Articulos Originales

Ethnic and gender inequalities in the prevalence of high blood pressure in the general population of Cochabamba: an intersectional analysis of health inequities.

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Abstract: Inequalities in health are commonly evaluated in a single dimension of analysis and little is known about the summative or multiplicative effect when two or more social dimensions are combined; representing a challenge for the prevention and control of high blood pressure (PAE). Objective: to analyze the factors involved in population inequalities regarding the prevalence of HBP in the inter-sectional space of the processes of social advantage and disadvantage by ethnic and gender reference. Methods: observational, cross-sectional study with intersectional approach. Subjects over 18 years of age with permanent residence in Cochabamba (n=10595), selected by tri-stage random sampling, participated in the study. The WHO-STEPS survey was used to collect information on PAE and associated risk factors. Four intersectional positions were constructed by the combination of gender and ethnicity. The Oaxaca-Blinder decomposition was applied to estimate the contributions of the explanatory factors of the inequalities. Results: the prevalence of PAE was higher among male-mestizos (10.76%); the disparity by gender reference was more important among mestizos (3.74%) and indigenous (3.11%); the intersectional disparity between extreme groups (3.53%) was greater than the disparity between middle groups (3.32%). Age, type of work and lifestyle contributed most to explain these differences. Conclusions: PAE is not distributed according to the expected patterns of social disadvantage in the intersectional space of ethnicity and gender. High social advantage was related to higher prevalences of PAE, as were associated behavioral risk factors.

Keywords: high blood pressure, health inequalities, non communicable disease, intersectionality, gender, ethnicity.

Resumen: Las desigualdades en salud comúnmente son evaluadas en una sola dimensión de análisis y poco se conoce sobre el efecto sumativo o multiplicativo cuando se combinan 2 o más dimensiones sociales; representando un desafío para la prevención y control de la Presión Arterial Elevada (PAE). Objetivo: analizar los factores involucrados en las desigualdades poblacionales de la prevalencia de PAE en el espacio inter seccional de los procesos de ventaja y desventaja social por referencia étnica y de género. Métodos: estudio observacional, de corte transversal con enfoque interseccional. Participaron sujetos mayores de 18 años con residencia permanente en

Cochabamba (n=10595), seleccionados mediante muestreo aleatorio trietápico. Se utilizó la encuesta WHO-STEPS para recopilar información sobre PAE y factores de riesgo asociados. Se construyeron cuatro posiciones interseccionales por la combinación de género y etnicidad. La descomposición de Oaxaca-Blinder se aplicó para estimar las contribuciones de los factores explicativos de las desigualdades. Resultados: la prevalencia de PAE fue mayor en los hombres-mestizos (10,76%); la disparidad por referencia de género fue más importante entre mestizos (3,74%) e indígenas (3,11%); la disparidad interseccional entre grupos extremos (3,53%) fue mayor a la disparidad entre grupos medios (3,32%). La edad, el tipo de trabajo y estilos de vida, contribuyeron más para explicar estas diferencias. Conclusiones: la PAE no se distribuye según los patrones esperados de desventaja social en el espacio interseccional de etnicidad y género. Una alta ventaja social se relacionó con prevalencias más altas de PAE, así como los factores de riesgo de comportamiento asociados.

Palabras clave: presión arterial alevada, inequidad en salud, enfermedades no comunicables, genero, etnicidad.

The burden of mortality from non-communicable diseases (ENT) is steadily increasing according to annual reports by the Pan American Health Organization (PAHO), especially in low and middle income countries (LMICs), where cardiovascular diseases (ECV) alone are the leading cause of overall mortality[1]. One of the main diseases prioritised for ENT/ECV mortality control is high blood pressure (PAE) and/or hypertension; the main pathology associated with coronary heart disease, chronic kidney disease and ischaemic or haemorrhagic stroke[1-3].

By 20151 the World Health Organisation (WHO) estimated a global prevalence of 22% of PAE, with the African region being the most affected (27%) and the Americas region having the lowest prevalence (18%); however, the last 10 years have seen an increase in PAE prevalence in low and middle income countries, with an estimated prevalence of 28% in 2015, in contrast to 18% in high-income countries[1].

In the case of Latin America and the Caribbean, the OPS estimated a prevalence of 23% in males and 18% in females for 2015[4], the same report highlights that the Andean region (Bolivia, Colombia, Ecuador, Peru and Venezuela) has the lowest prevalence (19.9% in males and 15.2% in females); and in the case of Bolivia, the estimates are close to this average (19.7% in males and 16.1% in females) for the same year. In all cases, the reports are based on estimates for public health systems that collect information based on the characteristics of each country, which, in the Bolivian case, until 2018, the lack of universal health coverage forced many patients with PAE to be treated in private hospitals that do not report the cases treated to the national health information system (SNIS), so a probable underestimation of this prevalence must be considered.

