ORIGINAL ARTICLE

The impact of socio-economic and demographic factors on non-communicable diseases in Morocco

L'impact des facteurs socio-économiques et démographiques sur les maladies non transmissibles au Maroc

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Abstract

Introduction: By 2030, non-communicable diseases (NCDs) are expected to overtake all other causes of death in Africa. The prevalence of NCDs and related risk factors are influenced by gender and socioeconomic disparities.
Aim: Thus, this study aimed to determine the impact of socio-economic and demographic factors on non-communicable diseases in Morocco.
Methods: Cross-sectional data were analysed from 4766 adults who participated in the 2017 STEPS survey in Morocco. Data collection included assessment of behavioural and biochemical risk factors. The Kolmogorov-Smirnov, Chi-square and the Kruskal-Wallis tests were performed. Results: There was a significant difference between genders in NCDs. Men had higher rates of tobacco and alcohol use (21.2%, 13.9%, respectively, with a p <0.001)), while women had higher obesity prevalence (31.2% (p <0.001)). Individuals with no formal education showed the highest prevalence of hypertension (38.9%), diabetes (10.1%), and obesity (27.9%) compared to those having primary education or more. Adults aged 70 years or older showed higher prevalence of hypertension and diabetes than the other age groups.
Conclusion: Morocco has a high prevalence of NCDs. The incidence of NCDs is significantly associated with sociodemographic and behavioral factors. A multisectoral and integrated strategy, focusing on sociodemographic and behavioral factors is necessary to prevent and control NCDs.

Key words: Non-communicable diseases, socio-demographic, socio-economic, risk factors, Morocco

Résumé

Introduction: D'ici 2030, les maladies non transmissibles (MNT) devraient dépasser toutes les autres causes de décès en Afrique. La prévalence des MNT et les facteurs de risque associés sont influencés par les disparités socio-économiques et de genre.
Objectif : Cette étude vise donc à déterminer l'impact des facteurs socio-économiques et démographiques sur les maladies non transmissibles au Maroc.
Méthodes: Des données transversales ont été analysées à partir de 4766 adultes qui ont participé à l'enquête STEPS 2017 au Maroc. La collecte des données comprenait l'évaluation des facteurs de risque comportementaux et biochimiques. Les tests de Kolmogorov-Smirnov, du Chi-carré et de Kruskal-Wallis ont été effectués. Résultats : Il y avait une différence significative entre les sexes en ce qui concerne les MNT. Les hommes avaient des taux plus élevés de consommation de tabac et d'alcool (21,2%, 13,9%, respectivement, avec un p <0,001)), tandis que les femmes avaient une prévalence plus élevée de l'obésité (31,2% (p <0,001)). Les personnes sans éducation formelle présentaient la plus forte prévalence d'hypertension (38,9 %), de diabète (10,1 %) et d'obésité (27,9 %) par rapport à celles ayant un niveau d'éducation primaire ou plus. Les adultes âgés de 70 ans ou plus présentaient une prévalence plus élevée d'hypertension et de diabète que les autres groupes d'âge.
Conclusion: La prévalence des maladies non transmissibles est élevée au Maroc. L'incidence des MNT est significativement associée à des facteurs sociodémographiques et comportementaux. Une stratégie multisectorielle et intégrée, axée sur les facteurs sociodémographiques et comportementaux, est nécessaire pour prévenir et contrôler les MNT.

Mots clés: Facteurs socio-économiques et démographiques, MNT, Maroc

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Introduction

Non-communicable diseases (NCDs) are becoming the main health issues worldwide. In 2021, the world health organization (WHO) estimated that 43 million deaths worldwide were attributable to NCDs, which accounted for 75% of all deaths. Approximately 73% of deaths from NCDs occur in low- and middle-income nations, with an estimated global cost expected to rise from US$6.3 trillion in 2010 to US$13 trillion by 2030. The majority of deaths from NCDs (19 million yearly) are caused by cardiovascular diseases, followed by cancer (10 million deaths), diabetes (more than 2 million deaths), and chronic respiratory diseases (4 million deaths) [1].

