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Prevalence ofRisk Factors forNon-Communicable Diseases (NCD) Using WHO STEP-Wise Approach inHerat City Afghanistan

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ABSTRACT:-
Background: Noncommunicable diseases (NCDs) are one of the major health and development challenges of the current century which is increasing worldwide due to high prevalence of controllable risk factors. This study was undertaken to measure the prevalence of major risk factors for non-communicable diseases in an urban setting, Herat city -Afghanistan.
Materials and Methods:A provincial cross-sectional study was conducted from May to June 2015 on the prevalence of NCD risk factors using the WHO STEPS adapted instrument. The study enrolled a random sample of1129 adults of age group of 25-70 years.Data were collected using a study questionnaire for assessing non-communicable diseases and their risk factors. Fasting venous blood sample was collected to assess the lipid profile and fasting blood sugar. Anthropometric measurements of the participants were also taken. Data was analyzed using SPSS version 20.
Results: Out of all respondents 594 (52.6%) were females and 535 (47.4%) were males with a mean age of 41.7±13.1 years. Illiteracy rate was 54% and 85.8% were married. Prevalence of smoking was 5.6% and 10.8% were mouth snuff users. Eighty three percent ate fruits less than 3 days per week and 71.4% took vegetables three days per week. Almost 10% practiced vigorous physical activity and 21.6% reported doing moderate physical activity. Almost half of study respondents were overweight and obese and 52.3% were suffering from central obesity. Prevalence of blood pressure was 35.6% raised blood sugar was 9.9%, 28.4% had higher cholesterol and 45% had higher triglycerides. Furthermore high level of low density lipoprotein (LDL) and high density lipoprotein (HDL) were both 47% in both groups.
Conclusion: The findings of study revealed a high burden of risk factors for NCDs in the study population, showing the country is experiencing both communicable and noncommunicable at the same time. It is recommended and emphasizedon focusing of interventions to prevent and control the noncommunicable diseases.

Keywords: *Non-communicable diseases, risk factors, prevalence, WHO step approach, Herat, Afghanistan*

I. INTRODUCTION

Noncommunicable diseases (NCDs) are one of the major health and development challenges of the current century with human, social and economic consequences particularly in low- and middle-income countries [1].Annually theburdenof infectious diseases are decreasing while total deaths due to NCDs is projected to increase to 52 million by 2030 [2, 3]. For instance a total of 56 million deaths occurred worldwide during 2012, of these, 38 million were due to NCDs, principally cardiovascular diseases, cancer and chronic respiratory diseases [4].Killing the younger age, in Eastern Mediterranean Region (EMR) countries up to 50% die from such diseases before the age of 60 years compared with less than 10% in Western Europe [5].Nearly 54 % of death occurred due to the NCDs in South East Asian Region [6]. The global economic burden of NCDs is huge [7] and disproportionately affects poorer individuals in low-income countries [8].
In Afghanistan more than two third of the health expenditure including NCDs are paid by patients via out-of-pocket which has a significant burden on household budgets [9].According to World Health Organization (WHO) NCDs are estimated to account for 62% of total deaths in Tajikistan, 79% of all deaths in Uzbekistan, 50% of deaths in Pakistan, 76% of total deaths in Iran and Turkmenistan which are neighbouring countries, however it accounts for 37% of total deaths in Afghanistan [10]. The probability of dying in age group of 30-70 due to main NCDs were 31.3% and 30.5% in 2010 and 2012respectively in the country [1].This was also evident by Afghanistan mortality survey 2010 that 33.3% of all deaths in the country were attributed to NCDs [11].Furthermore WHO estimates the number of diabetes, for instance, is expected to rise to nearly threefold in 2030 as compared with 2000 [12]. In a study among men aged 15 years and older in Kabul city the prevalence

