

# Chile's public healthcare sector hypertension control rates before and during the pandemic and HEARTS implementation

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## ABSTRACT

Hypertension (arterial blood pressure  $\geq 140/90$  mmHg) is a risk factor for cardiovascular diseases, with the greatest burden of attributable deaths in Chile, having a national prevalence of 27.6%. In 2018, the implementation of HEARTS begun in primary health care centers of the Public Health System, with the aim of achieving increase in control rates, by raising the proportion of hypertensive individuals who meet blood pressure goals ( $< 140/90$  mmHg for individuals 15–79 years old and of 150/90 mmHg for individuals 80 years and older), and thus contributing to reduce cardiovascular morbidity and mortality associated with this condition. This is a descriptive study that follows average treatment and control rates from the Public Health System between 2017–2021 obtained from health centers statistics reports during HEARTS implementation. Treatment and control rates remained at 57% and 39% respectively between 2017–2019. Between 2020 and 2021, in the context of the SARS-CoV-2 pandemic, treatment and control rates decreased very significantly, reaching 46% and 26%, respectively, in December 2021, even though the number of centers reporting the implementation of HEARTS increased from 227 to 387 in this same period. Prior to the pandemic, during the last quarter of 2019, a decrease in cardiovascular health controls was already observed as a result of social protests. In light of the results, the technical pillars of the HEARTS Initiative have an important role in helping to recover the population control rates reached in 2019 and increasing the speed to achieve better hypertension control rates.

## Keywords

Cardiovascular diseases; hypertension; COVID-19; clinical protocols; critical pathways; public health; Chile.

Hypertension (arterial blood pressure  $\geq 140/90$  mmHg) affects around 20% to 40% of the population in the Americas (1). Elevated blood pressure is one of the most important risk factors for cardiovascular disease which is a major cause of death in the Region (1). In Chile, a middle-income country in South America, the prevalence of hypertension is 27.6% in people 15 years and older, and approximately 75% in older adults aged 65 years and above, according to the last National Health Survey 2017 (2). Hypertension is the main risk factor for mortality in Chile (3).

The health system in Chile is organized in a private and public systems with a private and public insurance, respectively. The public health system represents 77% of individuals with health insurance in Chile. It is distributed by territories into 29 health services that coordinate primary care centers and hospitals in each area. Health services differ from each other in geography, local governance and population, although all follow the same guidelines from the Ministry of Health. In the public health system, people with hypertension are enrolled in the Cardiovascular Health Program (CVHP) where people with

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documented cardiovascular disease, type 2 diabetes, hypertension, high cholesterol and smokers are treated (4).

In 2018, Chile adhered to the Global Hearts Initiative under the guidance of the Pan American Health Organization and several other entities (5). This Initiative includes 6 technical packages: healthy lifestyle, evidence-based treatment protocols, access to essential medicines and technology, risk-based management, team care and task-sharing, and systems for monitoring (5).

Healthcare services in Chile were first interrupted in October 2019 because of social protests (6) and from March 2020 on, due to the COVID-19 pandemic (7). These disruptions affected screening services and inpatient and outpatient care of many diseases, including cardiovascular diseases. This hindered the treatment and control rates of people with hypertension impacting their blood pressure and predisposing them to cardiovascular events.

Monitorization and evaluation of performance indicators of hypertension control is a central aspect to plan directives and to meet the National and Sustainable Development Goals (8,9). This is essential to keep track of the effects of innovations in healthcare services such as those of HEARTS, plus the effects of the social agitation and the COVID-19 pandemic. Therefore, the objective of this study is to evaluate the trends in hypertension treatment and control rates in Chile during five years (2017-2021), which includes the period of implementation of the HEARTS Initiative and the interruption of healthcare throughout the public health services of the country in the context of the social disturbances and the COVID-19 pandemic.

