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FULL RESEARCH PAPER
Arterial hypertension

Elevated blood pressure levels among 533 167 adults living in Sub-Saharan Africa: a systematic review and meta-analysis

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Aims

Synthesizing contemporary data from sub-Saharan African countries, we did a systematic review and meta-analysis of blood pressure (BP) levels and hypertension among adults living in the region.

Methods and results

We searched PubMed and other databases to identify studies published from 1 January 2010 to 31 December 2021. We used a random-effects model to estimate the pooled-prevalence of hypertension and mean systolic/diastolic BP overall and on a sex- and age-specific basis. Heterogeneity (I^2) was assessed via the χ^2 test on Cochran's Q statistic. We identified 170 high-quality studies (195 samples) comprising 533 167 adults living in 26 countries. The pooled prevalence of hypertension was 30.5% (95% CI 28.4–32.6%). Overall mean systolic/diastolic BP was 128 (95% CI 127–129)/80 (95% CI 79–80) mmHg, with males recording higher mean BP levels (3.10 [95% CI 2.30–3.90]/0.69 [95% CI 0.10–1.29] mmHg) compared with females. Reflecting increasingly higher BP levels with age, the pooled estimates of hypertension prevalence initially rose three-fold (from 10.6% [95% CI 8.2–13.0%] to 30.9% [95% CI 27.8–34.0%]) in those aged 21–30 to 41–50 years, and then two-fold to 66.4% (95% CI 64.2–68.7%) among those aged 71–80 years, respectively. Hypertension prevalence was lower in healthy weight [28.4% (95% CI 26.1–30.6%)] compared with overweight [35.8% (95% CI 31.4–40.1%)] adults. Regionally, prevalent hypertension was lowest in those living in Eastern Africa [27.2% (95% CI 24.8–29.7%)].

Conclusion

Our findings suggest a steep age-related pattern of increasing BP levels in the region that will adversely affect millions of people within the next 10–20 years without urgent intervention.

Lay summary

A detailed review and analysis of 170 studies involving more than half a million adult men and women living in 26 sub-Saharan Africa countries, revealed that one in three have elevated blood pressure/hypertension.

- Elevated blood pressure levels, and the markedly increased risk of suffering a debilitating or fatal cardiovascular event at an early age, rose steeply from around one in ten affected at age 20–30 years to around one in three by the age of 50 years.
- Beyond the influence of age, the risk of having elevated blood pressure was different, given it increased markedly for overweight men and women, whilst those living in (mainly poorer) Eastern African countries had the lowest blood pressure levels.

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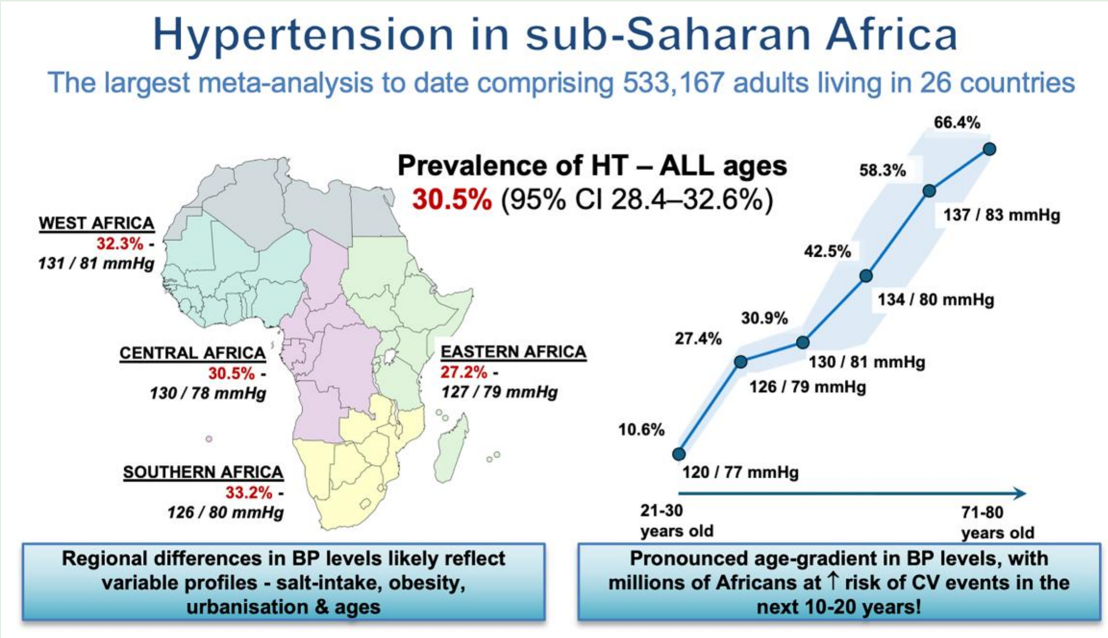
Graphical Abstract



Keywords Hypertension • Systematic review • Meta-analysis • Sub-Saharan Africa

Introduction

Hypertension continues to be a major, preventable cause of cardiovascular events and premature deaths worldwide.[1,2] On this basis, it is estimated that the global number of hypertensive women and men aged 30–79 years effectively doubled from 648 million to 1.28 billion between 1990 and 2019.[3] Unfortunately, readily preventable and treatable hypertension continues to drive a high burden of heart and cerebrovascular disease among the 1.3 billion people living in the diverse range of 49 low-to-middle income countries comprising sub-Saharan Africa (SSA).[4] Unlike high-income countries, many of the deadly and debilitating cardiovascular events linked to hypertension in SSA occur in younger working age people, with typically more women than men affected.[4,5] Dynamic changes in the demographic profile, economic resources and risk behaviours of the SSA population will likely adversely influence the proportion and characteristics of those who develop hypertension.[6] Thus, it is critical that our understanding of hypertension in SSA is continuously updated (and expanded) whenever possible.

