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A reflection on the results of the ENSANUT 2022 on high blood pressure in Mexican adults

Una reflexión sobre los resultados de la ENSANUT 2022 sobre hipertensión arterial en adultos mexicanos

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INTRODUCTION

National health surveys are essential in elaborating a punctual diagnosis of the public health of a particular nation over a selected period, identifying the most conspicuous health problems, permitting found scientifically applicable political policies, as well as diagnostic and treatment guidelines, and finally, monitoring the behavior of various risk factors, diseases, conditions, and various complications over time.[1,2]

Renowned epidemiologists and public health experts from the National Institute of Public Health have conducted these national health assessments for lustrums in our country. They have the financial resources, the backup of the Mexican State, and the technical and statistical know-how to bring about these complex and costly surveys. Certainly, no one else has such capacity in this country. The entire society, not only the health State agencies and institutions, should benefit from the knowledge derived from these epidemiological enquires. A clear understanding of the current epidemiological profile of our population can and should influence medical practice and the teaching of medicine at all levels. In this context, the results of the national surveys must be analyzed and judged by everyone involved in health affairs because all of us are directly interested in their problems and solutions. In the past, many of us have been critical of the results and interpretation of some data of the more recent national inquiries on health and nutrition without falling into the rude insinuation that the results of these searches were illusive or elusive, complying more with a political compromise than with the scientific truth. This text reveals its authors' opinion, critical but respectful, about the scientific value of National Surveys on health.

The recent publication of the 2022 version of the National Health and Nutrition Survey[3] results regarding high blood pressure (HBP) should have numerous consequences in developing sound public policies required to face the challenge of the hypertensive epidemic. These policies have yet to be generated or have only been applied insufficiently or partially.

Epidemiologic scientific knowledge is focused on the population behavior of the factors determining the origin, magnitude, characteristics, and velocity of propagation of a disease, syndrome, or other clinical condition. The certainty of an epidemiological inquiry is based on the quality of unbiased data from a probabilistic sample: their collection, the statistical analysis, and the derived biological or medical interpretation. The process must inform about the frequency and the pattern of the factors and determinants of the assessed disease, syndrome, or condition. Consecutive surveys report the tendency over time of the disease, syndrome, or conditions and their risk factors and determinants. The results of

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national serial surveys done under a similar methodology must be precise and consistent so that the medical and scientific community can accept them as genuine. But if the results of serial surveys are grossly inconsistent, or some of them are unreasonably unexpected or contrary to medical knowledge or simple logic, the rejection of the survey generates confusion or perplexity. It opens the door to all kinds of interpretations, some of them irrational and insulting, especially in a community like ours with an innate distrust of all government actions and tasks. If such is the case, the entire exercise of the epidemiological study depreciates and becomes unprofitable, despite its high cost and the effort of the researchers.

The more recent national health surveys consider numerous variables such as sociodemographic data, housing conditions, the state of health of children, adolescents, and adults, nutritional status, overweight and obesity, tobacco and alcohol consumption, violence, vaccinations, reproductive health, diabetes, dyslipidemias, and HBP, among many others. In this review, we only examine the topic of blood pressure (BP).

In 1985 the first national health survey was carried out,[2] which is now untraceable. In 1993 the ENEC[4] (National Survey on Chronic Diseases) was brought about, followed by the National Health Survey[5] in 2000. Since 2006, the so-called National Health and Nutrition Surveys (ENSANUTs) began to be carried out every six years, corresponding to each presidential period (ENSANUTs 2006,[6] and 2012[7]). Then, in the middle of the presidential six-year period next past, for some reason, the so-called Halfway National Survey on Health and Nutrition was conducted (ENSANUT MC 2016[8]). In 2018 was done the corresponding survey (ENSANUT 2018[9]) in which BP was not measured, and only the proportion of people who knew they had HBP was reported. In the same year, another survey was done on vulnerable populations residing in towns with less than 100,000 inhabitants (ENSANUT 100K 2018[10]). Since that year, the surveys have been carried out continuously every year (ENSANUT 2020,[11] ENSANUT 2021 on COVID-19,[12] ENSANUT 2022[3]).

