



THE GEORGE INSTITUTE
for Global Health

Hypertension: Global Burden & Barriers

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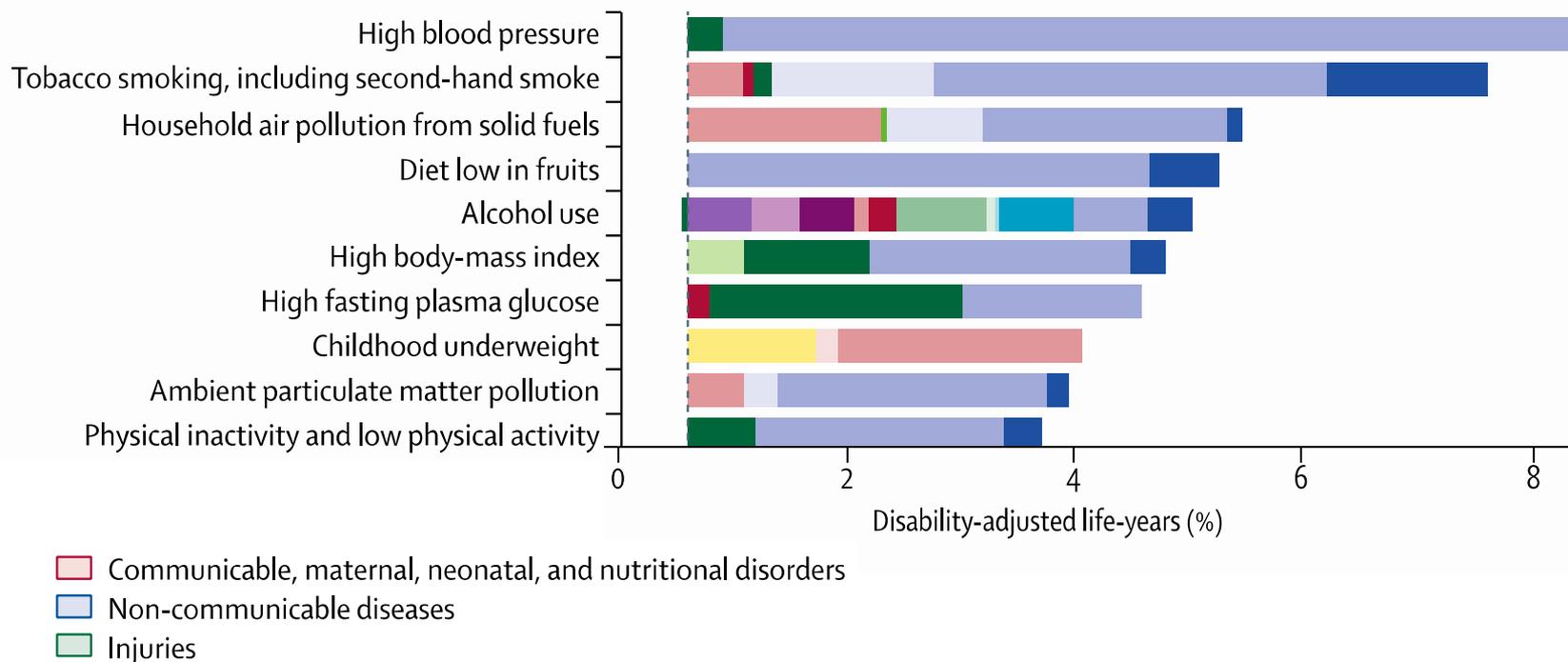
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Overview

- **Introduction**
- **Surveys of burden**
- **A framework to look at barriers to hypertension**
- **Discussion of Barriers**
- **Other issues**
- **Conclusions**

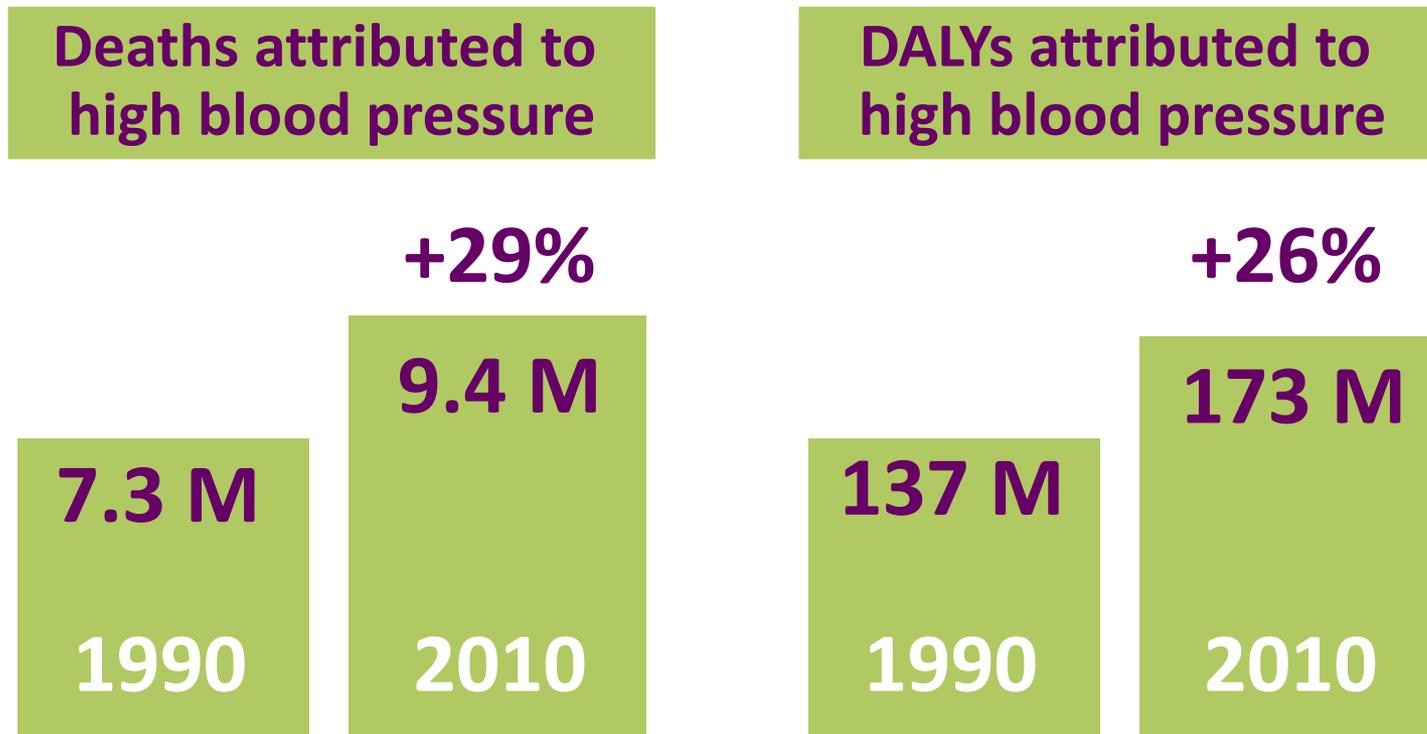
Top 10 contributors to global DALYs

Global Burden of Disease Study 2010



Adapted from Figure 2: Burden of disease attributable to 20 leading risk factors in 2010

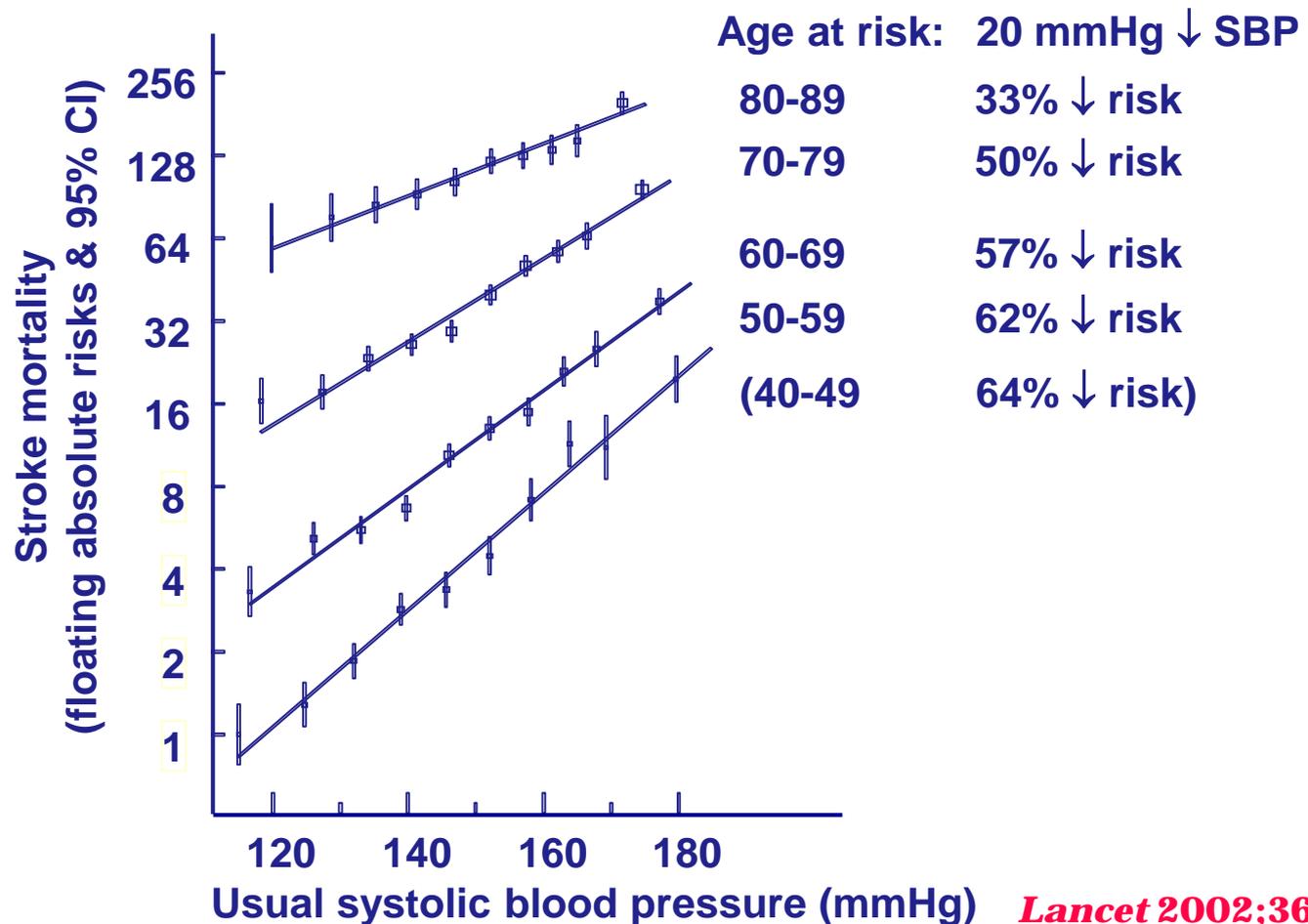
The global burden of high blood pressure