Risk analyses for the development of PAE are generally based on a unidimensional analysis in relation to social determinants and behavioural risk factors or lifestyles. From this perspective, most reports show a higher prevalence in men than in women[1,3,4]; and in the Bolivian case, a lower prevalence is also reported in the indigenous population[5]; however, very little has been studied of these differences from a two-dimensional or multidimensional perspective proposed from the sociological field[6-9], much less in quantitative research from the field of health, despite current trends on a holistic view of disease prevention and control.

Extending this viewpoint to the field of health, some authors such as Sen et al.10, or Jakcson et al[11], have suggested approaches to analysing health inequalities from an intersectional perspective, in relation to health outcomes, combining gender with socio-economic status, and demonstrating that patterns of disease behaviour or mortality rates may be completely different from those reported from a unidimensional perspective[10,11]. This approach is complemented by a Blinder-Oaxaca decomposition analysis12,13, commonly used in the field of economics, but recently tested to explain and decompose the absolute and relative contribution of factors involved in health inequity processes[12-16].

Despite advances in the field of research on gender differences from a unidimensional perspective, few studies with an intersectional perspective have examined how gender and ethnicity intertwine or combine to affect health, especially in ENT[17] and within them PAE ; in the Bolivian case, there is no report that combines these two social dimensions, considering that large differences are observed in terms of social advantage and disadvantage by reference to gender and ethnicity. The national programmes for the prevention and control of prioritised diseases, framed in the national policy of community and intercultural family health (SAFCI)[18], consider women in relation to gender and indigenous people in relation to ethnicity as vulnerable groups, given that both present the worst social and health indicators, according to reports from the national statistics institute[19] . These current social inequalities in health (access to health insurance, access to medical care, quality education, living wages, availability of food, etc.) are considered a barrier to the prevention and control of ENTs; an increasingly pressing concern for Bolivian society[18]. Socio-economically disadvantaged women seem to be more affected, especially in rural areas with an indigenous majority in terms of ethnicity. Therefore, assessing the behaviour of PAE prevalence from a perspective of intersectionality between ethnic identity and gender as a predictor of PAE is important for developing appropriate and equitable public policies, especially those related to ENTs at both local and national levels.

This paper seeks to employ the approach suggested by Sen & Iyer[10] combined with the Blinder-Oaxaca decomposition[12] in order to analyse the factors involved in population inequalities in the prevalence of PAE in the inter-sectional space regarding the processes of social advantage and disadvantage by ethnic and gender reference in Cochabamba, Bolivia.

Material and methods

Context

This study is the second report of the "Departmental Survey on Risk Factors Associated with Hypertension and Obesity" (FRAHO), jointly implemented by the Institute of Biomedical Research and Social Research of the Universidad Mayor de San Simón (IIBISMED-UMSS) and the Departmental Health Service (SEDES) of the department of Cochabamba, Bolivia, located in the central Andes Mountains. In 2012, demographic data indicated that 1.8 million people lived in this region, representing 17.5% of the national population; approximately 35-40% of them in rural areas[19].

Study design, population and sampling methodology

An observational, analytical, cross-sectional study was conducted, with data collected at the community level, involving young people and adults (over 18 years of age) with permanent residence in the 47 municipalities of Cochabamba, between July 2015 and November 2016; applying the WHO-STEPS[20] methodology for the collection of information; adapted for the Bolivian context by the research team and tested in a previous study with military personnel from the Cochabamba air force[21].

The sample size (n= 10,609) was calculated based on previous estimates of the prevalence of overweight and obesity in the department (around 30%) using a confidence level of 5%, a margin of error of 0.05; and a design effect of 1.05 as recommended by the WHO-STEPS manual and assuming a response rate of 85%.

All subjects were selected by three-stage random sampling: (a) 394 primary health care centres (CAPS) were selected to form the population sampling units (UMP); (b) in each UMP, households were selected based on the Bolivian Ministry of Health's rapid care coverage monitoring technique, appropriate for the purposes of the study, randomly selecting 3 to 5 communities, neighbourhoods or grassroots territorial organisations (OTBs) per each CAP; (c) in these final sampling units, households with persons meeting the inclusion criteria were selected and in each one an individual aged 18 years or older was selected using the Kish random method recommended in the WHO-STEP manual[20] . A total of n=10,704 subjects were included in the study excluding those who did not have complete blood pressure information, were pregnant or belonged to ethnic groups with less than 5% of the sample (Yuquis, Yuracares, Chimane, Afro-Bolivian, European descendants); entering in the statistical analysis n=10,595 participants.