A prior systematic review and meta-analysis of data from 110 414 community-dwelling, middle-aged adults living in 13 SSA countries in 2000–2013, reported that 30% were hypertensive.[5] A more recent report derived from 30 044 adults living in 10 SSA countries, reported a much higher figure of 48%.[7] Reconciling such differences in the reported prevalence of hypertension in SSA remains problematic for a number of reasons. Firstly, whilst most studies apply the same definition of hypertension found on screening [a blood pressure (BP) of 140/90 mmHg or greater], pre-existing hypertension is not always considered. Secondly, although positive age-related gradients in hypertension are consistently reported,[5,6] to date, insufficient data are available to generate robust age-specific estimates of hypertension and associated BP levels. Lastly, reflecting an ongoing, regional challenge, the surveillance and reporting of BP levels from many low-income SSA countries is sub-optimal. Thus, we sought to generate the largest and most representative systematic review and meta-analysis on the reported prevalence of hypertension in SSA to date. In doing so, we specifically focused on generating robust age-, sex- and region-specific estimates of hypertension that also considered the BP levels and definition(s) of hypertension underpinning them.

Methods

Search strategy and selection criteria

We searched PubMed (1664 studies initially found), Google Scholar (245 studies), African Index Medicus (137 studies), and Embase (513 studies) to identify all relevant English publications on hypertension in African adults from 1 January 2010 to 31 December 2021 (to generate contemporary data and to reduce heterogeneity between studies—supplementary material online, *Figure S1*). A search and selection strategy consisted of the combination of relevant terms and the individual names of 49 SSA countries using their English and official versions (e.g. 'Ivory Coast' and 'Côte d'Ivoire') was applied. Key search terms included 'hypertension', 'blood pressure', 'systolic hypertension', and 'diastolic hypertension'. References of all relevant articles were scrutinized to identify additional data sources with inputs from AOM and DBO.

Applying the search strategy outlined above, primary studies selected for data extraction and analyses had to be observational studies with a focus on men and women aged 18 years or above residing in SSA countries, irrespective of their ethnic, socioeconomic, and educational backgrounds, reporting the prevalence of hypertension or with enough data to compute these estimates. We excluded studies on non-systemic hypertension (intracranial or pulmonary hypertension), those focussed on non-resident Africans, studies with participant selection based on the presence of hypertension (e.g. clinical trials or case-control studies), and adult samples in which it was not possible to disaggregate data for adolescents. We also excluded case series with a small sample size (<100 participants), letters, reviews, commentaries, editorials, and studies without primary data or explicit description of methods. For studies reporting duplicated analyses, we considered the most comprehensive report and largest sample size.

Data extraction

Three investigators (AC, YKC and SS) independently extracted relevant data from individual studies using a standardized data extraction form. This included author's last name, year of publication, recruitment period, area (rural vs. urban), country, study design, setting, sample size, mean or median age, age range, proportion of male/female participants, body mass index (BMI)/weight status, method of obtaining BP levels and criteria used to identify hypertension. We assigned a United Nations Statistics Division (UNSD) for each country studied. Disagreements between authors were reconciled through discussion and consensus (all authors).

Data analysis

We evaluated the methodological quality of included studies using the tool developed by Hoy and colleagues.[8] We assigned each item a score of 1 (yes) or 0 (no), and summed all items to generate an overall quality score that ranged from 0 to 10. We classified studies as having a low (0–3), low-medium (4–6), or high (7–10) risk of bias. We then used meta-analyses to summarize both prevalence of hypertension and reported systolic/diastolic blood pressure (SBP/DBP) levels. To be included in the prevalence meta-analysis, studies had to provide sufficient data to identify those with a SBP/DBP of 140/90 mmHg or greater (current hypertension—comprising those found to have newly discovered hypertension or those being actively treated for hypertension but with an uncontrolled BP) and/or a history of being treated for hypertension (past hypertension). In this respect, a range of definitions were used to identify hypertension irrespective of a person's BP levels found on screening. Most commonly this comprised the presence of anti-hypertensive treatment within the past 14 days, but in some cases as a history of ever receiving anti-hypertensive therapy. Study samples also had to comprise people with no specific disease/profile and describe prospective data collection.

We analysed data using Open Meta for Windows. All quantitative analyses were conducted using random-effects meta-analytic models to account for between-study heterogeneity in design, population characteristics, and measurement protocols. For dichotomous outcomes (prevalence), pooled estimates and corresponding 95% confidence intervals (95% CI) were calculated using a binary random-effects model with the DerSimonian–Laird (DL) estimator, which provides a conservative summary when true effect sizes vary across studies. To enable variance estimation in strata with zero events, a continuity correction factor of 0.5 was applied. For continuous outcomes (mean SBP/DBP), pooled mean differences and standardized mean differences were derived using inverse-variance weighting under the DL random-effects framework. Statistical heterogeneity was quantified using the I^2 statistic, with values >50% indicating substantial variability beyond chance and assessed by Cochran's Q test ($P < 0.10$). Meta-regression analyses with restricted maximum likelihood estimation were used to examine trends by age, BMI category, and region, and to evaluate the moderating effects of sex. Age-standardized prevalence estimates were recalculated using the WHO World Standard Population[9] to ensure comparability across studies with differing age structures. Sensitivity analyses included (i) restricting to studies defining hypertension by measured BP only, (ii) comparing mercury vs. automated sphygmomanometer use, (iii) excluding moderate-to-high risk-of-bias studies (Hoy tool), and (iv) leave-one-out analyses to evaluate single-study influence.

