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Prevalence of chronic noncommunicable diseases in the prison system: a public health challenge

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Abstract *A descriptive, cross-sectional, and quantitative study was conducted in 2019 with 202 participants randomly selected from a male penitentiary, with the application of a questionnaire, clinical care, and laboratory tests to estimate the prevalence of risk factors and noncommunicable chronic diseases in people deprived of their liberty. Data analysis verified associations using Fisher's Exact Test and Chi-square Test. The predominant sociodemographic profile of the participants consisted of less-educated single, black, over 30 males with high prison recidivism. Most were sedentary smokers with high alcohol and drug consumption before incarceration. We identified prevalence levels of hypertension (24.8%), dyslipidemia (54.5%), overweight (49.9%), metabolic syndrome (16.8%), and diabetes (2.5%). The difficulty in accessing health services associated with long sentences and the unhealthy environment favors the development and deterioration of chronic diseases and their risk factors, a challenge for the organization of prison health care. This setting reiterates the need to apply resources and efforts to implement comprehensive, longitudinal, and equitable care for people deprived of liberty.*

Key words *Prisons, Noncommunicable diseases, Health profile, Health vulnerability*

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Introduction

The world's prison population increased by 24% in the early 21st century, with 175% in South America alone, totaling more than 10.7 million people deprived of liberty (PDL) globally[1]. The number of PDLs has grown by 576% in Brazil since the 1990s, reaching more than 700,000 people, of which 40% are still unconvicted[2]. The state of São Paulo has more than 202,000 male prisoners, a third of the PDLs in Brazil[3], distributed in 179 Prison Units (PU), whose most common causes of incarceration are drug trafficking (28%), robbery (26%), theft (12%), and homicides (11%)[3-5].

PDLs have fundamental rights similar to all citizens, regardless of the nature of the offense. They are deprived of liberty but not of human rights. Prison should assume a resocializing nature and not revenge or punishment. Extreme conditions such as overcrowding, insalubrity, drug use, violence risk, and poor diet and hygiene affect the health of PDLs and trigger the so-called "the condemned dual penalty"[6].

Since 1955, the United Nations[7] recommends that every penitentiary establishment has at least one doctor with knowledge of mental health and close links to the general administration of the PU and other points in the Health Care Network (RAS)[8]. In 2014, the publication of the National Comprehensive Health Care Policy for People Deprived of Liberty in the Prison System (PNAISP)[9] reiterated the State's responsibility to provide comprehensive care to PDLs and normalized the promotion, protection, prevention, care, recovery, and surveillance measures.

Even so, few Brazilian units have implemented health teams, hindering access to health services[2]. Notably, the PUs are primarily found in small municipalities, which often do not have a RAS articulated with other complexity levels. Besides the responsibility for comprehensive care at the PU, the municipality receives the migration of the convicts' relatives, increasing the number of residents, which can influence the general population's health indicators. Thus, the organization of adequate prison health reduces disease burdens for society as well[2,10,11].

The World Health Organization (WHO) estimates that chronic noncommunicable diseases (NCDs) are responsible for 60% of annual deaths worldwide and up to 75% of public health expenditures[12], a profile also expected in PDLs. A Spanish study estimated that 50% of PDLs had some type of chronic disease, the most common being dyslipidemia (DLP) (34.8%), hypertension (17.8%), and diabetes mellitus (DM) (5.3%), and a third of these diagnoses were found during the research[13]. Data from a paper on PDL mortality obtained a mean age of 34.9 years, whose leading cause (45.8%) was "non-HIV" diseases, such as cardiovascular, tumor, liver, respiratory, circulatory, and infectious diseases (except HIV). Such causes were higher than deaths from HIV/AIDS, which reached 39%[14].

There is a gap in the literature on chronic diseases and their risk factors in PDLs. Settings of increased prison mass, aging of the PDL profile of some prisons, and difficult access to health services warn about the hypothesis that NCDs are still underdiagnosed and, thus, not satisfactorily managed in the prison environment[13]. Thus, this manuscript aims to estimate the prevalence of NCDs and their risk factors in a PU for general crimes in the state of São Paulo.