NCDs have an impact on the economic livelihoods of individuals, their families and health systems due to their long-term and chronic nature, the requirement for lifelong treatment and follow-up, and the need for advanced methods to manage associated complications [2]. NCDs diseases are commonly associated with rapid unplanned urbanization, globalization of unhealthy lifestyles and population ageing. Unhealthy diets, physical inactivity, tobacco smoking, and harmful use of alcohol are also major risk factors of high blood pressure, increased blood glucose, elevated blood lipids, and obesity. These are called metabolic risk factors and can lead to cardiovascular disease, the leading NCD in terms of premature deaths [1]. Additionally, high rates of poverty and inequality particularly in low-income neighbourhoods are important precursors for NCD risk factors [3].

According to the WHO, the circumstances in which people are born, grow, live, work, and age - including the healthcare system - are the social determinants of health [4]. Thus, investigating how NCDs prevalence and their risk factors vary across genders, wealth quintiles, education levels and place of residence may provide public health authorities with invaluable knowledge for designing and implementing interventions to address the burden of NCDs. The aim of this study was to estimate the prevalence of some NCDs and investigate their association with sociodemographic and behavioral factors among Moroccan adults.

Methods

Study design and sampling

This study utilized data from Morocco's national cross-sectional STEPS survey on non-communicable disease (NCD) risk factors. The survey was conducted between June 2017 and February 2018, and targeted adults aged 18 and over across the 12 regions of the country. The participants were selected using a multistage, stratified, and geographically clustered sampling method.

Data collection instrument

A team of trained investigators collected data based on the WHO STEPwise (STEPS) approach for monitoring chronic (NCDs risk factors. All interviews and measurements were conducted in participants' homes, following the three standardized STEPS.

In Step 1, data was collected through face-to-face interviews using a culturally adapted and pre-tested version of the WHO STEPS questionnaire. This stage focused on collecting information related to sociodemographic data, medical history, and behavioral factors, including physical activity, alcohol consumption, and tobacco use.

In Step 2, physical measurements were performed using standardized equipment and procedures. Blood pressure was measured with a computerized automatic monitor, following at least 15 minutes of seated rest. Three readings were taken on the participant's left upper arm, with a three-minute interval between each. The final blood pressure value was calculated as the average of the three readings. Hypertension was defined as a systolic blood pressure greater than 140 mmHg, a diastolic pressure greater than 90 mmHg, or self-reported use of antihypertensive medication [7]. Body mass index (BMI) and waist circumference (WC) were also measured using standard tools. Participants' weight status was categorized according to the WHO guidelines as follows: underweight (BMI < 18.5 kg/m²), normal weight (18.5 ≤ BMI < 25 kg/m²), overweight (25 ≤ BMI < 30 kg/m²), and obese (BMI ≥ 30 kg/m²). [8]

Step 3 focused on biochemical measurements, including total cholesterol and fasting blood glucose (FBG) following a 12-hour overnight fast. Hypercholesterolemia was defined as a total cholesterol level ≥5 mmol/L, [9] while hyperglycemia was defined as an FBG level ≥6.1 mmol/L. In addition, a self-reported history of diabetes or hypercholesterolemia with a physician-prescribed treatment was also considered indicative of these conditions. [10]

Ethical considerations

Ethical approval for this survey was obtained from the biomedical research ethics committee of the Faculty of Medicine and Pharmacy in Rabat, Morocco (Approval number: 248; Date: 22 March 2016).

Statistical analysis

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) software (version 20.0; IBM Corp, Armonk, NY, USA). The Kolmogorov-Smirnov test was initially used to investigate the normality of each variable. Results are expressed as medians and interquartile ranges (IQR: 25th-75th percentile) or proportions and 95% confidence intervals using descriptive statistics. Differences between the proportions and medians of the different groups were assessed, by the Chi-square test and the Kruskal-Wallis test, respectively. A $P<0.05$ was considered statistically significant.

Results

The data of 4766 adults were analysed. Of these, 60% were urban residents, 65.7% were women, 73.8% were married and 51.7% had no formal education. Employment status showcases diverse categories, including government employees (3.0%), private sector employees (8.6%), and a substantial portion engaged in self-employment (17.1%). Other categories include volunteers (1.2%), students (3.2%), homemakers (53.5%), and retirees (4.4%), with smaller segments being unemployed but able to work (5.1%) or unable to work (3.8%).

Lastly, age distribution spans across various groups, with 18-29-year-olds constituting 18.5%, followed by 30-44-year-olds (31.9%), 45-59-year-olds (28.1%), 60-69-year-olds (13.1%), and those aged 70-110 (8.4%).

