based on regional conditions, depending on the degree of their health care and health care availability and their economic resources. (25) In 2007 these guides were updated based on the new clinical evidence. (28) As a result, a classification of blood pressure levels was made on the basis of the adopted definitions.(Table 3.)

Category*	Systolic pressure	Diastolic pressure
Optimal blood pressure	<120	<80
Normal blood pressure	120-129	80-84
High normal blood pressure	130-139	85-89
Grade 1 hypertension - mild	140-159	90-99
Grade 2 hypertension - medium	160-179	100-109
Grade 3 hypertension - severe	≥180	≥110
Isolated systolic hypertension	≥140	<90

Isolated systolic hypertension should be graded (1,2,3) according to systolic blood pressure values in the ranges indicated, provided that diastolic values are < 90mmHg. Grades 1, 2 and 3 correspond to classification in mild, moderate and severe hypertension, respectively. These terms have been now omitted to avoid confusion with quantification of total cardiovascular risk.

Source: 2007 Guidelines for the Management of Arterial Hypertension. The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC)

Table 3. Definitions and classification of blood pressure levels (mmHg)

4. Situational analysis in the Federation of Bosnia and Herzegovina

The Federation of Bosnia and Herzegovina is a part of Bosnia and Herzegovina. In April 1992, Bosnia and Herzegovina was internationally recognised as a new independent country and became a member of the United Nations. War broke out in 1992 and ended with the signing of the Dayton Peace agreement in December 1995. The Peace Agreement established Bosnia and Herzegovina as a country of two entities and one district - the Federation of Bosnia and Herzegovina, Republika Srpska and District Brcko. The war 1992-1995 caused drastically demographic and epidemiological changes in Bosnia and Herzegovina. (29,30)

The Federation of Bosnia and Herzegovina is currently going through a period of considerable political and economical transition which altogether has evident implications on the population's health status. Changed lifestyles are result of transitional socioeconomic changes. Over the past two decades health reports have constantly showed high mortality and morbidity rates for noncommunicable diseases, in particular cardiovascular disease.

Hospital discharge rate statistics for these diseases is not analyzed at the Federation of Bosnia and Herzegovina level. (32)

As the Federation of Bosnia and Herzegovina is currently going through a strong transitional and reform period of its socioeconomic development, its health system should be responsive to health and social needs of its population, especially at times when such needs turbulently change. Health system of the Federation of Bosnia and Herzegovina should be flexible and prompt to provide adequate and timely response to demographical and social changes, changes in epidemiological patterns of diseases, expectations of health care users for quality and their role in decision-making, inequity in health care system, and scientific and technological progress. (32,33)

According to the official statistics of the Federation BiH Statistics Office, population of the Federation of Bosnia and Herzegovina in 2009 reached 2,327,318 with average population density at 89 people per square kilometer. Population of the Federation of Bosnia and Herzegovina falls under the category of stationary/regressive population with 14% of people over 65+ years of age. In the overall structure of the population, female population accounts for 51%. (34) According to the World Health Organization (WHO) estimates, life expectancy at birth for males is 73 and for female 78.

The Federation of Bosnia and Herzegovina hypertension morbidity rate reported for 2009 was almost 12% increase compared to the time before 1992 when practically started the period of strong political and socio-economic transition. The hypertension morbidity rates are not reliable, primary as a result of inconsistency of the health statistics system. Statistics available on morbidity rates originate from the primary health care and as such they are simply tip of an iceberg. In fact the statistics is based on the patient-requested health care, not on actual health needs of population. Assessment of actual health needs of the population requires additional sensitive research, such as cross-sectional research population studies. (31) This was the original idea in designing this particular research and assessment of the health needs. (30)

In recent years, there have been several isolated population research studies in the Federation of Bosnia and Herzegovina which used different samples. Findings of one such study based on the CINDI methodology showed that unhealthy life habits have slightly increased in the population as a result of exposure to bad life habits such as smoking, unhealthy diet, physical inactivity, etc). (35) Wider public health implications of growingly unhealthy lifestyles are reflected in increased morbidity rates for chronic conditions and early disability, in particular those caused by cardiovascular disease. Statistics on awareness, treatment and control of hypertension in adult population of the Federation of Bosnia and Herzegovina are completely unreliable.

5. The case study

In order to effectively evaluate the prevalence of cardiovascular risk factors (overweight and obesity, smoking, history of hypercholesterolemia and diabetes mellitus) and also blood pressure values, a cross-sectional population study was carried out in the Federation of Bosnia and Herzegovina on a sample of adult population (aged 25-64 years), which was representative for the Federation of Bosnia and Herzegovina. (30)

The households were selected using the random sample method, following the survey conducted in the field. From each household one individual aged 25 to 64 years was selected. Stratified sampling allowed inclusion of both urban and rural areas within the selected municipalities.

Original size of the sample was 3,020 households/respondents, which is effectively the internationally recommended sample size for evaluation of noncommunicable diseases risk factors in adult population. The survey was carried out in the autumn of 2002. Compared to the original sample (3,020 people), response rate was very high (91.5 %). Female respondents made 59 % of the total sample.

Methodology of the survey fully complied with the international recommendations for survey protocol. (36-39) The survey involved interviews with and physical measurements of individual respondents in their homes. The physical measurements actually included blood pressure measurements.

Hypertension awareness in the respondents was evaluated through a question listed on the survey questionnaire about whether the respondents being informed on high blood pressure by health professionals.

Drug treatment of hypertension was evaluated by another question listed on the survey questionnaire. The term "treated" included the respondents who at that point were using antihypertensive drugs.