Blood pressure and stroke mortality

Associations among 1 M people

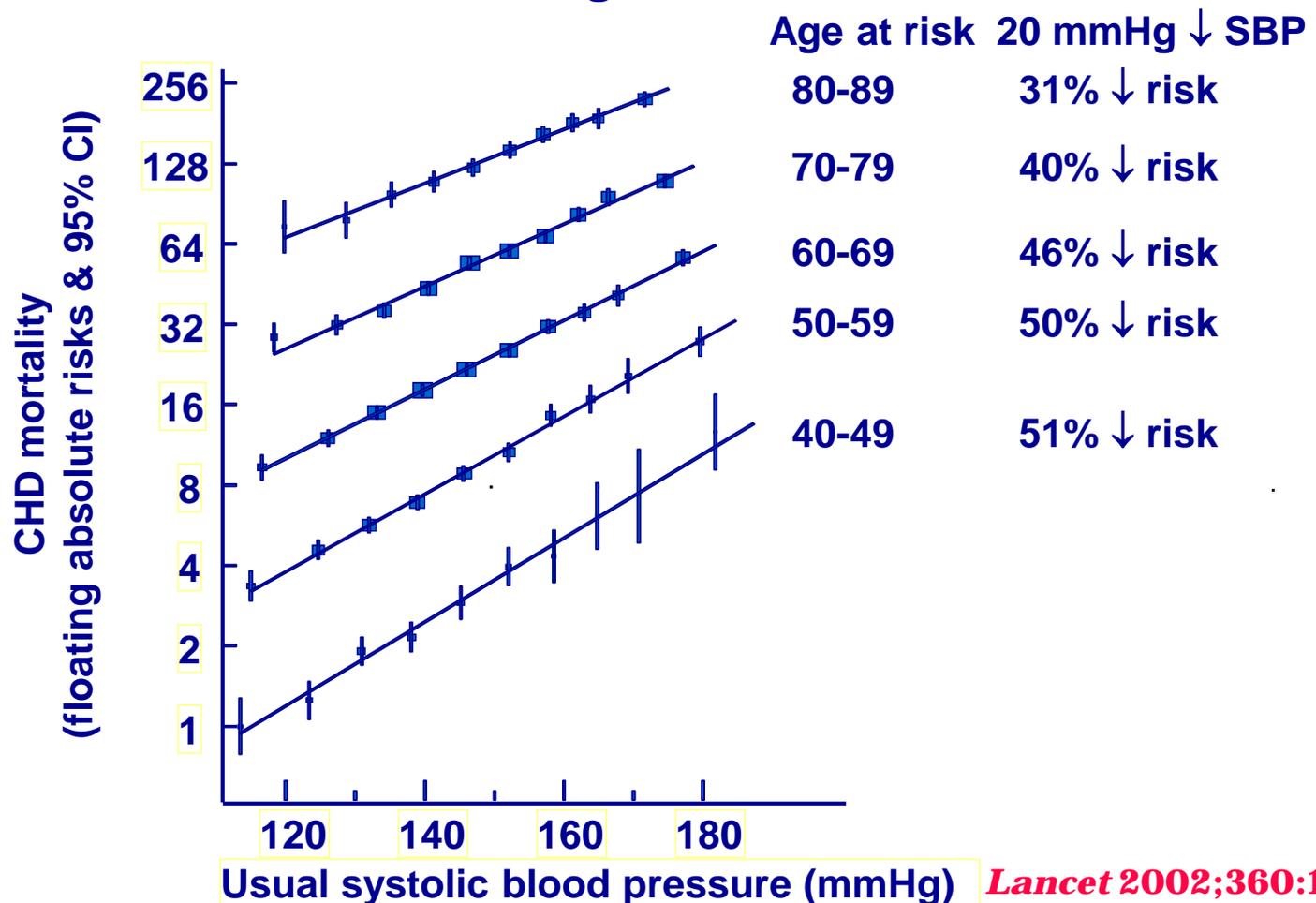
11 274 deaths at ages 50 - 89



Blood pressure and CHD mortality

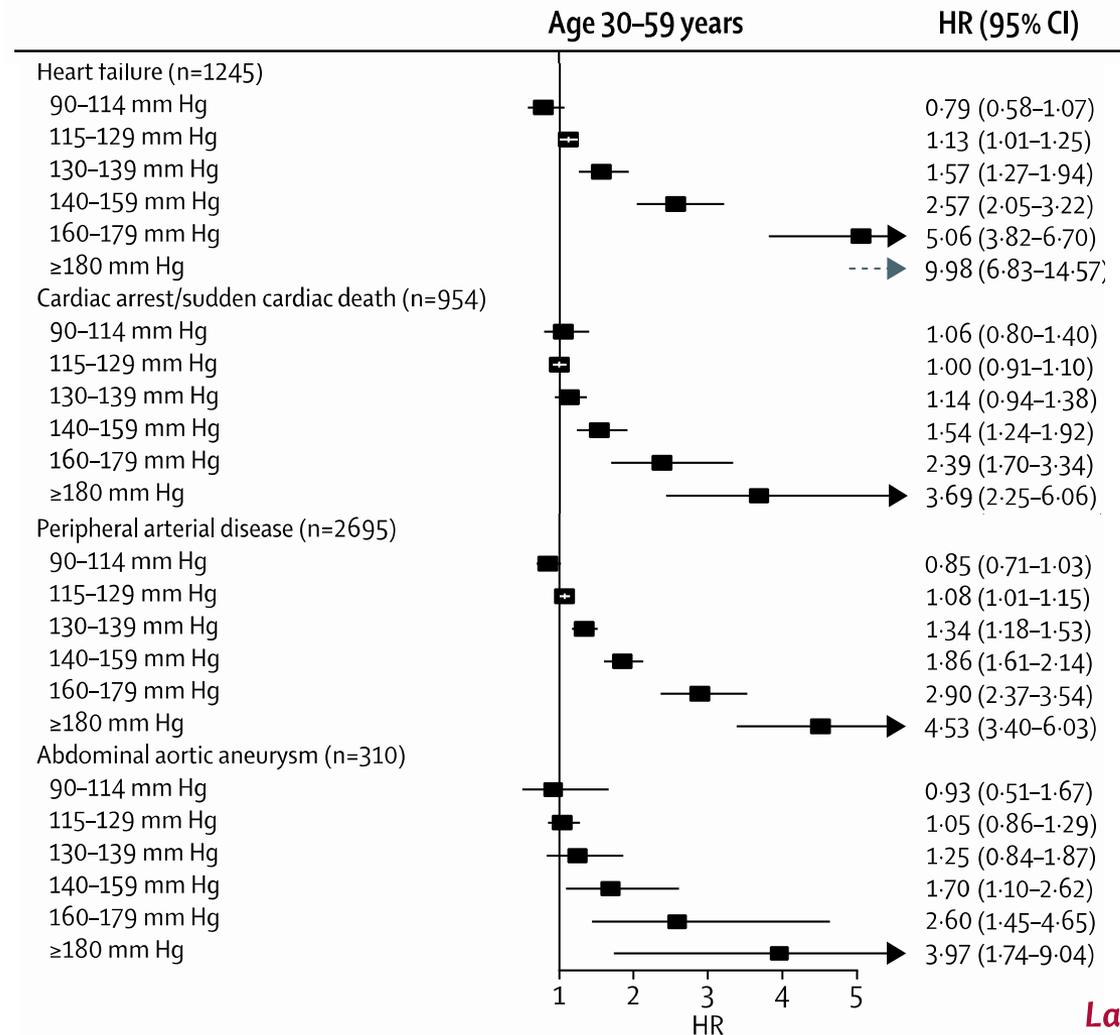
Associations among 1 M people

33 867 deaths at ages 40 - 89



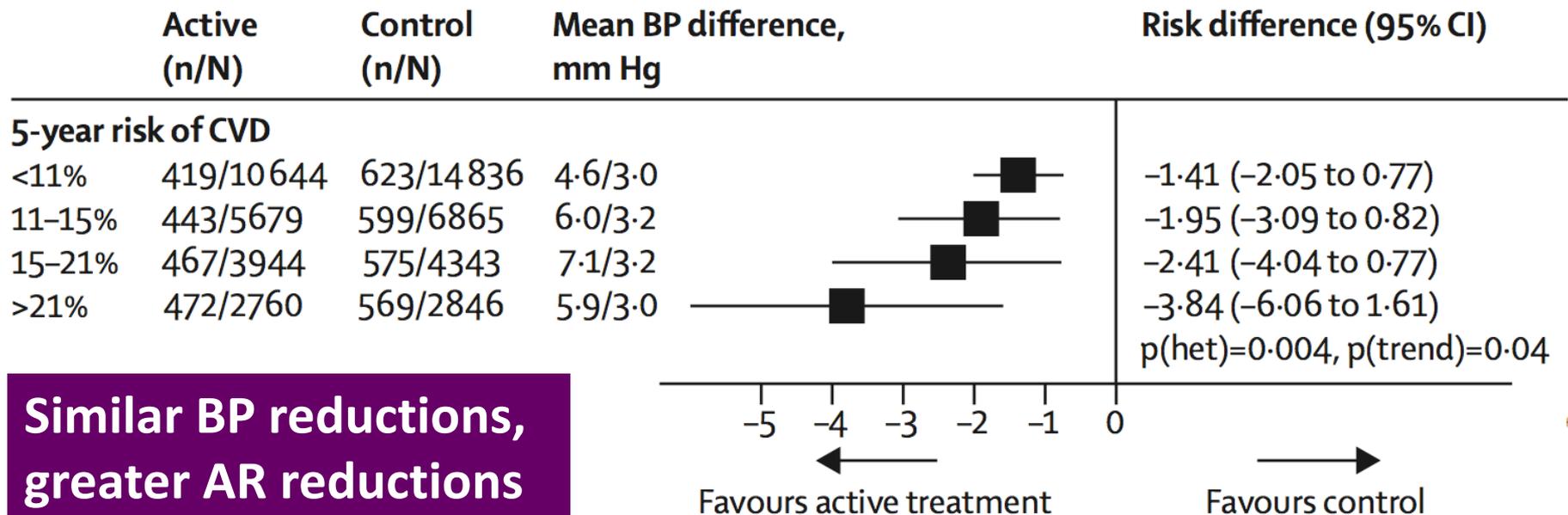
Blood pressure and other cardiac and vascular conditions:

1.25 M people, 83098 cardiovascular events



Effect of blood pressure lowering by 5-year risk of a major cardiovascular event

Part 2: effects on absolute risk

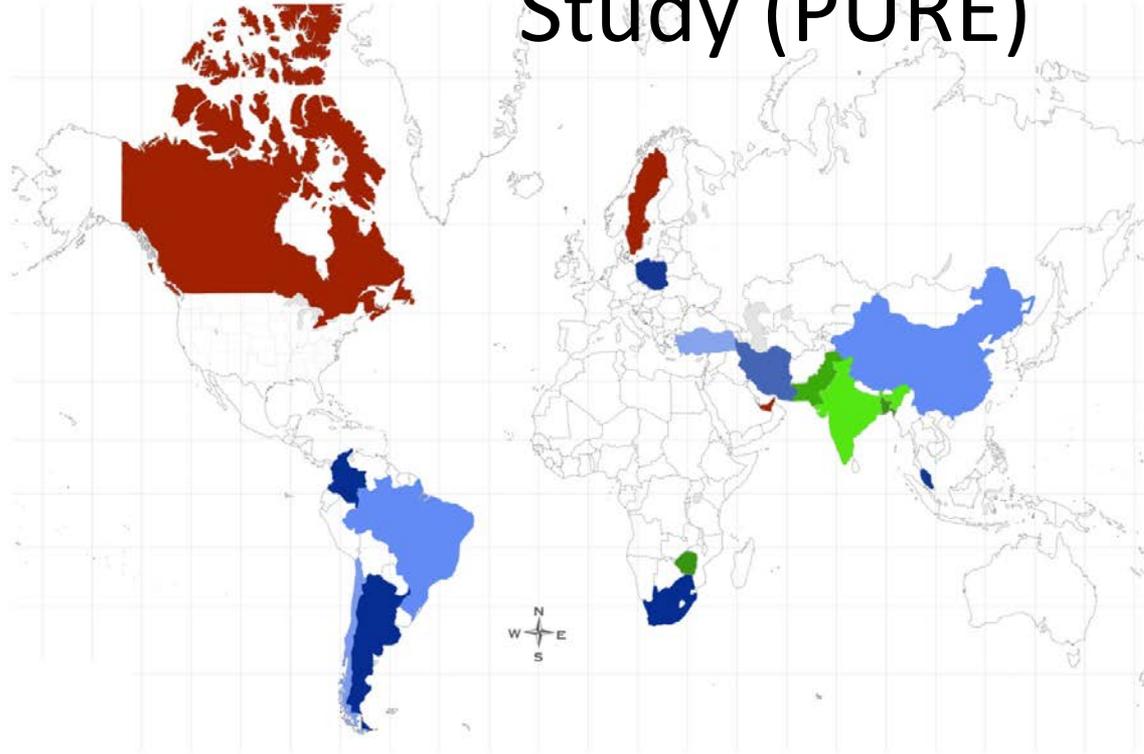


**Similar BP reductions,
greater AR reductions
with higher 5 yr risk**

Burden of hypertension



The Prospective Urban Rural Epidemiology Study (PURE)

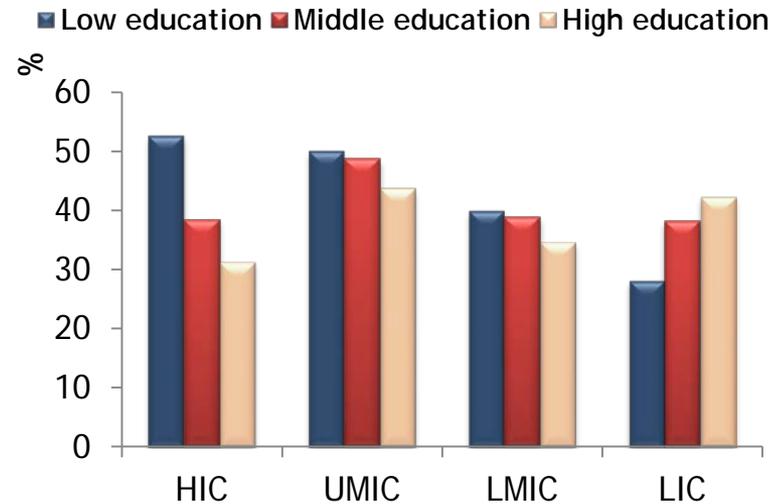
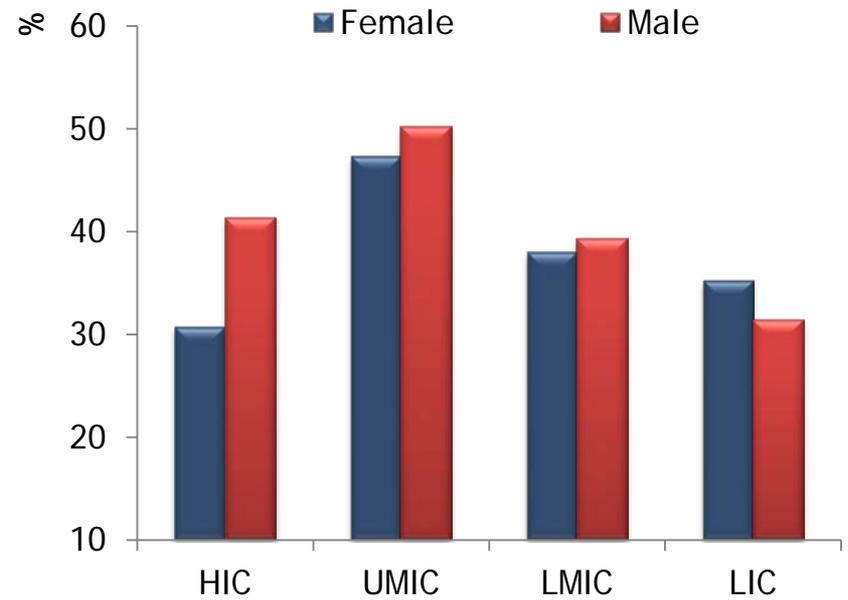
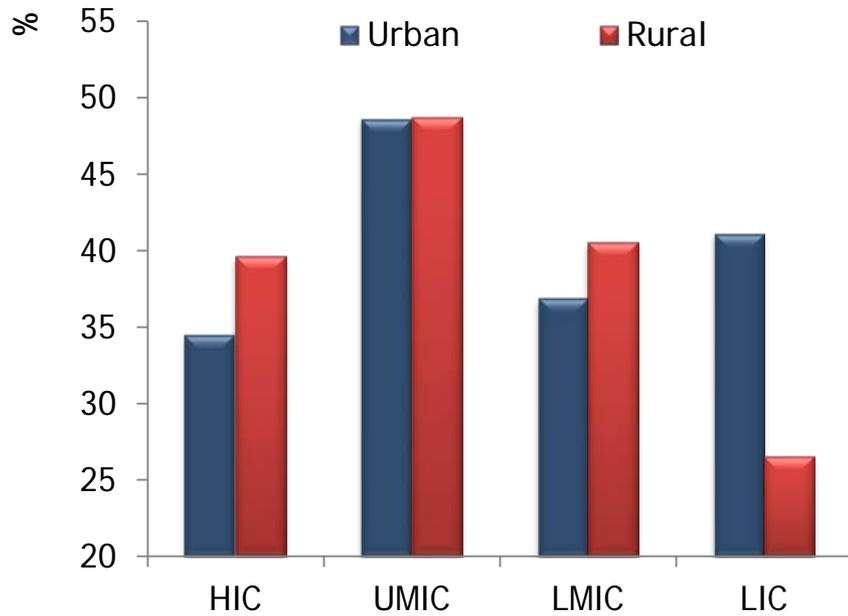


