Hypertension Evaluation and Management

- ✓ Identify High Blood Pressure
- ✓ Reduce Salt
- ✓ Personalize BP Target

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Disclosures

- Develop outcome measures under a contract with the Centers for Medicare and Medicaid Services (CMS)

- NIH/NIMHD funded U54. Project Lead: Health Disparities in Hypertension: A Precision Medicine-based Approach for Early Risk Stratification

Hypertension: The Silent Killer

"I'm going to take your blood pressure, so try to relax and not think about what a high reading might mean for your chances of living a long, healthy life."

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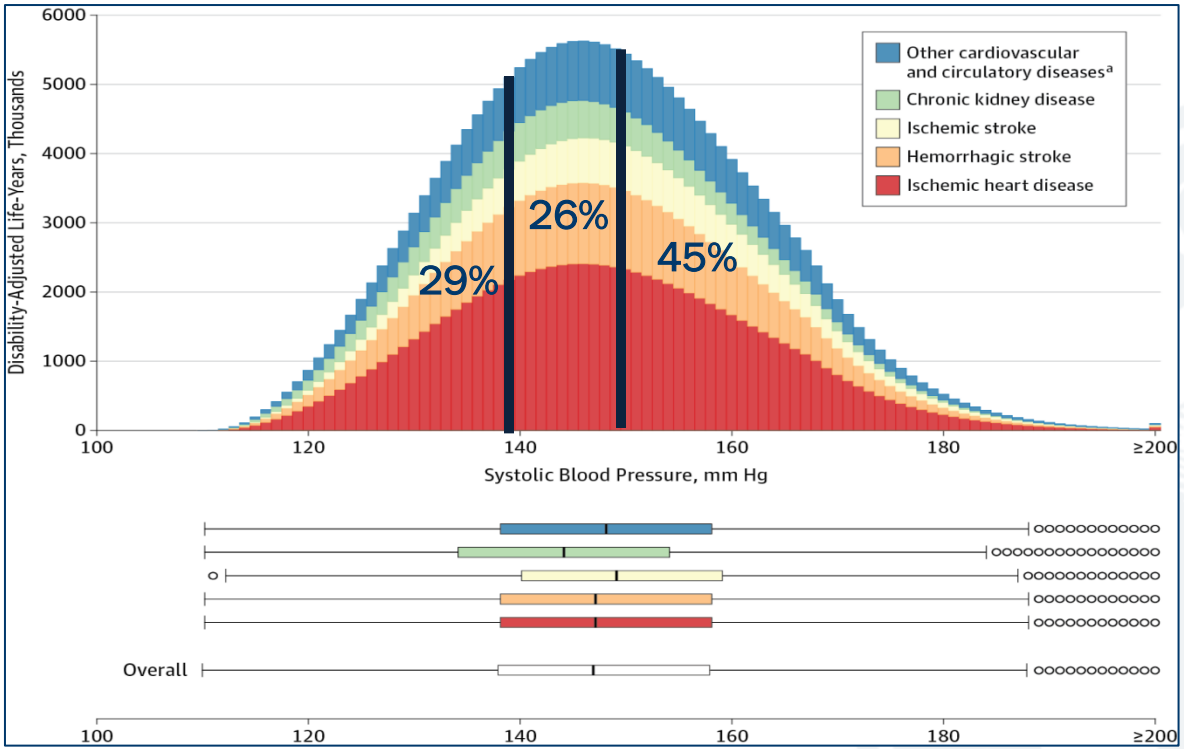
Hypertension: A Global Health Crisis