Control of hypertension was evaluated by the question on awareness of their hypertension, use of antihypertensive drugs and measured value of blood pressure.

The survey used a criterion for evaluation of hypertension prevalence which is normally used in population research studies. This criterion was based on the blood pressure threshold values and values of actual treatment by antihypertensive drugs. The respondents were hypertensive if they were using antihypertensive drugs and/or if their systolic blood pressure (SBP) was ≥ 140 mmHg and/or diastolic blood pressure (DBP) was ≥ 90 mmHg.

In addition to the above definitions, the research study also used the WHO/ISH definitions which categorize hypertension into three grades: mild, medium and severe. Following these definitions, **mild hypertension** included respondents who reported SBP of 140-159 mmHg and/or DBP of 90-99 mmHg; **medium hypertension** included respondents who reported SBP of 160-179 mmHg and/or DBP of 100-109 mmHg; and **severe hypertension** included respondents who reported SBP of > 180 mmHg and/or DBP of > 110 mmHg. (see Table 3)

Limitation of the survey is reflected in the categorization of hypertensive respondents based on one off blood pressure measurement, which in fact may lead to overrated hypertension levels, especially in patients who reported threshold values of SBP of 140 mmHg and/or DBP of 90 mmHg.

Although cross-sectional research studies are not ideal tools for evaluation, they are necessary to obtain information about individuals who have no contact with health professionals in health care institution, individuals who are not aware of their hypertension, level of treatment and control of hypertension in different countries. Description of blood pressure patterns in the population and the underlying trends classified by age, sex,

education and other socioeconomic variables, actually allows development of strategies for reduction of morbidity and mortality caused by high blood pressure.

5.1 Blood pressure

Mean value of SBP was under 140 mmHg, while the DBP mean value was above 80 mmHg in both male and female respondents. Reported values were higher in female respondents.

Age and gender structure showed that the lowest percentage of the respondents was from the youngest age group 25-34 years, males in particular. The highest number of respondents was from the age group 35-44 years, which proportionally included the highest number of females and males. (See Figure 1.)

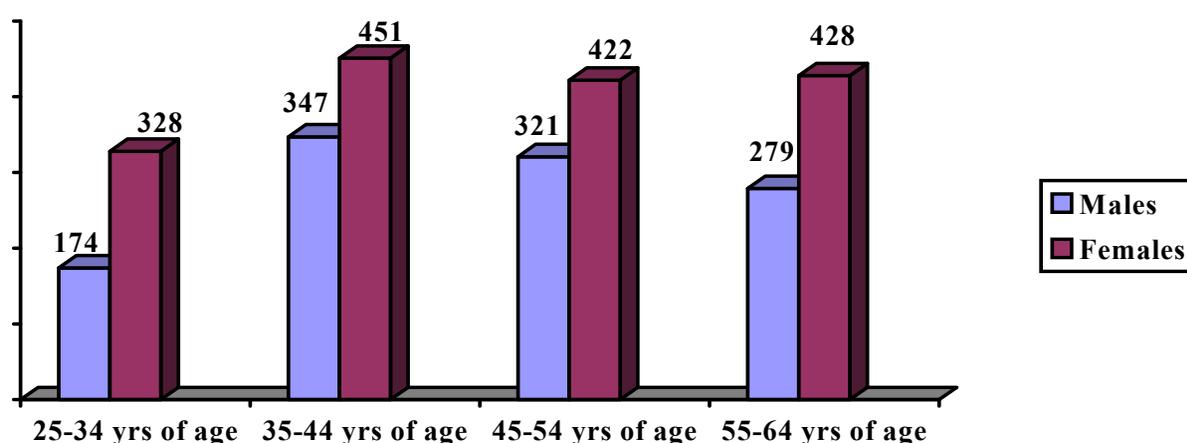


Fig. 1. Number of respondents by age and gender

$$\chi^2(3)=12.5, p<.006$$

Mean value of SBP in male respondents was 132 mmHg and in female respondents it was 135 mmHg. The difference was statistically significant ($p < 0.001$) (See Table 4.). Mean value of DBP was 84 mmHg in both genders. As with the SBP, mean value of DBP also increased with the age of the respondents.

5.2 Prevalence of hypertension

Following the definition of hypertension whereby the respondents were hypertensive if they were using antihypertensive drugs and/or if their SBP was ≥ 140 mmHg and/or DBP was ≥ 90 mmHg. Total of 41% respondents were hypertensive (Table 5.)

Prevalence of hypertension was 36% in male and 45% in female respondents. Proportion of the respondents with hypertension statistically increased to a significant degree in both female and male respondents ($p < 0.0001$), but slightly higher in female respondents in elderly age group (aged 45 to 64 years). (See Table 6.)

In addition to the above definitions, as already mentioned, the research study also used the WHO/ISH definitions which categorize hypertension into three grades: mild, medium and severe. Following these definitions, **mild hypertension** included respondents who reported

SBP of 140-159 mmHg and/or DBP of 90-99 mmHg; **medim hypertension** included respondents who reported SBP of 160-179 mmHg and/or DBP of 100-109 mmHg; and **severe hypertension** included respondents who reported SBP of > 180 mmHg and/or DBP of > 110mmHg. (See Table 3.)