Methods

This descriptive, cross-sectional, and quantitative study surveyed the prevalence of the main risk factors for NCDs in a male PU in inland São Paulo, where convicts are serving time for general crimes. The PU has an installed capacity of 853 inmates and had 1,943 inmates at the onset of the study[3], with an occupancy rate of 227.8%.

The research followed the WHO recommendations, using the three steps to investigate risk factors for NCDs, consisting of the application of questionnaires, physical examination, and laboratory analysis[15], with the VIGITEL[16] questionnaire as a theoretical framework given the lack of specific tools for this setting. It was adapted after a pre-test conducted in 2018 with 39 PDLs, where it was possible to adapt the tool and improve planning and data collection due to the field's uniqueness. The final, non-self-administered questionnaire, with 71 variables, comprised socioeconomic data, lifestyle habits, and current and past information about the health of the participants and their families. Trained researchers applied the tool, following the consent and security criteria established by the PU's direction and ethical precepts, to ensure the confidentiality of the collected data and voluntary participation. The project was submitted to and approved by the National Research Ethics Committee under Opinion N° 3.095.953 and by the Research Ethics Committee of the São Paulo State Penitentiary Secretariat under Opinion n°3.277.832.

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We adopted the formula for finite populations to calculate the sample[17], based on a prevalence of 17% of hypertension and a population of 1,943 individuals, with an acceptable error of 5% and a 95% confidence interval (CI), reaching an "N" of 196 people. The participants were randomly selected, with three prisoners drawn per cell and about 25 participants per sector (eight sectors in total).

After the draw, the participants were invited to present the project and read the Informed Consent Form (ICF). Those who agreed to participate signed the ICF, which was filed in their medical records. The PDLs who did not accept to be part of the study were taken to the pavilion of origin, and the convict from the same cell with the immediately higher registration was invited.

Data were collected from June to December 2019, during school holidays at the PU, where classrooms in the school pavilion were used to facilitate the organization of data collection, ensuring individuality and a reserved and protected space for the application of the questionnaires and clinical care. The research was divided into three stages: in the first stage, the questionnaire was applied, obtaining data from the physical examination and clinical care; laboratory tests were collected in the second stage; in the third stage, a new clinical visit was scheduled for the assessment of tests results and the management of the diagnosed diseases.

The physical examination included the measurement of blood pressure (BP) in both arms of each participant with an automatic device, and weight, height, and waist circumference (WC). Laboratory tests of fasting glucose (FG), glycated hemoglobin, total cholesterol (TC), high-density lipoprotein (HDL), and triglycerides (TGC) were performed under a 12-hour fast. All equipment used was calibrated and recommended by Brazilian scientific societies, as was the measurement, gauging, and diagnosis technique[18-22].

The test results were reported individually to the participants during the second clinical visit in the third phase. The diagnostic criterion for hypertension was two measurements of systolic blood pressure with values ≥140 mmHg or diastolic blood pressure ≥ 90 mmHg[18]. A DLP result was considered to change the reference values for TC > 200mg/dL; HDL < 40mg/dL; TGL > 200mg/dL or LDL > 160mg/dL[19]. Those with FG results ≥ 126 mg/dL or HbA1C ≥ 6.5% were considered for the diagnosis of DM in at least two collection results on different days[20], and the criterion used for nutritional assessment, according to body mass index (BMI), considered eutrophic individuals those with values lower than 24.9 kg/m^2, overweight those with values between 25 kg/m^2 and 29.9 kg/m^2, and obese those above 30 kg/m^2 [21]. WC was measured at half the distance between the lower surface of the last rib and the upper portion of the iliac crest. Those with WC ≥ 94 cm were considered to have increased cardiovascular risk. However, those with values ≥ 102 cm had an extremely high cardiovascular risk[21]. Metabolic Syndrome (MS) was characterized by three or more of the following criteria: WC > 102cm; TGL > 150mgdL; HDL < 40mg/dL; BP > 130mmHg or 85mmHg and FG > 110mg/dL[22].