Forouzanfar MH, *JAMA*. 2017

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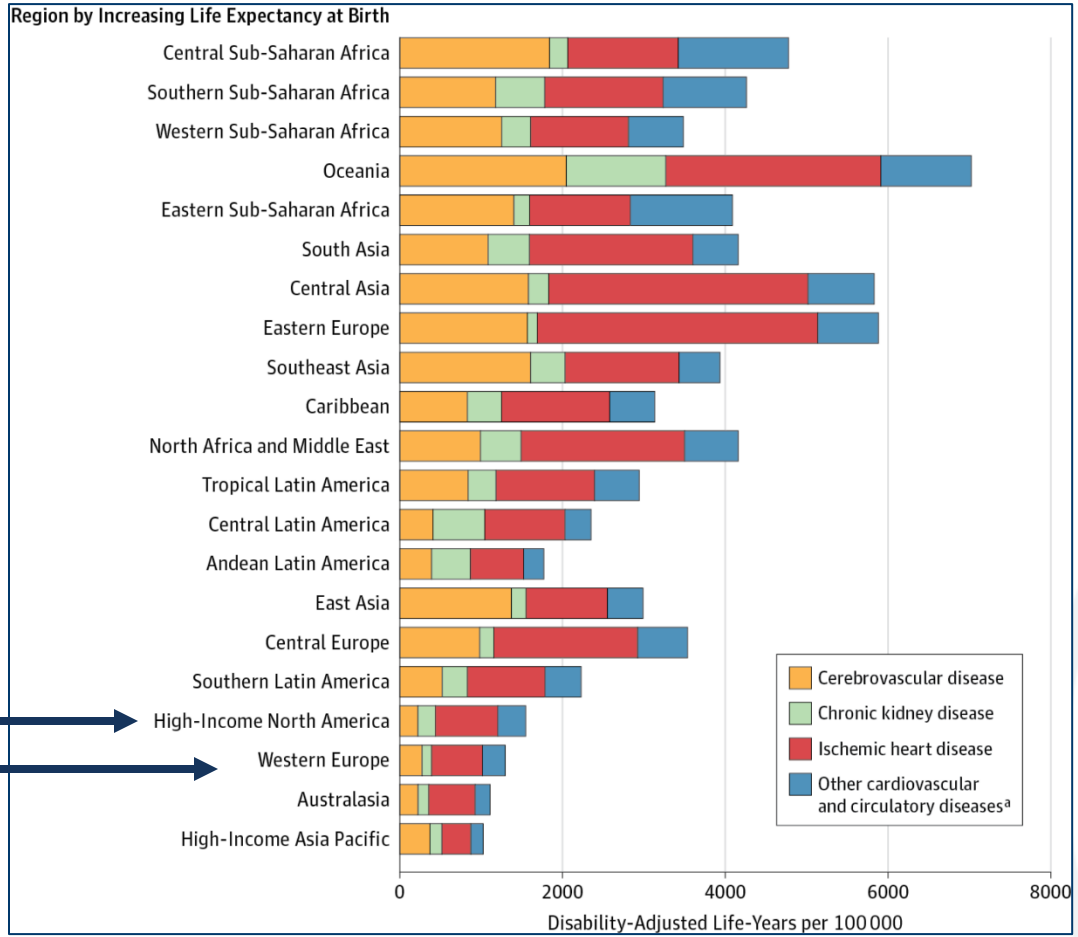

Higher burden of **stroke** in low and middle income regions.

HTN accounted for 14% of deaths (>10 million) & >212 million DALYs in 2015

1.4-fold increase since 1990

Forouzanfar MH, *JAMA*. 2017

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China: Million Persons Project

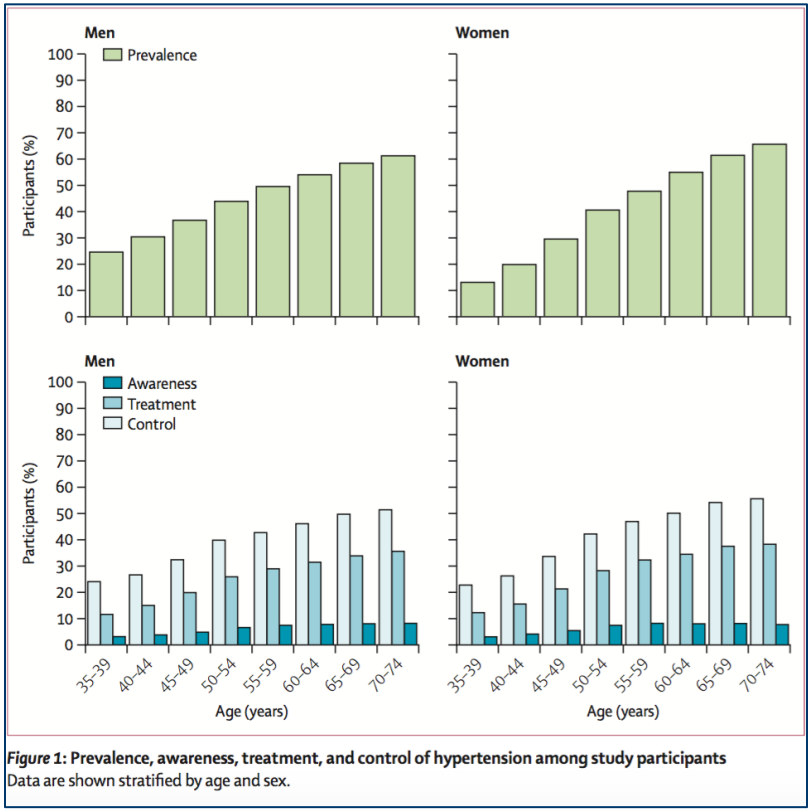

Figure 1: **Prevalence, awareness, treatment, and control of hypertension among study participants**
Data are shown stratified by age and sex.