Age (years)	Males			Females		
	Mean value	(SD)	N	Mean value	(SD)	N
<i>Systolic blood pressure</i>						
25-34	124	(10.8)	172	119	(12.8)	325
35-44	128	(13.2)	346	126	(17.8)	450
45-54	134	(16.5)	320	141	(24.5)	419
55-64	142	(23.7)	279	150	(25.1)	426
Total	132	(18.1)	1117	135	(24.2)	1620
<i>Diastolic blood pressure</i>						
25-34	79	(8.2)	172	77	(8.6)	325
35-44	83	(8.0)	346	81	(10.1)	450
45-54	85	(9.1)	320	87	(12.3)	419
55-64	87	(10.9)	279	90	(12.9)	426
Total	84	(9.4)	1117	84	(12.3)	1620

Table 4. Systolic and diastolic blood pressure (mean value and SD), by age and gender

Age (Years)	Normotensive		Hypertensive	
	N	%	N	%
Grade 1 hypertension				
25-34	422	88	58	12
35-44	572	73	213	27
45-54	372	50	365	50
55-64	220	31	482	69
Total	1586	59	1118	41

Table 5. Prevalence of hypertension by age

Prevalence of mild hypertension was equally distributed in both female and male respondents. Proportion of respondents suffering from mild hypertension statistically increased significantly with the age of both female and male respondents ($p < 0.0001$). Prevalence of moderate and severe hypertension was higher in female respondents. (See Table 7.).

Prevalence of hypertension on the threshold value of 140 and/or 90 mmHg among the adult population of the Federation of Bosnia and Herzegovina was higher than in some countries in this part of Europe, including Albania and Hungary. Cross-sectional research studies carried out in Albania and Hungary in recent years showed much lower prevalence of hypertension which in Albania was reported at 32% and in Hungary at 37%. (40,41)

Furthermore, compared to findings of research studies carried out in developed European counties (e.g. UK, Germany) in the past 10 years, where prevalence of hypertension was 38% and 32% respectively (and it was much lower in female respondents), prevalence of hypertension in the Federation of Bosnia and Herzegovina is quite high. (42,43) This altogether should be a challenge for public health of the Federation of Bosnia and Herzegovina in order to effectively identify potential additional risk factors.

Age (Years)	Normotensive		Hypertensive	
	N	%	N	%
<i>Males</i>				
25-34	145	88	20	12
35-44	254	75	86	25
45-54	190	60	129	40
55-64	120	43	158	57
Total	709	64	393	36
<i>Females</i>				
25-34	277	88	38	12
35-44	318	71	127	29
45-54	182	43	236	57
55-64	100	24	324	76
Total	877	55	725	45

* The respondent were classified as hypertensive if they were using antihypertensive drugs and/or if their systolic blood pressure was > 140 mmHg and/or diastolic blood pressure was > 90 mmHg
Males $\chi^2(3)=113.3$, $p<.0001$; Females $\chi^2(3)=377.6$, $p<.0001$

Table 6. Prevalence of hypertension by age and gender

Age (Years)	Normotensive		Grade 1 Mild hypertension		Grade 2 Moderate hypertension		Grade 3 Severe hypertension	
	N	%	N	%	N	%	N	%
<i>Males*</i>								
25-34	151	88	18	10	2	1	1	1
35-44	261	75	73	21	9	3	3	1
45-54	196	61	91	28	27	9	6	2
55-64	131	47	88	32	37	13	23	8
Total	739	66	270	24	75	7	33	3
<i>Females**</i>								
25-34	290	89	32	10	3	1	0	0
35-44	330	73	92	20	19	5	9	2
45-54	193	46	126	30	59	14	41	10
55-64	123	29	134	31	109	26	60	14
Total	936	58	384	24	190	12	110	6

* $\chi^2(9)=128.6$, $p < .0001$

** $\chi^2(6)=394.2$, $p < .0001$

Table 7. Prevalence of hypertension by age and gender (clinical classification of hypertension)

5.3 Awareness of hypertension, treatment and control of hypertension

Almost 54% of hypertensive respondents were not aware of their hypertension. Very high 79% of the hypertensive respondents who are aware of their hypertension were pharmacologically treated, which indicates relatively good availability of antihypertensive drugs. Of the total number of respondents who were pharmacologically treated, the condition was adequately controlled in only 13%. Generally female respondents were more aware of their hypertension and they were more regularly treated and controlled than male respondents.

In the hypertensive respondents there was a statistically significant difference between the genders with respect to the degree of awareness, treatment and control of hypertension. There were 63% of hypertensive male respondents who were not aware of their hypertension as opposed to 50% of females in this particular category of respondents. Hypertension treated but not controlled respondents included 24% male and 34% female respondents. Percentage of the hypertensive respondents who were both treated and controlled was relatively low - 5% in male and 6% in female respondents. (See Figure 2.)