Tabe 1. Socio-demographic characteristics of the survey population, Morocco STEPS

Characteristic	N	% (95% CI)
Residence		
Rural	1905	40.0(38.6-41.4)
Urban	2861	60.0(58.6-61.4
Gender		
Men	1637	34.3(33.1-35.6)
Women	3129	65.7(64.4-66.9)
Marital status		
Single	651	13.7(12.6-14.6)
Married	3516	73.8(72.5-75.1)
Divorced	134	2.8(2.3-3.3
Widowed	461	9.7(8.9-10.4)
Education level		
No formal education	2465	51.7(50.3-53.2)
Primary school	999	21.0(19.9-22.2
Secondary school	574	12.0(11.0-12.9)
High school	384	8.1(7.3-8.9)
University	341	7.2(6.5-8.0)
Occupation		
State employee	143	3.0(2.6-3.5)
Private sector employee	410	8.6(7.8-9.4)
Self-employed	813	17.1 (16.0-18.2
Volunteer	56	1.2 (0.9-1.5)
Student	154	3.2 (2.7-3.7)
Housewife	2550	53.5 (52.1-54.8)
Retired	211	4.4 (3.9-5.1)
Unemployed able to work	244	5.1 (4.5-5.7)
Unemployable	179	3.8(3.2-4.3)
Age groups		
18-29	880	18.5 (17.3-19.6)
30-44	1522	31.9 (30.6-33.5)
45-59	1341	28.1 (26.8-29.4)
60-69	623	13.1 (12.1-14.0)
70-110	400	8.4(7.6-9.3)

The data revealed significant differences in the prevalence of hypertension, diabetes, current tobacco use, alcohol consumption, and obesity across various socio-demographic groups. Rural individuals showed higher prevalence of hypertension, whereas urban residents showed higher diabetes and obesity rates having higher rates of tobacco and alcohol use, while females have higher obesity rates. Marital status impacts these conditions, with widowed individuals showing the highest prevalence rates. Education level also plays a crucial role; individuals with no formal education exhibit the highest prevalence rates for these conditions. Occupational status further influences health, with retired individuals and volunteers having higher prevalence rates for several conditions. Age is a significant factor, with older age groups showing substantially higher prevalence rates for hypertension, diabetes, and obesity. (Table2)

The data reveal significant differences in the prevalence of hypertension, diabetes, current tobacco use, alcohol use, and obesity across various demographics. Rural areas exhibit higher hypertension rates, whereas urban areas show higher diabetes and obesity rates. Gender differences are marked, with males having higher rates of tobacco and alcohol use, while females have higher obesity rates. Marital status impacts these conditions, with widowed individuals showing the highest prevalence rates. Education level also plays a crucial role; individuals with no formal education exhibit the highest prevalence rates for these conditions. Occupational status further influences health, with retired individuals and volunteers having higher prevalence rates for several conditions. Age is a significant factor, with older age groups showing substantially higher prevalence rates for hypertension, diabetes, and obesity. (Table2)

Discussion

Socio-economic status is one of the important factors that influence the health status of an individual or a family. It is determined by various variables such as income, level of education, profession, family influence, material assets, and social position [11]. This relative position plays a significant role in the health, nutritional status, mortality, and morbidity of a population [12].

Our results showed that the surveyed population predominantly resides in urban areas 60%, females make up most of the population, accounting for 65.7%, while males comprise 34.3% and married individuals 73.8%, while significant segments lack formal education 51.7% and engage in self-employment 17.1%. Also, a significant disparity in health conditions exist across demographics. Rural areas have higher hypertension rates, while urban areas exhibit elevated rates of diabetes and obesity.

In our study, we found that rural areas show higher hypertension rates, whereas urban areas show higher diabetes and obesity rates. This is consistent with the Indian study carried out by Singh et al that showed that the prevalence of hypertension and its associated risk factors in rural areas is now nearing—or in some cases even surpassing—that observed in urban settings [13]. In China a 2019 population-based study reported that the prevalence of hypertension was higher in rural areas 59% compared to urban regions 50%. This indicates a growing convergence in hypertension rates between rural and urban populations [14]. This can be explained by lifestyle changes, including increased physical inactivity and

Table 2. Prevalence of Hypertension, Diabetes, and Risk Behaviors across different socio-demographic groups