Overall, ½ of adults aged 35 to 75 had HTN

Only 1/3 were treated

1 in 12 were controlled (<140/90)

Lu J, Lu Y. *Lancet*.,2017

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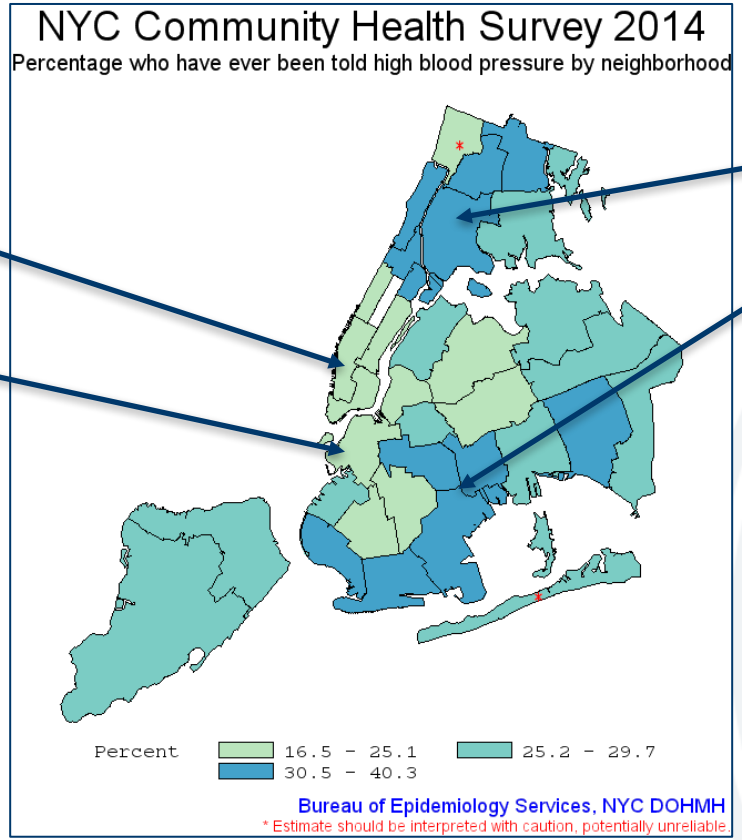
HTN in the US: A Tale of "2" Cities

Manhattan and Brooklyn Heights, HTN rates of 16-25%



Bronx and other parts of Brooklyn, HTN rates of 30-40%

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US Hypertension Prevalence

RACE	
	18 and Over
	Age-Adjusted
Prevalence	29%
White	28%
Black	42%
Hispanic	26%
Asian	25%