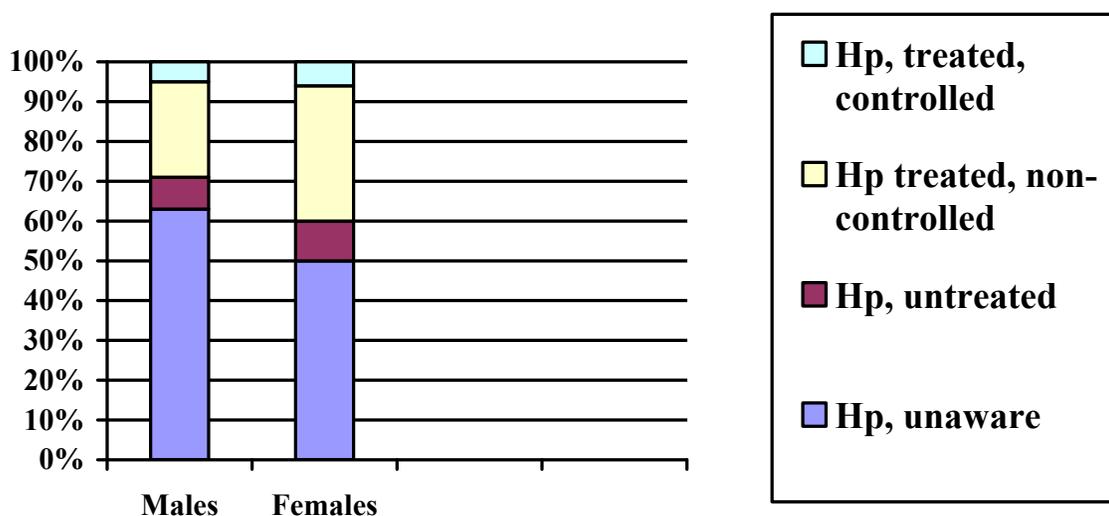


Fig. 2. Awareness, treatment and control in hypertensive respondents, by gender

In genders there was a statistically significant difference among the age groups with regards the degree of awareness of hypertension, treatment and control of hypertension. The degree of awareness of hypertension in both genders significantly increases with the age of the respondents. There were more hypertensive, treated, and non-controlled respondents in older age groups (45 to 64 years) and the portion significantly increased with the age of the respondents. Percentage of hypertensive, treated, and controlled respondents was low at males 5% and females 6%). (Table 8.)

The low rate of detection and control of hypertension in hypertensive respondents can be attributed to the lack of standardized integrated programs for reduction of hypertension or at least developed screening programs at the Primary health care (PHC) level. The degree of detection, treatment and control of hypertension increased with the age of the respondents as prevalence of hypertension increased.

	Hypertensive, Unaware		Hypertensive, untreated		Hypertensive, treated, non-controlled		Hypertensive, treated, controlled	
	N	%	N	%	N	%	N	%
Males								
25-34	19	95	0	0	1	5	0	0
35-44	75	87	6	7	1	1	4	5
45-54	81	63	15	12	28	22	5	4
55-64	74	47	11	7	63	40	10	6
Total	249	63	32	8	93	24	19	5
Females								
25-34	29	77	6	16	0	0	3	8
35-44	80	63	16	13	23	18	8	6
45-54	126	53	27	11	72	30	11	5
55-64	123	38	26	8	153	47	22	7
Total	358	50	75	10	248	34	44	6

Table 8. Awareness, treatment and control in hypertensive respondents by age and gender

6. Control of hypertension

Experiences of good practice exercised in various countries have showed that significant progress in health can be made through a well organized and focused approach to prevention, treatment and control of the disease, which should be a part of any health system. This is possible to achieve in social environments which support intervention programs in community. In order to make this happen, major changes need to be made in the areas of health policies, organization of health, training/academic education of health professional who also need to be properly equipped. Ultimately, such approaches do not require considerable resources compared to highly complex clinical interventions. (2,3,4)

Following the general managerial approach, the World Health Organization introduced in mid 1980s a number of integrated programs for prevention and control of disease that were defined as *“programs that combine resources and approaches to prevention and control of selected diseases and related conditions and programs that will allow managerial unification of activities that will lead to prevention and control of diseases and promotion of health in overall community.”* (4)

Integrated management of disease and risk factors is particularly recommended in countries with limited financial resources for health care. Mechanisms of such integrated approach can be used to evaluate actual health needs, develop manuals to be used at all levels of management, supervision, adequate treatment and mobilization of community in support of the population's health.

One of well-founded approaches and an example of good practice is Integrated Management of Childhood Illness (IMCI) which is very efficient and applicable in developing countries as more than 80 developing countries has adopted the IMCI as their national policy aimed at improving children's health. This approach allows provision of children's health care in an efficient and effective way. (2)

Since non-communicable diseases, in particular cardiovascular disease, are leading cause of global morbidity and mortality, defining an integrated management of cardiovascular disease, including risk factor management, represents a major challenge for the national health systems worldwide. The modeling of an integrated management of non-communicable diseases means improved supervision and monitoring, development and implementation of intervention prevention programs for different target population groups, implementation of intervention programs in the community and advocacy in public policies with considerable support for health care services. The model of integrated management should promote rational allocation of resources, evidence-based treatment, cost-effectiveness and self-management strategies aimed at achieving improved health outcomes through full involvement of the entire community. (44,45)

The integrated approach to control of hypertension is innovative in shifting the paradigm from “treatment of hypertension” to “management of hypertension” as an integrative program in control of risk factors such as high cholesterol, obesity and diabetes mellitus. This movement to an innovative approach is supported by evidence of cost-effectiveness of managerial approaches to the integrative control of hypertension in the population. Therefore the developing of an integrated hypertension management model at the level of the community should be supported in the country as the original, flexible approach and comprehensive package that combines different sustainable activities that will produce a synergic effect in fight against selected risk factors. (46-48)

Population approaches in dealing with the health needs of the population are the bigger challenge with the long-term results. Epidemiological theories confirmed by research studies have indicated that intensive treatment of individuals who are under a threat of high risk of developing a disease have actually yielded limited progress in reducing general risk in the population as opposed to the population approaches. (49-51)

This effectively corroborate the fundamental axiom of preventive medicine which says that a large number of people exposed to small risk can result in much bigger number of cases that the small number of people exposed to high risk.(2)

However, effective and efficient control of blood pressure in the population requires two approaches: *population approach and individual approach to high risk individuals*. Both approaches are necessary and complementary for effective control and management of hypertension in the community. It is important to specifically note that balanced combination of population preventive strategy and preventive strategy in dealing with the high risk individuals is vital for effective control of epidemic and growing burden of non-communicable in the community in general, in particular hypertension and cardiovascular disease. (See Figure 3) (2,4)