Due to the restricted entry of electronic equipment in the PU, for security reasons, the data were collected in printed instruments, double-entered, and validated in Microsoft Excel^R. We performed quantitative data analysis through absolute frequencies, percentages, contingency tables, and measures of central tendency (qualitative variables) and measures such as mean, standard deviation, minimum, median, and maximum (quantitative variables)[17]. Fisher's exact test and chi-square test were used for variable correlations. The analyses presented were performed using the R software, version 3.4.1, and the JASP program, version 0.12.1, adopting a significance level of 5% for all comparisons[23].

Results

A total of 228 people were drawn, with 26 losses related to refusals (13), dropouts (4), transfers (7), and serving a sentence (2), with a mean age of 36.5 years, a median of 35.4 years (minimum 21 and a maximum of 64 years), with more than 75% in the age group over 30 years. Most (53%) were single, mixed-race, or black (64.4%), with incomplete elementary school (57%) and 12.4% of illiteracy (Table 1).

The rate of penitentiary recidivism was 84.1%, with a tendency for singles to be more recidivists ($p < 0.001$) (OR = 4.579; 95%CI 2.788-7.522). About 60% of respondents reported having been arrested two to four times. The total sentence ranged from 1 to 79 years, with a mean of 15 years and a median of 11 years. On average, 44.3% of respondents served 50% of the sentence. At least on one occasion, PU health service clinical care was declared by 58.4% of respondents.

Most respondents were classified as sedentary (70.3%), and the main exercises cited were soccer, running, and weight training. Being active

suggested a protective association with tobacco use in prison (OR = 0.399; 95%CI 0.212-0.749). Regarding eating habits, only 11.9% (n = 24) (95%CI 7.8%-17.2%) reported daily consumption of vegetables or fruits.

As for tobacco use habits before incarceration and in the PU, there was a slight reduction from 54% to 49%, respectively ($p < 0.001$) (95%CI 1.14-2.36). The mean consumption of tobacco in the PU was 11.7 cigarettes/day, mainly straw cigarettes (67%). About 25% of PDLs smoked a pack or more/day, with smokers in all cells and sectors ranging from 29.1% to 68% of inmates per cell. Most (86.2%) started smoking before age 18, with a third reporting frequent tobacco use at age 12 or younger. The younger population (18-33 years) had a higher risk for tobacco use (OR = 1.8; 95%CI 1.036-3.197).

Most reported habitual consumption of alcohol (62.4%) and drugs (90.1%) before imprisonment, mainly marijuana (93.9%), cocaine (72%), and crack (24.2%). Young people (18-33 years) had a higher risk of drug use before arrest (OR = 3.35; 95%CI 1.08-10.42), unlike those aged over 50, whose tendency was protective (OR = 0.042; 95%CI 0.01-0.16).

Table 1. Profile and level of education of people deprived of liberty in a prison unit, Ribeirão Preto, 2021,

Variables		N	%
Age group	18-29 years	46	22.8
	30-39 years	98	48.5
	40-49 years	47	23.3
	≥ 50 years	11	5.4
Marital status	Single	106	53
	Married/Common-Law Marriage	88	43.1
	Separated/Divorced	7	3.5
	Widower	1	0.5
Self-declared skin color	Brown	109	54
	Black	21	10.4
	White	71	35.1
	Yellow	1	0.5
Schooling	Illiterate	25	12.4
	Schooling	115	57
	Elementary school	19	9.4
	High school incomplete	30	14.8
	High school	33	16.3
	Higher education incomplete and concluded	5	2.5

Source: Authors,

Approximately 47.5% of the interviewed reported having a first-degree family history of hypertension, and 11.4% reported being hypertensive. After the BP measurements, a total prevalence of 24.8% was obtained for hypertension (13.4% of new diagnoses), with a predominance of stage 1 (55.6%), followed by stages 2 and 3, 29.6% and 14.8%, respectively (Table 2). The family history of first-degree relatives doubled the risk of developing hypertension (OR = 2.150; 95%CI 1.127-4.10).