Data collection and measurements

The data collection procedure was based on the Pan-American version (V2.0) of the WHO-STEPS methodology adapted to the Bolivian context. This methodology consists of 3 stages of data collection: a) step 1 uses a questionnaire to collect demographic and lifestyle data; b) step 2 involves measurements of height, weight, blood pressure and waist circumference; and c) step 3, which includes the measurement of laboratory tests of the glycemic and lipid profile (not included in this study).

The STEPS tools were applied by health staff from primary health care service areas (CAPs) through direct face-to-face interviews. All interviewers were trained over two days covering the three stages of STEPS, including interactive classroom sessions and skills development for interviewing and field visits. A pilot test was conducted through peer self-application of the instrument for steps 1 and 2 with the same staff, contributing to the improvement of the implementation guide developed by the research team.

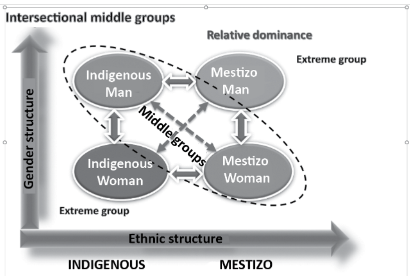
In step 1, a structured questionnaire was used through face-to-face interviews. Participants were asked about demographic information, including age (categorised into three groups according to Global Burden of Disease-GBD: 18-29, 30-44, 45-59 and ≥ 60 years); sex (defined as male or female); marital status (categorised into three groups: never married, currently married or cohabiting and widowed or separated); educational level (categorised into four groups: No formal schooling, primary, secondary and higher education); ethnicity (categorised into three groups: indigenous, mestizo and white or black as other); occupation (categorised into five groups: self-employed, employed, household chores, retired and unemployed); and place of residence (according to the 5 socio-demographic regions: Andean, South Cone, Central Valley, Tropic and Upper Valley); all categorisations were based on the STEP manual20. In step 1, information was also collected on risk factors, including fruit and vegetable intake (less than five servings or approximately 200 grams of fruit and vegetables per day were considered as an "at risk" group); tobacco use (having smoked in the last 30 days), alcohol consumption (amount, frequency and pattern of consumption in the last month) and physical activity in their daily life. Physical activity was measured using the Global Physical Activity Questionnaire format (GPAQ as part of the STEPS tool) and information was requested on four different aspects: physical activity at the workplace, during recreational time, during travel and during rest time. According to the Metabolic Task Equivalent (MET), less than 600 MET-minutes per week were classified as low physical activity, and values above 600 MET-minutes per week were classified as appropriate[7,15].

In step 2, measurements were performed using calibrated and standardised instruments. Physical measurements included weight and height; with these data, body mass index (BMI) was calculated, information not included in this analysis because of the collinearity effect detected in the preliminary analysis described in the statistical analysis. Blood pressure was measured at the midpoint of both arms after participants had rested for at least five minutes. Two blood pressure readings were obtained from all participants. A third reading was taken if there was a difference of more than 25 mmHg for systolic blood pressure (PAS) or 15 mmHg for diastolic blood pressure (PAD) between the first two readings. The mean of all measurements was used, based on the recommendations of the OMS protocol20. Elevated blood pressure was defined as a systolic blood pressure of ≥130 mm/Hg, a diastolic blood pressure of ≥85 mm/Hg or the use of antihypertensive medication, according to WHO guidelines[4, 20].

Intersectional positions by reference to gender and ethnicity

Gender and ethnicity were based on information from Step 1 records. Gender comprised the categories of female or male. Ethnicity was considered as indigenous (Quechua and Aymara) or mestizo, the other ethnic groupings were excluded from the analysis (Afro-American, Yuracacre, Chimane, Yuquis, European descendants or foreigners) as they were present in a very small proportion.

Consistent with the procedure illustrated by Sen & Iyer10,12 gender and ethnicity were combined to form four mutually exclusive intersectional positions, including the extreme groups: dominant or double socially advantaged (mixed-race men) and double socially disadvantaged indigenous women; the middle groups of mixed-race women and indigenous men (Graph 1).



GRAPH 1.
Middle Groups: Social position by ethnicity and gender references in Cochabamba Bolivia.
own elaboration

The variables were selected and constructed to capture processes of privilege, oppression or marginalisation in the intersectional space of ethnicity and gender, and which could potentially be used as leverage points for health advantages. For heuristic purposes, the factors were grouped into 3 domains: socio-demographic factors (age group, residence, marital status); socio-economic factors (education level, occupation, income), and behavioural risk factors (smoking, alcohol consumption, fruit and vegetable intake, physical activity), categories with low frequencies (<5%) were collapsed into more general categories and the body mass index variable was excluded from the decomposition because of a collinearity effect with PAE, verified in the preliminary analysis using the VIF (variance inflation factor) test[22].