7. Strategies for reducing high blood pressure

Despite many efforts to diagnose and effectively treat hypertension, this condition is still the leading cause of cardiovascular morbidity and mortality. This is why it is very important to improve unsatisfactorily treatment and control of hypertension globally. According to the research studies published by the WHO, major barriers for adequate management of hypertension include lack of standardized clinical guides at the national level, inadequate training of health professionals in management of hypertension and poor availability of

hypertension drugs at the Primary health care level. Development of management of hypertension in public health context represents the best way to introduce the management of cardiovascular risks. (52,53)

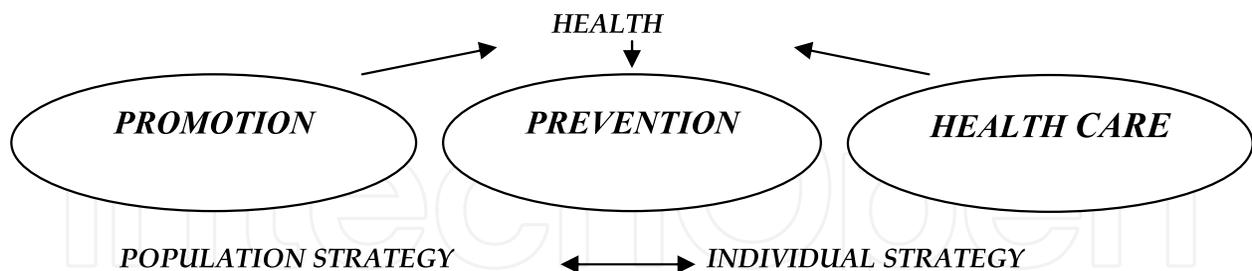


Fig. 3. Population vs. individual approach in improved health of the population

For the most part, successful implementation of guides and recommendations requires a multidisciplinary approach, from mass dissemination of recommendations, provision of public health education programs direction in the field, all the way to clinical treatment of ill patients. To achieve all this it is necessary to ensure involvement of larger number of stakeholders, from strategic to operational levels of management. Formal approval of guides essentially depends on national associations of hypertension and professional associations, in order to promote the proposed changes in behavior and improve prognosis for patients. (54-59)

Leading non-communicable diseases, including hypertension, are associated with common preventable risk factors – obesity, smoking and increased levels of fats in the blood. Better understanding of these risk factors and their determinants means better opportunities for prevention and control of the associated non-communicable diseases. Early detection and understanding of extent of this health issue, early warning and early response altogether allow timely prevention of future epidemic and “explosion” of risk factors. (60,61)

High rate of undetected hypertension and unsatisfactorily control of hypertension indicate that hypertension today is insufficiently and inadequately treated. This results in far reaching consequences in development of heart-, brains- and kidney-related conditions and eventually fatal outcomes. At this point the health system of the Federation of Bosnia and Herzegovina is treating adverse health outcome and the sequels. Number of complicated cardiac surgeries is on the rise and this in fact puts additional strain on already limited health sector budget allocations.

Lessons from many countries which developed the comprehensive policies showed that there is a significant reduction in mortality caused by cardiovascular disease. In Finland, for example, the comprehensive strategy that effectively combined prevention, promotion in the community and the approach to the treatment resulted in decrease of mortality rate by staggering 60%.

Two preventive strategies are described in the scientific literature: population and individual strategy.

Population strategy in reducing high blood pressure in countries throughout the world is very cost-effective – it is especially suitable for countries with limited resources such as Bosnia and Herzegovina. Population strategy allows potential control of incidence of disease in the population. With respect to hypertension, this approach includes reduction of

mean value of blood pressure in the population by shifting the entire distribution towards the left lower values (*distributional transition* – a shift from the current values towards the desired value and planned scenario) and reduction of prevalence of high blood pressure and hypertension in adult population in elderly age as well. (See Figure 4.) Population approach strongly supports promotion and improvement of cardiovascular health of the population. INTERSALT study showed that population measures which can reduce mean value of systolic blood pressure by 2-3 mmHg can also reduce prevalence of hypertension in the population by one fifth at the age of 20 to 59 years. This means that organized, focused and controlled measures put in place in the population/community can successfully lead to distributional transition. (62)

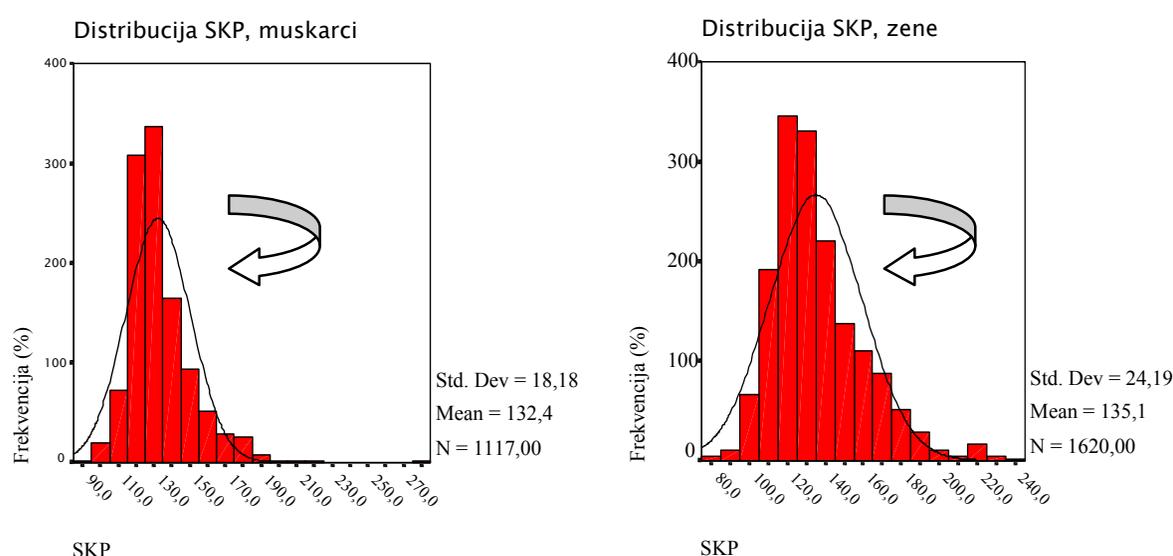


Fig. 4. Distribution of SBP in adult respondents and directions of distributional transition by gender