INCOME		
25 and Over		
<100% FPL	100-300% FPL	>300% FPL
50.8%	50.8%	40.3%

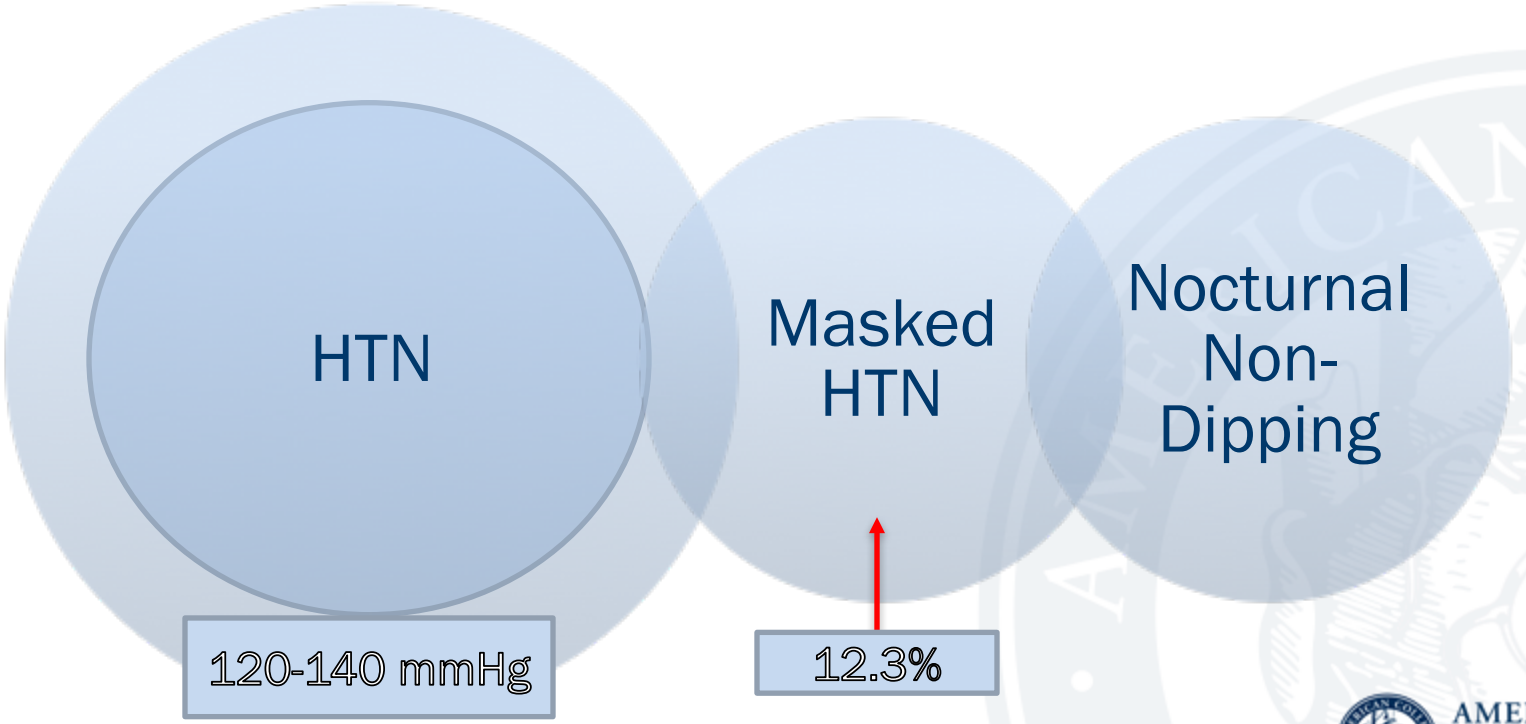
FPL: Federal Poverty Level

Beckman AL…Spatz ES. *JAMA Cardiology*, 2017;
Wang YC…Schwartz JE *Am J Epidemiol*, 2017

The problem is likely much worse.

Other phenotypes of hypertension, typically not measured, *also* portend worse cardiovascular outcomes.

Evaluation: Phenotypes of HTN



Wang YC…Schwartz JE *Am J Epidemiol*, 2017

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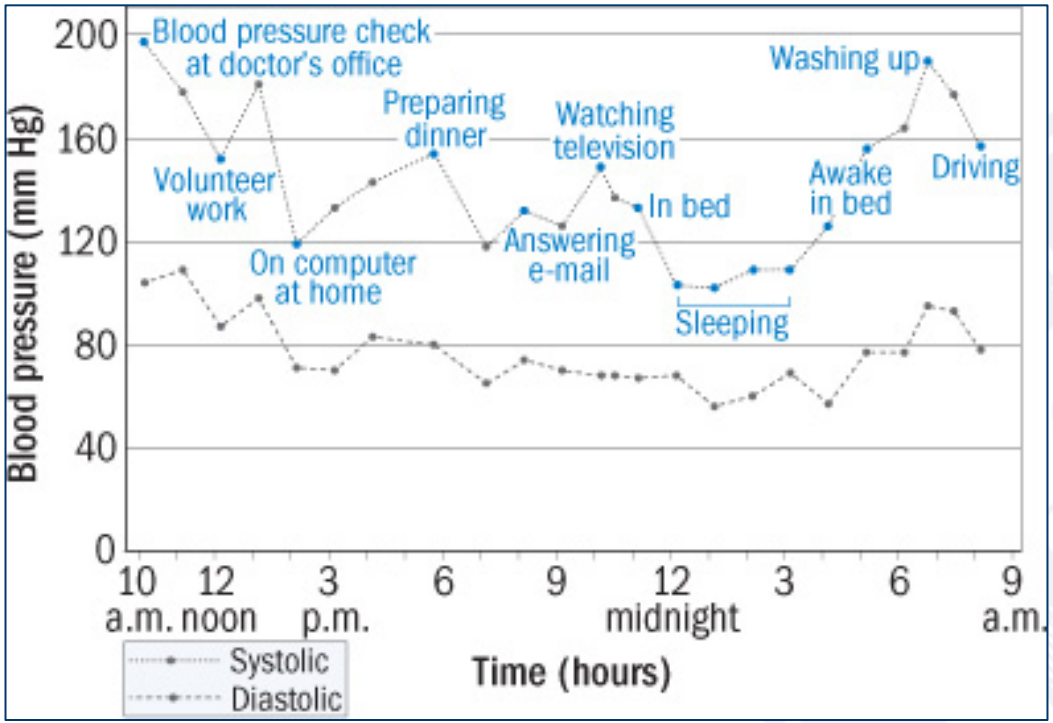
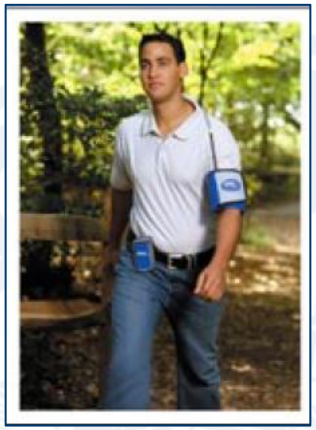
Masked HTN