Statistical methods

Data were entered into MS Excel®, followed by data cleaning and analysis using Stata / MP version 15.0 (StataCorp LLC-U.S.A.).

Following the main approach of Sen et al.[10,12] the population patterns of blood pressure in the intersectional positions are presented as averages of mean blood pressure (PAM) and PAE prevalences for the 4 intersectional subgroups. To account for the gaps in PAE prevalence between the dominant and subordinate groups, the Blinder-Oaxaca decomposition was used, using the Oaxaca command for binary data in Stata v1513. The basic idea of the Blinder-Oaxaca decomposition is to explain the distribution of the outcome, in this case the difference in the prevalence of elevated blood pressure between dominant, middle and subordinate groups, through a set of explanatory factors that vary systematically in frequency for each subgroup. The method is based on two regression models that are fitted separately for each of the groups, and then the technique divides the health gap between the groups into a fraction attributable to differences in explanatory factors (the explained fraction)

$$1)\ PAE^{Advantaged} = \beta X^{Adv} + \varepsilon AV$$
$$2)\ PAE^{Disadvantaged} = \beta X^{Dis} + \varepsilon Des$$

and differences in coefficients (the unexplained fraction)[13]. The Blinder-Oaxaca decomposition uses linear regression models. This method is based on two separate regression models for the two population groups.

$$\underbrace{\Delta^{Dis-Adv}}_{\text{Gap}} = \underbrace{(\bar{X}_{Adv} - \bar{X}_{Dis})\,\beta_{Dis}}_{\text{Explained fraction}} + \underbrace{\bar{X}_{Adv}\,(\beta_{Adv} - \beta_{Dis})}_{\text{Unexplained fraction}}$$

Where PAE is the outcome variable; β is the coefficient including the intercept; X is the explanatory variable; and ε is the error. The gap between the two disadvantaged (Dis:disadvantaged) and advantaged (Adv: advantaged) groups is:

The first part on the right-hand side of the above equations is the observable difference in the variables in the two groups (the explained component), and the second part relates to the differences in the coefficients of the variables in the two groups (the unexplained component)[13].

The Blinder - Oaxaca decomposition was applied to decompose the health gap for the following 6 comparisons of dominant versus subordinate groups:

1. Disparity by gender reference

mixed-race men vs. mixed-race women indigenous men vs. indigenous women

2. Disparity by ethnic reference

mestizo men vs. indigenous men mestizo vs. indigenous women

3. Intersectional disparity

mestizo men vs. indigenous women indigenous men vs. mestizo women

The total share explained, as well as the independent contribution of each of the explanatory factors, are reported as absolute contributions (i.e. on the same scale as the outcome) and as relative contributions (percentages).

Ethical considerations

Ethical approval was obtained from the ethics committee of the Faculty of Medicine of the University of San Simón in Cochabamba for the FRAHO project. All survey participants signed an informed consent (based on the WHO-STEPS survey consent form) for the project. In the case of illiterate participants, the informed consent was explained orally and after acceptance of participation, the fingerprint was stamped. The collected data were coded and administered exclusively by the research team. Participants with high blood pressure or any other disease were referred to the nearest health centre for investigation and treatment.

Results

A total of 10595 subjects participated in the final analysis, 65% of the participants self-identified as indigenous and 35% as mestizo. Table 1 describes the proportional distribution of endpoints in the study population by gender and ethnicity.

Mean Blood Pressure (PAM) was higher in mixed-race men (87.87±0.24) and mixed-race women (87.61±0.19). The prevalence of elevated blood pressure was higher in indegenous men (10.20%) and mixed-race men (9.67%) (Table 1).