Population approach supports identification and modification of risk factors associated with different behaviors such as, for example, dietary habits, smoking and physical inactivity. Multiple interventions with regards the risk factors are possible by setting up health policies in the country through the multisectorial approaches in the community. Managerial approach to the population/community requires active involvement of large number of stakeholders from all three levels of management (strategic, tactical and operational) in health sector which is the primary public sector for the starting of such initiative.

It is described in the scientific literature that interventions aimed at changing the unhealthy lifestyles are very successful in reducing the absolute risk of development of hypertension in the population. (52,63,64) Preventive strategies implemented in young population, or rather in early stages of life, allow long-term potential for prevention of conditions which lead to development of hypertension and high blood pressure, as well as for reduction of overall morbidity and complications associated with conditions caused by high blood pressure. (53)

On the other hand, *individual approach* in prevention of disease does not provide a big picture of causes of diseases in the environment and projections of potential trends of the disease. However, it requires continuous and considerable screening of new highly risk individuals. Individual approach to high risk individuals with respect to hypertension

includes detection, treatment and effective control of high blood pressure. Such approach requires effective treatment and both modification of lifestyle and pharmacological treatment.

It is necessary to create prerequisites necessary to study the approach to high-risk individuals which in fact primarily includes detection, early diagnosis and start of a treatment of hypertension. Changes to attitudes of health professionals in terms of the integrated hypertension management can be achieved through formal education of health professionals.

Based on the international recommendations, tables of cardiovascular risk stratification are recommended for management of hypertension at the level of an individual. Cardiovascular risk assessment systems have been for the most part developed on the findings of the Framingham Risk Score study. (65,66) Recent SCORE project developed the risk assessment tables to estimate the probability of developing fatal cardiovascular disease within the next 10 years, in particular for high-risk countries in the north of Europe and low-risk countries in the south of Europe.(67) These categories can be used as indicators for assessment of relative risk in the population. It is recommended that the countries adapt the risk stratification tables and to introduce them in daily practice. The SCORE tables are based on risk assessment relative to values of cholesterol and blood pressure and age and gender.

8. Model of integrated hypertension management in community

Based on the survey results, it has become necessary to introduce a model of integrated management of hypertension in the Federation of Bosnia and Herzegovina at this point because of the relatively high prevalence of hypertension and leading cardiovascular risk factors.

In the countries with limited budgetary allocations for health, such as the Federation of Bosnia and Herzegovina, population prevention strategies are the most cost-effective solution. (2, 68) These strategies control incidence of risk factors in the population, their goal is to change health behavior and reduce exposure to risk factors and also to reduce risk in the entire population. Potential benefits are high but there are challenges as well because the community largely benefits from preventive measures while it seems that such measures produce limited benefits for an individual. This, on the other hand, may cause a negative motivation in the population and this is described as "preventive paradox." Therefore it is necessary to use the both approaches complementary. The key challenge is to find a suitable balance between the population approach and the approach to high-risk individuals. (69)

Managerial approach to the community (to the population) requires active involvement of large number of stakeholders from all three levels of management (strategic, tactical and operational) in health sector which is the primary public sector for the starting of such initiative.

Role of strategic management in the health sector (a country's government) in reduction of risk is significant. The government should act as an advisor in the initiative to reduce the risk factors - selected, highly prevalent in the population and widely distributed risks. One of potential instruments include the passing of legislation, which is more cost-effective as it is assumed that the legal regulations will more readily lead to changes in agreements rather than

professional recommendations alone. Both approaches require consultations with a large number of active stakeholders and the multisectorial approach. (See Table 9.,) Unfortunately transition countries, such as the Federation of Bosnia and Herzegovina, have a poor regulatory structure and they are more dependable on the non-controlled market. Against such backdrop, it is necessary to select sustainable and implementable measures, including, for example, higher taxes on tobacco products, legislation on reduced salt content in industrially produced food products, use of mandatory content labeling of products, support for production of healthy food or subsidization of price of food produced by local producers.

Levels of management	Possible interventions	Responsible organizations	Theoretical coverage of population
Strategic management	1. Legal regulations on reduced content of salt in local industrially produced food products and mandatory food product content labeling	Government of the country	100%
Tactical management	1. Health education through mass media 2. Campaigns 3. Introduction of risk screenings 4. Development of diagnostics and therapeutic protocols 5. Training for health professionals 6. Development of reference programs such as the School of Hypertension in Community	Public health institutes, medical associations, professional associations, non-governmental organizations	60-80%
Operational management	1. Pharmacological treatment and patient education on lifestyles including dietary counseling for individuals with SBP over 160 mmHg or 140 mmHg. 2. Pharmacological treatment and patient education on lifestyles including dietary counseling for individuals with cholesterol serum concentration of over 5.7 mmol/l. 3. Nicotine replacement therapy with medical consultations by physician. 4. Triple therapy treatment for reduction of high blood pressure for individuals with absolute risk of cardiovascular events of 5% (15, 20, 25%) over the next 10 years. 5. Development of hypertension consultation facilities.	PHC Hospitals	26-41%

Table 9. Cost-effective interventions in reducing prevalence of hypertension

Role of tactical management in health sector, such as public health institutes, medical associations, professional physician associations, is reflected in designing, introducing and implementing intervention programs in the community through a series of mapped activities including preparation of culturally-sensitive promotional and preventive education messages, services aimed at supporting the changed lifestyles, introduction of risk screenings, development of diagnostic and therapeutic protocols, training for of health professionals and development of reference programs.