The National Health and Nutrition Survey[3] (ENSANUT 2022). This survey comprehended 8,647 adult persons comprising a probabilistic sample representing 83,697,700 adults ≥ 20 years old. BP was measured with an electronic device. HBP was defined using the cutoff values recently proposed by the binomial American College of Cardiology (ACC) and the American Heart Association (AHA)[13] (130/80 mmHg) or the older (140/90) than the authors attribute to the «Eighth» Joint National Committee JNC 8.[14] We quoted «Eight» because this last version of the Joint National Committee report was not, as the previous documents were, endorsed by the National Heart, Lung, and Blood Institute (NHLBI) of the United States (US). Instead, it was the product of a group initially appointed by the NHLBI to elaborate on the JNC 8 report. But later, that institute withdrew its endorsement, leaving the participants of the group alone with no representation other than their own.[15] But even more, the recommendations of the appointed panelist to the JNC 8 did not address any definitions of hypertension and prehypertension, as indeed did the JNC 7 (140/90 mmHg).[16]

How has HBP evolved in Mexico, according to the ENSANUTs. Our country experienced an accelerated and geographically heterogeneous epidemiological transition in the last decades that put heart diseases, diabetic mellitus, and malignancies in the first place as causes of general mortality. Hand in hand with a pandemic of overweight and obesity, conditions that affect more than 70% of the population, the prevalence of type 2 diabetes mellitus, atherogenic dyslipidemia, HBP, and ischemic heart disease rose significantly.

The prevalence of the common atherosclerotic risk factors does not change abruptly in a few years unless a natural or socioeconomic cataclysm occurs, like a catastrophic war, a prolonged famine, a devastating economic crisis, and the like. Inversely, after successfully applying solid public policies and population programs to obtain a massive detection of HBP and better therapeutic management, many years are needed to observe substantial changes.

Table 1 shows some inconsistencies in the results of the national surveys on HBP over almost three decades. We found three probable

Table 1: Prevalence of HBP according to diverse national surveys.

	ENEC 1993	ENSA 2000	ENSANUT 2006	ENSANUT 2012	ENSANUT MC 2016	ENSANUT-100 K 2018	ENSANUT 2020	ENSANUT 2022
Women	140/90	140/90	140/90	140/90	140/90	140/90	140/90	140/90
	28.1%	26.3%	31.1%/47.3%*	30.8%	26.1%	33.8%	28.6%	27.7%
						130/80	130/80	130/80
						46.8%	44%	42.4%
Men	140/90	140/90	140/90	140/90	140/90	140/90	140/90	140/90
	37.5%	34.2%	32.4%/40.3%*	33.3%	24.9%	31.4%	31.9%	31.3%
						130/80	130/80	130/80
						52.2%	53%	53.8%
Total	140/90	140/90	140/90	140/90	140/90	140/90	140/90	140/90
	32.8%	30.5%	30.8%/43.2%*	32%	25.5%	32.7%	30.2%	29.4%
						130/80	130/80	130/80
						49.2%	49.4%	47.8%

ENEC = National Survey on Chronic Diseases. ENSA = National Health Survey. ENSANUT = National Health, and Nutrition Surveys. MC = halfway. 100 K = towns of less than 100,000 inhabitants.
Cutoffs for diagnosing HBP: 140/90 (JNC 7) or 130/80 (ACC/AHA).
* Data from ENSANUT 2006: the first number corresponds to the official report, and the numbers with a single asterisk indicate those published in an article written by the same investigators.[6,17]

causes of these disparities: first, sloppy handling of calculations. With the data from ENSANUT 2006[6] and the cutoff values of 140/90 mmHg, the official report of that inquiry informed an HBP prevalence in both genders of about 30%. Later, in an article[17] on the HBP topic, the same investigators estimated an amazing prevalence greater than 40% using identical data. Which was the correct one? Everything suggests that the lower number is true because it coincides with the prevalence found in the previous surveys and the one that followed in 2012.[7] Secondly, in ENSANUT 2016 Halfway,[8] the methodology for blood pressure measurement changed, and a digital manometer was used. That modification was correct because the mercurial sphygmomanometers are perilous to the environment. The prevalence of HBP was less than in previous inquiries, about 25%. The authors[8] attribute this disparity to the different techniques employed. However, with the same methodology, the HBP prevalence found in ENSANUT 2020 was 30.2%, using the same cutoff value of 140/90 mmHg.[11] Furthermore, a recent meta-analysis on the usefulness of digital devices found a sensitivity of 79% and a specificity of 91%, signaling that both methods have similar accuracy.[18] Therefore, another explanation for this disparity would have to be sought. Finally, the most important reason for the survey's inconsistent results is the inclusion of the ACC/AHA's newest cutoff values for HBP (130/80 mmHg). To begin with, the 140/90 mmHg ciphers were the cutoffs accepted by Mexican health authorities, as stated in both the Mexican Official Norm and the project for a new one.[19,20] Although our government's intention to suppress many Official Mexican Norms (NOM) is in process, among them that of arterial hypertension, they are still in force to date and are obligatory throughout the country. Since ENSANUT 100 K to the last survey, the authors included the newest and the older cutoffs. According to the latter, the prevalence of HBP is slightly higher than 30%, coincident with the historical values and with the findings of some non-governmental academic-based epidemiological studies.[21] If we discard the results obtained with the ACC/AHA recent cutoff, the prevalence of HBP in adults in our country has remained stable since 1993 to date, around 30%.