Variables	Women (N=6095 - 57.53%)		Men (N=4500 - 42.47%)		Total (N=10595)	
	Indigenous	Mestizas	Indigenous	Mestizos	Indigenous	Mestizos
n	4,080	2,015	2,806	1,694	6,886	3,709
%	59.25	54.33	40.75	45.67	65%	35%
Blood Presure						
Mean and SD	84.24-0.16	87.61-0.19	84.13-0.22	87.87-0.24	85.6-0.12	85.83-0.16
% elevated BP	7.23	7.02	10.34	10.76	10.20	9.67
Sociodemographic Factors						
Age group						
18-29	40.74	53.35	35.14	48.76	38.45	51.25
30-44	26.86	24.57	24.34	24.20	25.84	24.40
45-59	14.49	13.10	17.82	14.58	15.84	13.78
≥ 60	17.92	8.98	22.70	12.46	19.87	10.57
Region of Residence						
Andean	12.10	4.02	13.33	4.82	12.55	4.39
South Cone	7.99	2.33	7.80	2.72	7.91	2.51
Central Valley	29.31	50.12	31.25	54.31	30.10	52.80
Tropic	15.59	13.80	15.47	16.23	15.54	14.91
Upper Valley	35.10	29.73	32.15	21.90	33.89	26.15
Education Level						
No formal education	13.58	4.27	8.37	1.77	11.46	3.13
Elementary	49.98	31.61	47.58	26.68	49.00	29.36
High School	28.75	45.96	34.71	50.24	31.18	47.91
Higher Education	7.70	18.16	9.34	21.31	8.36	19.60
Civil status						
Never married	25.64	35.43	28.62	44.33	26.85	39.50
Married or cohabiting	64.44	56.72	63.19	50.06	63.93	53.68
Divorced or widowed	9.93	7.84	8.20	5.61	9.22	6.82
Employment status						
Student	12.63	22.04	13.06	21.90	12.81	21.98
Self-employed	26.52	26.80	66.69	50.95	42.87	37.83
Employed	7.80	11.77	13.20	19.81	10.00	15.44
Household chores	50.19	36.47	0.72	0.84	30.06	20.21
Retired	1.33	1.15	4.03	4.00	2.43	2.45
Unemployed	1.53	1.75	2.30	2.51	1.84	2.10
Monthly household income (an estimate based on the national minimum wage-SMN)						
Less than 1 SMN	39.19	24.18	33.95	18.04	36.93	21.22
Between 2 to 4 SMN	50.02	59.39	52.79	58.97	51.22	59.17
Between 5 yand 6 SMN	7.87	11.38	9.18	16.43	8.44	13.82
7 or more SMN	2.91	5.08	4.08	6.55	3.42	5.79
Behavioral risk factors						
Current smoker	2.70	4.42	22.20	20.96	10.57	11.97
Alcohol consumption	33.33	35.04	54.35	55.37	41.90	44.32
Low consumption of fruits and vegetables	78.43	72.36	79.86	73.61	79.02	72.93
Physical Activity						
Low(<600 MET -min)	69.90	78.41	50.71	59.33	62.08	69.70
Moderate (600 –2999 MET-min)	27.01	19.80	36.92	34.47	31.05	26.50
High (3000+ MET-min)	3.09	1.79	12.37	6.20	6.87	3.80
Overweight and obesity	59.33	57.68	49.02	56.87	55.11	57.31

(Numbers are column percentages within each variable, unless otherwise indicated).
Source: Own elaboration, based on data collected in the FRAHO-Cbba study.

TABLE 1:
Percentage distribution of contributing factors for inequality in PAE

The distribution by age was similar in all groups, highlighting that the older adult population aged 60 years and over was higher in the indigenous population (19.87%). In relation to place of residence, the distribution of indigenous and mestizos was heterogeneous in the five political macro-regions of Cochabamba. In relation to schooling, the highest level was reached by a greater proportion of mestizos (19.60%) and, on the contrary, indigenous people had the highest proportion of people who did not receive any formal education (11.46%). Marital status was similar in all study subgroups, with a higher proportion of people married or cohabiting (>50%) in all cases. In terms of employment relationship or employment status, the high prevalence of women working in the home is striking, both among indigenous (50.19%) and mestizo women (36.47%). In relation to health insurance, a very low proportion of all groups (<17%). Monthly household income (an estimate based on the national minimum wage - SMN) shows that more than 50% of families in all groups report incomes between 2 and 4 SMN, with the proportion being higher in the mestizo group than in the indigenous group (Table 1).

In relation to behavioural risk factors associated with elevated blood pressure, smoking prevalence was assessed and was highest in Indigenous men (22.20%) and lowest in Indigenous women (2.70%). Current alcohol consumption was more prevalent in men (>50%) than in women (<36%). Low vegetable consumption was the highest risk factor, with similar proportions in all study subgroups (>72%). Low physical activity (<600 MET-min) was highest in mestizo women (78.41%) and lowest in indigenous men (50.71%). Overweight and obesity had the highest prevalence in indigenous women (59.33%) and the lowest in indigenous men (49.02%) (Table 1).

Table 2 breaks down the decomposition analysis for the Oaxaca-Blinder health inequities assessment, considering high blood pressure (PAE) as the outcome variable and the prevalence of PAE in the study subgroups, presenting only the combinations that presented statistically significant differences (p≤0.005) between the contrast groups. Dominant groups are presented as group-1 and subordinate groups as group-2. Results were ordered in absolute and relative contributions to Inter-class inequality, accompanied by the p-value for statistical significance assessment. For this analysis, the obesity variable was excluded because it presents a collinearity effect with the effect variable, generating a bias in the multivariate logistic regression analysis.