17 countries
41 centres
600 communities
154,000 individuals

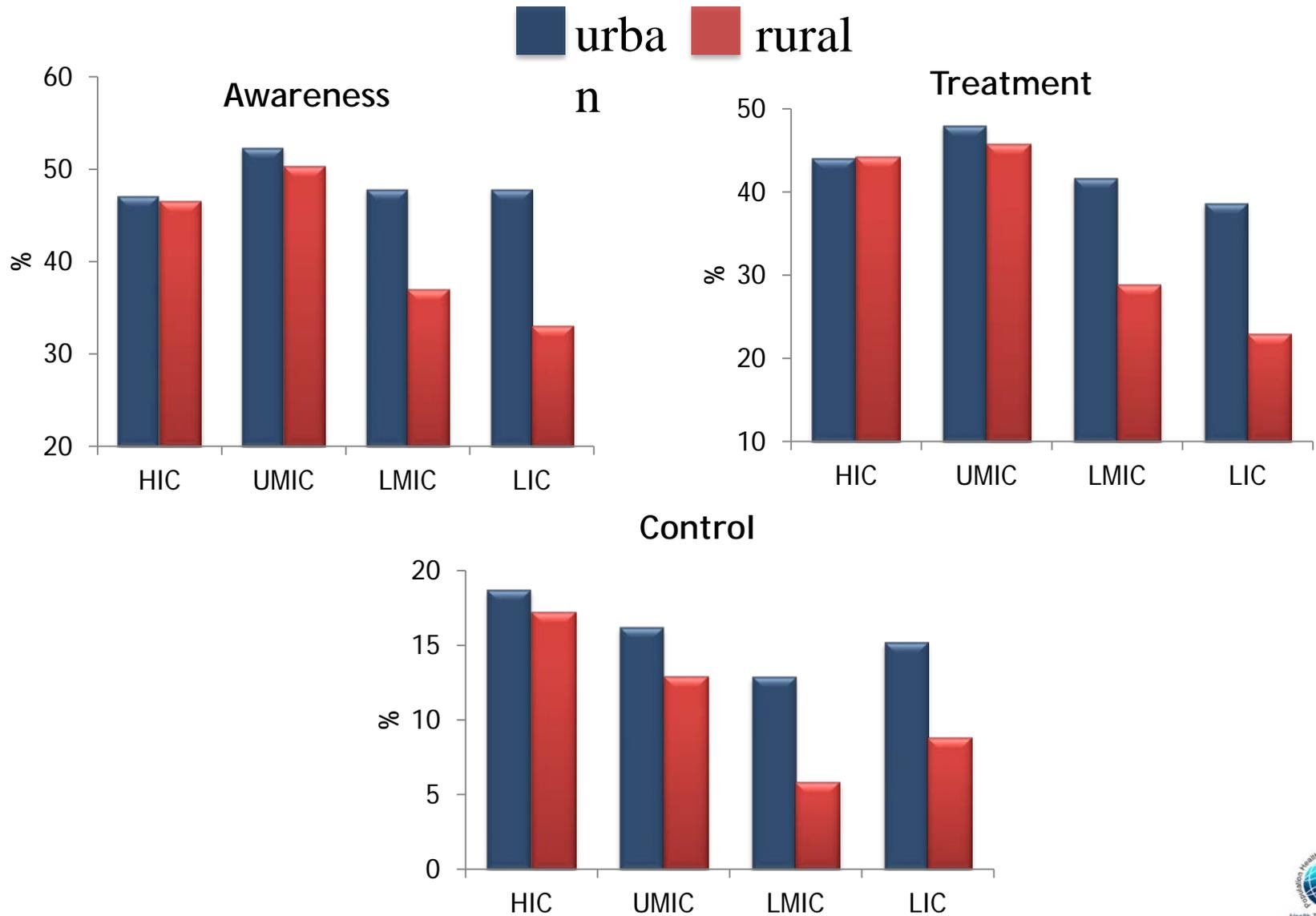
 High Income Countries  Middle Income Countries  Low Income Countries

A multi-community cohort study examining cardiovascular RFs/ disease and their determinants

Prevalence of Hypertension



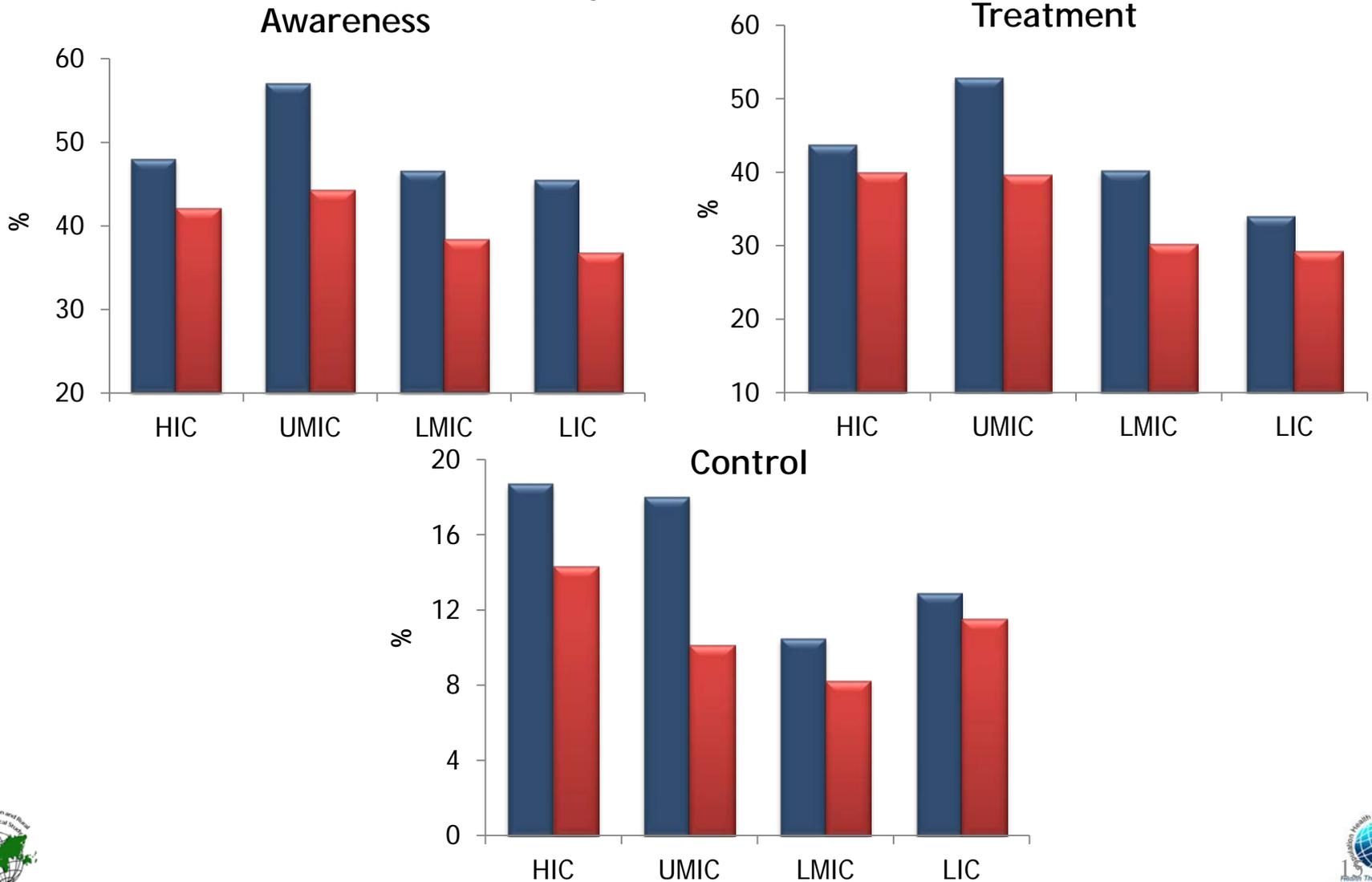
Awareness, treatment and Control by urban-rural location



Awareness, treatment and Control by gender

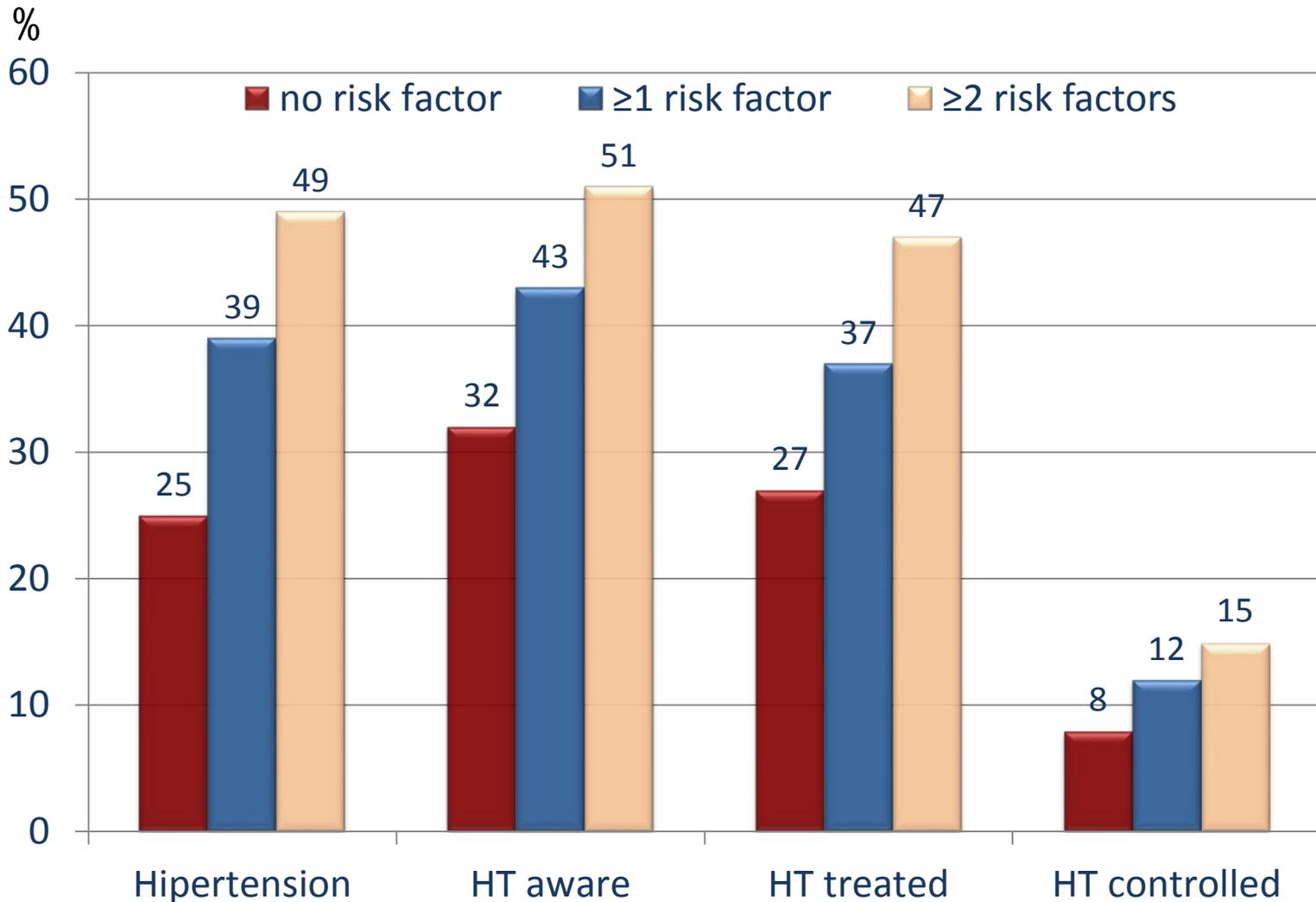
femal male

e



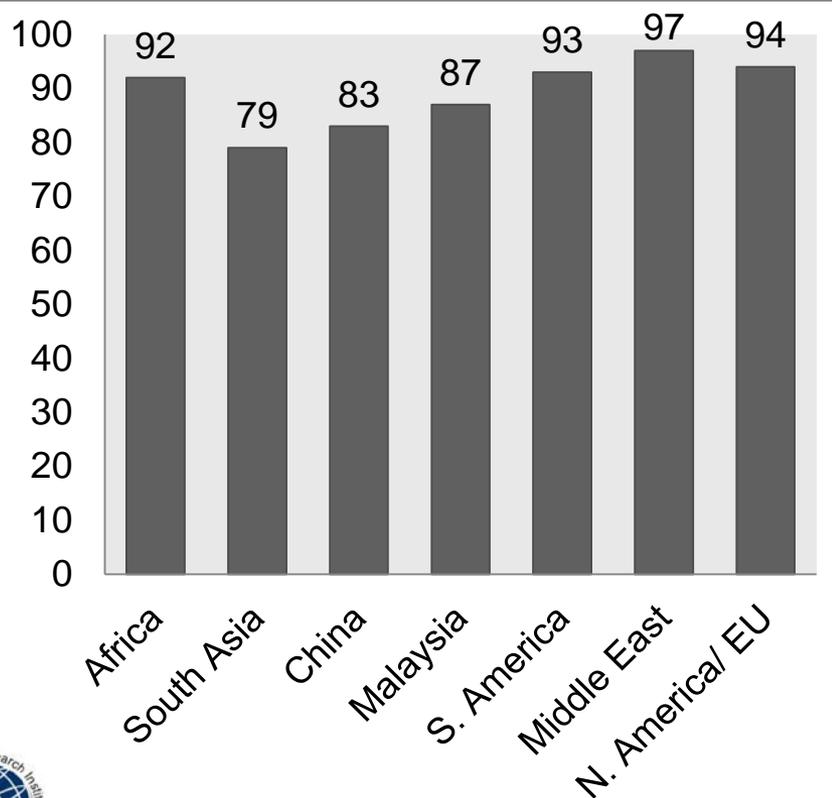
Prevalence, awareness, treatment and control of hypertension amongst those with and without other cardiovascular risk factors