The assessment of nutritional status per BMI identified that 50% were eutrophic, 35.6% overweight, and 13.4% obese. The assessment of waist circumference showed that 144 participants had values below 94 cm and 58 had increased cardiovascular risk (> 94 cm), of which 31 had a huge WC (> 102 cm) and, consequently, a higher cardiovascular risk.

Regarding dyslipidemia, 27.7% of the participants had altered values for TC and 28.2% for HDL concerning the adopted parameters. TGL and LDL levels showed values within the desired parameters, 66.8% and 74.6%, respectively (Table 2). Considering the value of lipids, 54.5% of respondents showed changes in any of the parameters analyzed, of which 98 were newly diagnosed cases.

Only four participants reported having a DM diagnosis, of which two were using insulin. Another DM diagnosis was performed after the laboratory investigation (Table 2). The investigation for MS revealed a prevalence of 16.8% of individuals with three or more of the five criteria necessary for the diagnosis.

Discussion

The participants' profile is over-represented by less-educated black people, and a growing age of PDLs was observed. NCDs are a reality in the PU, impacting the health of PDLs and the organization of care by health professionals. DLP and hypertension were the significant diseases diagnosed, along with the associated risk factors (overweight, obesity, increased WC, physical inactivity, tobacco use, and previous drug use).

Participants had a low schooling level, with an illiteracy rate almost double that of the Brazilian population[24]. Offering literacy in the PU may not change this reality since the occupation

Table 2. Prevalence of hypertension, nutritional status, dyslipidemia, diabetes mellitus, and metabolic syndrome in people deprived of their liberty treated in a prison unit. Ribeirão Preto, 2021.

Variables	N	(%)	95% CI
Arterial hypertension			
BP normal value	152	75.2	68.7-81.0
Total diagnoses	50	24.8	19.0-31.3
Total	202	100	
Previous hypertension diagnoses	23	46	7.4-16.6
New hypertension diagnoses	27	54	9.0-18.8
Stage 1	15	55.6	4.2-12.0
Stage 2	8	29.6	1.7-7.7
Stage 3	4	14.8	0.5-5.0
Nutritional status (BMI)			
Thin or underweight (< 18.5)	2	1.0	0.1-3.5
Normal or eutrophic (18.5-24.9)	101	50	41.4-55.6
Overweight (25-29.9)	72	35.6	29.0-42.7
Obesity	27	13.4	9.0-18.8
Obesity class I (30-34.9)	24	11.9	7.8-17.2
Obesity class II (35-39.9)	2	1.0	0.1-3.5
Obesity class III (≥ 40)	1	0.5	-
Total	202	100	
Waist circumference (missing = 1)			
< 94 cm	143	71.1	64.4-77.3
94 cm-101 cm (high)	27	13.4	9.0-18.9
≥102 cm (very high)	31	15.4	10.7-21.2
Dyslipidemia			
Total cholesterol (TC)			
Normal (< 200mg/dl)	146	72.3	65.6-78.3
Altered (≥ 200mg/dL)	56	27.7	21.7-34.4
HDL (missing = 1)			
Normal (> 40mg/dl)	144	71.6	64.9-77.8
Altered (< 40mg/dL)	57	28.2	22.2-35.1
Triglycerides (missing = 3)			
Desirable (< 150mg/dL)	133	66.8	59.6-73.2
Borderline (150-199mg/dL)	35	17.6	12.2-23.2
High (≥ 200mg/dL)	31	15.6	11.3-22.0
LDL (Missing= 1)			
Excellent (≤ 100mg/dL)	81	40.3	31.3-49.2
Desirable (100-129mg/dL)	69	34.3	25.7-42.9
Borderline (130-159mg/dL)	34	16.9	10.1-23.7
Altered (≥ 160mg/dL)	11	5.5	1.3-9.6
Incalculable (triglycerides ≥ 400)	6	3.0	0.0-6.08
Total dyslipidemia diagnoses*	110	54.5	47.3-61.5
Previous DLP diagnoses	12	10.9	3.1-10.2
New DLP diagnoses	98	89.1	42.1-56.4
Diabetes mellitus			
Normal blood glucose value	197	97.5	94.3-99.2
Total diagnoses	5	2.5	0.8-5.7
Previous DM diagnoses	4	2.0	0.5-5.0
New DM diagnoses	1	0.5	-
Metabolic syndrome			
No metabolic syndrome diagnosis	168	83.2%	77.3-88.1
Metabolic syndrome diagnosis	34	16.8	11.9-22.7

* Lipid alteration considered: HDL < 40 mg/dL or TGL ≥ 150 mg/dL or TC ≥ 200 mg/dL or LDL ≥ 130 mg/dL (benchmark for individual cardiovascular risk not considered in this calculation basis).