NIMHD Precision Medicine Grant: ABPM Trajectory Phenotypes

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ACC/AHA 2017 Guidelines

Recommendation for Out-of-Office and Self-Monitoring of BP References that support the recommendation are summarized in Online Data Supplement 3 and Systematic Review Report.		
COR	**LOE**	**Recommendation**
I	A^{SR}	1. Out-of-office BP measurements are recommended to confirm the diagnosis of hypertension (Table 11) and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions (1-4).

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ACC/AHA 2017 Guidelines

Table 6. Categories of BP in Adults*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

Table 11. Corresponding Values of SBP/DBP for Clinic, HBPM, Daytime, Nighttime, and 24-Hour ABPM Measurements

Clinic	HBPM	Daytime ABPM	Nighttime ABPM	24-Hour ABPM
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

Evaluation Summary

- Personalized, Population Health Approach
  - Engage persons inside and outside of the medical setting
  - Focused screening: populations at risk; families; networks
  - Attention to contextual environment
- Diagnosis of HTN
  - Home-based monitoring
  - 24-hour ABPM
  - Develop cheap, convenient BP detection devices

Hypertension Management

To reach BP goal of 120/80 mmHg and…

to improve cardiovascular outcomes

?

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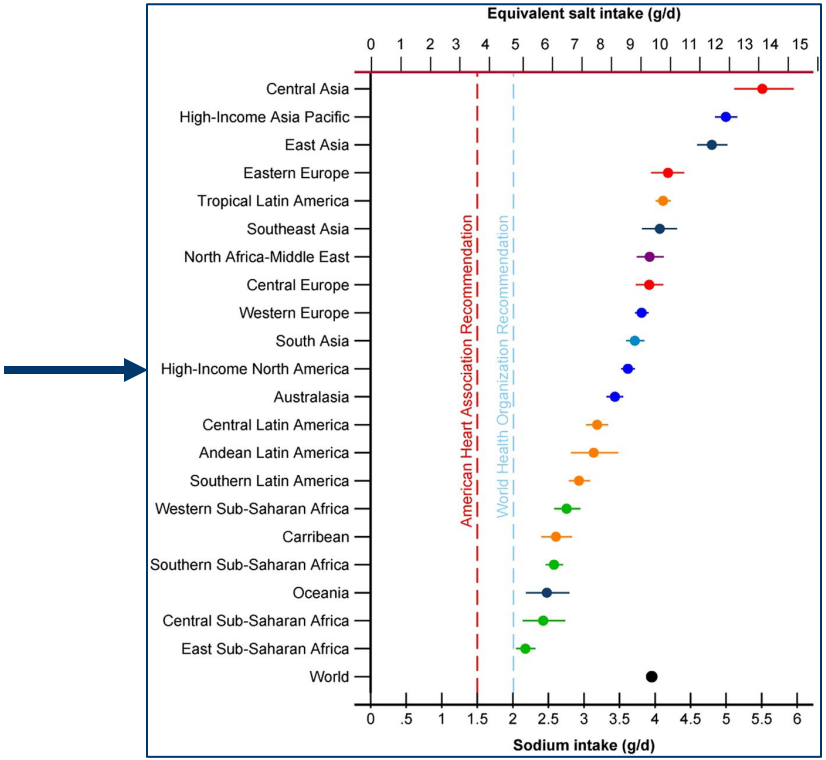
A Global Taste of Salt Intake



- Salt intake is high across the globe.
- N America 4-5 g/d of sodium (goal <2.3 g/d)
- Central, Asian Pacific, East Asia, and Eastern Europe have the highest salt intake

Will lowering salt reduce CV risk?

😇Population Level 😇	😔Individual Level 😔
	
We eat too much salt. Lower sodium intake is associated with lower blood pressure and fewer cardiovascular events	At an individual level, yes in some populations, though its difficult and the benefits are less certain.