The change of the HBP diagnostic paradigm. Has it been accepted? The diagnostic cutoffs of blood pressure are still up for debate. For many years ago, the limits between normotension and hypertension were figures ≥ 140/90 mmHg. In 2017, numerous US medical societies headed by the two greater cardiovascular societies, the ACC and the AHA, decided to lower the normotension threshold to less than 130/80 mmHg *(Table 2)*.[13] The European Societies of Cardiology and Hypertension (ESC/ESH) did not support this position, but without modifying the diagnostic values of ≥ 140/90 mmHg, lowered the blood pressure targets to < 130/80 mmHg.[22,23] Similarly, the International Society of Hypertension,[24] the Canadian 2020 Comprehensive Guidelines for the Prevention, Diagnosis, Risk Assessment, and Treatment of Hypertension in Adults and Children,[25] the Japanese Society of Hypertension,[26] the Korean Society of Hypertension,[27] the 2018 Chinese Guidelines for Prevention and Treatment of Hypertension,[28] the Australian National Heart Foundation,[29] the British National Institute for Health and Care Excellence (NICE),[30] the 7th Brazilian Guideline of Arterial Hypertension,[31] the Latin American Society of Hypertension Guidelines on the management of arterial hypertension and related comorbidities in Latin America,[32] and the Argentine Consensus on Arterial Hypertension (*Consenso Argentino Hipertensión Arterial*)[33] among many others around the world, have not modified the old diagnostic criteria. Even in the US, not all major medical associations agree with changing cutoff values: the American Academy of Family Physicians (AAFP) and the American College of Physicians (ACP) have rejected the paradigm modification.[34,35] So, it is evident that the ACC/AHA definition of hypertension, based on the cutoff point of 130/80 mmHg, it is rejected worldwide by most of the cardiological and hypertension societies, and national and international guidelines. In addition to the uncertainty about the usefulness of lowering SBP to less than 130 mmHg, some members of the AAFP have raised some ethical considerations. The Chair of the Steering Committee of the SPRINT study (whose results were taken as the main evidence for the modification of the cutoff point) was also Chair of the ACC/AHA guideline organism in charge of recommending the paradigm modification. That in Spanish is called being a «judge and part» of a process and is a clear example of intellectual conflict.

Table 2: New blood pressure categories proposed by the ACC/AHA and associated societies.[13]

Category	Blood pressure values, mmHg
Normal	SBP < 120 and DBP < 80
Elevated	SBP 120-129 and DBP < 80
Hypertension, stage 1	SBP 130-139 or DBP 80-89
Hypertension, stage 2	SBP > 140 or DBP > 90

SBP = systolic blood pressure. DBP = diastolic blood pressure.

What is the rationale for modifying the traditional cutoff points from which HBP is diagnosed? To state it at once, all BP cut points are pragmatic, set by expert opinion and epidemiological evidence. In other words, no physiologic threshold has been established to separate hypertension from normotension. As the relationship between BP values and cardiovascular risk is exponential, the selected cutoff threshold signals a point from which a small increment of BP is associated with a significant increase in risk. Consequently, the need to treat medically is based on these values. The higher the BP, the more frequent and serious the vascular complications of all kinds. But what is the physiologic level of BP in which it fulfills its function of properly perfusing the tissues without damaging the structure and function of blood vessels? HBP is perceived as a «civilization disease», rare in communities that live, still in our time, under the norms of the stone age. Among these tribal persons, the prevalence of HBP is very low, and the average population pressure is less than 120/80 mmHg in both genders and all age groups.[36] So, that must be the physiologically adequate level of BP. But it is impossible to compare these very primitive societies with modern, complex, and sophisticated contemporary human communities. Modern society is plagued by excessive consumption of salt and alcohol, poor ingestion of fresh fruit, vegetables, and dietary fiber, lack of physical exercise, and