## METHODS

This is a descriptive study of hypertension treatment and control rates of individuals affiliated to the public health system. The number of individuals, disaggregated by sex and age, affiliated to the public health system was obtained from the Ministry of Health and corresponds to December of each year, except for 2021 with data from October. Individuals with hypertension were estimated applying the prevalence of the most recent National Health Survey (2017) stratified by age (0.7% in 15 to 24 years; 10.6% in 25 to 44 years; 45.1% in 45 to 64 years; 73% in 65 years and older). Each public center in Chile is required to register their CVHP data aggregated by sex and age on a Monthly Statistic Reporting System that, after validation, is of public access. The blood pressure (BP) measurement recorded in the Statistic Report corresponds to the last reading of each person with hypertension registered in the CVHP in the previous 12 months; the BP is measured by a certified health care worker. Using data from December of each year, the following groups were defined: "Treated", individuals with hypertension enrolled in the CVHP; "Not treated", individuals with hypertension according to the estimated prevalence minus the "Treated" group; "Controlled", individuals enrolled in the CVHP whose BP is <140/90 mmHg in individuals 15-79 years old, plus those with BP <150/90 mmHg in those 80 years old or older; "Uncontrolled", individuals 15-79 years old enrolled in the CVHP with BP  $\geq$ 140/90 mmHg plus those 80 years old or older with BP  $\geq$ 150/90 mmHg. Treatment rates were estimated using the "Treated" divided by the estimated hypertensive population by prevalence in people 15 years and older affiliated

to the public system. Control rates were estimated using "Controlled" divided by the estimated hypertensive population by prevalence in people 15 years and older affiliated to the public system.

Health centers informed their HEARTS implementation status to their respective Health Services, without specifying which strategies were being implemented or their coverage.

## RESULTS AND DISCUSSION

Between 2017-2019 national average treatment and control rates reached a plateau, of 57.2% and 39.4% respectively, a situation that justifies the implementation of new strategies (Figure 1). The group with the best treatment and control rates were the group of females 65 years and older, with 82.4% and 57.7%, respectively, followed by males of the same age with 71.8% and 48.9%, respectively. In contrast, the group with the lowest treatment and control rates were males between 25 to 44 years with rates of 20.7% and 12.6%, respectively (Table 1).

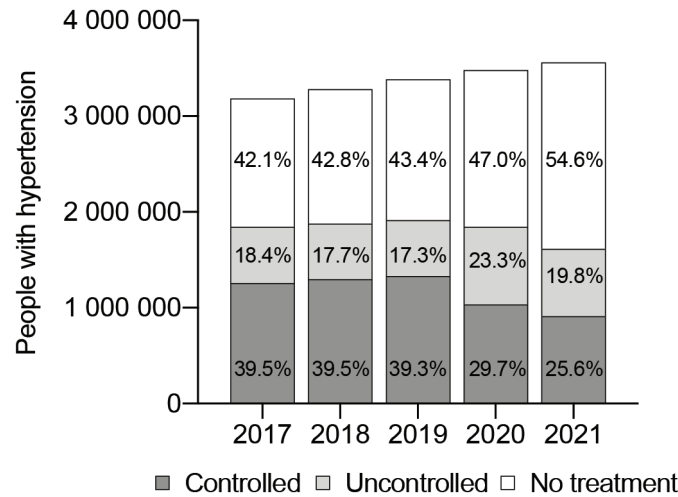
Treatment rates during the pandemic decreased from an average rate of 57.2% between 2017-2019, to 53.0% in 2020, and 45.4% in 2021 (see Fig. 1 and Table 1). Control rates also dropped from an average rate of 39.4%, between 2017-2019, to 29.7% in 2020, and 25.6% in 2021. Male and female groups from all ages had lower treatment and control rates during the pandemic. Females 65 years and older were the group most affected in their treatment and control rates with a decrease of 18.3 and 21.2, respectively, compared to the average rate between 2017-2019. The group of males 65 years and older were the second most affected with a reduction of 15.5 and 17.3 in treatment and control rates, respectively (see Table 1).