Source: Authors.

of vacancies in the prison school is not subject to the schooling level criterion but good behavior, personal interest, and available vacancies. The impact of low schooling allegedly perpetuates on the professional career, hindering reintegration into the labor market and less financial stability in post-prison life, which may reduce the opportunities for the social reintegration of those leaving the prison system and reflect on the recidivism rate. In this sense, we observed that the data found on penitentiary recidivism in the PU are more significant than the national literature (46.03%)[25]. The tendency for single people to be more prone to recidivism highlights the importance of family as a protective and receptive factor, also found in Australia[26].

Concerning self-declared skin color, more than two-thirds were blacks or browns, as the reality observed in the U.S., where incarceration has a more significant impact on the poor and ethnic minorities, where blacks are more likely to be incarcerated, have imprisoned relatives and neighbors, and greater risk of parental incarceration[11].

This study presented a population with an older age group than other national prevalence surveys. More than 70% of PDLs were over 30, while data from Rio de Janeiro show that 55% of PDLs were up to 29 years old, a percentage that did not reach 23% in the results of this study[27]. National data reveal an increase in those over 30 from 44.93% in 2014 to 77% in 2020[4]. These data align with international studies that observe aging in prison[28]. Moreover, the participants' mean length of sentence was similar to the national mean, in which 74.4% of prisoners serve a sentence of up to 15 years[4], showing a long period of stay in an unhealthy environment with difficult access to health services and conducive to the development and aggravation of diseases.

The high profile of a sedentary lifestyle (70.30%) contrasted with the national mean of men engaging in moderate physical activity (45.4%), which tends to decrease with age and increase with education level[16]. A study in Australia[29] evaluated risk factors for NCDs and found a high proportion of actives (84%). Possible factors for the sedentary lifestyle findings of this study are sector crowding, restricted shared space during sunbathing, lack of institutional projects that promote physical activities, or perpetuation of a little habit of exercise acquired before prison. Research on the impact of physical activity on PDLs concluded that ten of the 11 studies reported significant changes in self-reported mental and physical health[30]. Besides its leisure nature, physical activity can reduce the risk of diseases, promote health, provide general well-being, and contribute as a rehabilitating and resocializing tool. However, the main challenges in implementing these projects were the lack of resources and difficulty recruiting qualified personnel[31].

The respondents believe that the low daily consumption of vegetables (11.9%) was justified by the unavailability of meals, especially vegetables. In the Brazilian population, 33.9% consume fruits and vegetables, which is lower among men (27.7%)[16], but more than double the documented in the PU. The WHO recommends a daily intake of at least 400 grams of this food group, equivalent to five daily servings[16]. Studies point to inmates' dissatisfaction regarding access, food variability, frequency of meals, and quality of preparation[27]. A strategy to improve the availability of vegetables already implemented in some PUs involves organic garden projects to offer new jobs within the prison and the local production of some fresh supplies[32].

PUs remain one of the few closed environments where tobacco use is still allowed[27,33]. The general Brazilian population trends towards a decrease in smoking over the years. About 20 million smokers, or 15.6% of the population, were identified from 2006 to 2012. In 2018, these values were even lower, 9.3% for the general population and 12.1% for males[16,34]. This smoking cessation aspect is not reflected in PUs. A lower number of cigarettes/day after incarceration is observed, possibly influenced by the difficult access, but with habit preservation. In Rio de Janeiro, lifetime tobacco use was reported by 65.5% of respondents, in line with Spanish data, where 71% of male habitual smokers were found[13,27]. Australian data show a tobacco use prevalence of close to 80% in prisons, a value four times higher than in the general population, and the preferential use of hand-rolled cigarettes (96%)[33].