Risk factors include diabetes, current or former smoker, obesity, >65 years and male

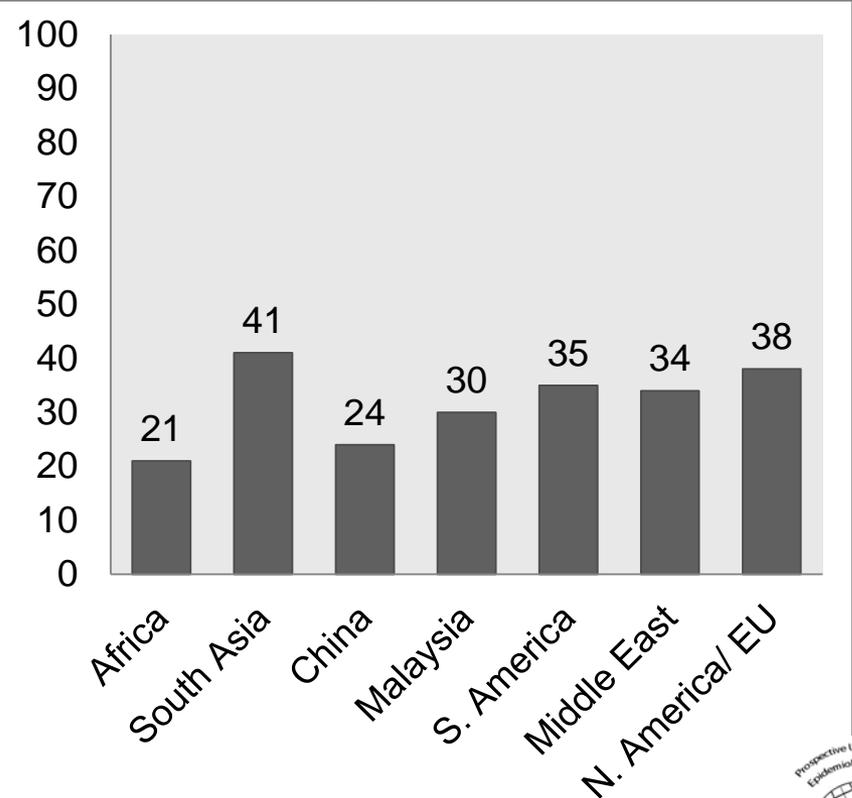


The gap in control of blood pressure

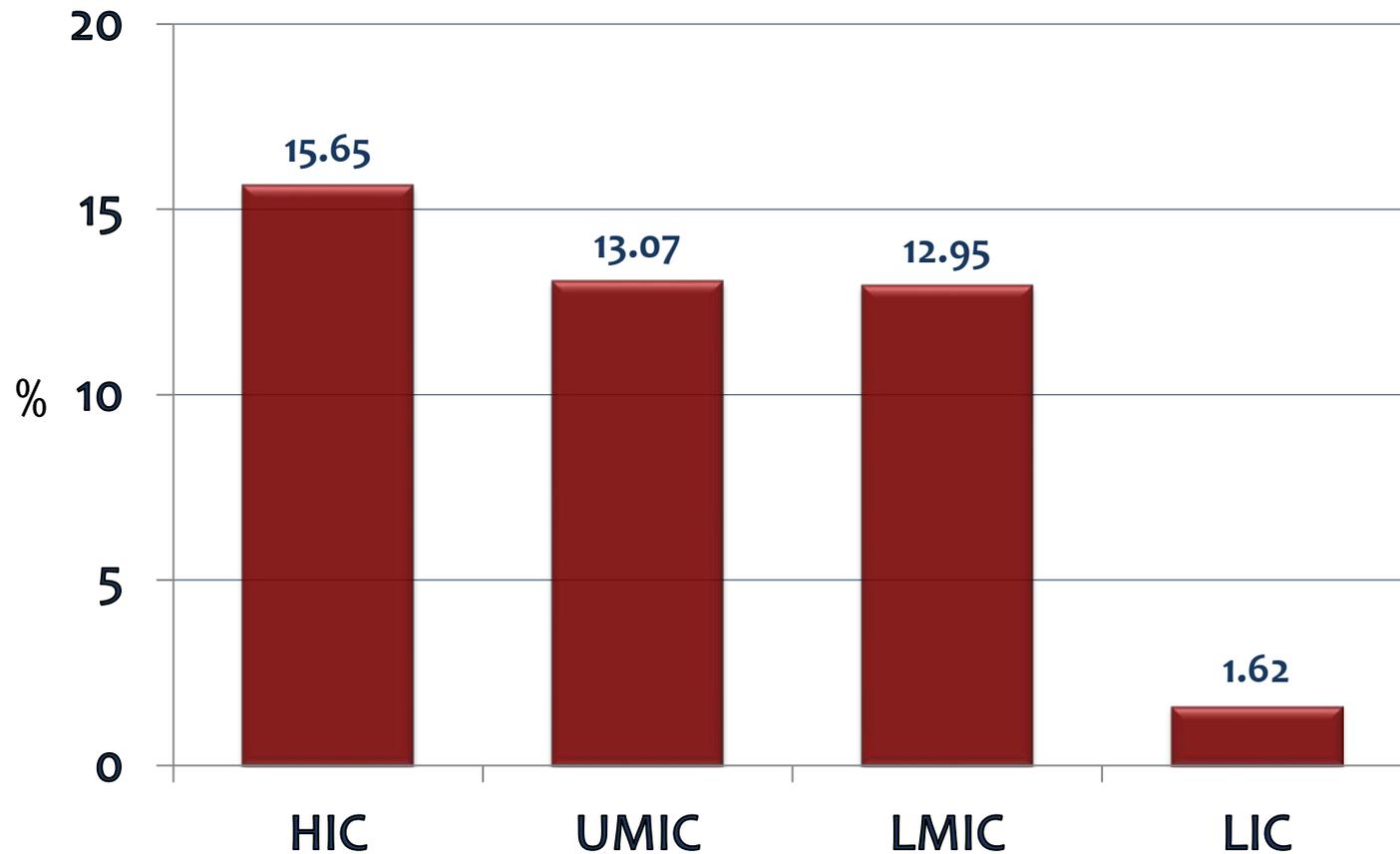
Treated among those aware of their HT



Controlled BP (<140/90) amongst those receiving treatment

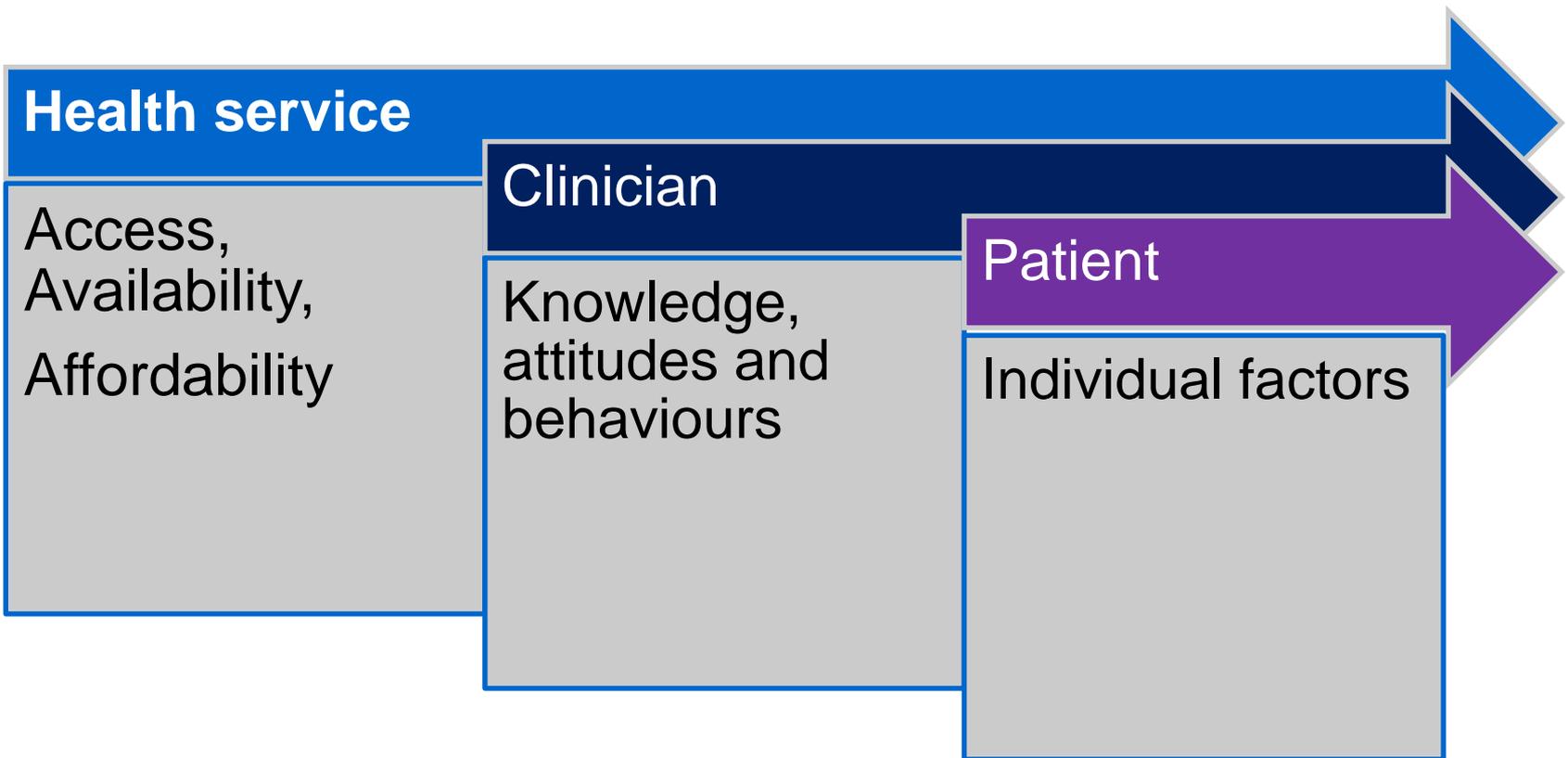


Use of ≥ 2 BP lowering medications



BARRIERS TO HYPERTENSION CONTROL

Barriers to HT control



Patient and Clinician Factors



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Patient and Clinician factors

- **Adherence**
- **Medication side effects**
- **Number of medications**
- **Complexity of dosing regimens**
- **Lack of motivation**
- **Perceived lack of benefit**
- **Making the diagnosis and deciding when to treat**
- **White coat hypertension**
- **Lack of up-titration – ‘Therapeutic inertia’**
- **Perceived inappropriate target BP**

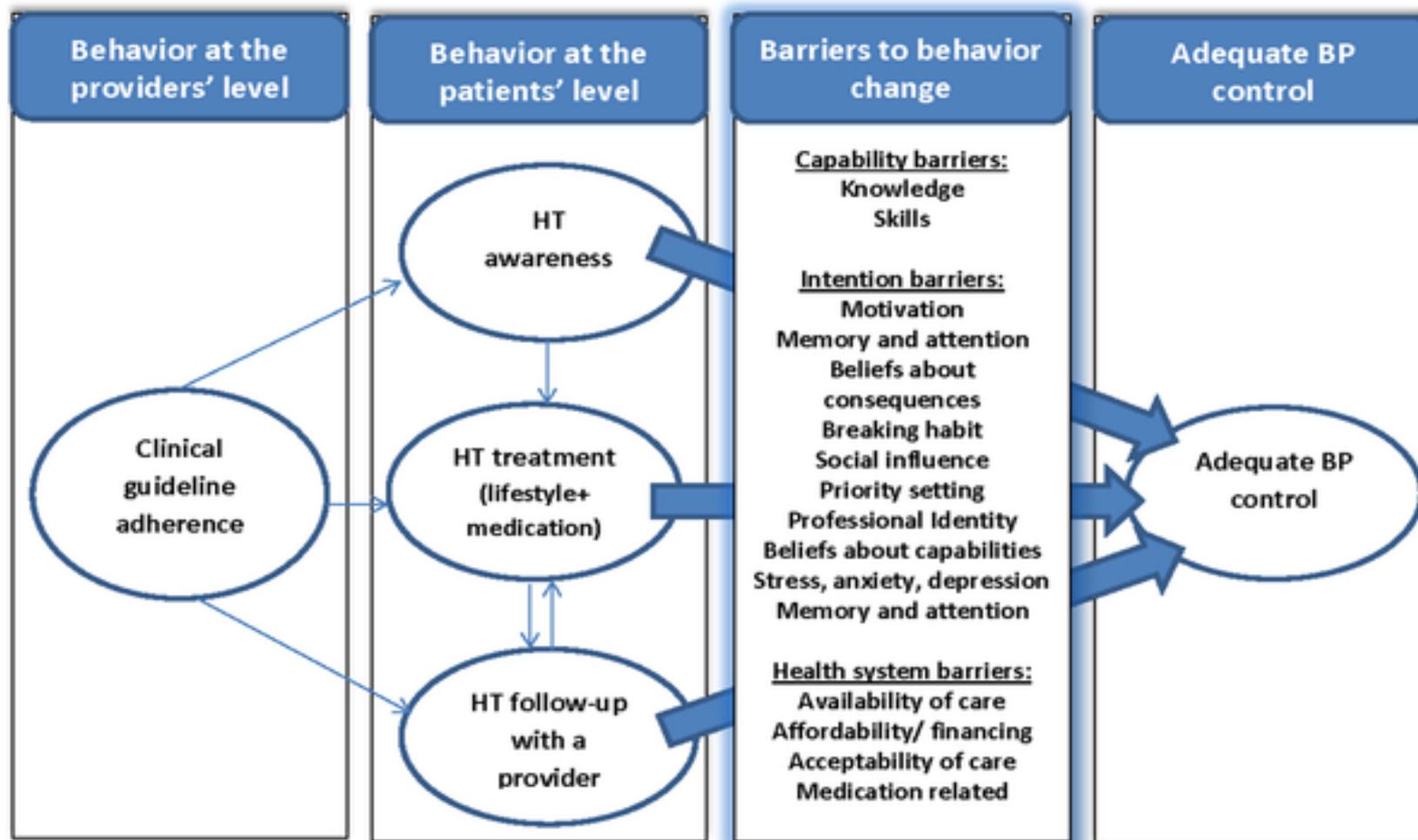


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Patient and Healthcare Provider Barriers to Hypertension Awareness