	Mestizo man (group 1) Mestizo woman (group 2)			Indigenous man (group 1) Indigenous woman (group 2)			Mestizo man (group 1) Indigenous woman (group 2)			Indigenous man (group 1) Mestizo woman (group 2)		
Model Estimates	**Abs.**	**p**	**%**	**Abs.**	**p**	**%**	**Abs.**	**p**	**%**	**Abs.**	**p**	**%**
PAE (group 1)	0.108	>0.001	10.76	0.103	>0.001	10.34	0.108	>0.001	10.76	0.103	>0.001	10.34
PAE (group 2)	0.070	>0.001	7.02	0.072	>0.001	7.23	0.072	>0.001	7.23	0.070	>0.001	7.02
Difference	0.037	0.003	3.74	0.031	0.001	3.11	0.035	0.002	3.53	0.033	0.002	3.32
Fraction Explained (FE)	0.025	0.003	67.18	0.025	0.001	81.04	0.022	0.007	61.00	0.034	>0.001	101.20
Unexplained Fraction (FNE)	0.012	0.402	32.82	0.006	0.609	18.96	0.014	0.292	39.00	0.000	0.977	-1.20
Factors contributing to inequity among subgroups (Absolute Coefficient - p -Relative coefficient%)												
Age group												
30-44	0.000	0.676	1.67	-0.001	0.442	-2.45	-0.001	0.435	-2.55	0.001	0.545	2.15
45-59	0.004	0.068	15.65	0.005	0.003	19.07	0.003	0.093	13.89	0.006	0.004	17.55
≥ 60	0.008	0.003	31.24	0.006	0	25.14	-0.006	0.004	-27.59	0.017	>0.001	51.16
Residence												
South Cone	0.000	0.53	1.18	0.001	0.382	2.79	-0.001	0.315	-5.11	0.011	>0.001	31.56
Central Valley	0.003	0.098	12.94	0.000	0.758	-0.99	0.009	0.001	39.53	-0.011	>0.001	-33.83
Tropic	0.002	0.218	9.33	0.001	0.397	2.73	0.000	0.792	1.27	0.002	0.073	7.34
Upper Valley	-0.005	0.011	-18.49	0.000	0.788	-1.16	-0.004	0.006	-16.78	-0.001	0.445	-3.42
Education level												
No formal education	0.002	0.043	7.41	0.000	0.976	0.16	0.003	0.295	15.51	-0.001	0.306	-4.16
Elementary	0.000	0.801	0.85	0.000	0.964	-0.06	0.007	0.144	32.34	0.005	0.199	13.80
High School	0.000	0.798	-0.33	0.000	0.902	-0.56	-0.007	0.078	-32.34	-0.004	0.118	-10.55
Marital status												
Married or cohabiting	0.001	0.239	4.30	0.000	0.343	-1.33	0.002	0.083	9.73	-0.001	0.342	-2.28
Divorced or widowed	0.000	0.883	0.48	-0.001	0.407	-2.25	-0.001	0.621	-3.01	0.000	0.901	-0.03
Occupation												
Self-employed	0.002	0.546	9.60	0.007	0.201	27.49	0.005	0.152	24.96	0.004	0.488	11.69
Employed	0.003	0.167	12.06	0.000	0.852	0.75	0.003	0.294	14.24	0.000	0.786	0.19
Household chores	-0.004	0.517	-17.46	0.001	0.849	5.38	-0.003	0.727	-11.96	-0.002	0.734	-6.63
Retired	0.000	0.915	0.71	0.001	0.404	4.23	0.000	0.764	-1.98	0.002	0.152	6.06
Unemployed	0.000	0.641	0.51	0.000	0.593	0.45	0.000	0.807	0.34	0.000	0.891	0.10
Financial income												
Less than 1 SMN	0.001	0.696	3.10	0.002	0.27	6.48	0.010	0.126	45.39	0.000	0.993	-0.07
Between 2 to 4 SMN	0.000	0.886	0.23	-0.001	0.501	-2.07	-0.003	0.338	-11.65	0.000	0.84	0.99
Between 5 and 6 SMN	0.000	0.965	-0.30	0.000	0.978	-0.04	-0.003	0.27	-14.47	-0.001	0.314	-2.47
Behavioral risk factors												
Current smoker	0.002	0.695	6.43	0.003	0.344	13.73	0.003	0.425	16.20	0.002	0.656	4.48
Alcohol consumption	0.007	0.021	28.11	0.004	0.033	17.75	0.005	0.076	22.03	0.006	0.007	18.04
↓fruit and vegetable intake	0.000	0.636	0.53	0.000	0.76	0.29	0.000	0.789	0.92	0.001	0.309	3.68
Low(<600 MET -min)	0.002	0.27	8.17	-0.004	0.064	-15.15	0.000	0.96	0.18	-0.004	0.199	-10.69
Moderate (600 –2999 MET-min)	-0.005	0.033	-17.91	0.000	0.928	-0.37	-0.002	0.033	-9.09	0.002	0.429	5.32

Source: Own elaboration, based on data collected in the FRAHO-Cbba study.