of smoking was 35% [13]. Another study on prevalence and risk factors of NCDs among the older adult population (aged ≥ 40 years) in Kabul city in 2012, reported the prevalence of diabetes mellitus to be 13.3%, obesity was 31.2% and hypertension 46.2% [14]. A recent study on NCDs in Jalalabad city an eastern big city of the country showed that the prevalence of overweight/obesity, diabetes and hypertension were 57.4%, 11.4% and 24.4% respectively. Among respondents, 8.0% reported being current cigarette smokers and 13.7% used mouth snuff; 69.8% and 19.6% had < 3 servings of fruits and of vegetables respectively in a week; and 33.5% and 57.8% reported vigorous and moderate physical activity respectively [15]. Furthermore an assessment of the air quality of Kabul city showed that the ambient air quality in the city has deteriorated to such extent that it can be ranked among the most polluted cities in the world, a situation which potentially increases the burden of respiratory diseases and different types of cancer among humans [16].Focusing on four main factors including tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol could substantially reduce the burden of NCDs [6]. Although few studies conducted on NCDs in Afghanistan, nevertheless, facts and figures from neighbouring countries such as Pakistan and the Islamic Republic of Iran give cause for concern [17-21]. Since there is inadequate evidence about the risk factors associated with NCDs in the country, therefore, this study aimed to identify the prevalence of risk factors for chronic NCDs in the urban population ofHeratprovince.

II. METHODS AND MATERIALS

A cross-sectional study was conducted from May to June 2015 on the prevalence of NCD risk factors using the WHO STEP-wise approachadapted instrument which prescribes three steps for measuring NCD risk factors. STEP I measures behavioural risk factors, STEP II covers physical measurements, and STEP III measures biological risk factors [22]. All permanent residents and household members aged more than 25 years, including men and women who gave consent to participate were included in the study. Temporary residents (resident < 6 months), inhabitants of institutionalized settings and insecure areas were excluded. Assuming the highest prevalence (50%), 95% confidence interval (CI) and margin of error of 5%, a sample size of 385subjectswas calculated to include in the study. However, considering the proportion of other risk factors and design effect (Design Effect of 2) of cluster sampling the final sample size was increased to (2 × 600) = 1200 for the city.

Sampling Techniques and Strategy:

The 2015 Expanded Programme for Immunization (EPI) list of clusters was used as the sampling frame due to its reliability to Ministry of Public Health. The EPI list in Herat province contained clusters, village/area name, population, and number of households per cluster. Using multi-stage cluster sampling, in the first stage we conventionally and randomly selected 16 out of 60 EPI cluster. In the second stage, from each selected cluster five areas (Called Area/Guzar) were randomly selected, and finally the overall sample of 1200 households distributed among these selected area according to the proportion to the size of household number in each cluster / areas. Taking into account the number of households in each area, the households were selected using systematic random sampling.

***Data collection*:**

The adapted questionnaire used by interviewers which covered information on demographic, behavioral and physical measurements. Using structured and field tested tool the experienced and trained data collectors as couples (males and females) were recruited and trained to fill the forms, measure hypertension and waist circumference and collect blood samples in the field.A household was defined as a group of people who share the same food pot (not the same roof). In households with more than one eligible person, we used a lottery system to select only one respondent. In cases of refusalthe interviewer approached the next alternate household. Anthropometric measurements including height and weight were used to calculate body mass index (BMI). A BMI≥30 kg/m^2 was considered as obese, 25–30 kg/m^2 as overweight and 18.5–25 kg/m^2 as normal weight [23]. A waist circumference of 94 cm for men and 80 cm for women was defined as central obesity [24]. Systolic blood pressure (SBP) 140 mmHg and diastolic pressure (DBP) 90 mmHg were considered as hypertensive. Furthermore SBP of less than 120 mmHg and DBP of less than 80 mmHg were calculated hypotensive while the group between the two were considered as pre-hypertensive [25]. Blood samples were collected the next morning after the respondent had fasted for 10–12 hours and were transported in coldboxes (2-8°C) from field to provincial health laboratory. Following processing and separation, the samples were shipped to Central Public Health Laboratory (CPHL) in Kabul in separate consignments by air. Using Cry-vials the samples were coded with ID number of the questionnaire. On arrival in CPHL all serum samples were stored at -80°C and later on all samples were tested doing biochemical measurement of triglyceride, cholesterol, and glucose, except 9 samples which were poor and discarded.A fasting blood sugar of≥ 126 mg/dL was considered as diabetes mellitus [26]. The cut off for total biochemical markers was determined as: cholesterol 190 mg/dL, LDL was 100 mg/dL,

HDL for male 40 mg/dL and female 50 mg/dL, and finally triglycerides 150 mg/dL. Data management and analysis was done using *Epi-info*, version 7 and *SPSS*, version 20.