Role of operational management in the health sector, such as primary, secondary and tertiary health care levels (hospitals, clinics and health resorts) and non-governmental sector is reflected in the active implementation of recommendations, design and dissemination of written materials and active participation in the health training/education.

These interventions could be used as strategies in creation of population approach in management of hypertension.

Findings of this research study showed that prevalence of detection and prevalence of control of hypertension were relatively low, which further supports the importance of introducing the integrated management of hypertension.

Based on evaluation of prevalence of hypertension and distribution of major cardiovascular factors in the population research study, the managerial approach was assumed, through all developmental stages of the process (input, process and output) for for hypertension. (See Figure 5.)

Input included input variables (income) and resources (actual input).

Input variables (income) included:

1. High prevalence of hypertension in the population (41%),
2. High prevalence of selected major cardiovascular risk factors (27% in both genders)
3. High prevalence of smoking in young males aged 25 to 44 years (56%)
4. High prevalence of obesity in middle-aged women aged 35 to 54 years (35%).

Actual input included required resources:

1. Staff
2. Premises
3. Equipment
4. Time
5. Money

Process included supervision, stakeholders and activities.

1. **Supervision** included formal bodies such as steering committees of projects implemented in the community or intervention programs which targeted subgroups within the population.
2. **Implementers** included predominantly the health sector experts from different implementation sites (Family Medicine Ambulantas, work places, schools).
3. **Activities** were linked together through project cycles, with clearly defined goals, performance indicators and monitoring that was carried out. (See Table10.)

Output included output variables and outcome.

Output variables were:

1. Process evaluation of the project (resources, process, monitoring)

Outcome and impact was:

1. Degree of achieved value - achievement of the desired quantified goal.

GOAL - WHAT?	PROCESS - HOW?	LOCATION - WHERE?	TIME - WHEN?
1. Reduced prevalence of hypertension by 10% in adult population	Legal regulations on reduced content of salt in local industrially produced food products and mandatory food product content labeling	THE COMMUNITY <u>Coverage</u> 100% of the population	CONTINUOUSLY
2. Reduced mean value of blood pressure in the population (distributional transition) aimed at promoting and improving cardiovascular health of the population	Develop the reference program <i>the School of Hypertension in the Community</i>	THE COMMUNITY <u>Coverage</u> 100% of the population 1. Health professionals - Family Medicine teams (PHC) 2. Support groups - healthy population 3. Population under the risk 4. Representatives of mass media	ONE-YEAR CONTROLLED PROGRAM IN LOCAL DEMONSTRATIONAL AREAS
3. Reduced smoking by 10%, especially in young males	- Campaigns on possible use of nicotine replacement therapies with medical counseling by physician. - Health education through the mass media - TV shows on how to quit smoking	Big shopping centers, places which people of this age normally visit (entertainment and sports venues), sports non-governmental organizations, TV stations <u>Coverage</u> 55% of male population	ONE-YEAR CONTROLLED PROGRAM IN LOCAL DEMONSTRATIONAL AREAS
4. Reduced obesity by 10%, especially in middle-aged women	- Health education through the mass media - TV shows on importance of physical activity - On-the-job education - Promotion of recipes for low-calorie meals	TV stations big shopping centers, women's non-governmental organizations <u>Coverage</u> 40% of female population	ONE-YEAR CONTROLLED PROGRAM IN LOCAL DEMONSTRATIONAL AREAS

Table 10. Activities proposed in managerial process of intervention programs in the community - population approach

These interventions could be used as strategies in creation of population approach in management of hypertension. Findings of this research study showed that prevalence of detection and prevalence of control of hypertension were relatively low, which further supports the importance of introducing the integrated management of hypertension. The individual approach is better suited for high prevalence of hypertension. Compounded by the high prevalence of major cardiovascular factors, detection, adequate treatment and control are placed at (70)