This systematic review/meta-analysis was registered and approved in the PROSPERO International Prospective Register of systematic reviews, registration number CRD42022297948 (protocol unpublished) and reported according to PRISMA guidelines.[10]

Role of the funding source

This is no specific funding source. SS was supported by the NHMRC of Australia (GNT1135894). The senior corresponding author had full access to all study data and had final responsibility for the decision to submit the paper for publication.

Results

Literature search outcome

We initially identified 2559 records for further scrutiny, and after eliminating duplicates, 2456 records remained. After further excluding 2375 irrelevant or non-eligible records and 513 of the remaining 683 texts, findings from 170 full text research reports[7,11–179] informed our meta-analyses (*Figure 1*). Inter-rate agreement for study selection ($\kappa = 0.84$), study inclusion ($\kappa = 0.85$) and data extraction (0.91) was high. The methodological conduct and quality of included studies is summarized in supplementary material online, Table *S1*. All data were extracted from cross-sectional studies, with 108/170 (64%) assessed as low risk of bias and the remainder low-medium risk of bias.

The specific methods used to measure BP were heterogeneous. Accordingly, when repeated BP levels were obtained, the time taken between measurements varied (with some reports not reporting this detail) with 51/170 (30%) reporting the use of an automated digital sphygmomanometer and all but seven of the rest reporting the use of a mercury/manual sphygmomanometer. A total of 119/170 studies used a history and/or current hypertension as their definition of positive cases, with most also 'topping-up' these cases with those found to have a measured systolic/diastolic BP of 140/90 mmHg or greater. Conversely, 51/170 studies specifically identified hypertensive cases (applying the same thresholds) based on measured BP levels only.

Data from 533 167 adults (195 samples) living in 26/49 SSA countries and representing a diverse mixture of rural, peri-urban and urban communities were used to generate pooled estimates of hypertension prevalence (*Figure 2*). Specific data to permit analyses of mean BP levels, in addition to sex- and age-specific analyses (of hypertension and BP levels) were reported in 94/170 studies, 123/170 studies (354 248 cases) and all studies/cases, respectively.

Prevalence of hypertension

Overall, the pooled prevalence of hypertension was 30.5% (95% CI 28.4–32.6%)—see *Figure 3*. As shown in supplementary material online, *Table S2*, on an age-standardized basis (using the world population as a reference point) the pooled prevalence of hypertension was slightly lower at 29.2% (95% CI 24.4–34.0%, $I^2 = 99.74\%$, $P < 0.001$).

Blood pressure levels

The pooled mean systolic/diastolic BP reported was 128 (95% CI 127–129, $I^2 = 99.88\%$)/80 (95% CI 79–80, $I^2 = 99.84\%$) mmHg—see supplementary material online, *Figure S2A* and *B*.

Sex-specific findings

Overall, males were reported to have a 1.05 times higher prevalence of hypertension compared with females—supplementary material online, *Figure S3*. Whilst this observed difference was not significant (95% CI: 0.99–1.10, $I^2 = 87.8\%$), males were found to have significantly higher mean BP than females, with a mean difference in SBP/DBP of 3.10 mmHg (95% CI: 2.30–3.90, $I^2 = 97.97\%$, $P < 0.001$)/0.69 mmHg (95% CI: 0.10–1.29, $I^2 = 98.6\%$, $P < 0.001$), respectively—supplementary material online, *Figure S4A* and *B*.