TABLE 2.

Decomposition analysis for the assessment of health inequities for high blood pressure using the Oaxaca-Blinder breakdown

Disparity by gender reference:

A statistically significant difference of 3.74% is reported between mestizo-men and mestizo-women; this inequity towards mestizo men, who have a higher prevalence, can be explained by 67.17% of the study variables; the contribution of these variables to explain the inequity is heterogeneous between groups and within groups (inter-class and intra-class); evidencing a greater positive effect by the age of the participants (48.56%) and alcohol consumption (28.11%), while physical activity has the opposite effect with -9.43% (Table 2 and Graph 1).

We can also highlight the statistically significant difference of 3.11% between indigenous-men and indigenous-women, this inequity towards indigenous men, who present a higher prevalence, is explained in 81.04% by the study variables; and as in the previous case, the contribution of these variables to the inequality is heterogeneous between and within groups, with a greater positive effect of the age of the participants (41.71%), work or occupation (38.28%), alcohol consumption (13.73%) and tobacco consumption (13.3%), while physical activity has the opposite effect, reducing the inequality by -15.52% (Table 2 and Graph 1).

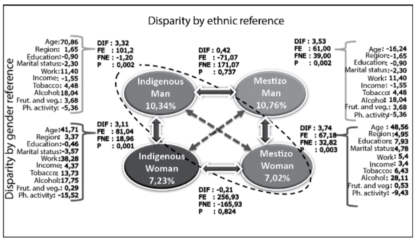
Disparity by ethnic reference

In relation to the intra-group difference by ethnic reference between indigenous and mestizos, it was observed that the differences were not statistically significant. In the case of men (mestizos vs. indigenous), the difference was 0.42% (p=0.737), with the fraction explained by the model being negative (-71.07) and the fraction not explained (171.07) by the study variables that were evaluated being much higher (Graph 1).

A similar situation occurs with the disparity between mestizo vs. indigenous women, whose difference was not statistically significant and presented a negative value (-0.21%; p=0.824), indicating a higher prevalence in the less favoured group by ethnic reference (Indigenous Women); however this inequity can be explained by the study variables that were used in the mathematical model (256.93%), but this effect is not statistically significant (graph 1).

Intersectional disparity between extreme and middle groups.

A statistically significant difference of 3.53% is reported between the extreme groups (men-mestizos and women-Indigenous), this inequity towards mestizo men, who present a higher prevalence, is explained by 61.00% by the study variables; the contribution of these variables to inequality is heterogeneous between and within classes; a greater positive effect is evidenced by alcohol consumption (18.04%), work or occupation (11.40%), while physical activity has the opposite effect, reducing inequality by -5.36% and the age of the participants (-16.24%) (Table 2 and Graph 1).



GRAPH 2.

Disparity analysis by ethnic reference, gender and extreme intersectional groups for High Blood Pressure.

A statistically significant difference of 3.32% is observed between the middle groups (men-indigenous and women-mestiza), this inequity towards indigenous men, who present a higher prevalence, is explained in 101.2% by the study variables; and as in the previous case the contribution of these variables in the inequity is heterogeneous inter-group and intra-group; The positive effect of age of participants (70.86%), alcohol consumption (18.04%) and work or occupation (11.40%) was greater, while physical activity had the opposite effect, reducing inequality by -5.36% and marital status by -2.30% (Table 2 and Graph 2).

Discussion

Current social inequalities in health are considered a barrier in the prevention and control of NCDs23 , an increasingly pressing concern for Bolivian society due to the complex configuration of vulnerable population groups; therefore, the assessment of health gaps, from a perspective of intersectionality between ethnic and gender identity as a predictor of high blood pressure, is important to develop appropriate and equitable public policies, especially policies related to the prevention of ECPs and their cardiovascular effects in Cochabamba and Bolivia as a whole.

The present study is the first to analyse patterns of elevated blood pressure through intersections between gender and ethnicity, and makes visible the role of contributing or reducing risk factors and health determinants in the gap between the most advantaged and disadvantaged groups in the Bolivian social structure, thus providing a better picture for the prioritisation of vulnerable groups and the most important risk factors to explain these differences.