Health services performance throughout Chile are diverse. In the years before the pandemic (2017-2019), control rates of health services varied from an average rate of 27.7% to 52.7% (Figure 2). Several, but not all health services decreased control rates in 2019 compared to previous trends, which coincides with the social agitation that interrupted health care services in October 2019. All health services decreased their control rates during the pandemic; reductions varied from 1.5 to 19.1 percentage points in 2021 compared to 2017-2019 (see Fig. 2).

The HEARTS Initiative is being implemented in Chile since 2018. Health services reported 23 centers in the initial year followed by 128 centers in 2019, 76 in 2020 and 160 in 2021. This sums 387 centers in 2021 from a total of 535 centers (72%). The first health service to have all centers with the HEARTS Initiative implemented was Antofagasta, in the northern part of the country, in 2018. This health service, however, was also highly affected by social protests in 2019 (see Fig. 2). Since almost two-thirds of the health centers that reported having initiated the implementation of HEARTS joined the Initiative in 2020 or 2021, during the pandemic, it can be assumed that the majority are at an early stage of implementation.

In summary, treatment and control rates reached a plateau between 2017 and 2019. The group with lowest coverage rates were males between 25-44 years old. Control rates of different Health Services varied largely in this period throughout the nation. In 2019 several, but not all health services reduced their control rates probably because of the social agitation in October 2019. The pandemic reduced control rates of all groups impacting mostly the group over 65 years, and even more women of this age group. The number of centers that have implemented

**FIGURE 1. Hypertension treatment and control rates in the public healthcare sector, Chile, 2017–2021**



**Note:** Treatment and control rates in Chile by year. People with hypertension in the public healthcare sector were estimated using national prevalence. Number of controlled and treated individuals were obtained from health centers statistics reports.

**TABLE 1. Treatment and control rates by year, sex and age in the public health sector, Chile, 2017–2021**

	Treatment Rate								Control Rate					
	2017	2018	2019	2020	2021	Average 2017-2019	Reduction in 2021	2017	2018	2019	2020	2021	Average 2017-2019	Reduction in 2021
Male 15-24 years	37.3%	36.5%	36.9%	34.2%	29.4%	36.9%	7.5	21.8%	22.2%	22.0%	16.0%	14.7%	22.0%	7.4
Female 15-24 years	35.4%	35.5%	36.1%	32.7%	30.7%	35.7%	4.9	23.5%	23.5%	23.1%	15.6%	16.8%	23.4%	6.5
Male 25-44 years	21.1%	20.5%	20.3%	19.1%	16.6%	20.7%	4.1	13.1%	12.4%	12.2%	8.8%	8.3%	12.6%	4.3
Female 25-44 years	31.4%	29.8%	29.0%	26.9%	23.7%	30.1%	6.3	21.8%	20.5%	19.8%	14.2%	13.5%	20.7%	7.2
Male 45-64 years	37.2%	37.1%	36.8%	35.1%	30.1%	37.0%	6.9	23.8%	23.8%	23.7%	17.7%	15.7%	23.7%	8.0
Female 45-64 years	58.5%	57.2%	55.8%	51.7%	45.0%	57.2%	12.2	41.7%	40.9%	39.9%	29.8%	26.6%	40.8%	14.3
Male ≥ 65 years	72.2%	72.0%	71.2%	66.7%	56.3%	71.8%	15.5	48.4%	49.0%	49.3%	37.4%	31.5%	48.9%	17.3
Female ≥ 65 years	83.2%	82.4%	81.5%	76.0%	64.1%	82.4%	18.3	57.4%	58.0%	57.9%	44.1%	36.6%	57.8%	21.2
<b>All sexes and ages</b>	<b>57.9%</b>	<b>57.2%</b>	<b>56.6%</b>	<b>53.0%</b>	<b>45.4%</b>	<b>57.2%</b>	<b>11.8</b>	<b>39.5%</b>	<b>39.5%</b>	<b>39.3%</b>	<b>29.7%</b>	<b>25.6%</b>	<b>39.4%</b>	<b>13.8</b>

**Note:** The rates were obtained by dividing the number of controlled, or treated as corresponding, obtained from the statistical reports of the health centers, by the number of people with hypertension estimated from the national prevalence by sex and age. The reduction in 2021 was obtained by subtracting the average rates of 2017–2019 with 2021.