considerable sociopsychological stress, among other numerous vascular damage factors.[36] Conversely, the genetic homology between modern chimpanzees and humans is about 96%.[37] They are the closest living beings, genetically speaking, to us. It is impossible to measure the BP in wild apes and very difficult indeed in captive ones, as it is necessary to sedate them, altering in the process the physiologic levels of the BP.[38] Despite all difficulties and shortcomings, BP has been measured in captive adult chimpanzees. The median normotension found is 126/63 mmHg, like the adequate human BP.[39] These anthropometric and comparative zoology data show doubtlessly that the optimal blood pressure level should be at least 120/80 mmHg or less. In fact, the general opinion is that these figures, and even lower, are healthier and desirable. On the other hand, although observational studies have shown that each increment of 20 mmHg of systolic blood pressure (SBP) and 10 mmHg of diastolic blood pressure (DBP) double the risk of cardiovascular (CV) death,[40] the contrary, diminishing 20 mmHg and 10 mmHg in SBP and DBP reduces in different proportions the absolute CV risk.

Behind the modification of the diagnostic cutoffs of BP is the concept that the lower, the better. But, as in any therapeutic or preventive intervention, lowering BP must consider a balance between the risks and benefits. A therapeutic-driven excessive reduction of some biological parameters could yield undesirable effects, sometimes catastrophic, except in the case of LDL-cholesterol. As an example, in a patient with diabetes, lessening the blood sugar to 80 mg/dL theoretically must have advantages to a discrete reduction to 120 mg/dL. Whatever the benefits of such a reduction, the risk of hypoglycemia, even fatal, makes strict glycemic control ill-advised. Regarding BP, a so-called J-curve signals the occurrence of outcomes, mainly coronary, when BP descends too much. Although more robust evidence is lacking in this respect, observational data indicate that an excessive reduction of DBP, principally in the frail elderly or in patients with or without diabetes but with coronary atherosclerotic plaques, can cause a dangerous diminution of coronary flow and adverse outcomes.[41]

A single study, the SPRINT,[42] aimed to establish a better target for SBP to diminish CV risk, it is the foundation on which all the arguments regarding the lowering of the cut-off point and the reclassification of HBP are built.

The SPRINT[42] study: its results have provoked a very broad discussion, especially based on the differences in the methodology used to measure blood pressure. This controlled, randomized, open-label study was sponsored (but not endorsed) by the National Heart, Lung, and Blood Institute from the US and carried out in several clinical centers in this country and Puerto Rico. The study group comprised 9,361 hypertensive patients with SBP 130-180 mmHg and increased CV risk (Framingham 10-yr cardiovascular disease risk score) but without diabetes or previous stroke or younger than 50 years old, 91% of which received some antihypertensive medication. Women and persons aged ≥ 75 years were represented (35.6% and 28.2%, respectively). The participants were randomly assigned to two groups, one in which SBP was lowered with intensive treatment to less than 120 mmHg and another in which the SBP was reduced to less than 140 mmHg with standard therapy. In an open-label fashion, patients were treated with any antihypertensive drugs. The defined primary composite outcome was myocardial infarction, another acute coronary syndrome not resulting in myocardial infarction, stroke, acute heart failure, or death from cardiovascular causes. Additionally, renal outcomes in patients with chronic kidney disease (CKD) were a composed final renal outcome of a decrease of 50% of the glomerular filtration rate (eGRF), worsening of the CKD, or the need for dialysis or transplant. In those without CKD, the final renal outcome was a decrement of 30% in basal eGFR and a doubling of the AUC (urinary albumin/creatinine) ratio. The study compared the time of the first primary outcome in both groups, the one with an intensive and the other with standard treatment. *Table 3* shows some results obtained from the data displayed in the published article.

Intensive treatment reduced the relative risks of the primary outcome, total and cardiovascular mortality, heart failure, and a combination of death or incidence of the primary outcome to a great extent, 22 to 57%. Relative risk is

Table 3: Main results from the SPRINT study.