- Systematic review: 25 qualitative and 44 quantitative studies
- Most U.S., 20% LMIC. 28% population based, most clinic/hospital. Health Care provider: 33% Non-Physician HCW
- Quantitative studies identified *disagreement with clinical recommendations* as the most common barrier among health care providers.
- Quantitative studies: *lack of knowledge* was the most common barrier to hypertension awareness. *Forgetting to take medication* as common barrier to hypertension treatment adherence.
- LMIC vs HIC – LMIC: lack of equipment, medication, time, and specialists. HIC: availability of guidelines and organization of follow up care

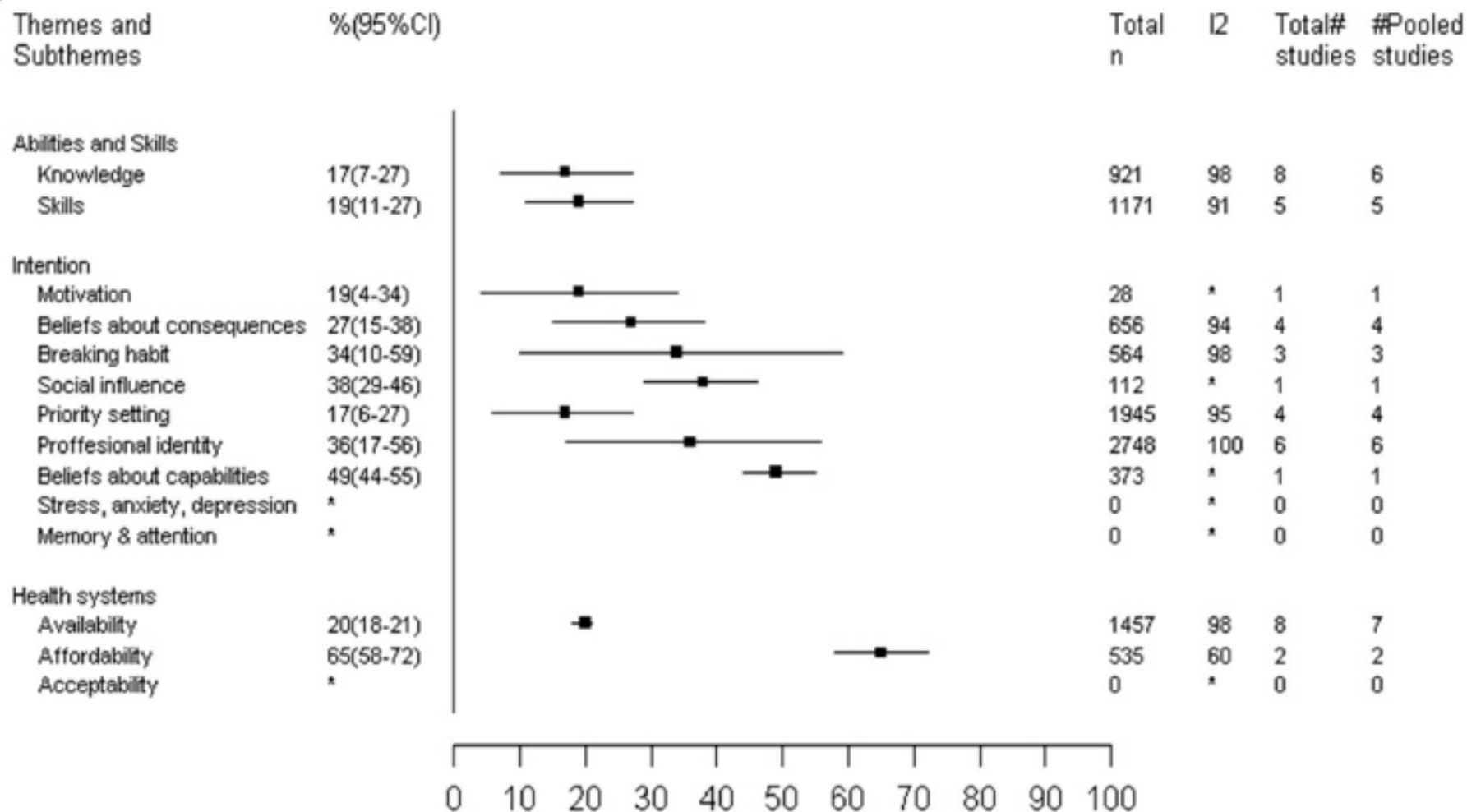
Figure 1. Barriers to hypertension management, modified from Michie et al (2004) and Fishbein et al (2000).



Khatib R, Schwalm J-D, Yusuf S, Haynes RB, et al. (2014) Patient and Healthcare Provider Barriers to Hypertension Awareness, Treatment and Follow Up: A Systematic Review and Meta-Analysis of Qualitative and Quantitative Studies. PLoS ONE 9(1): e84238. doi:10.1371/journal.pone.0084238

<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0084238>

Pooled prevalence (%) and 95% CI of provider level barriers to hypertension management organized by Michie et al framework (n = 13).



Factors associated with NOT being Aware of HT

Factor	Aware N=33540	Not Aware N=27917	OR (95% CI)	P-value
Age < 50 yrs	24.8%	38.1%	1.83 (1.76 – 1.89)	<0.0001
Male	39.1%	48.0%	1.49 (1.44 – 1.54)	<0.0001
Never married	3.7%	4.5%	1.38 (1.26 – 1.50)	<0.0001
Primary or less	47.8%	45.6%	1.03 (0.99 – 1.06)	0.1875

Multivariate models include age, gender, education, region, location (urban v rural), marital status, n= n=62023

Factors associated with NOT being on Treatment

Factor	Treated N=26263	Not treated N=35760	OR (95% CI)	P-value
Age < 50 years	20.5%	38.4%	2.35 (2.26 – 2.44)	<0.0001
Male gender	38.9%	46.3%	1.47 (1.42 – 1.52)	<0.0001
Never married	3.7%	4.4%	1.41 (1.29 – 1.54)	<0.0001
Primary or less	46.6%	46.9%	1.16 (1.12 – 1.21)	<0.0001

Multivariate models include age, gender, education, region, location (urban v rural), marital status n=62023

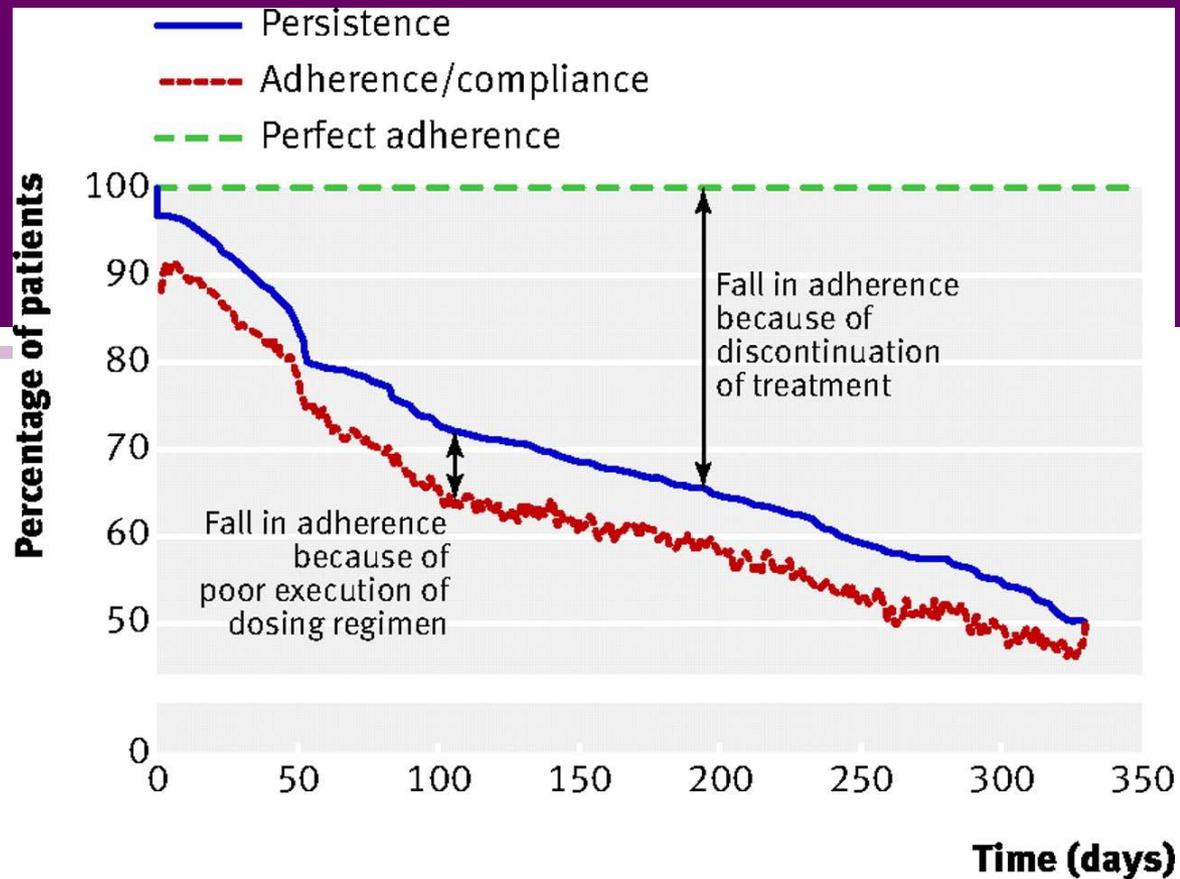
Factors associated with NOT being Controlled

Factor	Controlled N=11799	Not controlled N=50224	OR (95% CI)	P-value
Age < 50 years	29.6%	31.1%	1.07 (1.02 – 1.12)	0.0053
Male gender	37.0%	44.6%	1.42 (1.36 – 1.49)	<0.0001
Never married	4.1%	4.0%	1.07 (0.96 – 1.18)	0.2335
Primary or less	44.0%	47.5%	1.06 (1.01 – 1.11)	0.0127

Multivariate models include age, gender, education, region, location (urban v rural), marital status, n=62023

Adherence

Data from 4783 patients with HT in phase IV clinical studies monitored with a medication event monitor (MEMS), archived in database for 1989 – 2006

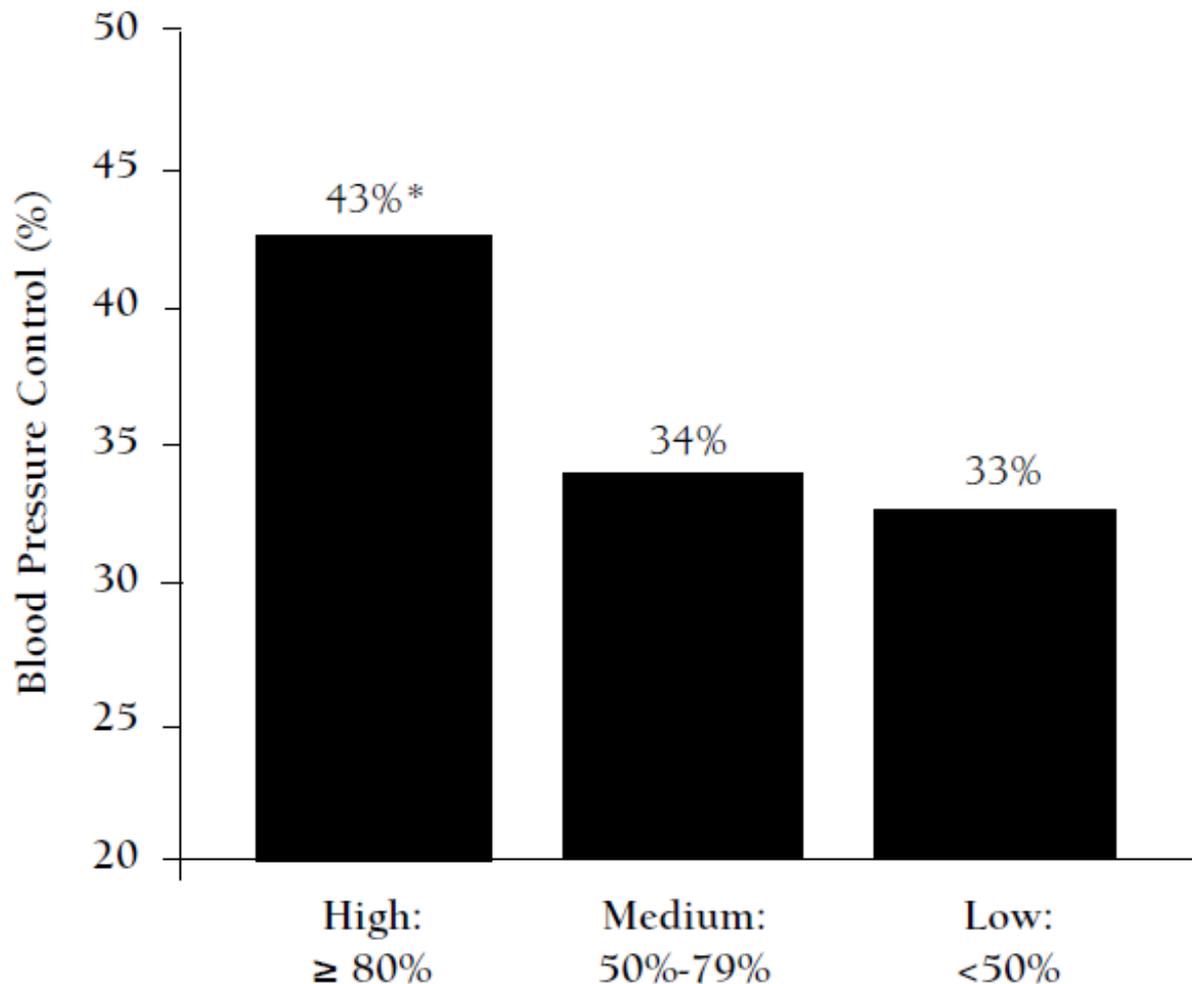


No of patients remaining in study	3108	980	828	618	474	400	331
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About half of the patients who were prescribed an antihypertensive drug had stopped taking it within 1 years. On any day, patients were still engaged with the drug dosing regiment omitted about 10% of the scheduled doses: 42% of these omissions were of a single day's dose, whereas 43% were part of a sequence of several days. About half of patients had at least one drug holiday a year.