	Hypertension	P-value	Diabetes	P-value	Current tobacco use	P-value	Alcohol use	P-value	Obesity	P-value
Residence										
Rural	32(29.8-34.3)	<0.001	5.8(4.9-7.0)	<0.001	7.9(6.6-9.1)	0.001	4.6(3.8-5.7)	<0.001	19.0(17.3-20.8)	<0.001
Urban	30.1(28.4-31.7)		10.0(8.9-11.1)		7.5(6.6-8.5)		5.5(4.7-6.4)		28.1(26.4-30.0)	
Gender										
Men	32.1(29.8-34.4)	0·056	6.8(5.7-8.1)	0·11	21.2(19.3-23.1)	<0.001	13.9(12.2-15.5)	<0·001	12.2(10.6-13.8)	<0·001
Women	30.1(28.5-31.8)		9.1(8.2-10.2)		0.3(0.1-0.5)		0.4(0.2-0.7)		31.2(29.5-32.8)	
Marital status										
Single	15.7 (13.3-16.3)	<0.001	3.4(2.8-5.1)	<0·001	10.6(9.5-11.9)	<0·001	7.1(6.3-8.1)	<0·001	11.4 (9.6-13.3)	<0·001
Married	29.7 (27.5-31.8)		7.8(6.2-9.5)		7.6(6.3-8.8)		4.9(3.5-5.9)		25.3 (23.4-26.9)	
Divorced	29.9 (27.3-31.2)		9.0(7.9-11.2)		11.9(10.2-12.8)		12.7(11.3-14.5)		32.8 (30.5-34.2)	
Widowed	55.5 (54.2-57.0)		17.6(15. 7-19.6)		1.3(0.8-2.6)		0.7(0.3-0.9)		35.1 (33.8-37.2)	
Level of education										
No formal education	38.9(36.6-40.1)	<0·001	10.1 (8.5-11.9)	<0·001	3.9 (2.6-5.8)	<0·001	3.1 (2.1-5.9)	<0·001	27.9(25.1-29.5)	<0·001
Primary school	24.1 (22.6-25.9)		6.7 (4.2-8.8)		12.8 (10.3-14.6)		7.3 (5.2-9.1)		21.6(19.4-23.0)	
Secondary school	19.4 (17.5-21.0)		6.4 (4.5-8.2)		10.6 (9.4-12.1)		7.0 (5.0-8.9)		23.9(21.3-25.1)	
High school	18.2(16.4-19.9)		4.7 (2.0-5.9)		10.4 (9.4-12.5)		7.0 (5.2-9.1)		18.6(16.6-20.3)	
University	18.5 (16.1-20.5)		6.2 (4.1-8.3)		8.8 (6.3-10.1)		6.7(4.4-8.5)		15.6(12.9-17.0)	
Occupation										
State employee	28.7(26.6-30.2)	<0·001	9.1(7.2-11.5)	<0·001	12.6(10.3-14.1)	<0·001	7.7(5.3-9.1)	<0·001	17.6(15.1-19.8)	<0·001
Private sector employee	21.7(19.8-23.5)		6.8(5.0-8.1)		20.5(18.6-22.1)		11.7(9.2-13.0)		15.6(13.1-17.6)	
Self-employed	28.1(26.5-30.2)		5.0(3.2-7.6)		19.1(17.5-21.3)		12.5(10.3-14.2)		15.8(13.7-17.2)	
Volunteer	32.1(30.6-34.1)		7.1(5.8-9.2)		16.1(14.3-18.5)		19.6(17.4-21.8)		14.3(12.3-16.8)	
Student	9.7(7.4-11.2)		0.6(0.4-0.8)		4.5(2.2-6.4)		4.5(2.7-6.1)		2.6(1.1-4.0)	
Housewife	30.7(28.7-32.3)		8.9(6.2-10.7)		0.2(0.0-0. 4)		0.1(0.0-0.3)		33.3(3&.2-35.8)	
Retired	56.9(54.8-58.6)		17.1(15.1-19.6)		10.9(8.3-12.5)		12.8(10.5-14.0)		19.5(17.1-21.3)	
Unemployed able to work	20.5(18.0-22.3)		5.3(4.6-6.3)		16.8(14.6-18.2)		8.2(6.3-10.6)		12.0(10.6-14.8)	
Unemployable	55.6(53.4-5.2)		16.2(15.4-17.3)		7.3(5.3-9.4)		6.1(4.0-8.3)		14.5(12.4-16.2)	
Age groups										
18-29	9.9(8.0 -11.8)	<0·001	1.5(0.8-2.3)	<0·001	5.9(4.3-7.4)	0·001	3.3(2.2 -4.5)	0.006	9.7(7.6 -11.6)	<0001
30-44	17.2(15.3-19.1)		4.5(3.5-5.6)		8.1(6.8-9.4)		5.5(4.3 -6.8)		26.9(24.7-29.4)	
45-59	37.3(34.7-39.9)		11.1(9.5-12.8)		8.8(7.3-10.4)		5.1(4.0 -6.3)		29.9(27.4-32.4)	
60-69	57.2(53.1-61.1)		16.5(13.6-19.6)		8.3(6.3-10.6)		7.2(5.1-9.1)		29.7(26.0-33.8)	
70-110	60.0(55.5-64.8)		14.8(11.3-18.5)		3.0(1.5-4.8)		3.5(2.0 -5.5)		20.0(16.0-24.0)	