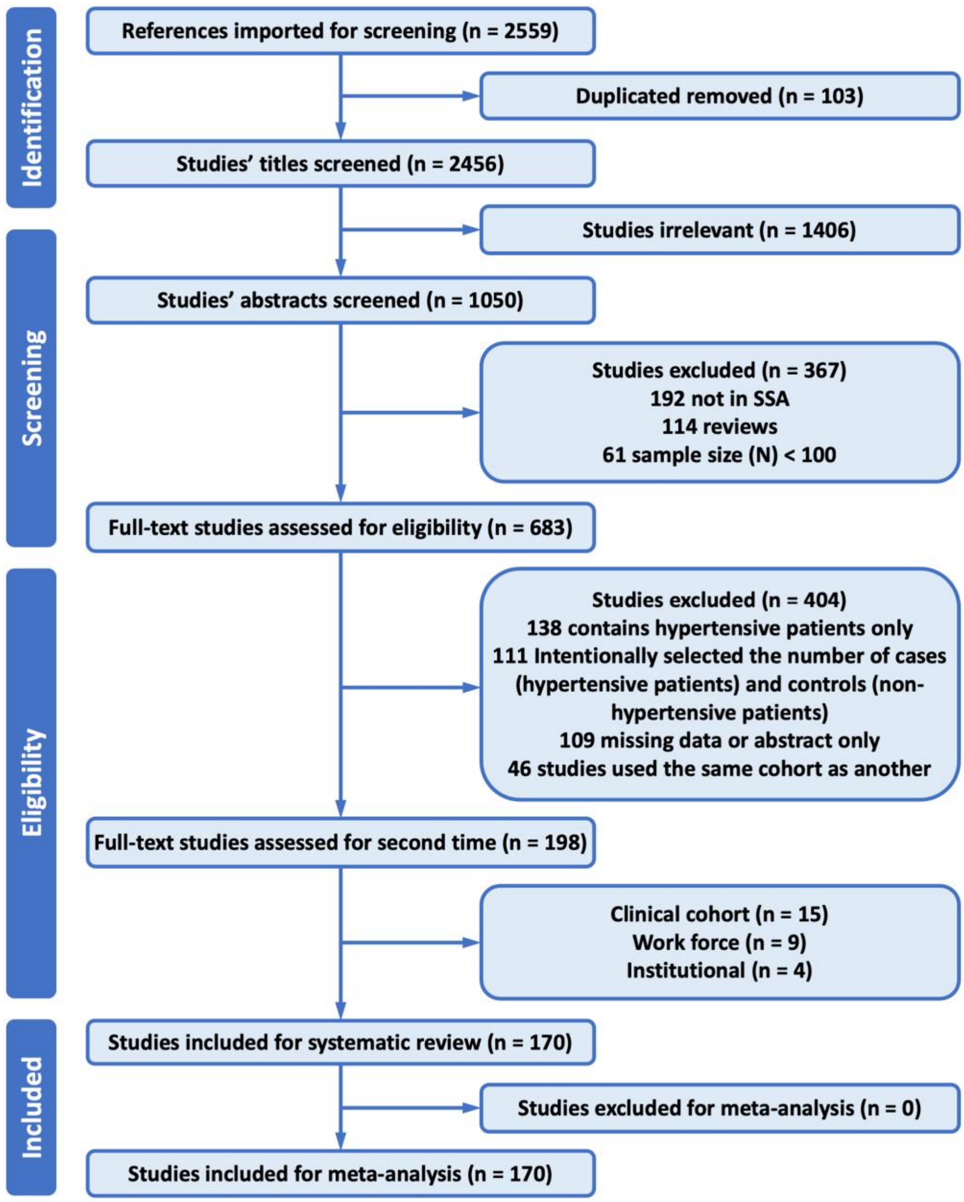


Figure 1 Study selection. *Figure 1* shows the study selection process. It consists of four stages: identification, screening, eligibility, and inclusion.

Age-specific findings

Age was found to be positively associated with hypertension prevalence and mean SBP/DBP (all $P < 0.001$)—supplementary material online, *Figure S5A–C*. The pooled prevalence of hypertension rose three-fold from 10.6% (95% CI 8.2–13.0%, $I^2 = 97.93\%$) in those aged 21–30 years to 30.9% (95% CI 27.8–34.0%, $I^2 = 99.71\%$) in those aged 41–50 years old. Thereafter, prevalent hypertension effectively doubled to 66.4% (95% CI 64.2–68.7%, $I^2 = 0\%$) in those aged to 71–80 years, with a broad plateau in BP levels in the older age groups evident, as shown in Figure 4. The apparent $I^2 = 0\%$ observed in the oldest age group (71–80 years) reflects the limited degrees of freedom with only two studies, rather than a true absence of heterogeneity. Among those aged over 70 years, women tended to have higher mean SBP than men, although confidence intervals overlapped. Diastolic BP levels displayed an inverted U-shaped trajectory, rising through mid-life and declining in older ages—supplementary material online, *Figure S5C*.

Hypertension according to weight Status

The pooled prevalence of hypertension (see supplementary material online, *Figure S6*) and associated BP levels (see supplementary material online, *Figures S7A and B*) among individuals with a healthy weight were significantly lower ($P < 0.001$ for all comparisons) compared with overweight/obese individuals—being 28.4% (95% CI: 26.1–30.6%, $I^2 = 99.71\%$) vs. 35.8% (95% CI: 31.4–40.1%, $I^2 = 99.68\%$) and 127 mmHg (95% CI: 125–128, $I^2 = 99.88\%$)/79 mmHg [95% CI: 78–80, $I^2 = 99.82\%$) vs. 130 mmHg (95% CI: 128–133, $I^2 = 99.87\%$)/81 mmHg (95% CI: 79–83, $I^2 = 99.86\%$).