Morning takers were more likely to take meds than evening takers (1.38, 1.36 – 1.41). Sunday morning was when morning takers missed most doses.

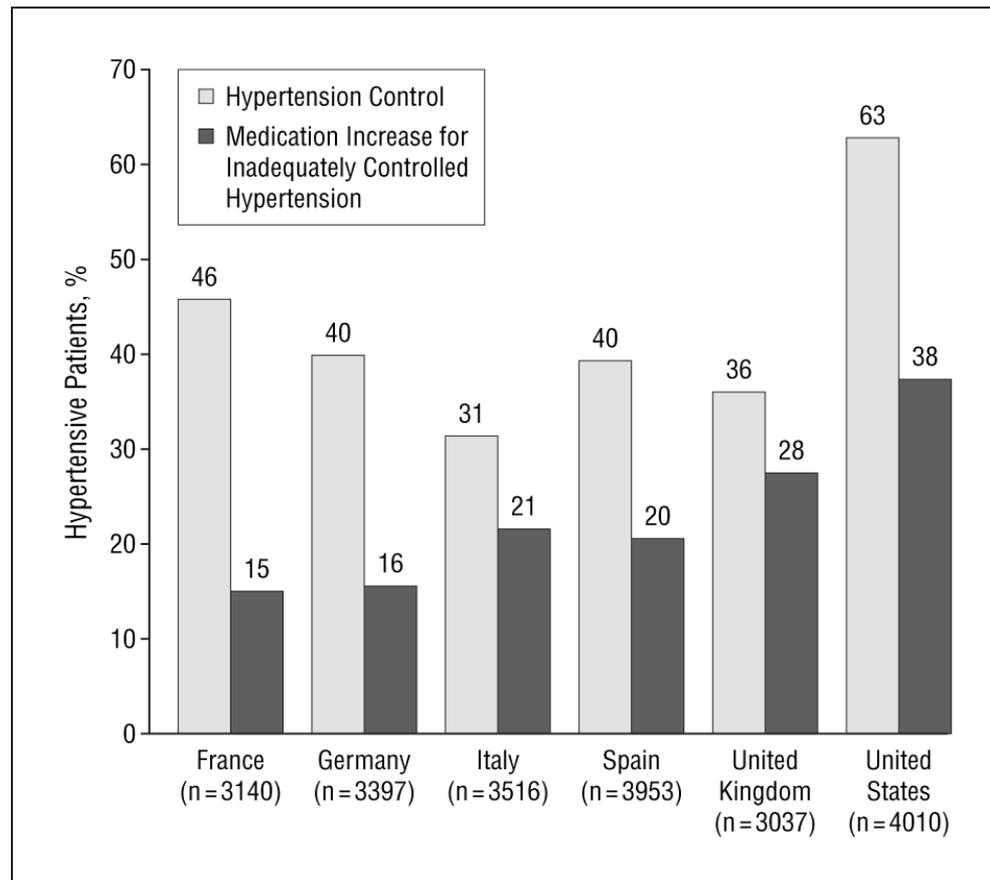
BP Control by category of medication adherence



**P = 0.06 prior to adjustment; P = 0.026 in regression analysis*

Cross-country differences in control and medication increases

Data from 21,053 hypertensive patients visiting 291 cardiologists and 1284 primary care physicians, *Cardiomonitor* 2004



Medication increases were a dose escalation or an addition to or switch of drug therapy

Reasons for not Intensifying Antihypertensive Treatment (RIAT) survey

- **Representative samples of physicians in 16 countries, 1596 centres in Latin America, Eastern Europe, Africa, Asia enrolled hypertensive patients**
- **32,224 (91.4%) complete follow up to visit 4**
- **Mean interval between each visit ~1month**
- **Baseline BP 159/95**
- **Most physicians defined a target BP for their patients identical or lower than the one specified by national or international guidelines**

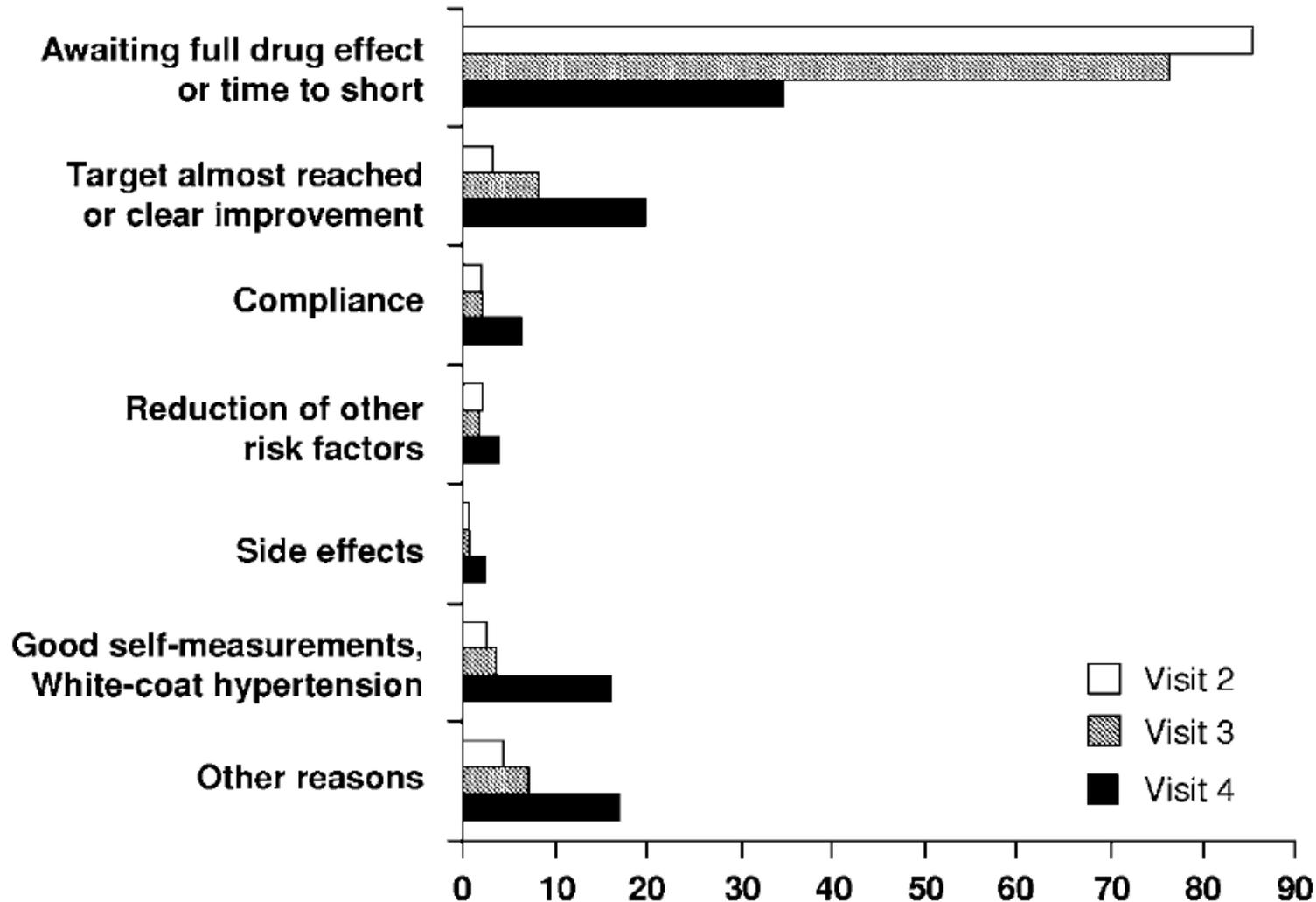
Ferrari J Hum HT(2009) 23, 151–159



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Reasons for not Intensifying Antihypertensive Treatment (RIAT)



Physician perceptions about BP targets and acceptable BP levels

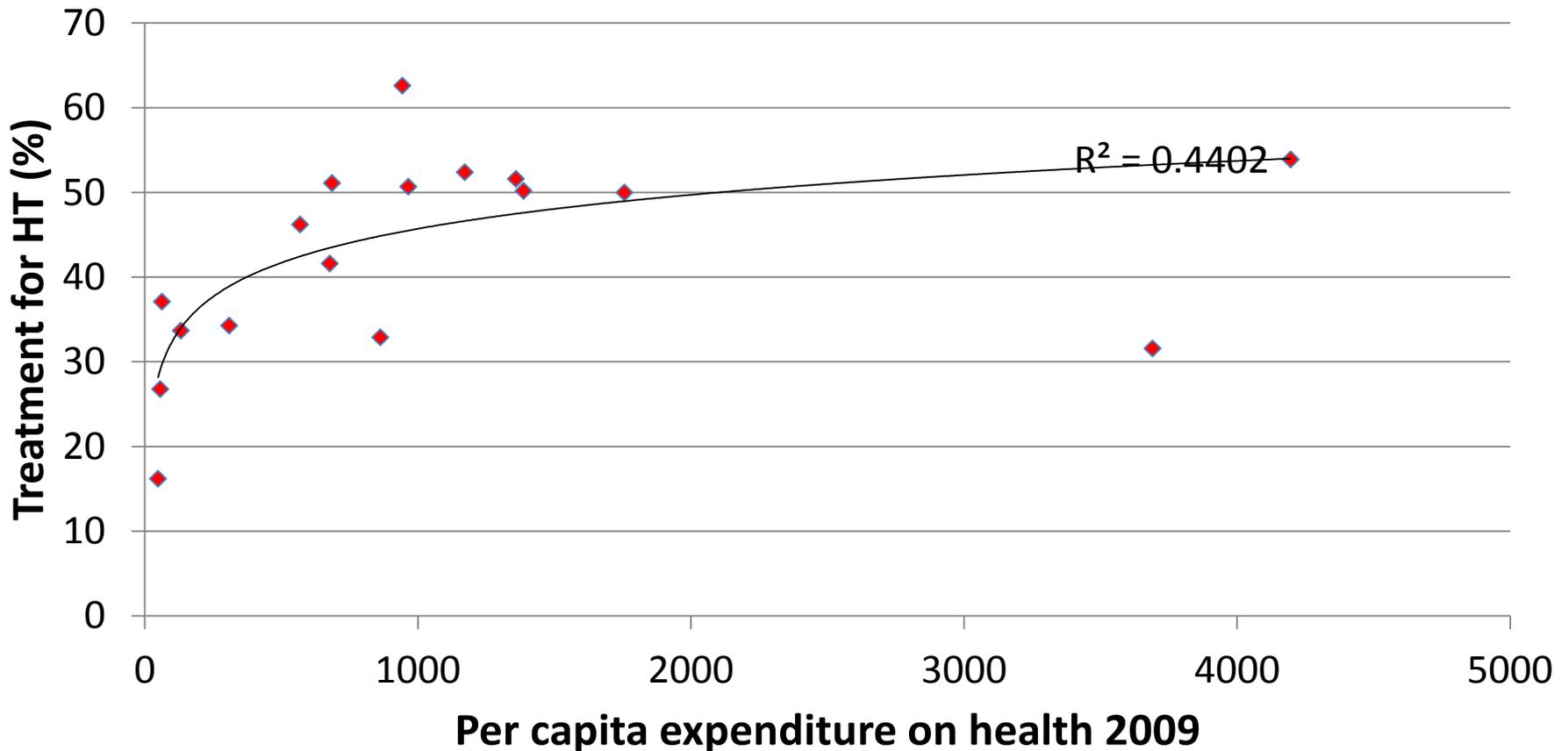
- Survey of 2629 European physicians in 2009
- 95% of physicians felt that patients SBP needed to be higher than the guideline recommended goal levels before taking immediate action
- The mean levels of SBP/DBP that physicians reported they were satisfied with - 132/82, concerned about – 149/92, or would cause them to take immediate action was 168/100