Ethical consideration:

For this study a general approval was given by the institutional review board (IRB) of the Ministry of Public Health and informed consent was taken from each individual before the interview. The results of physical and biochemical measurements communicated to required participants and the confidentiality of the information gathered was maintained. All blood samples were stored under -80°C in CPHL after completing biochemical measurements for further testing.

III. RESULTS

We were able to approach and interview 1129 individuals. Out of these, 594 (52.6%) were females and 535 (47.4%) males with a mean age of 41.7±13.1 years; (60%) were aged less than 45 years. More than half of the respondents (54%) were illiterates, and 82.7% of participants had a monthly income < 10 000 Afghanis (USD146). Majority of the study participants were married (85.8%), while more than 80% of women were housewives (Table 1).Table 2 shows the prevalence of various behavioral risk factors for NCD; 5.6% were current smokers and half of smokers had duration of 10 years or more while twice of that (10.8%) were mouth snuff users. Eighty three percent ate fruits less than 3 days per week and 71.4% ate vegetables three days per week. On average the subjects were taking fruits 2.14 days per week and vegetables 2.89 days per week. Forty five percent of respondents reported to use liquid oil for cooking in their kitchen. Almost ten percent of the respondents practiced vigorous physical activity and 21.6% of subjects reported doing moderate physical activity. One third of respondents reported to walk or use bicycle for 10 minutes per day. Sixty one percent of respondents (61.1%) recorded a reclining of three hours or more per day. Table 3 shows the prevalence of pathophysiological risk factors of study participants. About 48% of study respondents were overweight and obese as combined and close to half (52.3%) were suffering from central obesity. Only about one third (37.9%) and 26.5% of the respondents had low or normal blood pressure respectively while 35.6% had high blood pressure. Ten percent recorded as raised blood sugar of them the prevalence of diabetes 9.8% were for females and 10.1% for males. Approximately 28.4% had higher cholesterol and 45% had higher triglycerides. Furthermore high level of low density lipoprotein (LDL) andlow level of high density lipoprotein (HDL) were both 47% in both groups.

IV. DISCUSSION

This study shows Afghanistan, being a low-income country, is suffering from high burden of noncommunicable disease while NCDs once regarded as diseases of the affluent population. Mostly due attention is given practically on communicable diseases in the country [27-28]. However by this study we were able to collect data on the behavioural, anthropometric and biochemical risk factors attributed to NCDs.Using of tobacco in Afghanistan is moderate and there are several forms of consumption among population such as cigarette smoking, Shisha smoking, snuffing in mouth and nose etc. Prevalence of cigarette smoking was 5.6% with double of them (10.8%) is mouth snuff use with higher proportion in men as compare to women. Low cost of mouth snuff could be the reason for more use of it than smoking but less proportion in females is perhaps due to the cultural unacceptability of these practices for women. Such differences are supported by other studies [29-30] as well as are comparable with Kabul study [14] while that is lower than Jalalabad study [15] in the country.Sex differences in risk factors were also demonstrated in Karachi in Pakistan [31]. Our study revealed that almost one fifth of study subjects used 3 days a week fruits and one third used vegetables 3 days per week. This usage was high in women than men. The level of strong (vigorous) and moderate physical activity was one tenth and one fifth in study population while one third were using bicycle or walking by foot. While two third were reclining at home for more than 3 hours per day. These findings are lower as compare to Kabul and Jalalabad studies [14-15].Physical inactivity is the fourth leading risk factor for global mortality and has major implications on the NCDs, particularly cardiovascular diseases and the general health. It seems majority of participants didn't exercise which could be due to low awareness or less availability of open space in cities. It has been supported by earlier studies [14-15, 32]. There is a need to sensitize and actively promote physical activity in this study as well as similar populations. The findings shows approximately half of the adults in Herat city were suffering from overweight (31.8%) or obesity (15.8%). These findings are supported by other studies conducted in Kabul and Jalalabad [14-15]. Furthermore this results are also in consistency with the global studies done elsewhere [31, 33-34]. Also, females had higher BMI and waist circumference than men which put them at higher risk of NCDs. This could be related to cultural issue in Afghan context on access to physical exercise facilities and restriction female movement outside the homes. Probably lack of awareness and considering being obese as healthy generally they are reluctant to lose weight. In our study one third of subjects were suffering from hypertension which is a significant finding. In an earlier study in Kabul city the prevalence