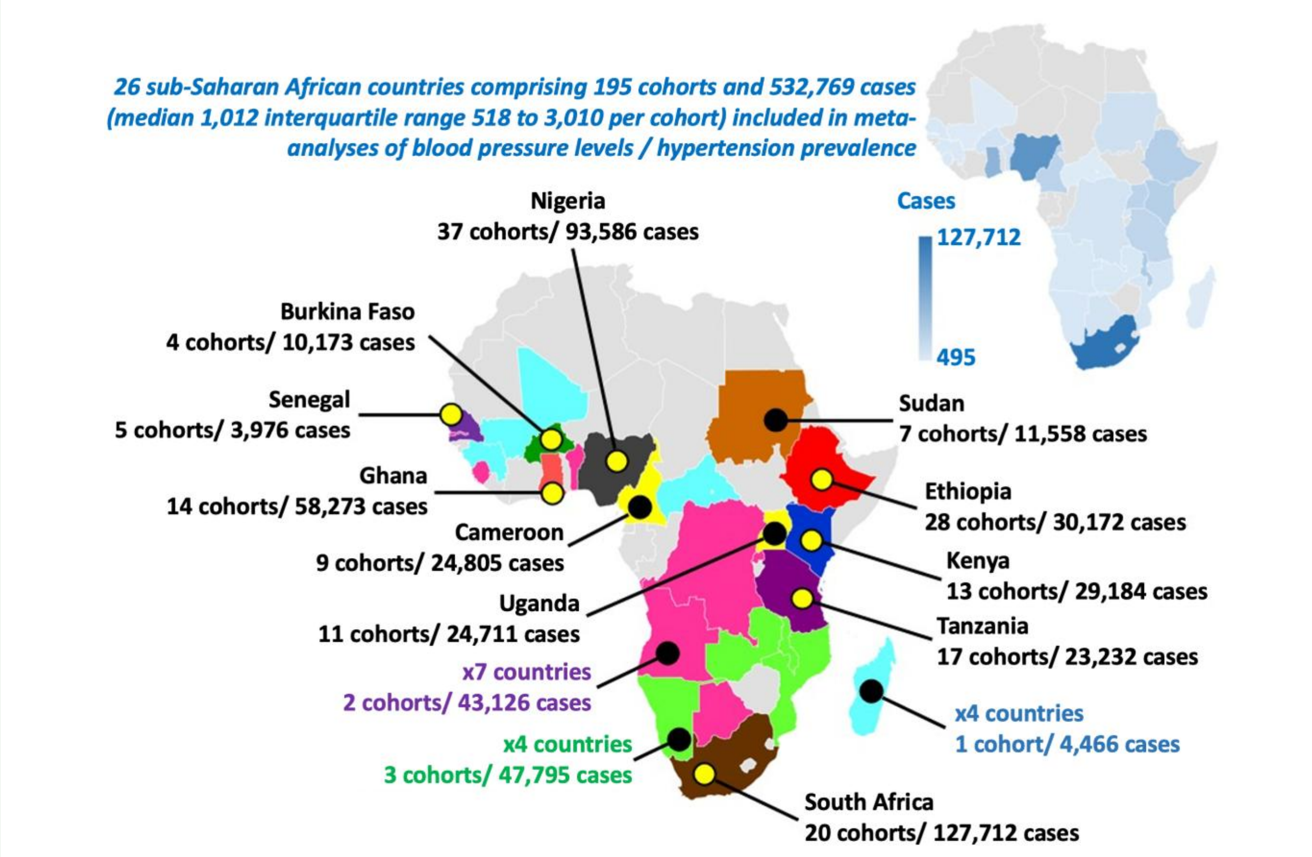


Figure 2 Geographical distribution of studies. *Figure 2* shows those sub-Saharan African countries (11/26 represent in meta-analyses) with 5 or more contributing studies. The rest (with one to four contributing studies) are depicted by the same colour.

Geographic distribution of hypertension

From a geographic perspective, data were derived from 26/49 SSA countries (including 9 multi-national studies), with the economically advanced countries of Nigeria and South Africa contributing to >200 000 cases. In rank order, Southern (33.2%), Western (32.3%), Central (30.5%) and Eastern Africa (27.2%) had the highest to lowest prevalence of hypertension by sub-group meta-analysis—*Figure 5* and supplementary material online, *Figure S8A—C*.

Sensitivity analyses

The pooled prevalence of hypertension was significantly lower ($P <$ 0.001) among studies defining hypertension based solely on BP levels found on screening compared with other studies also considering a past history of hypertension (28.0% [95% CI: 24.3–31.6%, $I^2 =$ 99.71%] vs. 31.7% [95% CI: 29.0–32.6%, $I^2 = 99.75\%$])—supplementary material online, *Figure S9*. In terms of assessed risk of bias, the pooled prevalence estimate was 30.9% (95% CI: 28.5–33.4%, $I^2 = 99.69\%$) for studies assessed as having low risk of bias, and 29.7% (95% CI: 26.4–33.1%, $I^2 = 99.64\%$) for those with higher risk—supplementary material online, *Figure S10*. Adjusting for age, sex and weight status, the pooled mean SBP/DBP among those screened with a mercury compared with automated sphygmomanometers (see supplementary material online, *Figure S11A* and *B*) was 129 mmHg (95% CI: 127–131, $I^2 = 99.88\%$)/80 mmHg (95% CI: 79–81, $I^2 = 99.74\%$) vs. 128 mmHg (95% CI: 126–129, $I^2 = 99.87\%$)/80 mmHg (95% CI: 78–81, $I^2 = 99.87\%$). Finally, a 'leave-one-out' analysis did not identify any study that meaningfully influenced our overall findings—supplementary material online, *Figure S12*.

Assessment of publication bias

There was no evidence of publication bias across all reported outcomes. This was confirmed by both Hoy's risk of bias tool and Egger's test, whilst heterogeneity remained high across all parameters analysed (I^2 ranging from 87.80% to 99.88% with all $P < 0.005$).

Discussion

To our knowledge, this is the largest and most comprehensive study of hypertension and BP levels among adults living in SSA to date. Specifically, combining contemporary BP surveillance data from more than half a million men and women living in just over half of all SSA countries, our meta-analysis suggests that 28–33% of adults in the region are hypertensive, with a slightly lower prevalence range (24–32%) when considering those studies using the standard threshold of a systolic/diastolic BP of 140/90 mmHg or greater at the time of surveillance. Further analyses demonstrated minimal differences based on the type of sphygmomanometer used (mercury vs. automated) and the assessed risk of bias. While the 1.05-fold difference between men and women in terms of being hypertensive was not significant (perhaps due to heterogeneity and limited sample sizes within strata), mean