Access, Availability & Affordability of treatments

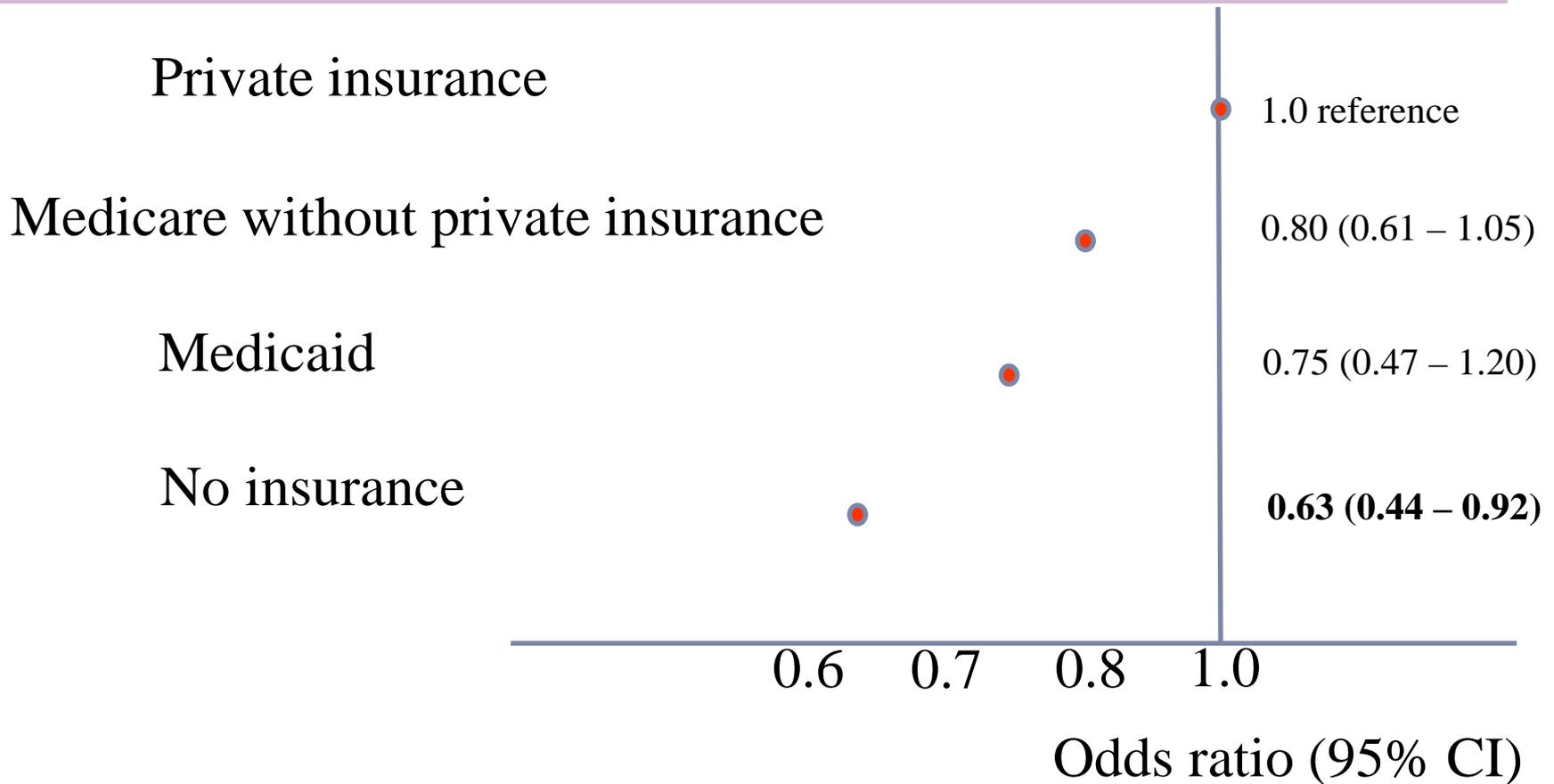


Relation of per capita health expenditure to Treatment for HT

Treatment for HT



Adequate BP control and health insurance status



Adjusted odds ratios of adequate hypertension control among 1999–2002 NHANES participants, by insurance status

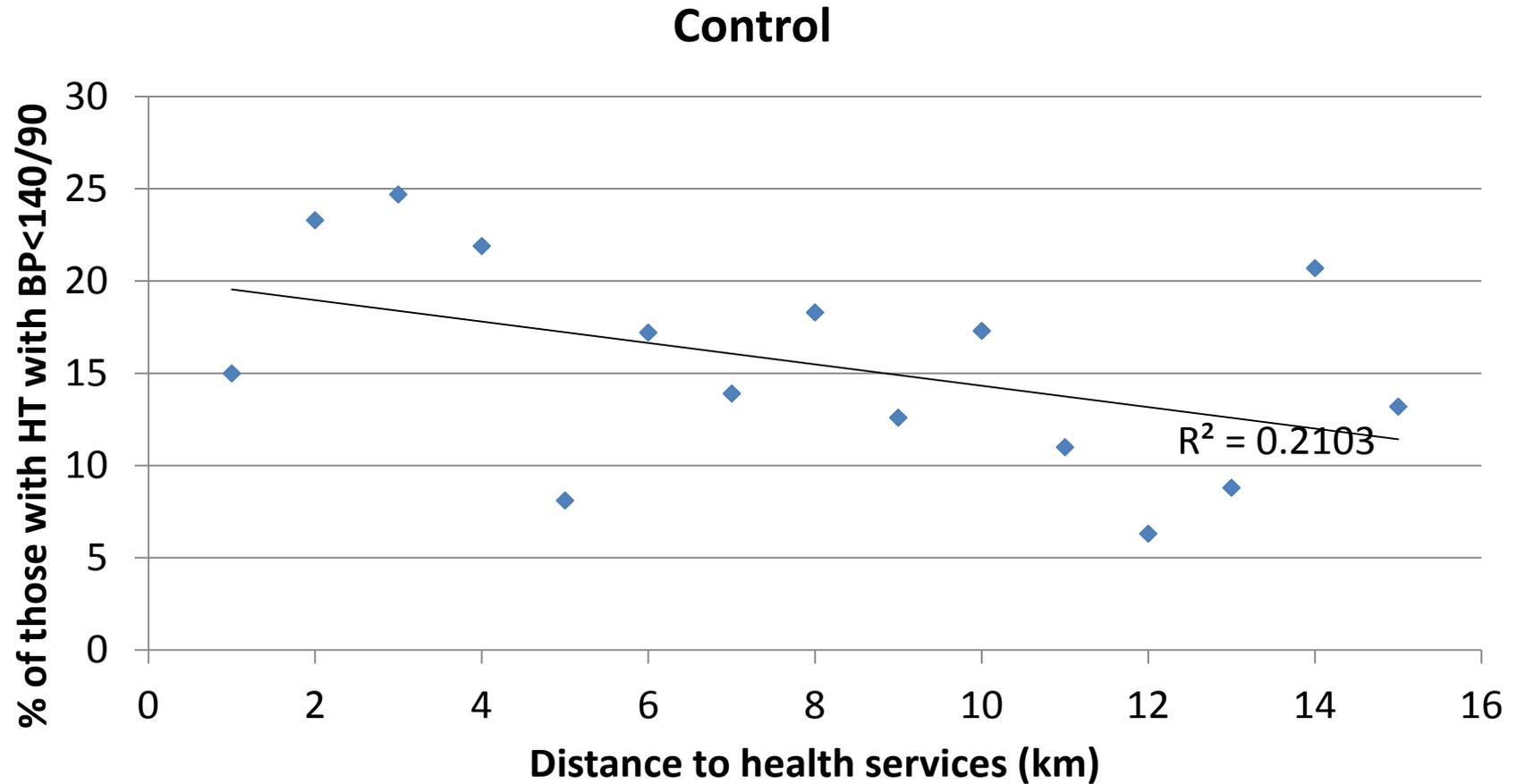
Kenrik Am J HT 2007;20:348–353

No. of days of income required to meet cost of 1 month medications

	B-block	Diur	ACE/ARB	CCB
HIC	2.2	1.1	3.1	3.2
UMIC	4.1	7.2	4.2	5.2
LMIC	6.4	1.1	14.3	22.2
LIC	9.4	0.3	17.6	14.3

*Zimbabwe & Bangladesh not included in this analysis

Distance to health services and Control



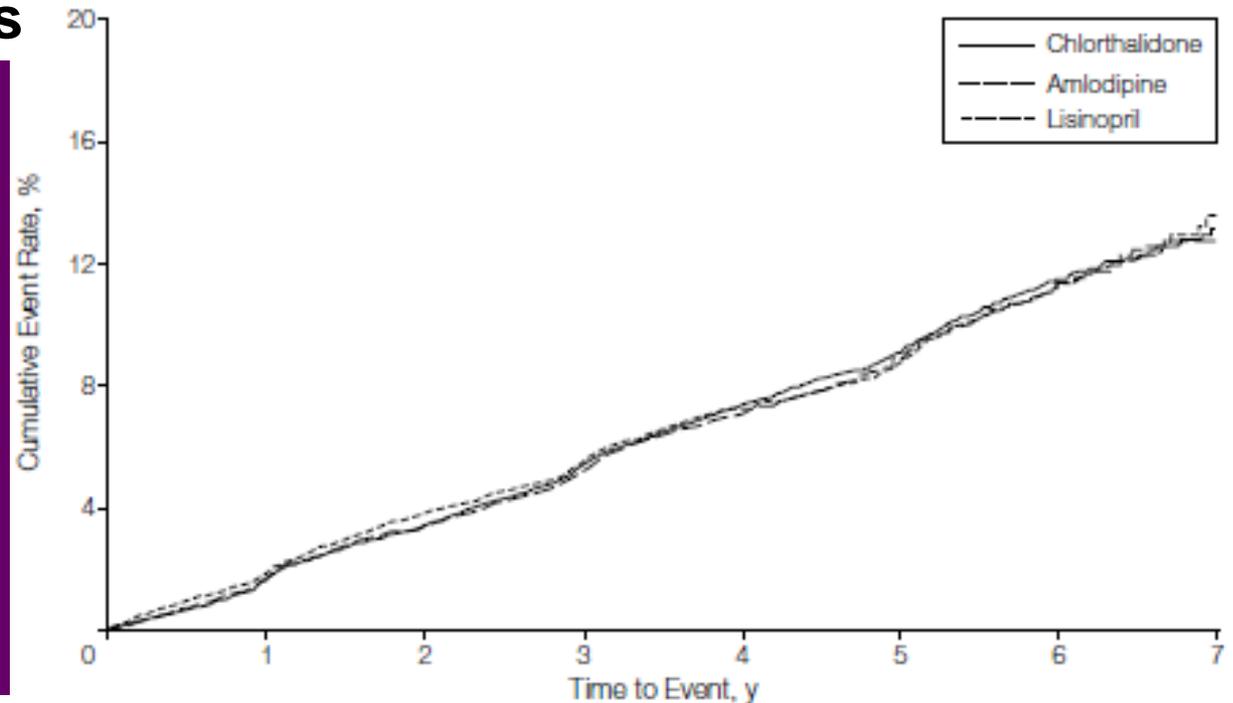
Other issues that may impact

- **Is one drug better than another?**
- **Changing methods of diagnosing hypertension**
- **Changing guidelines and cut-off confusion**

Is one drug better than another?

- ... probably not for BP lowering, but maybe with certain co-morbidities

No differences in CHD events between amlodipine, chlorthalidone or lisinopril with a mean followup of 4.9 yrs



No. at Risk								
Chlorthalidone	15255	14477	13820	13102	11362	6340	2956	209
Amlodipine	9048	8576	8218	7843	6824	3870	1878	215
Lisinopril	9054	8535	8123	7711	6662	3832	1770	195



Diagnosis differences

- JNC 7 - Office BP still main measure:
- Ambulatory BP useful in: “Suspected white-coat hypertension in patients with hypertension and no target organ damage, Apparent drug resistance, Hypotensive symptoms with antihypertensive medication, Episodic hypertension, Autonomic dysfunction”
- NICE 2010 – Encourages ABPM generally or home monitoring for confirmation.
- “If the clinic blood pressure is 140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension.” (Need 2/ hr in day and >14 measures). Or confirm with Home BP monitoring (7days)
- ESC 2013 : Automated measures in a isolated room

Cut-off confusion

- **JNC-8 (2014):**
- ≥ 60 years, initiate drug treatment to lower BP at (SBP)150mmHg or (DBP)90mmHg and treat to a goal SBP <150 mm Hg and goal DBP <90 mm Hg
- <60 years, initiate pharmacologic treatment to lower BP at SBP140mmHg or DBP 90 and treat to a goal <140/ 90mmHg
- ESC 2013
- Grade 1 hypertension and low CV risk trial lifestyle modification for few months before considering drug treatment, but if inc. CV risk start drug treatment early target <140/90

How can barriers analysis help with developing interventions

Barrier	General approach	Specific strategy to overcome the barrier
Systems level		
Insufficient time	Task shifting	Simplify the physician's task; assign some responsibility for life-style changes to CHW
Lack of time for physician counseling	Task shifting	Shift some responsibility for life-style changes to CHW
Lack of continuity of care	Team change	CHWs liaise physician appointments
Discontinuation of prescribed free medications	Policy change	CHW facilitates delivery of prescribed drugs to patient's home
Poor access of patients to PHC clinic	Home visits by CHWs	Improve family-based approach and liaison with the PHC clinic
Provider level		
Lack of adherence to treatment guidelines, "clinical inertia"	Physician education	Interactive, case-based workshops delivered by opinion leaders following adult learning theory
Uncertainty of whether office BP represents usual BP	At-home BP monitoring	Provide at-home BP-monitoring records to physician at clinical visit

Patient level		
Passive attitude and misperceptions about high BP	Improve self-efficacy	Provide automated at-home BP monitor and BP log to involve patients in self-monitoring and control
Poor adherence to medications	Family-support, patient education, at-home BP monitoring	SMS reminders to reinforce adherence to medications; family members help to remind each other; provide pill box and review medications; self-monitoring provides immediate feedback
Hypertension knowledge/risk perception	Patient education	Information on importance of maintaining BP control; life-style change counseling tailored to patient's risk factors
Poor memory	Reminding, family support, patient education	SMS reminders to mobile phone or e-mail; family members help to remind each other; provide pill box and review medications
Low health literacy	Patient education	Transmit consistent <comma> clear messages on life-style changes; recruit CHW from local community to ensure that health information is culturally and linguistically appropriate
Poor motivation	Reminding, family support, patient education, at-home BP monitoring	Use motivational interviewing to tailor intervention; tailor text/e-mail reminders to reinforce behavior change; family support for life-style changes; self-monitoring provides immediate feedback to reinforce life-style changes
Medication costs	Policy change, physician education, patient education	Leverage clinical network to improve access; train physicians to adhere to clinical practice guidelines; healthier life-styles may decrease need for medication
Adverse effects	Physician education, patient education	Discuss any medication adverse events with provider