HEARTS annually has been steadily increasing except for 2020 where only a few centers reported implementation.

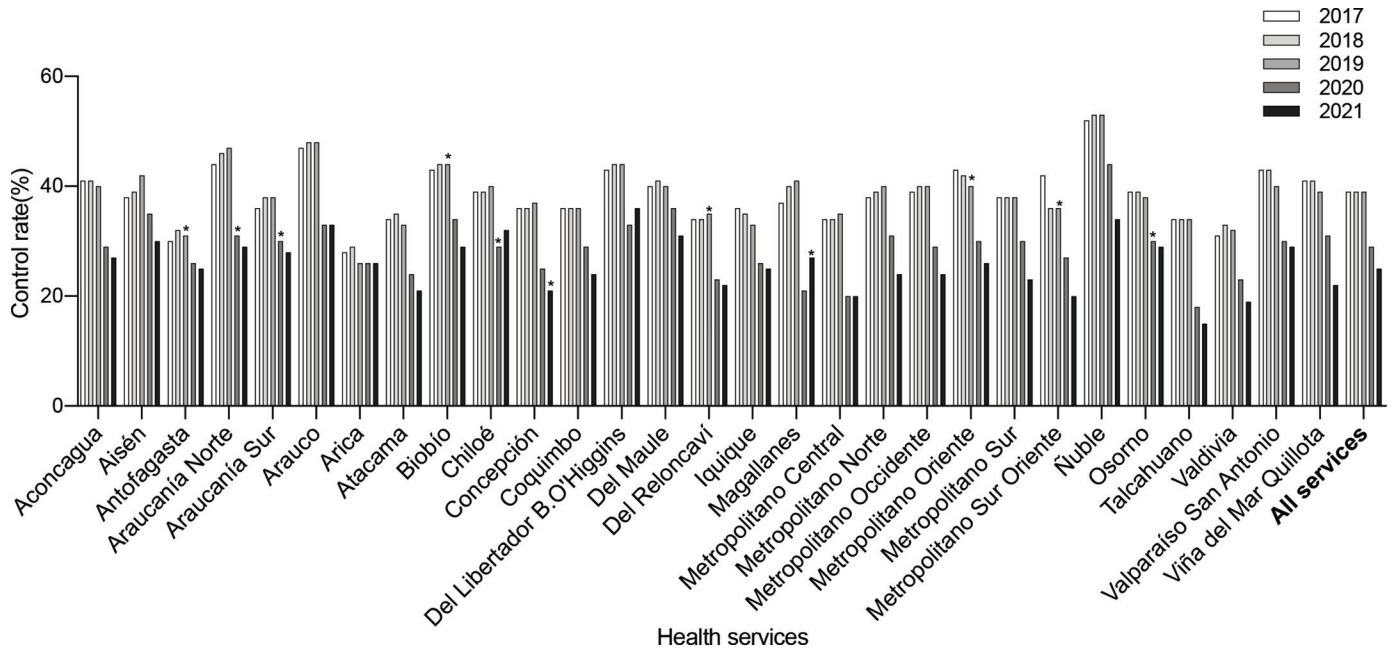
This study has some limitations. First, the total number of people with hypertension was estimated by prevalence from the National Health Survey; this population differs from the studied population because it includes individuals affiliated to private insurance which correlates to higher income. A strength of using this strategy to obtain treatment and control rates is that centers are required to monitor this rate as obtained here. Second, it might be possible that the estimated group of people with hypertension is overestimated considering it was calculated using the prevalence reported on the last National Health Survey (2017), which shows a slight but significant decrease in the prevalence compared to the one in 2003 (10). This could underestimate the treatment and control rates calculated in this study. Third, the Monthly Statistical Reporting System does not consider people that having public insurance, receive treatment on the private sector. Finally, adherence to the implementation of the Initiative varies between centers, and at this point of time the information available is only on the number of

centers that have made a commitment to implement HEARTS, requiring more in-depth information on what key drivers associated to hypertension control are being implemented, and their coverage.