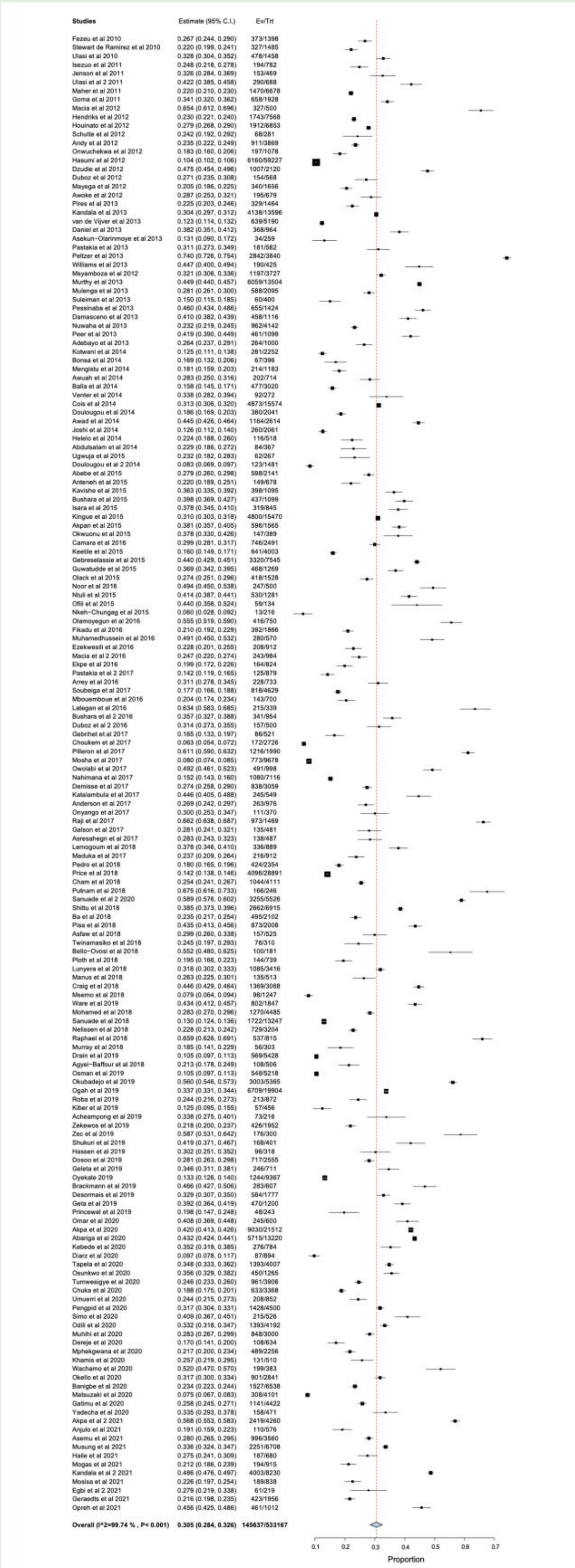


Figure 3 Pooled prevalence of hypertension. *Figure 3* presents the main results of our meta-analyses on the pooled prevalence of hypertension.

SBP levels among men were 2.30–3.90 mmHg higher than women. Overall, in both sexes, increasing age was associated with a steep gradient in BP levels and the subsequent prevalence of hypertension (rising from 11 to 27% among those aged 21–40 years to 58–66% among those aged 61–80 years). Both the weight status of participants (1.25-fold increased prevalence among those overweight) and where they lived [a 1.22-fold difference in prevalence from Eastern (lowest) compared with Southern (highest) Africa] appear to be important modulators of BP across the region.

In considering our headline findings and the impact of age (and other key factors) on observed BP levels, it is important to note the extensive heterogeneity within all the studies (and parameters) included in our analyses. This was not unexpected given the diverse range of countries, population demographics, study settings (urban vs. rural), measurement methods, and definitions of hypertension captured within the source data. Such methodological and contextual diversity is an inherent feature of large-scale meta-analyses covering an entire region like SSA.[6–8] Importantly, our findings more likely reflect real-world variations in BP levels across SSA rather than systemic methodological flaws in contributing studies. Unfortunately, despite a two to five-fold increase in the number of represented SSA countries and people living within them, our findings still do not capture the BP profiles of many low-income SSA countries. This lack of fully representative SSA data continues to limit the generalizability of ours and previous studies. As highlighted in an earlier report,[10] while the WHO STEPS methodology[180] has contributed to greater methodological consistency, there remains a pressing need to standardize the specific data reported in hypertension-focused surveillance studies. In addition to supporting more research in under-represented African countries, such standardization is essential in maximizing efforts to combine data to better understand BP levels across SSA. This is something we are actively addressing via the Pan-African Cardiac Society.[181]

Despite potentially important differences in the timing, size and scope of included studies, our estimate that 31% of adults living in SSA are hypertensive, are concordant with that previously reported by Ataktle and colleagues.[182] Specifically, it falls within their confidence intervals around the prevalence of undiagnosed hypertensive adults (27–34%) as well as their 'predicted' hypertension increased from 16 to 44% among those aged 30–60 years living in 13 SSA countries; and entirely consistent with our previous report that around 10% of SSA adolescents approaching early adulthood are already hypertensive.[10]

Alternatively, our findings are discordant with more recent reports of markedly elevated levels of hypertension when compared with the rest of the world. For example, applying the same definition of hypertension, Zhou and colleagues reported that 48% (95% CI 42–54%) of women and 34% (95% CI 24–35%) of men in Africa have hypertension[3]; this sex-specific difference being particularly discordant with the BP levels reported in the studies we analysed. However, as acknowledged in their report, in addition to the inclusion of North African data among a limited number of studies overall, estimates were adjusted to the overall world population.[3] Such discordance, emphasizes the need to consider the markedly different population profile of SSA and the need to derive age-specific data on BP levels (as we have now done).

Noting an increasing confluence between hypertension and other endemic conditions such as HIV-AIDS,[183] with increasing urbanization (something we have not specifically addressed in this report) and the subsequent adoption of higher-risk lifestyles (leading to obesity)[3,184–188] it seems inevitable that the disease burden of hypertension will steadily increase in this region, even if its underlying prevalence is not as high as commonly reported. As consistently shown by large,