Menta A (PURE); O'Donnell MJ (PURE), Mozaffarian D, (NutriCode). NEJM, 2014

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Kirsten Bibbins-Dor
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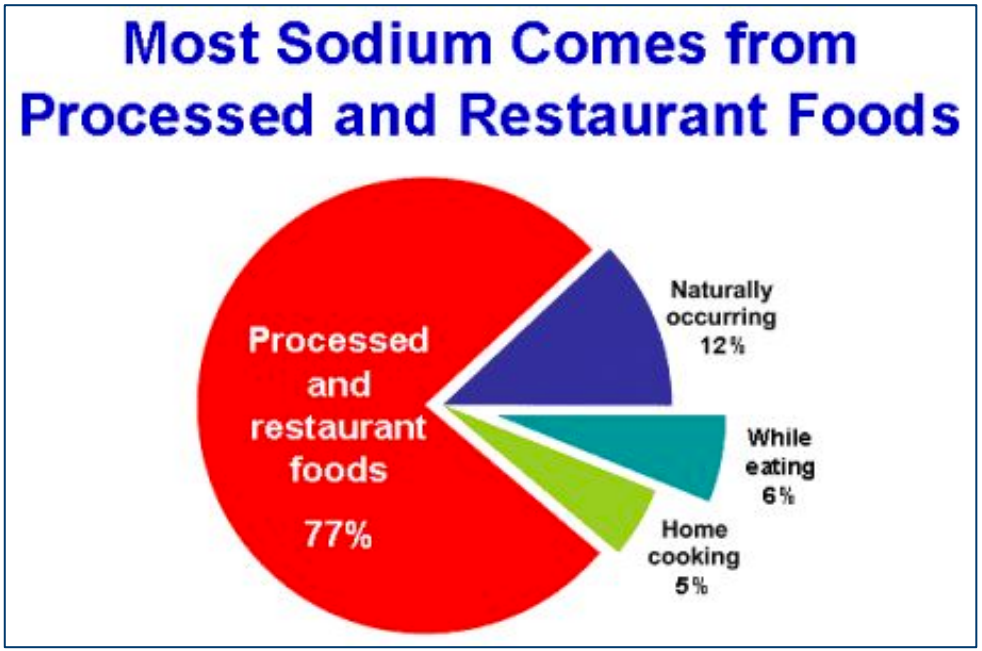
A Correction Has Been Published
Urinary Sodium and Potassium Excretion, Mortality, and Cardiovascular Events
Martin O'Donnell, M.B., Ph.D., Andrew Mente, Ph.D., Sumathy Rangarajan, M.Sc., Matthew J. McQueen, M.B., Ph.D., Xingyu Wang, Ph.D., Lisheng Liu, M.D., Hou Yan, Ph.D., Shun Fu Lee, Ph.D., Prem Mony, M.D., Anitha Devanath, M.D., Annika Rosengren, M.D., Patricio Lopez-Jaramillo, M.D., Ph.D., Rafael Diaz, M.D., Alvaro Avezum, M.D., Ph.D., Fernando Lanas, M.D., Khalid Yusoff, M.B., B.S., Romaina Iqbal, Ph.D., Rafal Ilow, Ph.D., Noushin Mohammadifard, M.Sc., Sadi Gulec, M.D., Afzal Hussein Yusufali, M.D., Lanthe Kruger, Ph.D., Rita Yusuf, Ph.D., Jephat Chifamba, M.Phil., Conrad Kabali, Ph.D., Gilles Dagenais, M.D., Scott A. Lear, Ph.D., Koon Teo, M.B., Ph.D., and Salim Yusuf, D.Phil., for the PURE Investigators
N Engl J Med 2014; 371:612-623 | August 14, 2014 | DOI: 10.1056/NEJMoa1311889

Salt Reduction: Challenge



"The issue is not what you do with your salt shaker."