The lower treatment rates in the years affected by the pandemic (2020 and 2021) could reflect less awareness of hypertension due to lack of screening services, fewer people attending the public health centers because they either stopped their treatment, received treatment elsewhere or maintained their treatments on their own. Control rates might have also been impacted by the same factors and also by an increase in blood pressure. In a large study in the United States (11) the American Heart Association reported an increase in blood pressure during 2020 compared with the year before the pandemic, and a similar effect could be expected in Chile.

The period between 2017-2019, with no progress in the indicators, raises an alarm that needs to be addressed. The HEARTS initiative provides an opportunity to implement innovative strategies that could contribute and significantly improve the control and coverage rates of hypertensive people in Chile.

**FIGURE 2. Hypertension control rates by health services of the public health centers, Chile, 2017–2021**



**Note:** Control rates per health service by year. Control rates were obtained by dividing the number of controlled, obtained from the statistical reports of the health centers, by the number of people with hypertension estimated from the national prevalence by health service. (\*Indicates the year in which the majority of the centers of the specified health service implemented the HEARTS Initiative).

In 2019 several health services implemented at least part of the HEARTS package but the last trimester of 2019 the health system was interrupted by social protests and soon after in 2020 by the pandemic, thus impeding a proper analysis of the implementation. Therefore, stronger efforts need to be attained to reduce cardiovascular disease burden in Chile.

The HEARTS Initiative provides a broad spectrum of strategies to reduce blood pressure (5). So far, Chile has made progress in the implementation of several of them: continuous training of health care teams on the scientific evidence that supports the recommendations of HEARTS; application of a standardized treatment protocol which includes and warrants medicines free-of-charge not only for hypertension, but also for diabetes and dyslipidemia at the primary healthcare level; and increased availability—although still insufficient—of validated blood pressure monitors and training to improve BP measurement precision. Other points that require further attainment are: therapeutic inertia; use of fixed-dose combination drugs; more frequency in the progress monitor system, at least every three months; legal changes that allow nurses to take more responsibilities in the intensification of treatment of patients; and the incorporation of community strategies to increase regular screening.

Chilean national guidelines have blood pressure goals that were developed when blood pressure goals were less strict, so the blood pressure limits are higher than other international guidelines, including those of the World Health Organization, which is of < 130/80 mmHg for people with high cardiovascular risk (5). The Chilean guidelines only consider this goal for individuals at high cardiovascular risk with chronic kidney

disease and urinary albumin/creatinine ratio > 30 mg/g. Chile must review its national guidelines and consider adopting the WHO blood pressure goals, that have evidence of an even greater reduction in cardiovascular events.

Further implementation of the HEARTS Initiative in each center and its expansion to all health centers of the country, will certainly contribute to recuperate performance indicators achieved in 2017-2019, and from there on, increase and attain higher and acceptable control rates that reduce cardiovascular risk. Additional time and more stable conditions are needed, without the detrimental effects of the social agitation and the pandemic, to evaluate the impact of the HEARTS Initiative in hypertension control in Chile.

**Author contributions.** FB, MP, CN and MCE conceived the original idea. MR and VR collected and contributed data. FB analyzed the data. FB and MP interpreted the results. FB, MP and MCE wrote the paper. All authors reviewed and approved the final version. FB and MP contributed equally to this work.

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**Conflicts of interests.** None declared.