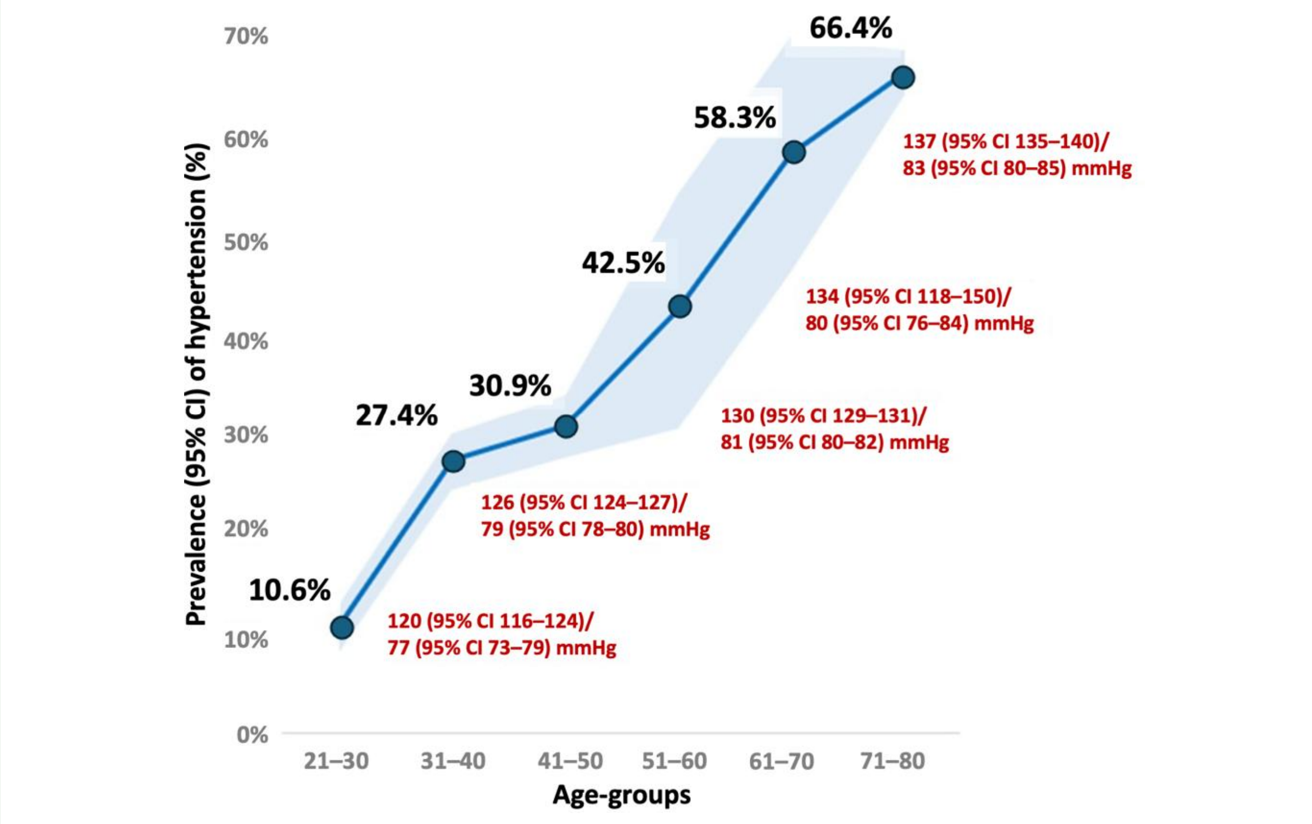


Figure 4 Pooled blood pressure levels. *Figure 4* summarizes the results of our meta-analysis of the prevalence of hypertension and meta-regression analyses of mean blood pressure levels according to age.

representative studies such as the Heart of Soweto Study (33% of cases),[187] the sub-Saharan Africa Survey of Heart Failure Study (45% of cases)[184] and INTERnational Congestive Heart Failure Study (35% of cases), hypertension remains a major cause of deadly and disabling heart failure among relatively young men and women.[185] A similar, but more profound scenario is evident in relation to hypertension and stroke. The Study of the Importance of Conventional and Emerging Risk Factors of Stroke in Different Regions and Ethnic Groups of the World found that globally (32 participating countries) a previous history of hypertension or BP of 140/90 mmHg or higher was the most important risk factor for a first stroke (three-fold increased risk).[189] Among the subset of SSA subjects, hypertension was the predominant attributable cause of stroke with a population attributable risk of 91%.[190] Critically, these findings are entirely consistent with those of the Stroke Investigative Research and Educational Network (SIREN) Study of people living in Ghana and Nigeria.[186] Overall, our study suggests that around one in three adults in SSA are at high-risk of prematurely developing these deadly and disabling conditions; often at an age when they are still able to work and be economically productive within their community. Most probably reflecting survival biases (i.e. the deadly impact of elevated BP over the life-course leading to less hypertensive survivors) we observed a 'flattening' of the otherwise monotonic association of BP levels at the most advanced ages accompanied by a narrowing in sex-specific differences observed in younger individuals. To reinforce the likely impact of premature cardiovascular events linked to unrecognized and uncontrolled hypertension, over the next 25 years, it is projected that there will be 500 000 more cardiovascular events directly attributable to the adverse effects of elevated BP in early adulthood[191,192] among the 16.1 million adolescents aged 15–19 years currently living in SSA who are already hypertensive.[10]

In considering the future consequence of hypertension in SSA, it is important to remember that high BP is easily measurable and often treatable in many parts of the world. However, even when detected, limited access to affordable anti-hypertensive medication is a major barrier across SSA.[193] Treatment and control rates remain very low, largely due to high out-of-pocket costs, inconsistent supply, and limited primary care coverage. From a treatment perspective, there is a need for more African-specific studies such as the pivotal pan-African CREOLE Trial that demonstrated calcium channel blocker-based combinations are more effective in reducing BP levels compared with an angiotensin converting enzyme inhibitor-thiazide diuretic combination in hypertensive African men and women.[194,195] Thus, multiple gaps contribute to the high prevalence of uncontrolled hypertension and may partly explain regional differences observed in our analyses. Overall, the unique context of hypertension and consequent end-organ-damage in those living in SSA reinforces the need for locally relevant guidelines for the detection and management of hypertension in SSA[181] based on an expanded range of evidence derived from high-quality surveillance to randomized trials.[196]

Beyond the methodological issues around heterogeneity and generalizability of findings derived from a still limited number of SSA