of hypertension was 46.0% [14] and in Jalalabad [15] the prevalence of hypertension was 28.4% which are higher than the current study.These findings are consistent with a study in Iran and Pakistan [19, 35]. Furthermore one tent of population has raised blood sugar which is consistent with other studies in the country [14-15].In Punjab province in Pakistan the prevalence of diabetes was reported to be 12.1% in males and 9.8% in females which support the findings [18].

As a whole this study discloses high burden of NCDs and their risk factors in urban setting and encourages the policy makers to focus on NCD prevention and control strategy. Education campaigns to raise awareness on physical activity as and healthy diet against as protective factors against all NCDs are recommended. Establishment of sport centres and jogging areas, which are lacking in urban settings particularly for women, is encouraged. Study shows that NCDs occur as a combined syndrome in the adult population meaning that many risk factors are existing in one person. Therefore interventions are needed to target a group of risk factors rather than just one or two factors. Despite of these findings financial constraints which prevented listing of the households ahead of study, overestimation of NCD burdens due to free checking of blood pressure and blood testing, and poor security situation which forced us to exclude some areas were main limitations. The findings pave the way for a nationwide study on NCDs using WHO STEP wise approach to provide full information at country level. Although national health policy in Afghanistan [36] focus on framework for NCD control and prevention, however, it is recommended the NCDs to be integrated in basic package of health services in the country.

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Table 1: Frequency distribution of demographic characteristics of the study participants (N=1129)							
Variables	**Categories**	**Female**		**Male**		**Total**	
		N	**%**	**N**	**%**	**N**	**%**
Age							
	25-34	227	38.2	172	32.1	399	35.3
	35-44	164	27.6	124	23.2	288	25.5
	45-54	120	20.2	100	18.7	220	19.5
	55+	83	14	139	26	222	19.7
Level of Education							
	Illiterate	394	66.7	213	40	607	54
	Primary and unofficial	154	26.1	226	42.4	380	33.8
	Secondary school	28	4.7	45	8.4	73	6.5
	High school and over	15	2.5	49	9.2	64	5.7
Work Status							
	Official Employees	32	5.7	68	16.5	100	10.2
	Private Business	2	0.4	87	21.1	89	9.1
	Worker/Farmer	5	0.9	179	43.3	184	18.8
	Jobless	11	1.9	40	9.7	51	5.2
	Housework	460	81.4	1	0.2	461	47.1
	Unable to work	55	9.7	38	9.2	93	9.5
Monthly Income in AFN							
	<10000	250	81.4	204	84.3	454	82.7
	≥10000	57	18.6	38	15.7	95	17.3
Marital Status							
	Single	16	2.7	37	7	53	4.7
	Married	486	82.1	478	90	964	85.8
	Widow/Widower	77	13	6	1.1	83	7.4
	Divorced	0	0	1	0.2	1	0,1
	Refused	13	2.2	9	1.7	22	2