greater consumption of salt, sugar, and fat. Similar to our results, the Indian STEPS survey revealed that urban females (34.3%) had a greater prevalence of obesity than rural females (23.2%). [15]

Tobacco and alcohol use, tobacco use were significantly prevalent among men, this corroborates findings from studies in Italy [16], Germany [17], Brazil [18], South Africa [19] and Zambia [20], which also found that the tobacco smoking odds were highest among men, compared to women. Consistent with findings from most studies in low and middle-income countries, we found that the odds of being overweight/obese were significantly high among women. Overweight/obesity among women has been linked with biological, physiological and lifestyle factors. According to Templeton [21], being overweight or obese among women can be linked with changes in the reproductive cycle, with reduced fertility, as well as with a heightened risk of polycystic ovarian syndrome (PCOS) and infrequent or no ovulation.

Older age groups exhibit notably higher prevalence rates for hypertension, diabetes, and obesity. A similar trend of NCD prevalence was reported in a study by the World Health Organization on global ageing and adult health from six countries across the globe, which likewise indicated that the prevalence of NCDs increases with age. [22] Several studies have linked lower education levels to higher incidence and prevalence of non-communicable diseases [23]. However, the relationship between education and the incidence of NCDs such as heart diseases or cancers shows nuances, with less direct links [24].

On the other hand, hyperlipidemia was positively associated with education level [24], which has been explained by a higher level of education may lead

to dietary patterns associated with higher risks of hyperlipidemia. Indeed, total energy and fat intake have been positively associated with household expenditures, which are closely linked to education level, among adults in Japan [25]. Additionally, more educated individuals and those with higher social status are more likely to eat out [26]. Conversely, lower income and lower occupational status, associated with unhealthy behaviours, explain health disparities related to income [27,28]. Several studies worldwide have shown that individuals with low socioeconomic status, particularly unskilled workers, especially in Asia and low- to middle-income countries, have an increased risk of cardiovascular diseases and hypertension [29-31].

Our findings highlight the critical need for targeted public health interventions that address these disparities, focusing on improving socio-economic determinants such as education, employment, and living conditions.

A key strength of this study is its use of a relatively large, nationally representative sample, which enhances the generalizability of the findings. Additionally, the application of the standardized WHO STEPs methodology for chronic disease risk surveillance allows for meaningful comparisons with studies conducted in other countries and settings. However, the study's cross-sectional design limits the ability to establish causal relationships between explanatory variables and non-communicable disease (NCD) risk factors. Moreover, the reliance on self-reported data for demographic and lifestyle behaviors—such as smoking and alcohol use—may introduce information bias.

In order to address NCDs in Morocco, comprehensive preventative programs are necessary, according to our research. Although the nation is working toward universal health coverage, the majority of actions to date have been on the curative side of healthcare. Prioritizing preventive measures is essential to successfully reducing the elevated risk associated with NCDs, especially in the context of a developing country. Developing and implementing a cogent national health policy that prioritizes building public health capacity and creating province-specific NCD wings is crucial to addressing these issues. Additionally, better resource allocation and governance are essential, as is active participation from the public and commercial sectors.

In conclusion, to reduce socio-economic disparities fuelling the development of non-communicable diseases, comprehensive interventions and a holistic approach are necessary. This entails integrated policies, combining social, economic, and public health aspects to create an environment conducive to health promotion and prevention of NCDs among disadvantaged populations.

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