--David Katz, MD
Yale University Preventive Medicine

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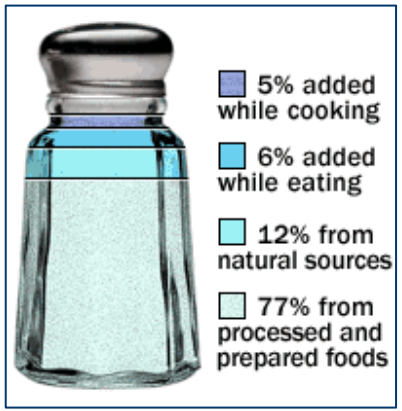
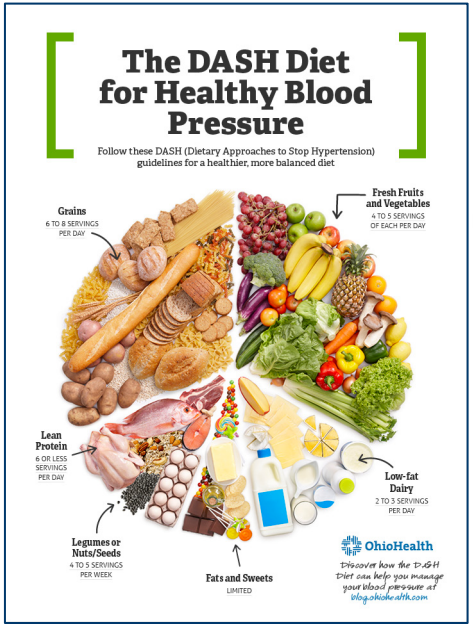
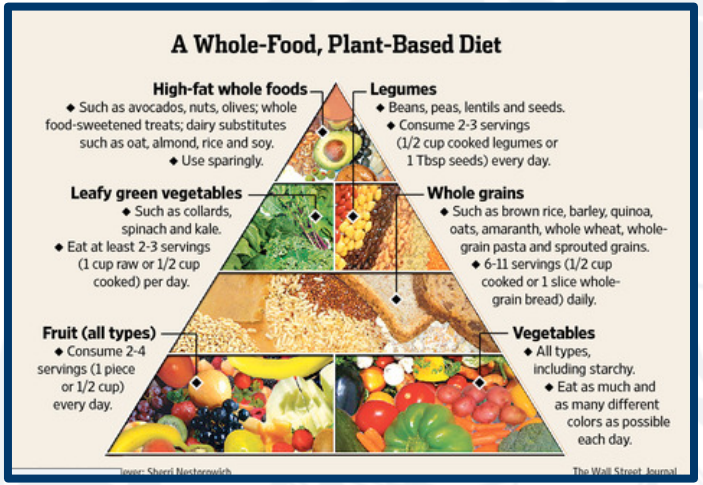
Salt Reduction: Individual Level







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Personalized Approach

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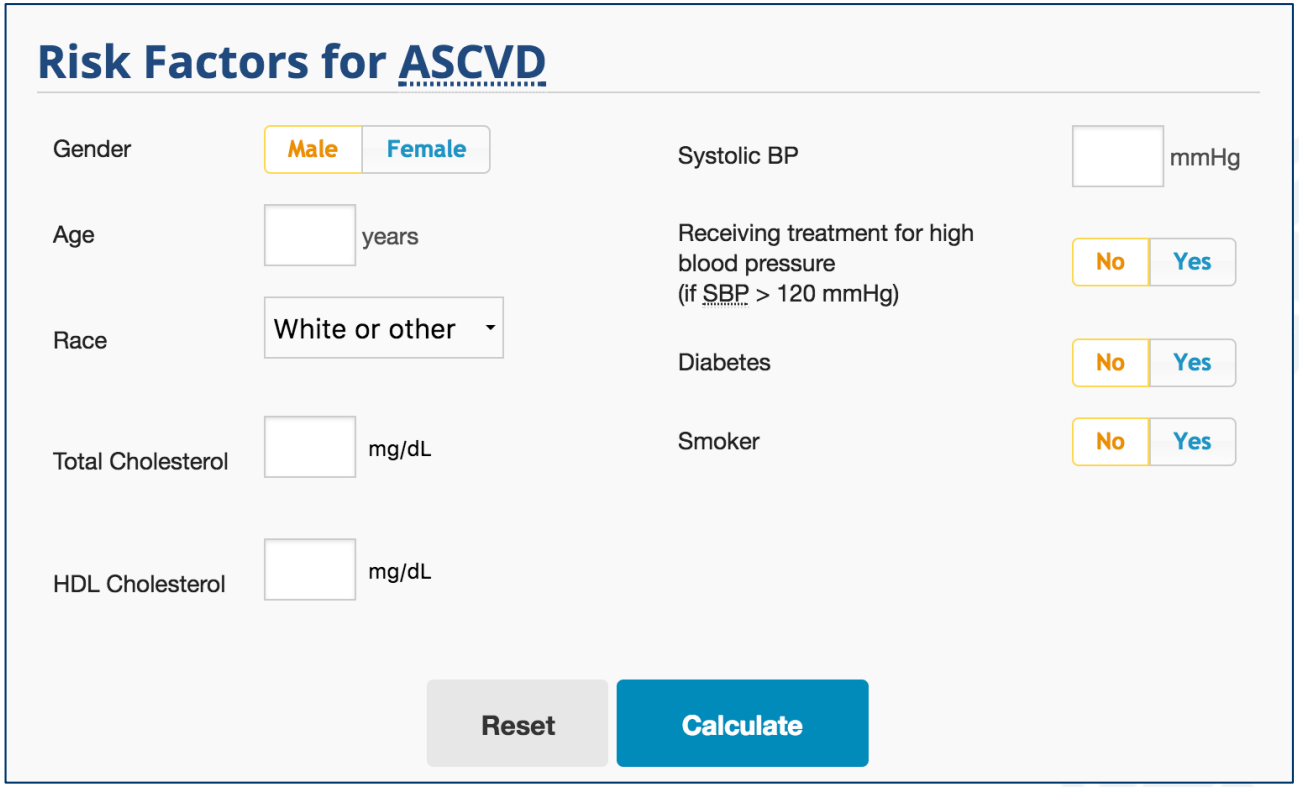
Individualize based on risk