Variable	Intensive treatment, %	Standard treatment, %	Hazard ratio	RRR, %	p	RAR, %	NNT
Primary outcome	5.2	6.8	0.75	25	< 0.001	1.6	62
Death from any cause	3.3	4.5	0.73	27	0.003	1.2	83
Death from CV cause	0.8	1.4	0.43	57	0.005	0.6	166
Heart failure	1.3	2.1	0.62	38	0.002	0.8	125
Primary outcome or death	7.1	9	0.78	22	< 0.001	1.9	52
Complications	**Intensive treatment, %**	**Standard treatment, %**	**Hazard ratio**	**IRR, %**	**p**	**IAR, %**	**NNH**
Hypotension	2.4	1.4	1.70	70	0.001	1	100
Acute kidney injury	4.4	2.6	1.69	69	0.001	1.8	55
Syncope	3.5	2.4	1.45	45	0.003	1.1	90
30% ↓ eGFR in patients without CKD	3.8	1.1	3.45	345	0.001	2.7	37

RRR = reduction of relative risk. RAR = reduction of absolute risk. IRR = increment of relative risk. IAR = increment of absolute risk. NNT = number needed to treat. NNH = number needed to harm.
Although consistent, there are small variations between these estimates and those provided by the authors in the original article.

the probability that an event will happen in one group exposed to a factor or treatment compared to a nonexposed group. Meanwhile, absolute risk is the probability of an event in a group. In this case, the reduction of relative risk (RRR) measures the comparative size of the therapeutic intervention. At the same time, the reduction of absolute risk (RRA) estimates the crude proportion of curtailing an event because of the intervention. The RRR overestimates the real effectiveness of an intervention, so RAA is the most reliable statistical tool to estimate its true significance.[43] The inverse of RRA yields the number of patients needed to be treated (NNT) to obtain a reduction of an event. Of course, the larger the RRA, the fewer patients needed to treat. An NNT of less than 50 in prevention means an acceptable pharmacoeconomic effect. Compared with the larger RRR in the study, the RRA numbers were rather small, yielding a very large NNT. For example, treating HBP intensively in 160 patients is necessary to prevent a single death. And what was the prize to obtain that meager success? Many complications, none labeled by the authors as severe, but anyway limiting, and probably perilous in the long-range, as the decrease of eGFR. Truly, the estimations of NNH, the number of patients needed to put in evidence an undesirable outcome, are also very large. For example, it is necessary to treat 90 patients intensively to cause a single case of syncope. So, the study results are not as spectacular as they seem (looking at the reduction of absolute instead of relative risks), and their limited benefits are balanced by complications such as hypotension, syncope, acute kidney injury, and decreased glomerular filtration rate in patients without previous kidney disease. In addition, as the study does not include diabetic or stroke patients, its results are insufficient to justify drastically lowering the BP thresholds. Furthermore, in the study, BP was measured by an automatic device, without any human intervention, following the strict recommendations of the AHA,[44] which generally are not observed in daily medical practice. This disparity in how BP is measured

makes it difficult to transfer the study's findings to the real clinic. For all the above mentioned facts, ENSANUT researchers should give less importance to this controversial study.

CONCLUSION

Being HBP the most important and prevalent cardiovascular risk factor, its control is crucial for public health. Sequential national surveys must operate as an unchallenged indicator of the epidemiological course of the disease and of the correctness or not of the public policies and the clinical and therapeutic measures addressed for its control. It would be highly desirable for our esteemed epidemiologists and public health experts in charge of the now continuous ENSANUTs to articulate efforts with the cardiovascular community to carry out future evaluations jointly. As individuals and representatives of diverse cardiovascular societies or associations, we can offer, in good faith, our wide and deep knowledge of HBP, a rather intricate syndrome, one of the major enemies of the health of our fellow Mexicans.

A point of caution must be placed on the fact that establishing precise cutoff points in a continuous and fluctuating variable, such as BP, can impact decision-making in public health. Furthermore, applying this concept in the daily clinic, in which the measurement of BP is very inaccurate, requires an educated judgment of the treating physician and the participation of an informed patient in making decisions about the presence or not of HBP and its adequate management. All this requires the development of a lifetime program, which generally requires significant behavioral modifications and the permanent taking of medications for the rest of the patient's life.

In conclusion, our opinion as clinical cardiologists, nephrolgists, and internists, who have dedicated long years to the study of HBP and the care of victims of this disease is that the lowering of the established cutoffs of 140/90 mmHg just brings a modest benefit which is canceled by the complications derived from a significant decrease in BP. We courteously suggest to the researchers in charge of the National Health Surveys to discard the cutoff point proposed only by the ACC/AHA, rejected by most of the world's hypertension and cardiovascular associations, in the following surveys.

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