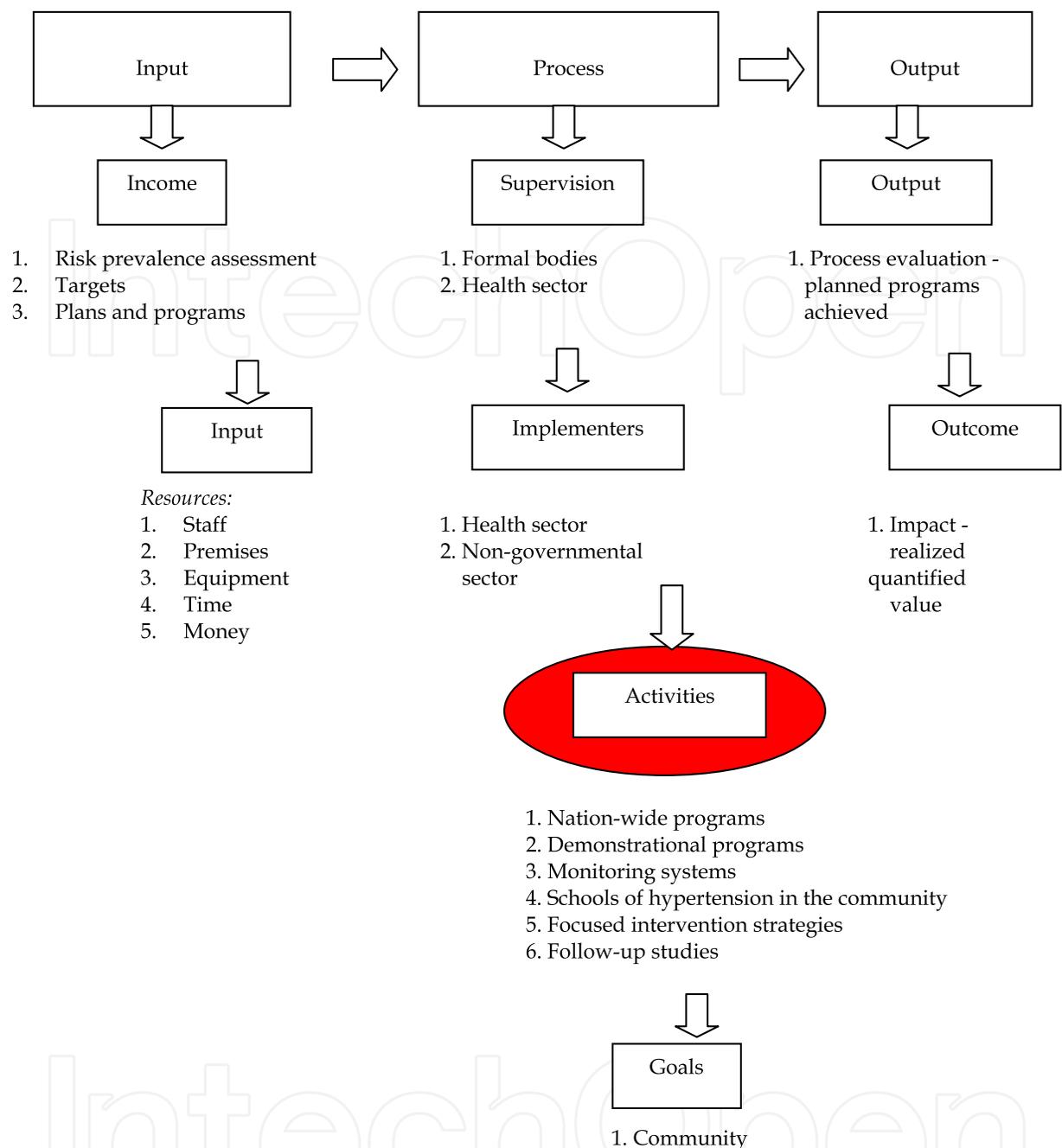


Fig. 5. Integrated management of blood pressure in the community (Intervention programs in the community)

9. Recommendations

1. Ensure support to healthy policies in the country by introducing a number of multisectorial approaches in the community that will allow multiple interventions in reducing the risk factors. The community is a significant partner and the vital point in achieving the goals that have been set.
2. It is necessary to develop a model of integrated management of hypertension and major cardiovascular risk factors as a comprehensive model introduced in the community that should be primarily directed towards modification of a detrimental lifestyle.

3. Health care should be restructured in order to effectively provide integrated health care through changed attitudes of health professionals, availability of technologies used for diagnostics and treatment of hypertension and improved quality of the referral system that will reduce inequities in the health.
4. With regards to the findings of the research study, purpose of the integrated hypertension program should be reduction of high blood pressure in adult population, with the following specific objectives –
 - Raise awareness of hypertension in hypertensive individuals through efficient *detection* of hypertensive individuals by health professionals through improved monitoring, in particular at the level of Primary health care;
 - Introduce standardized and suitable diagnostic and therapeutic protocols to be used by health professionals – efficient *monitoring and treatment of hypertension*;
 - Improve *control of hypertension* in hypertensive individuals;
 - Allow effective collection of data on epidemiology of hypertension.
5. Strong support to development of population approach in the managerial process of implementation of intervention programs of blood pressure control that will promote reduction of mean value of blood pressure in the population (distributional transition) in order to improve and advance cardiovascular health of the population.

In the light of the above recommendations, these activities should be focused on clear identification of health needs. Carefully planned, well designed and well implemented programs of disease control, either population or individual, represent a strong sole instruments to effectively deal with the problem of morbidity through the use of preventive measures. (71,72)

Prevention of disease is crucial to human development. Through such approach, it will be possible to reach different groups of the population, which will in turn facilitate equity in health. (31,33.)

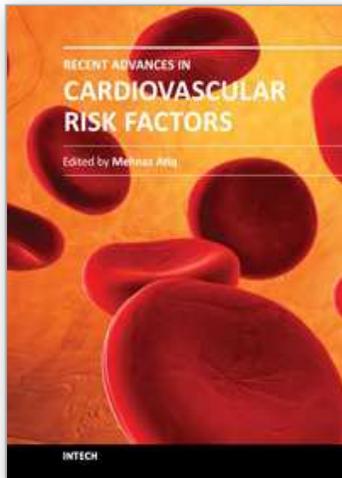
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Among the non-communicable diseases, cardiovascular disorders are the leading cause of morbidity and mortality in both the developed and the developing countries. The spectrum of risk factors is wide and their understanding is imperative to prevent the first and recurrent episodes of myocardial infarction, stroke or peripheral vascular disease which may prove fatal or disabling. This book has tried to present an update on risk factors incorporating new research which has thrown more light on the existing knowledge. It has also tried to highlight regional diversity addressing such issues. It will hopefully be resourceful to the cardiologists, general practitioners, family physicians, researchers, graduate students committed to cardiovascular risk prevention.

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