In this research, about half of the respondents were smokers, mainly of straw cigarettes, which are more toxic than the standard filter cigarette. Straw cigarettes have higher nicotine and tar content, and more smoke is inhaled with each puff, increasing the risk of tobacco-related diseases[35].

Considering smokers in all sectors and overcrowding, the number of cigarettes per day, lack of ventilation, and the probable consumption inside the cells, we can estimate that all of them could be passive smokers while serving their sentence in a closed regime. It is further condemnation of deprivation of liberty, as cited by the U.S. Supreme Court as "cruel and unusual

punishment"[33]. Given this setting, partial or total bans have been implemented in U.S. prisons for disease prevention and fear of lawsuits by non-smokers[33].

The prevalence of alcohol-related problems is high among PDLs, considered the most significant public health issue in Europe[8]. Data showed high consumption of alcohol before arrest by most respondents, above the mean consumption of alcoholic beverages (five or more drinks per occasion) by Brazilians in the community (17.9%)[16]. Evidence points to the association between alcohol use and criminal activity, family violence, mental disorder, risky sexual behavior, and unemployment, where the prison environment is an opportunity for detecting and treating those with alcohol abuse[5,8,26].

Most respondents reported using illicit drugs before prison, and marijuana and cocaine were the most cited by users, data similar to those found in national and European studies[5,8]. Drug use was more common among younger people, and aging was a protective factor in the PU. This reality was also observed in Australia, among 74% of the youngest and 42% of those over 45 years of age[26]. The use of illicit drugs by men deprived of their liberty is reported three times more often than people in the community, with clinical and social repercussions[26].

The identified diagnoses of hypertension are close to the self-reported prevalence for people over 18 years of age (25%)[16] and slightly below the diagnosed rate (32.5%)[18]. However, it is noteworthy that hypertension is more prevalent in patients aged over 60 years (44.4%), a profile different from the prison population studied. The values were higher than those found in a study conducted in Rio de Janeiro, where PDLs aged 20-29 reported having cardiovascular diseases in 17.5%[27]. The increase in the number of hypertension diagnoses suggests the importance of systematically tracking new cases.

A relevant challenge in this setting involves the longitudinal follow-up of patients with hypertension and the management of the hypertensive crisis, with comprehensive care required but not always available at the PU and, sometimes, with the need for referrals to other points of the RAS. Extramural trips of the PDLs under the custody of the State demand coordination between health services, security, and police escort. It is essential to consider that most PUs are in small municipalities, thus not always with sufficient resources and infrastructure to accommodate the flow of referrals to medium and high complexity[2,10].

Almost half of the participants were overweight (BMI > 25 kg/m^2), a value slightly lower than that observed in the Brazilian male population (57.5%)[16]. The prevalence of obesity among those overweight was 37.5%, a value higher than that found in national data (30%)[36]. Likewise, international studies carried out with PDLs also found a higher prevalence of overweight in Spain (51.9%), the U.S. (69.4%), and Australia (72.5%)[13,37,38]. Obesity appeared as a more severe condition in the U.S., affecting 23.7% of the PDLs studied[37]. Considering overweight as an essential risk factor for the development of NCDs, the literature indicates that even minimal altered values in frequency should not be tolerable in the adult population[36].

DLP was diagnosed in more than half of the population studied, consistent with data from the Brazilian population, whose variation is 43-60% in population-based studies[19]. These data corroborate the results observed in the prison population of Australia and Spain[13,38]. Lipid alterations are often neglected by users and health professionals, resulting in a lack of screening and, consequently, underdiagnosis, despite being a significant risk factor for developing NCDs[21].

The low prevalence of DM was similar to data from international studies, ranging from 5.0 to 7.3%[13,37,38]. It is worth mentioning that the prevalence of this disease is higher in older patients, whose profile is different from PDLs for general crimes. Since almost half of the respondents were overweight and sedentary, it is necessary to carry out health promotion and prevention actions for the early diagnosis and treatment of DM and its risk factors.