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## Tasas de control de la hipertensión en el sector de salud pública en Chile antes y durante la pandemia y aplicación de la iniciativa HEARTS

### RESUMEN

La hipertensión arterial (presión arterial  $\geq 140/90$  mmHg) es un factor de riesgo para las enfermedades cardiovasculares, que tienen la mayor carga de muertes atribuibles en Chile. En este país, la hipertensión tiene una prevalencia nacional del 27,6%. En el 2018 se inició la aplicación del paquete técnico HEARTS en los centros de atención primaria de salud del sistema público de salud de Chile, con el objetivo de lograr un aumento de las tasas de control, al elevar la proporción de personas hipertensas que cumplen con las metas de presión arterial ( $< 140/90$  mmHg para personas de 15 a 79 años y de  $150/90$  mmHg para personas de 80 años o más) y así contribuir a reducir la morbilidad y la mortalidad cardiovascular asociadas a esta enfermedad. En este estudio descriptivo se realiza un seguimiento de las tasas promedio de tratamiento y control del sistema público de salud entre el 2017 y el 2021 obtenidas de los informes estadísticos de los centros de salud durante la aplicación de la iniciativa HEARTS. Las tasas de tratamiento y control se mantuvieron en 57% y 39%, respectivamente, en el período entre el 2017 y el 2019. Entre el 2020 y el 2021, en el contexto de la pandemia de SARS-CoV-2, las tasas de tratamiento y control disminuyeron de manera muy significativa, y se ubicaron en 46% y 26%, respectivamente, en diciembre del 2021, a pesar de que el número de centros que notificaron la aplicación de HEARTS aumentó de 227 a 387 en el mismo período. Antes de la pandemia, en el último trimestre del 2019, ya se había observado una disminución en los controles de salud cardiovascular debido a las protestas sociales. En vista de estos resultados, los pilares técnicos de la iniciativa HEARTS desempeñan un papel importante para ayudar a recuperar las tasas de control que se habían alcanzado en el 2019 y acelerar la consecución de mejores tasas de control de la hipertensión.

### Palabras clave

Enfermedades cardiovasculares; hipertensión; COVID-19; protocolos clínicos; vías clínicas; salud pública; Chile.

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## Taxas de controle da hipertensão arterial no setor de saúde pública do Chile antes e durante a pandemia e implementação da iniciativa HEARTS

### RESUMO

A hipertensão (pressão arterial  $\geq 140/90$  mmHg) é um fator de risco para doenças cardiovasculares, com a maior carga de mortes atribuíveis no Chile, onde a prevalência nacional é de 27,6%. Em 2018, teve início a implementação da iniciativa HEARTS em centros de atenção primária à saúde do sistema de saúde pública, com o objetivo de elevar as taxas de controle, pelo aumento da proporção de indivíduos hipertensos que alcançam as metas de pressão arterial ( $< 140/90$  mmHg para pessoas de 15-79 anos e de  $150/90$  mmHg para pessoas a partir de 80 anos), e, assim, contribuir para a redução da morbimortalidade cardiovascular associada a essa condição. Este é um estudo descritivo que acompanha as taxas médias de tratamento e controle no sistema de saúde pública entre 2017 e 2021, obtidas de relatórios estatísticos dos centros de saúde durante a implementação da iniciativa HEARTS. Entre 2017 e 2019, as taxas de tratamento e de controle foram, respectivamente, de 57% e 39%. Entre 2020 e 2021, no contexto da pandemia causada pelo SARS-CoV-2, houve uma diminuição muito significativa das taxas de tratamento e de controle, que chegaram, respectivamente, a 46% e 26% em dezembro de 2021, embora o número de centros que informaram ter implementado o pacote HEARTS tenha aumentado de 227 para 387 no mesmo período. Antes da pandemia, durante o último trimestre de 2019, já se observava uma diminuição dos controles da saúde cardiovascular em consequência de uma onda de protestos sociais. Os resultados mostram que os pilares técnicos da iniciativa HEARTS são importantes para ajudar a recuperar as taxas de controle na população alcançadas em 2019 e aumentar a velocidade para atingir melhores taxas de controle da hipertensão.

### Palavras-chave

Doenças cardiovasculares; hipertensão; COVID-19; protocolos clínicos; procedimentos clínicos; saúde pública; Chile.

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