Conclusions

- **High blood pressure is a leading modifiable cause of global morbidity and mortality**
- **Many people are still not aware of their high blood pressure**
- **Control of hypertension is poor globally**
- **Patient adherence and Physician inertia appear to be common barriers**
- **Health system level barriers are often more complex and vary across settings**

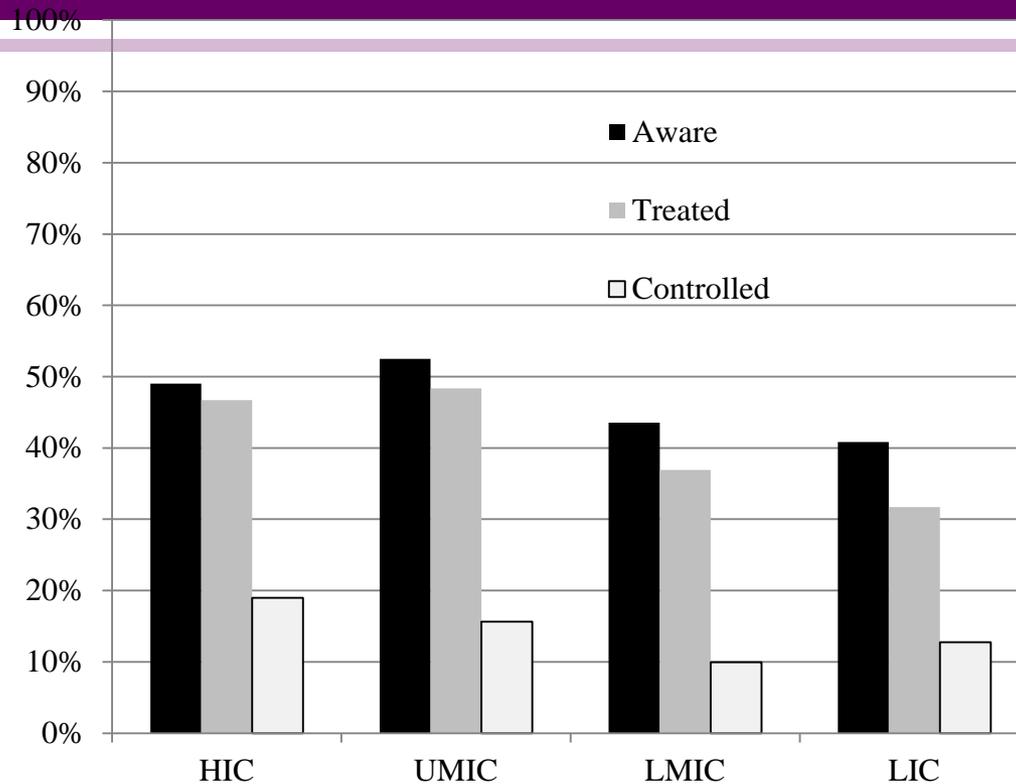


Innovation is needed in BP control

- **Tens of billions have been spent on ‘newer’ ‘better’ drugs: little or no evidence of benefits beyond blood pressure reduction**
- **Limited pipeline for NCEs**
- **Other approaches eg. renal denervation, niche, and/or not yet ready for primetime**

- **Innovation is needed using the drugs we have already**

Hypertension Awareness, Treatment and Control in the PURE Study (154,000 individuals from 628 communities in 17 countries)

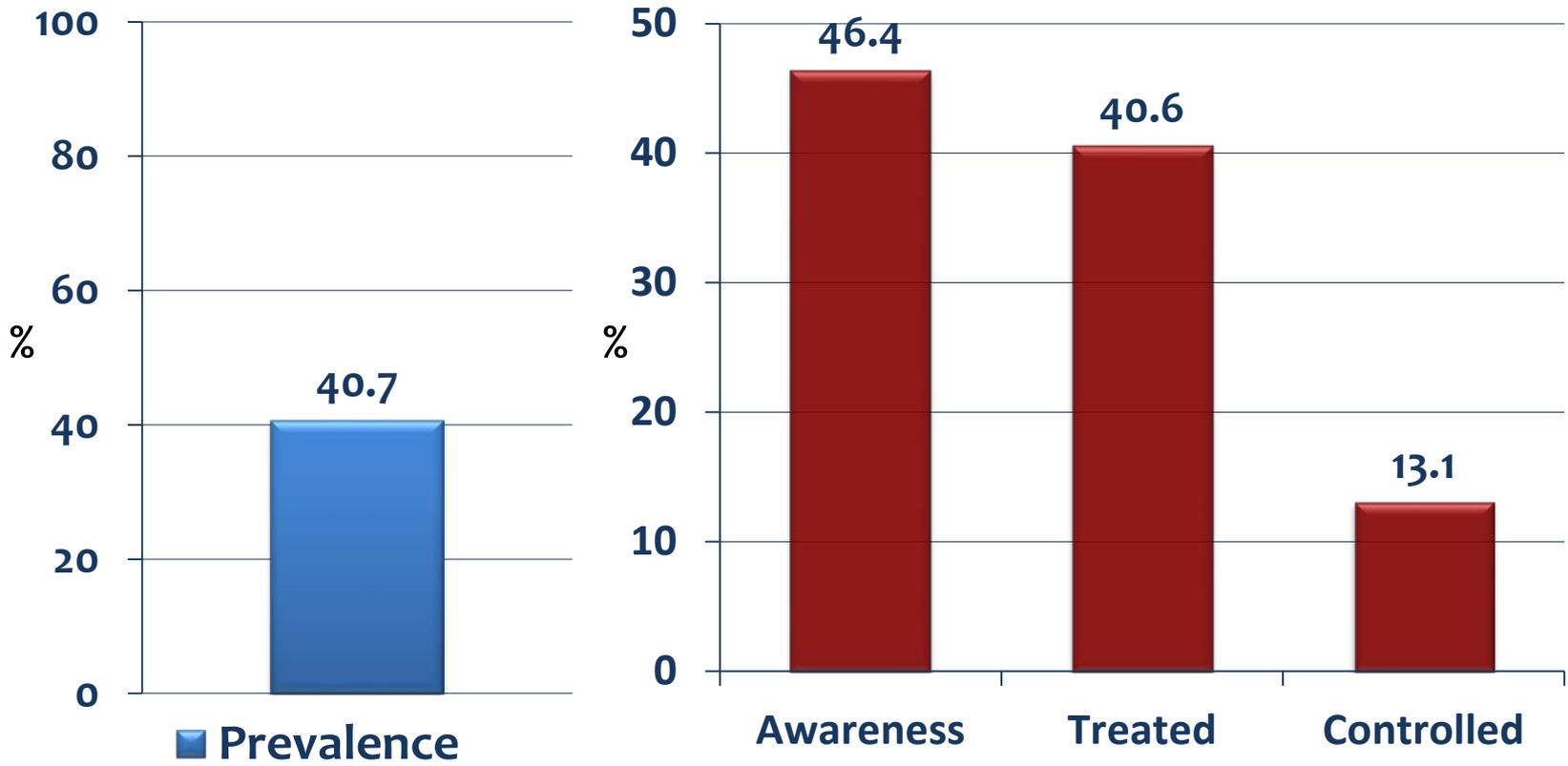


HIC, UMIC, LMIC, LIC = High, upper-middle, lower-middle, and low-income countries

Chow et al, 2013

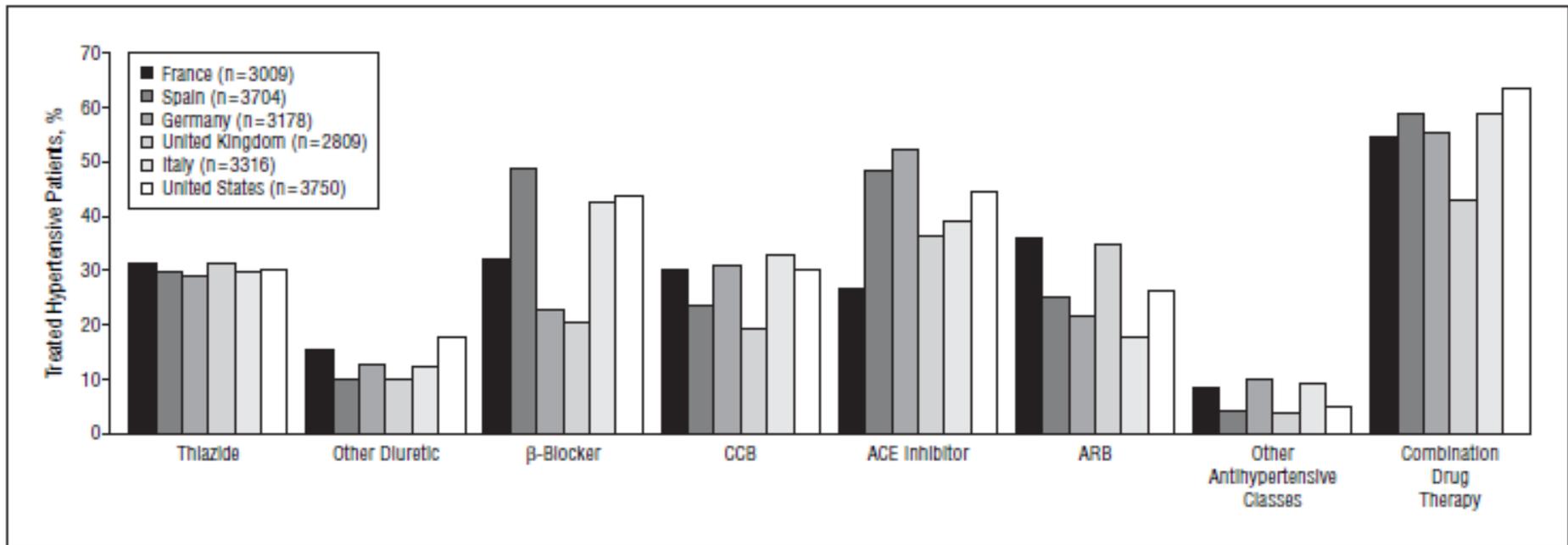
Hypertension prevalence, awareness, treatment & control

N = 143,830

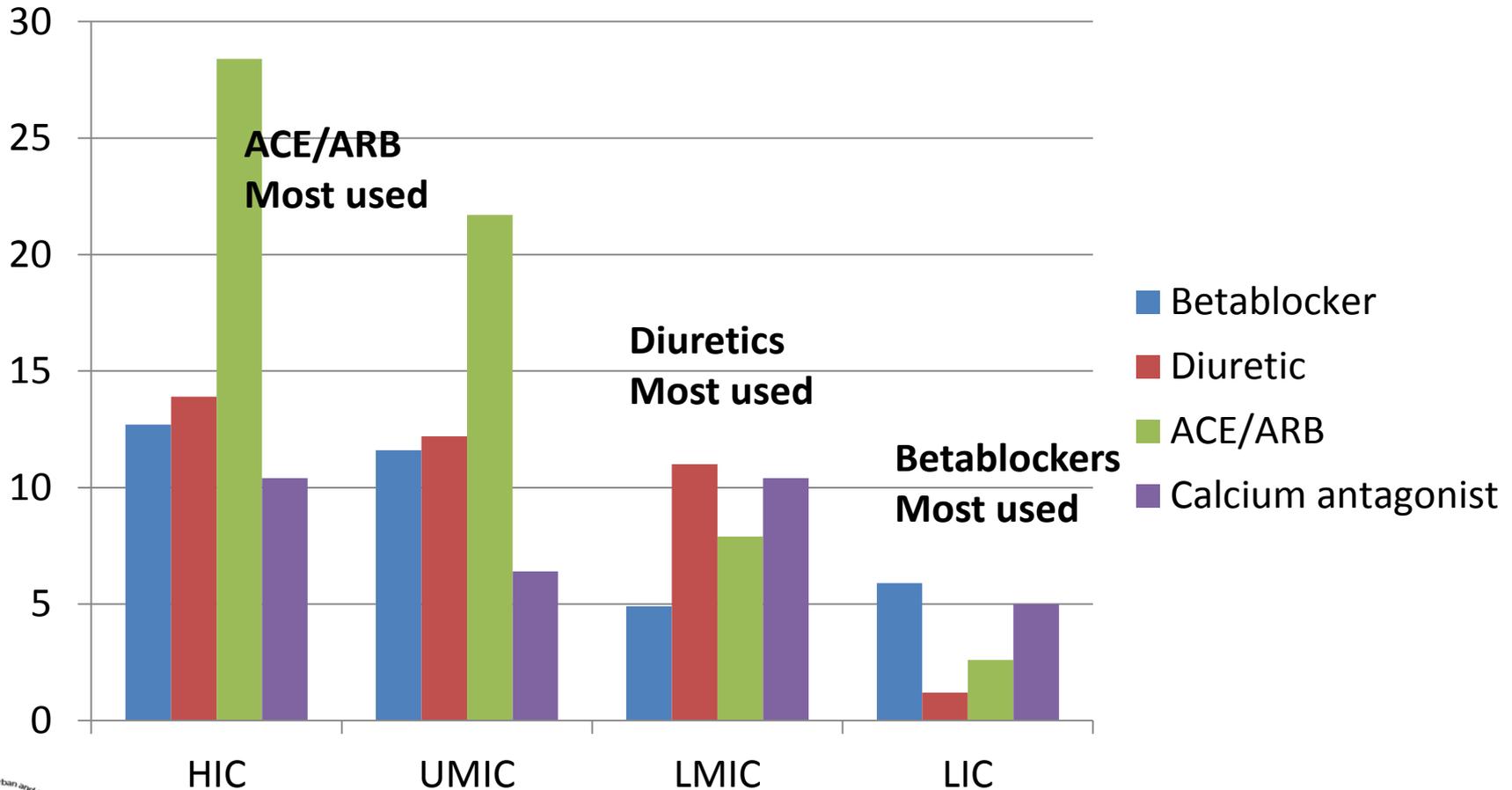


** among all patients with hypertension*

Cross-country differences in use of antihypertensive drug classes



Types of treatments for HT by economic status of country



Treatment of hypertension – No. of BP lowering medications