Table 2: Frequency distribution of behavioral risk factors for noncommunicable diseases among the study participants (N=1129)							
Variables	**Categories**	**Female**		**Male**		**Total**	
		N	**%**	**N**	**%**	**N**	**%**
Cigarette Smoking Status							
	No	559	95.2	496	93.4	1055	94.4
	Yes	28	4.8	35	6.6	63	5.6
Duration of smoking in years (not equal to above due to non-response or ex smoking)							
	< 10 years	21	56.8	32	44.4	53	48.6
	10 - 20 years	9	24.3	28	38.9	37	33.9
	≥ 20 years	7	18.9	12	16.7	19	17.4
Mouth Snuff Status							
	No	566	97.3	428	80.5	994	89.2
	Yes	16	2.7	104	19.5	120	10.8
Fruit serving[1] (days per week)							
	< 3	430	79.6	440	86.6	870	83
	≥ 3	110	20.4	68	13.4	178	17
Vegetables serving[2](days per week)							
	< 3	354	63.9	408	79.5	762	71.4
	≥ 3	200	36.1	105	20.5	305	28.6
Type of Kitchen Oil							
	Liquid	265	45.1	238	45.2	503	45.2
	Solid	207	35.3	173	32.8	380	34.1

	Both	113	19.3	108	20.5	221	19.8
	Refused	2	0.3	8	1.5	10	0.9
Vigorous Physical Activity[3]							
	No	547	92.7	457	86.2	1004	89.6
	Yes	43	7.3	73	13.8	116	10.4
Moderate Physical Activity[4]							
	No	451	76.4	426	80.7	877	78.4
	Yes	139	23.6	102	19.3	241	21.6
Pedal or bicycle for 10 Minutes per day							
	No	511	86.9	254	47.8	765	68.4
	Yes	77	13.1	277	52.2	354	31.6
Reclining/siting (hours per day)							
	< 3	174	32.3	235	45.8	409	38.9
	≥ 3	364	67.7	278	54.2	642	61.1

[1,2] One serving is amount of fruits or vegetables taken once, [3] Physical activity in ten minutes caused high heart beats or respiration, [4] Physical activity in ten minutes caused moderate heart beats or respiration

Table 3: Frequency of pathophysiological risk factors for NCDs of study participants (N=1129)

Variables	**Categories**	**Female**		**Male**		**Total**	
		N	%	N	%	N	%
Basic Mass index (in kg/m square)							
	Underweight[1]	39	6.6	21	3.9	60	5.3
	Normal weight[2]	228	38.5	302	56.7	530	47.1
	Overweight[3]	211	35.6	147	27.6	358	31.8
	Obesity I[4]	72	12.2	54	10.1	126	11.2
	Obesity II[5]	31	5.2	7	1.3	38	3.4
	Obesity III[6]	11	1.9	2	0.4	13	1.2
Central Obesity (excluding Pregnancy)							
	No	166	27.9	373	69.7	539	47.7
	Yes	428	72.1	162	30.3	590	52.3
Blood Pressure (including under treatment)							
	Hypotensive[7]	252	42.4	176	32.9	428	37.9
	Normotensive[8]	129	21.7	170	31.8	299	26.5
	Hypertensive[9]	213	35.9	189	35.3	402	35.6
Blood Sugar elevated[10] (Diabetes Mellitus including under treatment)							
	No	536	90.2	481	89.9	1017	90.1
	Yes	58	9.8	189	10.1	112	9.9
Total Cholesterol							
	<190 mg/dL	426	71.7	382	71.4	808	71.6
	≥ 190 mg/dL	128	28.3	153	28.6	321	28.4
LDL							
	<100 mg/dL	335	56.4	261	48.8	596	52.8
	≥100 mg/dL	259	46.3	274	51.2	533	47.2
HDL(borderline 40 mg/dL for male and 50mg/dL for female)							
	<40 and 50mg/dL	350	58.9	248	46.4	598	53
	≥40 and 50mg/dL	244	41.1	287	53.6	531	47
Triglycerides (missing=25)							
	<150 mg/dL	298	50.2	323	60.4	621	55
	≥150 mg/dL	296	49.8	212	39.6	508	45

[1] BMI <18.5, [2] BMI 18.5-24.9, [3] BMI 25-29.9, [4] BMI 30-35, [5] BMI 35-40, [6] BMI >40

[7] Systolic Blood Pressure (SBP) 120mmHg and Diastolic Blood Pressure (DBP) 80mmHg, [8] SBP 120-140mmHg and DBP 80-90mmHg, [9] SBP≥140mmHg and DBP≥ 90mmHg, [10] FBS ≥ 126mg%