- ✓ Personal evidence of target organ damage
- ✓ Family hx of stroke, CAD, blindness or renal disease

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Individualize based on risk

	SPRINT	ACCORD	HOPE 3
Goal	Treat to Target	Treat to Target	Fixed dose med trial
Strategy tested	<140 vs <120	<140 vs <120	ARB/thiazide v. placebo
In whom?	**High risk patients**	**Diabetes**	**Intermediate risk**
What worked?	<120 mmHg	<140 mmHg	<140 mmHg
At what expense?	++ meds ++ side effects resulting in ED visits	More side effects (renal)	No difference in discontinuation (25% both arms)
At what benefit?	25% RRR in MACE, (no reduction in MI or stroke)	No difference in MACE or death. Fewer strokes.	Benefit restricted to group with systolic BP >142 mmHg

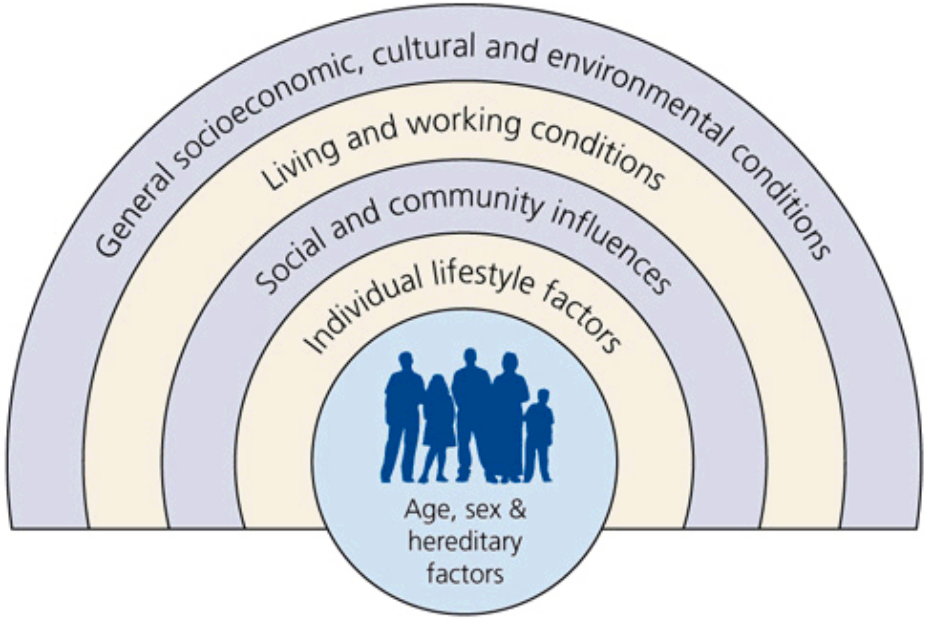
Shared Decision Making

- Personalize identification and characterization of BP patterns
- Assess BP in context of overall CV risk
- Co-design goals
- Find therapies with the least burden
- Manage contributors to hypertension – lifestyle, stress
- Openly address adherence

A person-centered approach takes a health system

Assess Risk Factors

- ✓ Diet
- ✓ Physical Activity
- ✓ Stress
- ✓ Weight
- ✓ Social context
- ✓ Physical env
- ✓ SES
- ✓ Access to care
- ✓ Out of pocket costs



Health Promotion

- ✓ Personalize diagnosis
- ✓ Elicit preferences and goals
- ✓ Do shared decision making
- ✓ Improve health system support
- ✓ Continued feedback and realignment

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