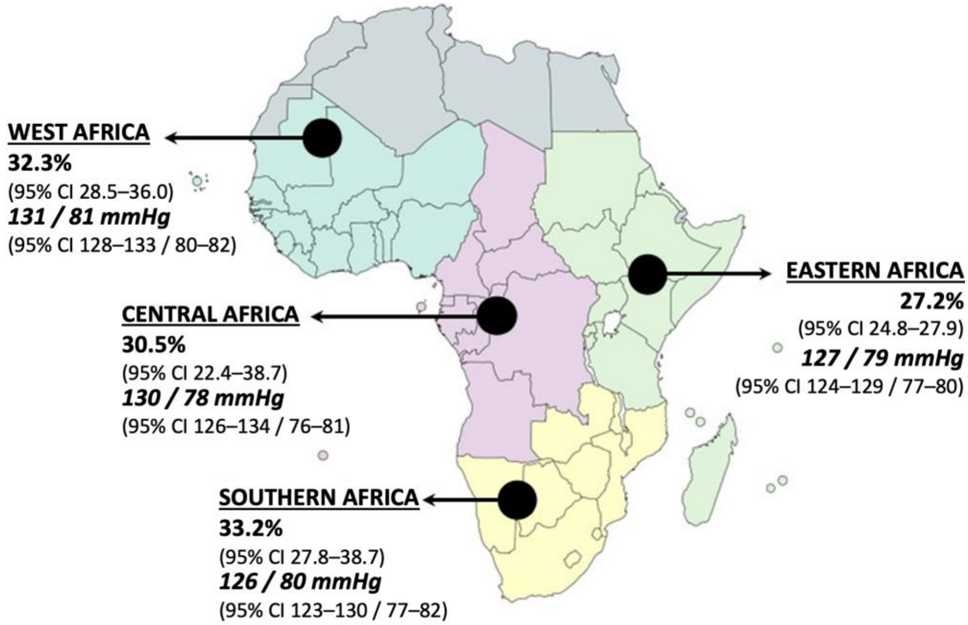


Figure 5 Blood pressure levels across sub-Saharan Africa. *Figure 5* present the results of our meta-analysis of the prevalence of hypertension and meta-regression analyses of mean blood pressure levels according to UNSD region.

countries discussed above, a range of caveats needs to be considered when interpreting our findings. Firstly, as directly addressed via a series of sensitivity analyses, the issue of applying standardized BP surveillance methods and reporting remains problematic. Regional differences in BP may partly reflect selection bias, as many included studies were not nationally representative. Our estimates are based on single cross-sectional BP measurements. This approach may overstate the true prevalence of hypertension. Alternatively, estimates often reflect the proportion of individuals classified as hypertensive at the time of screening rather than the population-wide burden of sustained hypertension. By focussing on the published English literature and full study reports, we may have undoubtedly missed potentially important data from regions where English is not the predominant language. We also acknowledge that by selecting studies with a primary rather than secondary focus on BP levels, we have not collated all the available data possible for interpretation. Data on educational attainment, an important social determinant of hypertension, were inconsistently reported and insufficient for pooled analysis. Likewise, information on rural vs. urban residence was inconsistently reported, with most studies including mixed populations or lacking clear classification. Only few studies were exclusively rural or exclusively urban (<6% of all included studies). Consequently, these limitations prevented us from conducting robust sub-group analyses to fully capture potentially important differences in BP levels based on varying educational levels and location-specific factors across SSA.

In conclusion, our meta-analysis of contemporary observational data derived from more than 500 000 adults living in SSA suggests the overall prevalence of hypertension continues to be around 30%. However, given steep age-gradients evident in relation to being hypertensive (from one in ten to close to two in three younger to older individuals affected), paradoxically, any improvements in the life-expectancy of the SSA population is likely to increase its prevalence and subsequent burden of disease. As reflected by observed regional differences, a large degree of heterogeneity in BP levels across studies and a paucity of data from many low-income countries, there is still much to learn about hypertension in SSA; particularly when considering the likely differential impact of rapid urbanization combined with broader socio-economic and behavioural factors across the region. Nevertheless, hypertension remains a highly preventable cause of premature cardiovascular events among some of the poorest people in the world. Study findings provide a timely reminder that much needs to be done to properly address the current and future burden of disease imposed by hypertension in SSA.

Supplementary material

Supplementary material is available at *European Journal of Preventive Cardiology*.

Author contributions

Alexander Chen (Conceptualization [equal]; Formal analysis [lead]; Investigation [lead]; Methodology [equal]; Writing—original draft [supporting]; Writing—review & editing [supporting]), Yih-Kai Chan (Formal analysis [supporting]; Investigation [supporting]; Methodology [supporting]; Writing—original draft [supporting]; Writing—review & editing [supporting]), Ana O Mocumbi (Conceptualization [supporting]; Formal analysis [supporting]; Writing—review & editing [supporting]), Justin Beilby (Supervision [supporting]; Writing—review & editing [supporting]), Dike B Ojji (Validation [supporting]; Writing—review & editing [supporting]), Karen Sliwa (Validation [supporting]; Writing—review & editing [supporting]), Albertino Damasceno (Validation [supporting]; Writing—review & editing [supporting]), and Simon Stewart (PhD DMSc (Conceptualization [equal]; Formal analysis [supporting]; Investigation [supporting]; Supervision

[lead]; Validation [supporting]; Writing—original draft [lead]; Writing—review & editing [lead]))

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Conflict of interest: The authors have no conflicts of interest to declare.

Data availability

All data used in this study were obtained from previously published articles that are publicly accessible through databases such as PubMed, Google Scholar, African Index Medicus, and Embase. The extracted datasets underlying the analyses, along with analytic code and outputs, are available from the corresponding author upon reasonable request.

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