For the disparity by gender reference, the differences were significant for both mestizos and indigenous people, showing that it is the main factor for the inequalities in the prevalence of ECP in favour of women, who presented the lowest prevalences, mainly associated with the type of work, tobacco and alcohol consumption, as the main contributing factors to explain these differences. This aspect may be associated with the fact that current social roles limit women to caring for the home and family[6,24] , so that they are socially expected not to smoke or drink, or to drink less frequently and in smaller quantities than men, two factors widely associated with the development of arterial hypertension[14] ; therefore, tobacco and alcohol prevention campaigns should focus on men, to reduce prevalences in this gender and narrow the gap on ECP.

In relation to the disparity by ethnic reference, a similar prevalence is highlighted within their structural position (mestizos vs indigenous) for both genders, this finding suggests that gender reference is more important in ECP inequalities in our context. However, it should be considered that prevalence was higher in mestizos, associated with higher educational level, occupation, alcohol consumption and physical inactivity. These findings suggest that a better social position is associated with an increase in the prevalence of ECP[24, 25]; therefore, prevention and control activities should consider this population group as one of the priorities for the implementation of specific strategies to increase physical activity and reduce alcohol consumption.

For the intersectional disparity, similar prevalence gaps were observed between the extreme groups of the most advantaged or with double social advantage (men-mestizos) compared to the group with double social disadvantage (indigenous women), likewise, for the middle groups, the dominant group (indigenous men) presented a higher prevalence than the subordinate group (mestizo women). These differences were explained by differences in age, type of work and alcohol consumption among participants. Again, it is highlighted that women's social role of caring for the home protects them from exposure to harmful behaviours such as tobacco and alcohol consumption[6,24] , which was more prevalent in both mestizo and indigenous men. This fact could be used as an opportunity to focus alcohol prevention strategies on men, in order to reduce the prevalence of ECP in this group and narrow the intersectional gap.

It should be considered that, from a classical perspective of unidimensional analysis of health inequities, it is known that men have a higher prevalence of ECP[1, 3,5,20] and in relation to ethnicity, mestizos have the highest prevalence of ECP5; However, it is not recognised that the differences may be similar or greater among the middle groups, because the classic methods for evaluating health inequity generally only compare the extreme groups (the most advantaged vs. the most disadvantaged), but the pattern of ECP prevalence in the middle groups is not homogeneous in this study, which highlights the need to consider the intermediate groups in the evaluation of health inequities, not only for ECP, but also for other risk factors such as overweight, obesity, etc.

The application of the decomposition analysis of inequalities between these intermediate positions sheds further light on the processes that underpin health inequalities, and how the intersections of gender and ethnicity materialise through the positive or negative contributions of modifiable and non-modifiable risk factors (social determinants) considered by the WHO-STEPS methodology20, However, the unexplained fractions exposed in this analysis suggest that they are not sufficient to explain the totality of inequity between population subgroups, opening the door to the inclusion of other factors such as stress levels[26] , comorbidities, metabolic syndrome or others that are also associated with the development of EAP[1,27,28]. The gender advantage in relation to the low consumption of tobacco and alcohol in women stands out as valuable resources to obtain an advantage for the prevention of ECP and, on the contrary, the advantages in physical activity seem to be a valuable leverage point to obtain an advantage over ECP in relation to men; aspects that should be considered in the generation of health policies aimed at the prevention and control of ECP and therefore NCDs in the new context of universal health coverage implemented a few months ago in our country.

Methodological considerations

Methodological strengths of the study include: a large population-based sample, with a validated outcome measure and the use of novel statistical approaches. However, the cross-sectional nature of the data precludes any causal inference. Social categories are a matter of debate within intersectionality research, and even the pragmatic provisional use of social categories; however, we believe it is a starting point for the inclusion of a multidimensional perspective in the analysis of health inequalities, which is increasingly gaining momentum in quantitative research. Finally, field measurements of blood pressure may be limited by the expertise of health personnel, as well as the white coat effect, which could over- or underestimate the prevalence of hypertension, which is why in this study we took the precaution of categorising as ECP and not as hypertension, because for the latter, a confirmation phase of blood pressure assessment under optimal conditions is needed, according to international guidelines[27,29,30].

Conclusion

The present study highlights that the prevalence of ECP is not distributed according to expected patterns of social disadvantage in the intersectional space of ethnicity and gender. High social advantage was associated with higher prevalences of ECP, as well as associated behavioural risk factors. Future cross-sectional research should pay attention to intermediate cross-sectional groups, and the complex processes of harnessing underlying health inequalities between them for health strategy planning. Promoting physical activity and reducing alcohol intake are two areas that stand out as promising areas for policy and prevention that seek to improve equity by reference to gender and ethnicity in ECP prevalence.

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