The main challenges of DM are related to early diagnosis, drug control, and prevention of complications since some PUs have insufficient numbers of laboratory tests and drugs[10]. The use of insulin can be a hindrance to DM management since its application is usually performed only in the PU's health sector, which requires the articulation of security agents for the daily trips of these patients, even during the night and on the weekends. Likewise, glycemic monitoring performed by finger prick also requires the organization of security agents, health workers, and patients. It may be necessary to provide care at other points of the RAS to investigate DM complications, which implies articulation between the stakeholders involved, available escorts, and vacancies in health services.

Food is also characterized as an aggravating factor for metabolic control. Despite the offer

of three daily meals, breakfast (7:00 am), lunch (11:00 am), and dinner (4:00 pm), with food supplementation at night for people with diabetes, PDLs complained about the quality, volume, and variety of food served, mainly in terms of the smaller amount of fruits and vegetables and greater availability of refined foods. It is noteworthy that there is a lack of nutritionists among the PU[4] servants, which can compromise the development of more balanced menus.

One in four U.S. adults has Metabolic Syndrome. However, few data on its prevalence in Brazil[22] are available in the literature. The data found align with national data[22] but are lower than the Australian PDL data[38]. MS is related to increased cardiovascular risk and general and cardiovascular mortality. In this sense, the findings are alarming and may represent the tip of the iceberg since its development is associated with aging and risk factors such as obesity, increased WC, dyslipidemia, and sedentary lifestyle, found in most PDLs in this study[22]. As a result, it is imperative to invest in proposing health promotion and disease prevention actions to change lifestyles and reduce these factors and the establishment of NCDs, which could overload prison health services, burden the State, and attach a more significant burden of suffering and death to this population.

Respondents reported difficulty in accessing the health service since 40% reported never having received clinical care at this unit. In the PHC context, it is estimated that 21.7% of a community would need health care per month, which correlated with the PU studied (1,943 people). It would represent 422 monthly visits, about 14 visits/day, without considering the vulnerability of this population[39]. Possible causes of this lack of care involve the lack of doctors in the team and the care model that historically performs specific walk-in demand actions, without situational diagnosis and planning of health actions[2,10,28].

NCDs were the leading cause of mortality in 2011, following the global trend of epidemiological transition[14]. International studies have shown that this reality is also found in prisons, as transmissible infectious diseases such as hepatitis and HIV/AIDS, which can now be controlled, do not currently represent the leading cause of mortality in this population[14,28].

Thus, care models focused on longitudinal care for patients with NCDs and comprehensive actions to prevent diseases and promote health are indicated for citizens and reiterated by the PNAISP for PDLs.

This study's data are the profile and prevalence of NCDs and their risk factors in a male penitentiary in the state of São Paulo and cannot be extrapolated to those who have not yet been convicted, serving time for sexual crimes, to female PDLs or those under 18 years of age. However, they explain the reality of PDLs for general PU crimes that do not have organized health care as recommended by the PNAISP.

The encounter of ethnic low income and schooling minorities points to the profile of marginalized populations over-represented in prison, with difficult access to education, health, and work services, translated by high illiteracy and penitentiary recidivism rates. The long sentences associated with the unhealthy environment with difficult access to health services favor the development and deterioration of chronic diseases and their risk factors, portrayed by the high prevalence rates of arterial hypertension, dyslipidemia, overweight, tobacco use, and sedentary lifestyle. From the perspective of ensuring the right to health in the prison environment, transforming the curative care model into a comprehensive care modality, emphasizing universal, humanized, and longitudinal care integrated into a resolute, equitable, and efficient care network, is a public health challenge.

Collaborations

RM Serra worked on the project design, data research and analysis, and writing and approval of the version to be published. LC Ribeiro worked on the project design, data research and analysis, and writing and approval of the version to be published. JBB Ferreira worked on the project design and writing and approval of the version to be published. LL Santos worked on the conception and design of the project, data research and analysis, and the writing and approval of the version to be published.

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